Amplify Desmos Math
FLORIDA

Algebra 1
A1

Assessment and Lesson Resources

Inside you'll find:

- Unit and Lesson Assessments
- Answer keys
- Activity sheets and Cards

Amplify Desmos Math FLORIDA

Algebra 1

Assessment and Lesson Resources

About Amplify

Amplify is dedicated to collaborating with educators to create learning experiences that are rigorous and riveting for all students. Amplify creates K–12 core and supplemental curriculum, assessment, and intervention programs for today's students.

A pioneer in K–12 education since 2000, Amplify is leading the way in next-generation curriculum and assessment. All of our programs provide teachers with powerful tools that help them understand and respond to the needs of every student.

Amplify gratefully acknowledges the work of distinguished program advisors from English Learners Success Forum (ELSF), who have been integral in the development of Amplify Desmos Math. ELSF is a 501(c)(3) nonprofit organization whose mission is to expand educational equity for multilingual learners by increasing the supply of high-quality instructional materials that center their cultural and linguistic assets.

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ISBN: 9798895804766
Printed in [e.g., the United States of America] [# of print run] [print vendor] [year of printing]

Contents

Assessment Resources

Contents (continued)

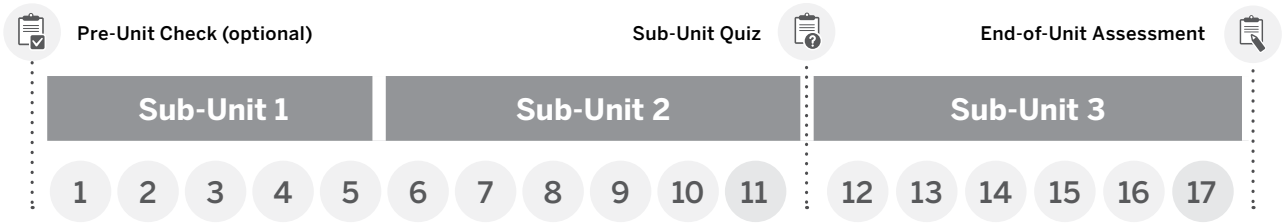
Lesson Resources

Assessment Overview

Throughout the lessons, units, and course, you'll find summative and formative assessments that provide insights into students' conceptual understanding, procedural fluency, and application, as described in the grade-level standards.

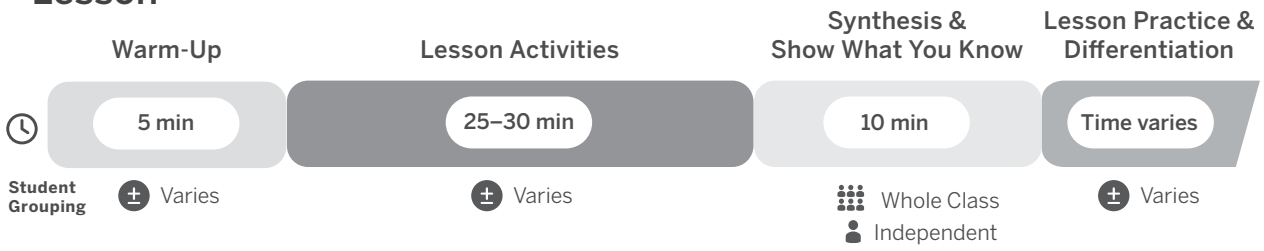
Course

Unit



Note: The number of sub-units, quizzes, and lessons within each unit varies. This depiction shows the general structure of a unit. See the course Table of Contents in the Teacher Edition for more details.

Lesson



Assessment Philosophy

- There are a variety of informal and formal assessment opportunities throughout a unit and course.
- Problems on assessments vary in form and depth of knowledge.
- Some problems mirror lesson problems, while others ask students to apply their knowledge to new situations.
- Students are often asked to explain their thinking or decide and defend an opinion.
- When possible, problems are designed so they can be approached from multiple angles and using different strategies.

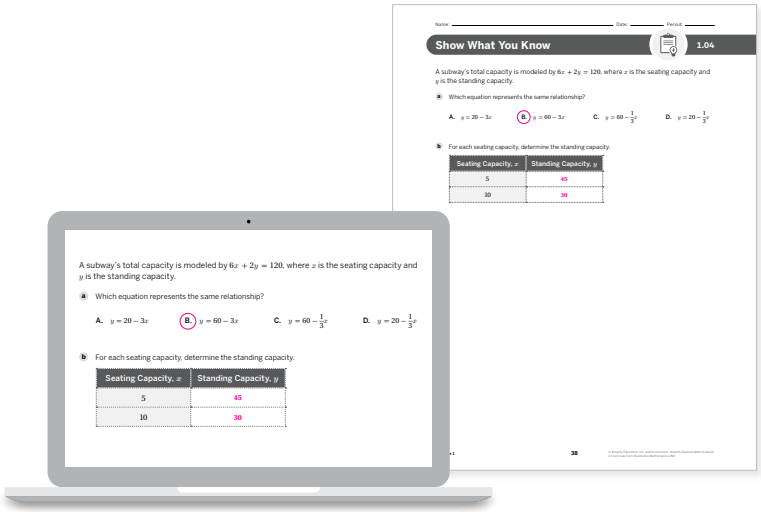
End-of-Lesson Assessment

Every lesson ends with an opportunity to check in, as well as ideas about next steps based on students' level of understanding.

Show What You Know

Each lesson has a daily formative assessment focused on key concepts in the lesson.

- Show What You Know moments are designed to minimize the time they take to complete while maximizing the insight they give teachers, so that teachers can better attend to student needs in the following class.



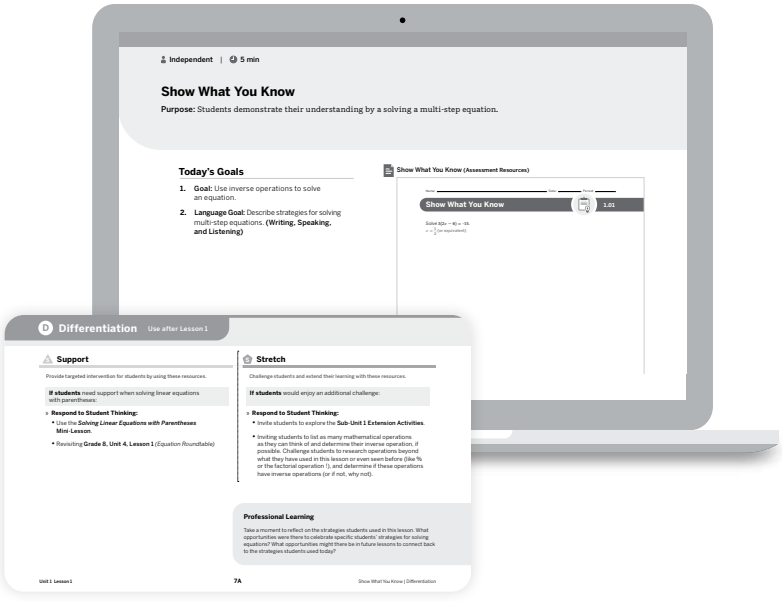
Differentiation Beyond the Lesson

Every Show What You Know is accompanied by options for differentiation beyond the lesson that are based on students' work.

The differentiation table offers suggestions to **support**, **strengthen**, and **stretch** student learning. It's available in the Teacher Edition and on the digital lesson page.

These suggestions can include:

- Mini-Lessons
- Previous Lessons
- Specific Teacher Moves
- Lesson Practice
- DOK 3 Lesson Practice problems
- Extensions



Unit-Level Assessments

Embedded unit assessments offer key insights into students' understanding of the grade-level standards in the unit.

Types of Assessment

Each unit includes an optional Pre-Unit Check, one or more Sub-Unit Quizzes, and an End-of-Unit Assessment.

Pre-Unit Check

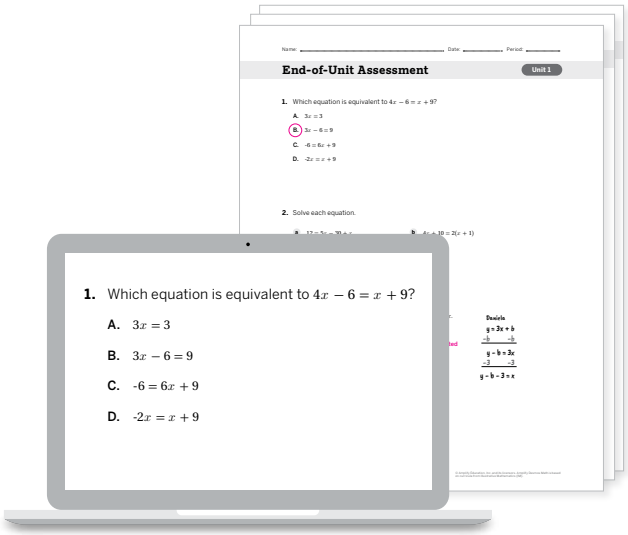
Each unit begins with an optional check of students' understanding of the foundational concepts and skills that will support them in the upcoming unit. It can be assigned in its entirety before the unit or spread throughout the unit.

Sub-Unit Quizzes

Each unit contains one or more sub-unit quizzes designed to assess students' understanding of the content up to that point in the unit.

End-of-Unit Assessment

Each unit ends with an assessment of students' understanding of the content in that unit. There are two forms of each End-of-Unit Assessment: Form A and Form B.



All assessments are available digitally, in the Assessment and Lesson Resources book, as downloadable PDFs.

Assess and Respond Guides

Each assessment is accompanied by an Assess and Respond Guide in the Teacher Edition.

Item Analysis

Look up the standard, depth of knowledge (DOK), and concept associated with each problem.

Item Analysis, Forms A and B

Problem(s)	Concept or skill	Addressed in	DOK	FL B.E.S.T. Math Benchmarks
1	Given a mathematical or real-world context, write and solve one-variable absolute value equations.	Lesson 14	2	MA.912.AR.4.1
2a	Write and solve one-variable compound inequalities.	Lesson 13	1	MA.912.AR.2.6
2b	Write and solve one-variable compound inequalities.	Lesson 13	1	MA.912.AR.2.6
3	Solve multi-variable equations.	Lessons 4–7	3	MA.912.AR.1.2
4	Solve one-variable inequalities.	Lessons 10–12	2	MA.912.AR.1.2 MTR.4.1
5	Graph solutions to two-variable inequalities.	Lessons 16–17	2	MA.912.AR.2.8
6a	Identify solutions to two-variable inequalities.	Lessons 16–17	2	MA.912.AR.2.6
6b	Write a situation to match an two-variable inequality.	Lesson 15	3	MA.912.AR.2.6 MTR.6.1
7	Write equations and inequalities and interpret their solutions in context.	Lesson 16	3	MA.912.AR.2.7 MTR.6.1, MTR.7.1

D Differentiation

Respond to student thinking through resources and teacher moves that **support**, **strengthen**, and **stretch** learning.

D Differentiation (End-of-Unit Assessment)

Note: To **strengthen** and **stretch** students' learning, refer to the differentiation resources suggested throughout this unit and in the Unit Overview.

Sub-Unit Goals	Problem(s)	To respond to student thinking, consider:
Solve one-variable absolute value equations. Write and solve linear inequalities for a real-world situation. **(Lessons 13–14)**	1, 2	**Support** • **Lesson:** Lesson 3, Activity 2 **Strengthen** • **Repeated Challenges:** Lesson 1 *(Working Backwards)* • **Practice Day 2:** Problems 1–2 • **Teacher Move:** Invite students to solve more equations from Lesson 2 Activity 3 and discuss their strategies with a partner. **Stretch** • **You're invited to explore more:** Lesson 3 *(Same Position)*
Solve multi-variable equations for a given variable. **(Lessons 4–7)**	3	**Support** • **Lesson:** Lesson 5, Activity 2 *(Various Variables)* **Strengthen** • **Repeated Challenges:** Lesson 6 *(Shelley the Snail)* • **Practice Day 2:** Problems 4–5
Create equations, graphs, and tables to represent linear relationships and interpret their solutions in context. **(Lesson 7)**	7a	**Support** • **Lesson:** Lesson 7, Activity 2 *(Five Representations)* **Stretch** • **Teacher Move:** Invite students to write their own scenario that can be modeled by a linear equation and create a matching equation, graph, table, and diagram.
Determine solutions to inequalities algebraically and graphically. **(Lessons 10–13, 16, 17)**	4	**Support** • **Lesson:** Lesson 12, Activity 2 *(Solutions and Sheep)* **Strengthen** • **Repeated Challenges:** Lesson 12 *(Solutions and Sheep)* • **Practice Day 2:** Problem 3
	5, 6a	**Support** • **Lesson:** Lesson 17, Activity 1 *(All of the Solutions)* **Strengthen** • **Repeated Challenges:** Lesson 17 *(All of the Solutions)* • **Practice Day 2:** Problems 5–7, 9
Write inequalities in one and two variables to represent constraints. **(Lessons 10, 13, 16–18)**	6b, 7b, 7c	**Support** • **Lesson:** Lesson 16, Activity 2 *(Bracelet Budgets)* • **Practice Day 2:** Problems 10–11

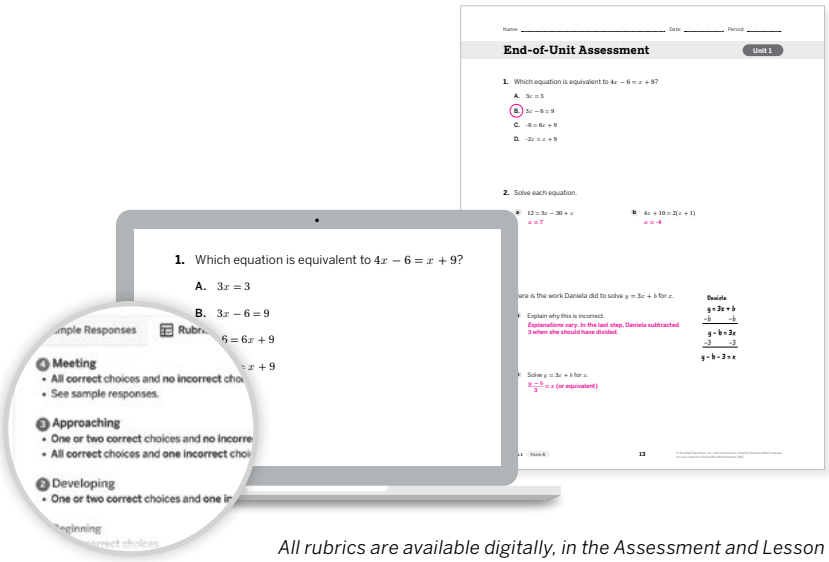
Assessment Rubrics and Grading

Amplify Desmos Math Florida comes with tools that support you in giving students standards-based feedback in a variety of ways.

Assessment Rubrics

In-depth rubrics help teachers anticipate and respond to students' learning needs.

- Every Sub-Unit Quiz and End-of-Unit Assessment includes an accompanying rubric.
- The purpose of the rubric is to support teachers in recognizing what students might understand, especially when their answers do not match the correct responses.
- Rubrics are aligned to the 4-point scale embedded in the assessment grading tool.



All rubrics are available digitally, in the Assessment and Lesson Resources book, as downloadable PDFs.

Lesson Resources

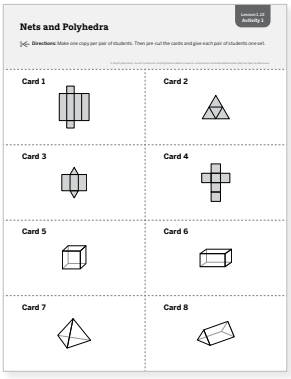
Some Amplify Desmos Math Florida lessons include Lesson Resources in addition to the Teacher and Student edition pages that help make learning more hands-on and collaborative.

Types of Lesson Resources

Each grade includes a variety of Lesson Resources available to teachers and students.

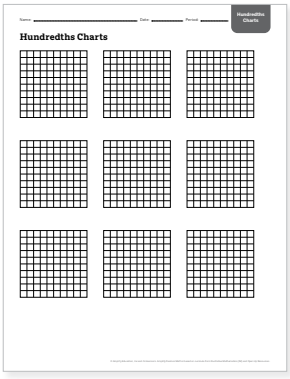
Activity Sheets and Cards

Unit-, lesson-, and activity-specific sheets and cards are provided for hands-on and collaborative learning. Examples include card sorts or sheets with real world data.



Optional Sheets

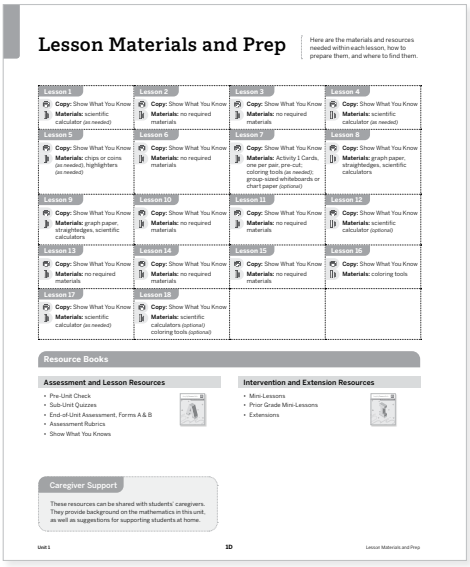
Some lessons contain optional sheets that can be used as needed, such as number lines or hundredths charts.



Preparing Lesson Resources

Use the **Lesson Materials and Prep** pages in the Unit Overview to identify all of the required materials for printing and copying at the unit-level. The pages show which materials need to be cut in advance and which materials will be reused later in lessons.

Additional guidance and optional materials, including materials for students using print when devices are recommended, can be found in **Prep Checklist** of every lesson.



Assessment Resources

Unit 1
Assessments and Rubrics

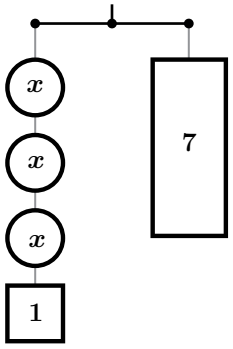
Name: ..... Date: ..... Period: .....

Pre-Unit Check

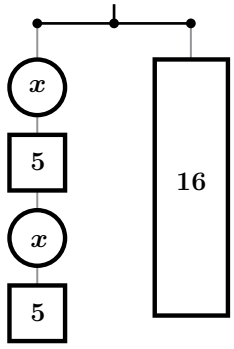
Unit 1

1. For each equation, determine what value of x makes the equation true. Use the hanger diagram if it helps with your thinking.

a $3x + 1 = 7$



b $16 = 2(x + 5)$



2. Solve each equation.

a $x - \frac{1}{2} = 12$

b $-\frac{1}{2}x = 12$

c $1 - x = 12 - 2x$

3. Here are four expressions. Circle two expressions.

$-2x - 2$	$8x + 8$
-3	$3(x + 1)$

a Write the sum of the circled expressions using the fewest number of terms.

b Write the sum of the other two expressions using the fewest number of terms.

c Rewrite the expression $2(x + 3) - 5x + 2$ using the fewest terms possible.

Pre-Unit Check (continued)

Unit 1

4. Determine if each equation has no solution, one solution, or many solutions. Circle your answer.

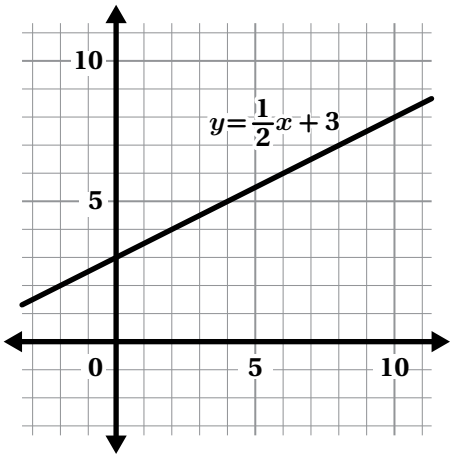
a $x + 6 = 2x + 3$ No solution One solution Many solutions

b $x + 6 = x + 3$ No solution One solution Many solutions

c $2x + 6 = 2(x + 3)$ No solution One solution Many solutions

5. Here is the equation $y = \frac{1}{2}x + 3$ and its graph. Complete the table with two solutions to the equation.

x	y
4	
	12



Pre-Unit Check (continued)

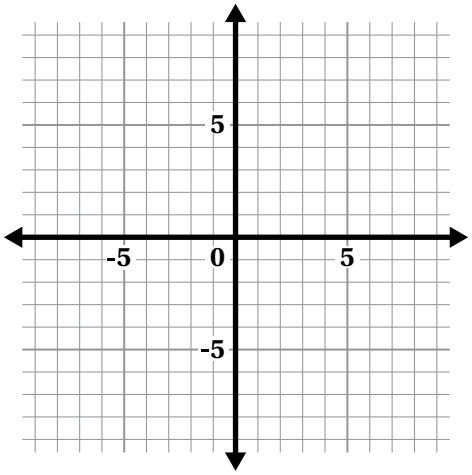
Unit 1

6. Here is another equation: $x + 2y = 8$.

a Complete the table with three solutions to the equation.

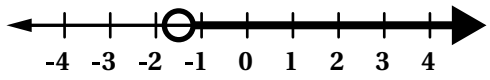
x	y

b Plot each point on the graph.

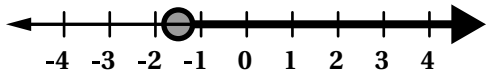


7. Which number line shows all of the solutions to the inequality $x \leq -1.5$?

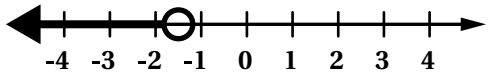
A.



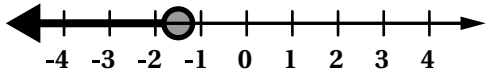
B.



C.

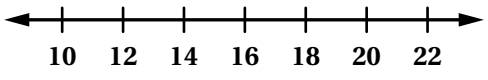


D.



8. To work at an amusement park, employees must be at least 14 years old.

a Use the number line to represent all the possible ages of employees at this park.



b Let x be the age of a park employee. Write an inequality to represent this situation.

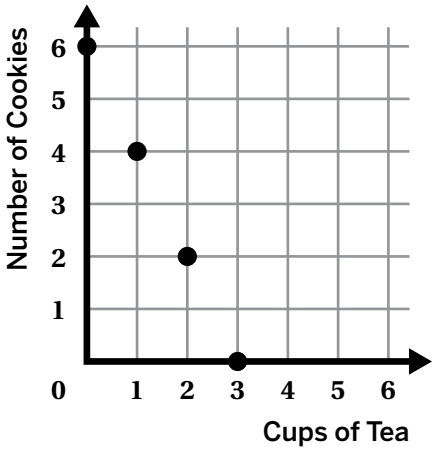
Name: ..... Date: ..... Period: .....

Sub-Unit Quiz

Unit 1

1. A store sells cups of tea for $2 and cookies for $1 each. A customer wants to spend $6 in total.

Here is a graph of this situation.
Which of these is a solution?



(A.) 0 cups of tea and 0 cookies

(B.) 0 cups of tea and 3 cookies

(C.) 3 cups of tea and 0 cookies

(D.) 6 cups of tea and 0 cookies

2. Which equation is equivalent to $3(x - 4) = 45$?

(A.) $3x - 4 = 45$ (B.) $x - 4 = 42$ (C.) $3x = 49$ (D.) $x - 4 = 15$

Explain or show how you know that the equation you selected is equivalent to $3(x - 4) = 45$.

3. Solve each equation.

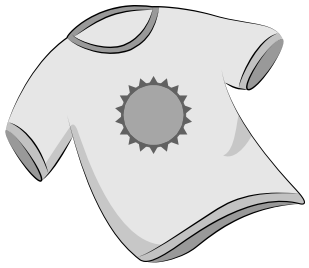
a Solve for a: $21 = 3a$

b Solve for R: $V = IR$

c Solve for b: $7b - 4 = 10$

d Solve for x: $ax - c = d$

4. A shirt printing company charges a $50 setup fee and $3 per shirt.



A school club has $86 for shirts.

Xavier wrote $50 + 3x = 86$ to describe the situation.

a Solve this equation for x.

b Explain the meaning of the solution.

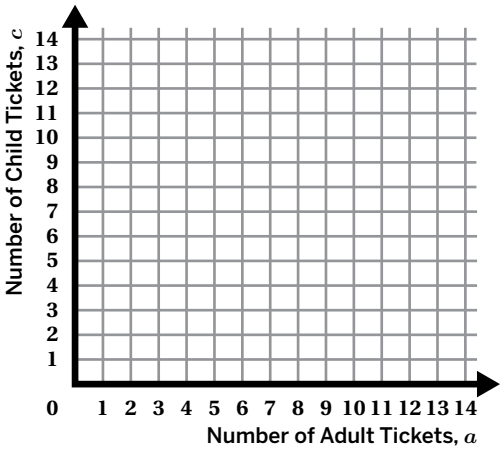
5. Tickets to a zoo cost \$12 for each adult and \$8 for each child. A family has \$72 for the zoo trip.

a Write an equation for this relationship.

- Use a for the number of adult tickets.
- Use c for the number of child tickets.

b Graph this relationship. Use the table if it helps with your thinking.

Number of Adult Tickets, a	Number of Child Tickets, c



c Elena says that if 2 adults go to the zoo, then 7 children can also go for \$72. Explain or show how you know this is incorrect.

6. The equation of a line is given: $x + 2y = 8$.

a Which of these linear equations are parallel to the given linear equation?

(A.) $y = \frac{1}{2}x + 4$

(B.) $y = -\frac{1}{2}x - 3$

(C.) $y = 2x - 4$

(D.) $y = -2x + 3$

b Which of these lines are perpendicular to the given linear equation?

(A.) $y = \frac{1}{2}x + 4$

(B.) $y = -\frac{1}{2}x - 3$

(C.) $y = 2x - 4$

(D.) $y = -2x + 3$

Standard	MA.912.AR.1.2	MA.912.AR.2.1	MA.912.AR.2.2	MA.912.AR.2.3	MA.912.AR.2.5
Problem(s)	3b, 3d	2, 3a, 3c, 4	5a	6a, 6b	1, 5b, 5c

Problem 1

Standard: MA.912.AR.2.5

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: **3 cups of tea and 0 cookies**			**Incorrect** choice. Students who select "0 cups of tea and 3 cookies" may have reversed the axes.

Problem 2

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice with **complete** explanation. $x - 4 = 15$ ***Explanations vary.*** **If I divide both sides of the equation by 3, then I get $x - 4 = 15$. I know they are equivalent because the solution to both equations is $x = 19$.**	**Correct** choice with **minor flaws** in explanation. **Incorrect** choice with logical and **complete explanation**.	**Correct** choice with **incomplete** explanation. **Incorrect** choice with explanation that shows **partial understanding**. E.g., Response includes the distributive property or performing operations on both sides of the equation.	**Incorrect** choice with **no** explanation.

Problem 3a

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **$a = 7$ (or equivalent)**	Response shows **conceptual understanding** with minor errors. Students who write $a = 8$ may have made a calculation error when dividing by 3.	Response shows **incomplete understanding** with significant errors. Students who write $x = 18$ may have subtracted 3 from each side as their first step.	Response shows **limited understanding.**

Problem 3b

Standard: MA.912.AR.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $\frac{V}{I} = R$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. E.g., $\frac{V}{R} = I$.	Response shows **incomplete understanding** with significant errors. E.g., $V - I = R$	Response shows **limited understanding.**

Problem 3c

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $b = 2$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. Students who write $b = \frac{6}{7}$ may have written $7b = 6$ as their first step.	Response shows **incomplete understanding** with significant errors. Students who write $b = \frac{10}{11}$ may have written $11b = 10$ as their first step.	Response shows **limited understanding**.

Problem 3d

Standard: MA.912.AR.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = \frac{d+c}{a}$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. E.g., $x = \frac{d}{a} + c$	Response shows **incomplete understanding** with significant errors. E.g., $d + c = ax$	Response shows **limited understanding.**

Problem 4

Standards: MA.912.AR.2.1, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation**. $x = 12$ ***Explanations vary.*** **The solution means that the club can buy 12 printed shirts.**	Response shows **conceptual understanding** with minor errors. Students who write $x = 11$ may have made a calculation error.	Response shows **incomplete understanding** with significant errors. Students who write $x = 33$ may have subtracted 3 as their last step.	Response shows **limited understanding.**

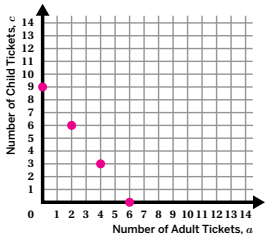
Problem 5a

Standards: MA.912.AR.2.2, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $12a + 8c = 72$	Response shows **conceptual understanding** with minor errors. E.g., $8a + 12c = 72$	Response shows **incomplete understanding** with significant errors. E.g., $12a + 8c$	Response shows **limited understanding.**

Problem 5b

Standard: MA.912.AR.2.5

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: 	Graph shows **conceptual understanding** with minor errors. E.g., Graph includes only three correct points.	Graph shows **incomplete understanding** with significant errors.	Graph shows **limited understanding.**

Problem 5c

Standards: MA.912.AR.2.5, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* I know that this is incorrect because the point is not on the graph representing this relationship.	Response shows **conceptual understanding** with minor errors. E.g., Response includes substituting into the earlier equation with a calculator error.	Response shows **incomplete understanding** with significant errors. E.g., This is incorrect because it would not cost $72.	Response shows **limited understanding.**

Problem 6a

Standard: MA.912.AR.2.3

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $y = -\frac{1}{2}x - 3$			**Incorrect** choice.

Problem 6b

Standard: MA.912.AR.2.3

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $y = 2x - 4$			**Incorrect** choice.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 1

1. Which equation is equivalent to $4x - 6 = x + 9$?

- **A.** $3x = 3$
- **B.** $3x - 6 = 9$
- **C.** $-6 = 6x + 9$
- **D.** $-2x = x + 9$

2. Solve each equation.

a $12 = 5x - 30 + x$

b $4x + 10 = 2(x + 1)$

3. Here is the work Daniela did to solve $y = 3x + b$ for x.

a Explain why this is incorrect.

Daniela

$y = 3x + b$

$-b \quad -b$

$y - b = 3x$

$-3 \quad -3$

$y - b - 3 = x$

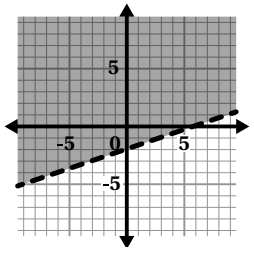
b Solve $y = 3x + b$ for x.

4. Select *all* the solutions to the inequality $2x + 6 > 3x - 12$.

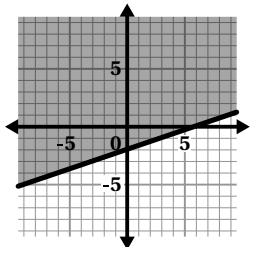
- ☐ **A.** 30
- ☐ **B.** -5
- ☐ **C.** 18
- ☐ **D.** 0
- ☐ **E.** 6

5. Which graph represents all the solutions to $x - 3y < 6$?

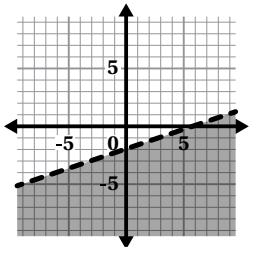
A.



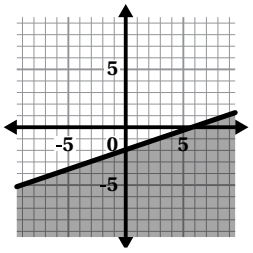
B.



C.



D.



6. Here is an inequality: $4x + 5y \leq 20$.

a Write the coordinates of three solutions to this inequality.

(....., ...) (....., ...) (....., ...)

b Write a situation that this inequality could represent, including the meaning of x and y.

End-of-Unit Assessment (continued)

Unit 1

7. A gardening club has 300 square feet to plant cucumbers and tomatoes.

Each cucumber plant uses 6 square feet of space, and each tomato plant uses 4 square feet.

- Let c represent the number of cucumber plants.
- Let t represent the number of tomato plants.

a Write an *equation* that represents the number of cucumber and tomato plants that can fill the garden.

b Write an *inequality* that represents all of the combinations of cucumber and tomato plants that can fit in 300 square feet or less.

The garden club decides to grow 20 cucumber plants.

c Write and solve an inequality to represent the number of tomato plants that can fit in this garden.

d Explain what your solution says about the number of tomato plants in the garden.

8. The community service guidelines for Student Council state that you must complete 10 to 20 hours of community service during the summer. You have already completed 4 hours. You can work up to 3 hours on any day. How many days must you work to meet the program requirements? Write and solve a compound inequality to determine the acceptable range of day, d, work shifts to meet the program requirements.

a Choose two options that define the compound inequality for the number of days you need to work.

- ☐ **A.** $10 \leq 4 + 3d \leq 20$
- ☐ **B.** $10 \leq 3d - 4 \leq 20$
- ☐ **C.** $6 \leq 4 + 3d \leq 16$
- ☐ **D.** $6 \leq 3d \leq 16$
- ☐ **E.** $14 \leq 3d \leq 24$

b Which compound inequality defines the number of days you need to work?

- (A.) $3.67 \leq d \leq 5.33$
- (B.) $2 \leq d \leq 5.33$
- (C.) $3 \leq d \leq 5.67$
- (D.) $2.67 \leq d \leq 5.67$

9. Consider the absolute value equation $8 - |x - 3| = 2$. Select *all* of the true statements.

- ☐ **A.** $x = 3$ is a solution.
- ☐ **B.** $x = 9$ is a solution.
- ☐ **C.** The equation has no solutions.
- ☐ **D.** The solutions are numbers that are 3 units away from 6.
- ☐ **E.** $x = -1$ is a solution.
- ☐ **F.** The solutions are numbers that are 6 units away from 3.

Standard	MA.912.AR. 1.2	MA.912.AR.2.1	MA.912.AR.2.6	MA.912.AR.2.8	MA.912.AR.4.1
Problem(s)	3a, 3b, 4	1, 2a, 2b	6a, 6b, 7a, 7b, 7c, 7d, 8a, 8b	5	9

Problem 1

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $3x - 6 = 9$			**Incorrect** choice. Students who select $-2x = x + 9$ may have added $4x$ and -6 on the left of the equation.

Problem 2a

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = 7$	Response shows **conceptual understanding** with minor errors. Students who write $x = 12$ may have written $12 = 4x - 30$ as their first step.	Response shows **incomplete understanding** with significant errors. Students who write $x = -\frac{1}{2}$ may have written $12 = -24x$ as their first step.	Response shows **limited understanding**.

Problem 2b

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = -4$	Response shows **conceptual understanding** with minor errors. Students who write $x = -4.5$ may have written $4x + 10 = 2x + 1$ as their first step.	Response shows **incomplete understanding** with significant errors. Students who write $x = -\frac{7}{3}$ may have written $4x + 8 = x + 1$ as their first step.	Response shows **limited understanding**.

Problem 3a

Standard: MA.912.AR.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Explanations vary.* **In the last step, Daniela subtracted 3 when she should have divided.**	Response shows **conceptual understanding** with minor errors. E.g., Response states Daniela did not move the 3 correctly.	Response shows **incomplete understanding** with significant errors. E.g., Response states Daniela did not solve for x correctly.	Response shows **limited understanding**.

Problem 3b

Standard: MA.912.AR.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $\frac{y-b}{3}=x$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. Students who write $\frac{y}{3}-b=x$ may not have divided all of the terms by 3.	Response shows **incomplete understanding** with significant errors. Students who write $y-b=3x$ may not have solved for x.	Response shows **limited understanding**.

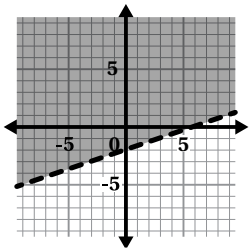
Problem 4

Standards: MA.912.AR.1.2, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • **-5** • **0** • **6**	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice. Students who select 18 may have interpreted the inequality as $\geq$.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 5

Standard: MA.912.AR.2.8

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice:  			**Incorrect** choice. Students who select the dashed line with shading below may have noticed $<$.

Problem 6a

Standard: MA.912.AR.2.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** • $(0, 0)$ • $(1, 0)$ • $(5, 0)$	**Two correct** ordered pairs.	**One correct** ordered pair.	**Only incorrect** ordered pairs.

Problem 6b

Standards: MA.912.AR.2.6, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response with variables defined. ***Responses vary.*** **Breadsticks cost \$4 and pizza costs \$5. The most I can spend is \$20. x is the number of breadsticks and y is the number of pizzas.**	Response shows **conceptual understanding** with minor errors. E.g., When I combine 4 x's and 5 y's, they must be less than or equal to 20. x is the number of x's, and y is the number of y's.	Response shows **incomplete understanding** with significant errors. E.g., I have 4 dogs and I want 5 more dogs. The most I can have is 20 dogs.	Response shows **limited understanding**.

Problem 7a

Standards: MA.912.AR.2.6, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $6c + 4t = 300$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., $4c + 6t = 300$	Response shows **incomplete understanding** with significant errors. E.g., $6c + 4t$	Response shows **limited understanding**.

Problem 7b

Standards: MA.912.AR.2.6, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $6c + 4t \leq 300$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., $6c + 4t \geq 300$ or $6c + 4t < 300$	Response shows **incomplete understanding** with significant errors. E.g., $6c + 4t = 300$	Response shows **limited understanding**.

Problem 7c

Standards: MA.912.AR.2.6, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $6(20) + 4t \leq 300$ (or equivalent) $t \leq 45$ (or equivalent)	Response shows **conceptual understanding** with minor errors. Students who write $c \leq \frac{220}{6}$ may have substituted 20 for the quantity of tomatoes.	Response shows **incomplete understanding** with significant errors. E.g., Response includes an inequality, but not a solution.	Response shows **limited understanding**.

Problem 7d

Standards: MA.912.AR.2.6, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Explanations vary.* The solution means that I can fit 45 or fewer tomato plants in the 300-square-foot garden along with the 20 cucumber plants.	Response shows **conceptual understanding** with minor errors. E.g., The solution means that I can fit 45 tomato plants in the garden.	Response shows **incomplete understanding** with significant errors. E.g., The solution means that t is 45.	Response shows **limited understanding**.

Problem 8a

Standard: MA.912.AR.2.6

4 Exceeding	3 Meeting	2 Approaching	1 Beginning
Correct response: **A and D:** $10 \leq 4 + 3d \leq 20$ $6 \leq 3d \leq 16$		Only chooses **first correct answer: A** $10 \leq 4 + 3d \leq 20$	**Incorrect** choices.

Problem 8b

Standard: MA.912.AR.2.6

4 Exceeding	3 Meeting	2 Approaching	1 Beginning
Correct choice: **B** $2 \leq d \leq 5.33$			**Incorrect** choice.

Problem 9

Standard: MA.912.AR.4.1

4 Exceeding	3 Meeting	2 Approaching	1 Beginning
Correct choices: **B and F:** $x = 9$ is a solution. The solutions are numbers that are 6 units away from 3.		Only chooses **first correct answer: A** $x = 9$ is a solution.	**Incorrect** choices.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 1

1. Which equation is equivalent to $3x - 4 = 5x + 7$?

A. $-4 = 2x + 7$

B. $6x = 3$

C. $8x - 4 = 7$

D. $3 = 2x$

2. Solve each equation.

a $4(x + 3) = 2x + 2$

b $2x - 7 - 4x = 13$

3. Here is the work Dyani did to solve $y = mx + 7$ for m.

Dyani

$\frac{y}{x} = \frac{mx}{x} + 7$

$\frac{y}{x} = m + 7$

$-7 \quad -7$

$\frac{y}{x} - 7 = m$

a Explain why this is incorrect.

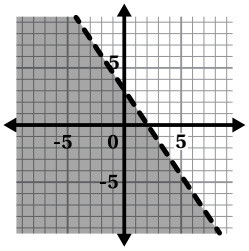
b Solve $y = mx + 7$ for m.

4. Select *all* the solutions to the inequality $3x + 1 \leq 5x - 3$.

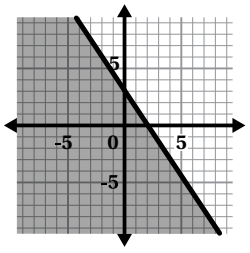
- ☐ **A.** 20
- ☐ **B.** 15
- ☐ **C.** 2
- ☐ **D.** 0
- ☐ **E.** -3

5. Which graph represents all the solutions to $2y + 3x \geq 6$?

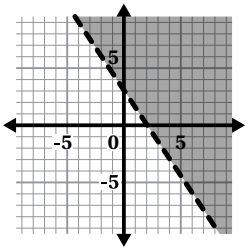
A.



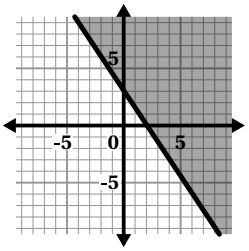
B.



C.



D.



6. Here is an inequality: $3x + 7y < 30$.

a Write the coordinates of three solutions to this inequality.

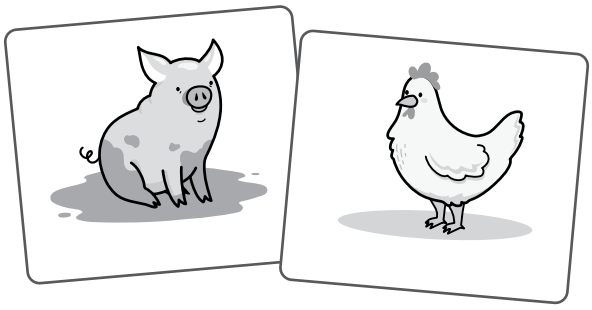
(....., ...) (....., ...) (....., ...)

b Write a situation that this inequality could represent, including the meaning of x and y

End-of-Unit Assessment (continued)

Unit 1

7. A farmer has a 210-square-foot barn to house chickens and pigs.



Each pig requires 50 square feet of space, and each chicken requires 4 square feet.

- Let c represent the number of chickens.
- Let p represent the number of pigs.

a Write an *equation* that represents the number of chickens and pigs that can fill the barn.

b Write an inequality that represents all of the combinations of chickens and pigs that can fit in 210 square feet or less.

The farmer decides to house 3 pigs.

c Write and solve an *inequality* to represent the number of chickens that can fit in this barn.

d Explain what your solution says about the number of chickens in the barn.

8. The part-time job guidelines for the local library state that you must complete 15 to 25 hours of work each week. You always work 5 hours on Saturday. For the remaining weekdays, you can work 4 hours on any day. How many days a week must you work to meet the program requirements? Write and solve a compound inequality to determine the acceptable range of weekday, d, work shifts to meet the program requirements.

a Choose two options that define the compound inequality for the days you can work each week.

- ☐ **A.** $15 \leq 4d - 5 \leq 25$
- ☐ **B.** $15 \leq 5 + 4d \leq 25$
- ☐ **C.** $15 \leq 4 + 5d \leq 25$
- ☐ **D.** $11 \leq 4d \leq 21$
- ☐ **E.** $10 \leq 4d \leq 20$
- ☐ **F.** $20 \leq 4d \leq 30$

b Write the compound inequality that defines the days you can work each week.

- (A.) $2.75 \leq d \leq 5.25$
- (B.) $5 \leq d \leq 7.5$
- (C.) $2.5 \leq d \leq 5$
- (D.) $2 \leq d \leq 5.5$

9. Consider the absolute value equation $10 - |x + 4| = 5$. Select *all* of the true statements.

- ☐ **A.** $x = 1$ is a solution.
- ☐ **B.** $x = 4$ is a solution.
- ☐ **C.** The equation has no solutions.
- ☐ **D.** The solutions are numbers that are 5 units away from -4.
- ☐ **E.** $x = -1$ is a solution.
- ☐ **F.** The solutions are numbers that are 4 units away from 5.

Standard	MA.912.AR. 1.2	MA.912.AR.2.1	MA.912.AR.2.6	MA.912.AR.2.8	MA.912.AR.4.1
Problem(s)	3a, 3b, 4	1, 2a, 2b	6a, 6b, 7a, 7b, 7c, 7d, 8a, 8b	5	9

Problem 1

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $-4 = 2x + 7$			**Incorrect** choice. Students who select $3 = 2x$ may have added 7 to the left of the equation.

Problem 2a

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = -5$	Response shows **conceptual understanding** with minor errors. Students who write $x = -\frac{1}{2}$ may have written $4x + 3 = 2x + 2$ as their first step.	Response shows **incomplete understanding** with significant errors. Students who write $x = 5$ may have written $x + 3 = 2x - 2$ as their first step.	Response shows **limited understanding**.

Problem 2b

Standard: MA.912.AR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = -10$	Response shows **conceptual understanding** with minor errors. Students who write $x = \frac{10}{3}$ may have written $x + 3 = 2x - 2$ as their first step.	Response shows **incomplete understanding** with significant errors. Students who write $x = -1$ may have written $-13x = 13$ as their first step.	Response shows **limited understanding**.

Problem 3a

Standard: MA.912.AR.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Explanations vary.*** **In the first step, Dyani divided only parts of the equation by x instead of the whole equation. Dyani could have subtracted 7 from both sides first.**	Response shows **conceptual understanding** with minor errors. E.g., Response states Dyani did not move the x correctly.	Response shows **incomplete understanding** with significant errors. E.g., Response states Dyani should have subtracted 7 first.	Response shows **limited understanding**.

Problem 3b

Standard: MA.912.AR.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $\frac{y-7}{x}=m$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. Students who write $\frac{y+7}{x}=m$ may have moved 7 incorrectly but divided all of the terms by x.	Response shows **incomplete understanding** with significant errors. Students who write $y-7=mx$ may not have solved for m.	Response shows **limited understanding**.

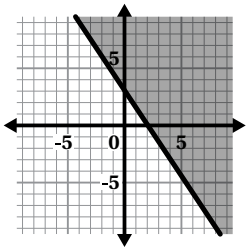
Problem 4

Standard: MA.912.AR.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • **20** • **15** • **2**	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice. Students who do not select 2 may have interpreted the inequality as $<$.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 5

Standard: MA.912.AR.2.8

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice:  			**Incorrect** choice. Students who select the solid line with shading below may have noticed the ≥ symbol.

Problem 6a

Standard: MA.912.AR.2.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** • $(0, 0)$ • $(1, 2)$ • $(9, 0)$	**Two correct** ordered pairs.	**One correct** ordered pair.	**Only incorrect** ordered pairs.

Problem 6b

Standards: MA.912.AR.2.6, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response with variables defined. ***Responses vary.*** **Bagels cost \$3 and loaves of bread cost \$7. I must spend less than \$30. x is the number of bagels and y is the number of bread loaves.**	Response shows **conceptual understanding** with minor errors. E.g., When I combine 3 x's and 7 y's, they must be less than 30. x is the number of x's, and y is the number of y's.	Response shows **incomplete understanding** with significant errors. E.g., I have 3 dogs and I want 7 more dogs. I need to have less than 30 dogs.	Response shows **limited understanding**.

Problem 7a

Standards: MA.912.AR.2.6, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $4c + 50p = 210$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., $50c + 4p = 210$	Response shows **incomplete understanding** with significant errors. E.g., $4c + 50p$	Response shows **limited understanding**.

Problem 7b

Standards: MA.912.AR.2.6, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $4c + 50p \leq 210$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., $4c + 50p < 210$ or $4c + 50p \geq 210$	Response shows **incomplete understanding** with significant errors. E.g., $4c + 50p = 210$	Response shows **limited understanding**.

Problem 7c

Standards: MA.912.AR.2.6, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $4c + 50(3) \leq 210$ (or equivalent) $c \leq 15$ (or equivalent)	Response shows **conceptual understanding** with minor errors. Students who write $p \leq \frac{198}{50}$ may have substituted 3 for the quantity of chickens.	Response shows **incomplete understanding** with significant errors. E.g., Response includes an inequality, but not a solution.	Response shows **limited understanding**.

Problem 7d

Standards: MA.912.AR.2.6, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Explanations vary.* The solution means that the farmer can fit 15 or fewer chickens in the 210-square-foot barn along with the 3 pigs.	Response shows **conceptual understanding** with minor errors. E.g., The solution means that the farmer can fit 15 chickens in the barn.	Response shows **incomplete understanding** with significant errors. E.g., The solution means that c is 15.	Response shows **limited understanding**.

Problem 8a

Standard: MA.912.AR.2.6

4 Exceeding	3 Meeting	2 Approaching	1 Beginning
Correct response: **B and E:** $15 \leq 5 + 4d \leq 25$ $10 \leq 4d \leq 20$		Only chooses **first correct answer: B** $15 \leq 5 + 4d \leq 25$	**Incorrect** choices.

Problem 8b

Standard: MA.912.AR.2.6

4 Exceeding	3 Meeting	2 Approaching	1 Beginning
Correct choice: **C** $2.5 \leq d \leq 5$			**Incorrect** choice.

Problem 9

Standard: MA.912.AR.4.1

4 Exceeding	3 Meeting	2 Approaching	1 Beginning
Correct choices: **A and D:** $x = 1$ is a solution. The solutions are numbers that are 5 units away from -4.		Only chooses **first correct answer: A** $x = 1$ is a solution.	**Incorrect** choices.

Unit 1
Show What You Know PDFs

Name: Date: Period:

Show What You Know

1.01

Solve $3(2x - 6) = -15$.

Name: Date: Period:

Show What You Know

1.02

Solve each equation. Show your thinking.

a $-2(x+5) = 3x + 5$

b $x - 2x + 10 = \frac{2x - 28}{2}$

Name: Date: Period:

Show What You Know

1.03

How many solutions does the equation $10x = 2.5x$ have? Circle one.

One solution No solution Infinitely many solutions

If there is one solution, what is the solution?

If there are no solutions or infinitely many solutions, show or explain how you know.

Name: Date: Period:

Show What You Know

1.04

A subway's total capacity is modeled by $6x + 2y = 120$, where x is the seating capacity and y is the standing capacity.

a Which equation represents the same relationship?

A. $y = 20 - 3x$ **B.** $y = 60 - 3x$ **C.** $y = 60 - \frac{1}{3}x$ **D.** $y = 20 - \frac{1}{3}x$

b For each seating capacity, determine the standing capacity.

Seating Capacity, x	Standing Capacity, y
5	
10	

Name: Date: Period:

Show What You Know

1.05

Solve each equation for x. Show or explain your thinking.

a $2x + 8(3) = 16$

b $2x + 8y = 16$

Name: Date: Period:

Show What You Know

1.06

Which equation is equivalent to $6x + 2y = 12$?

A. $y = 6 + 3x$

B. $y = 12 - 6x$

C. $y = 6 - 3x$

D. $y = 2 - \frac{1}{3}x$

Explain or show how you know.

Name: Date: Period:

Show What You Know

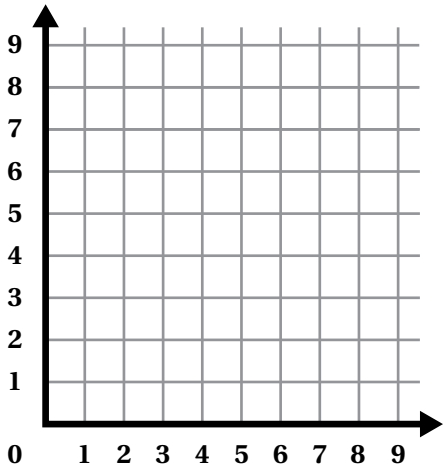
1.07

Ariana spent a total of $\$18$ on dried berries and oats. Berries cost $\$6$ per pound and oats cost $\$3$ per pound.

a Write an equation for this relationship where:

- x represents the number of pounds of berries.
- y represents the number of pounds of oats.

b Graph the equation. Make a table if it helps with your thinking.



Name: Date: Period:

Show What You Know

1.08

The equation for Line S is $y = 2x - 7$.

a What is the slope of a line parallel to Line S?

b What is the equation of the line parallel to Line S that passes through the point $(3, -5)$?

c What is the equation of the line parallel to Line S that passes through the origin?

Name: Date: Period:

Show What You Know

1.09

The equation for Line T is $y = \left(\frac{1}{3}\right)x + 5$.

a What is the slope of a line perpendicular to Line T?

b What is the equation of the line perpendicular to Line T that passes through the origin?

c What is the equation of the line perpendicular to Line T that passes through the point $(6, 2)$?

Name: Date: Period:

Show What You Know

1.10

Amoli can spend as much as $\$4$ on oranges.

Each orange, x, costs $\$0.50$.

a Which inequality represents this situation?

A. $0.5x \leq 4$

B. $0.5x \geq 4$

C. $4x \leq 0.5$

D. $4x \geq 0.5$

b Show or describe all the numbers of oranges, x, that Amoli can purchase with $\$4$.

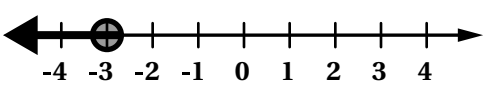
Name: Date: Period:

Show What You Know

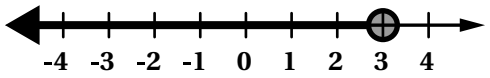
1.11

Which graph represents the solutions to the inequality $-5x \geq 15$?

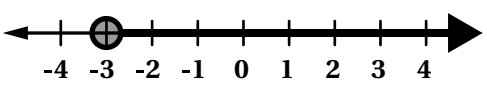
A.



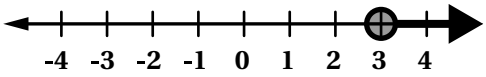
B.



C.



D.



Explain your thinking.

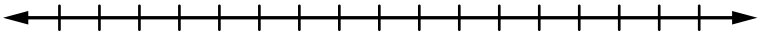
Name: Date: Period:

Show What You Know

1.12

Solve this inequality: $-5x + 2 \leq 12$

Use the number line if it helps with your thinking.



Name: Date: Period:

Show What You Know

1.13

Kayla is going to the bookstore. She wants to buy 4 books plus a $\$20$ gift certificate. She wants to spend between $\$60$ and $\$100$.

a Let x represent the price Kayla pays for each book. Write an inequality that can be used to determine the minimum and maximum price of the books Kayla can buy and stay in her budget.

b Plot the solution set on a line graph.

c How do you interpret the maximum and minimum?

Name: ..... Date: ..... Period: .....

Show What You Know

1.14

Solve the absolute value equation $|x + 1| = 2$.

$x =$ ..... or $x =$ .....

Name: ..... Date: ..... Period: .....

Show What You Know

1.15

The temperature in a room starts at 70 degrees. The temperature then changes 5 degrees.

a Write an absolute value equation that represents the possible current temperature, x.

b Without solving, how many solutions does your equation have?

.....

c Explain your thinking.

d Solve your equation.

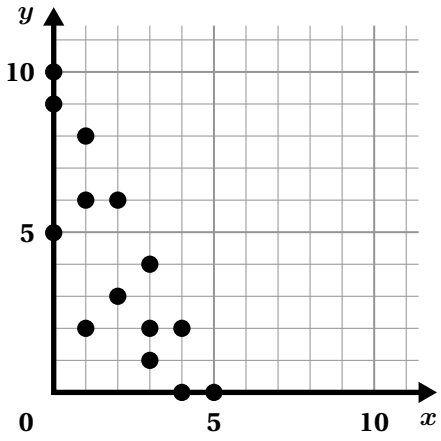
$x =$ ..... or $x =$ .....

Name: Date: Period:

Show What You Know

1.16

The graph shows some solutions to $2x + y \leq 10$.



Which of these other points is also a solution?

A. $(6, 0)$

B. $(3, 3)$

C. Both

D. Neither

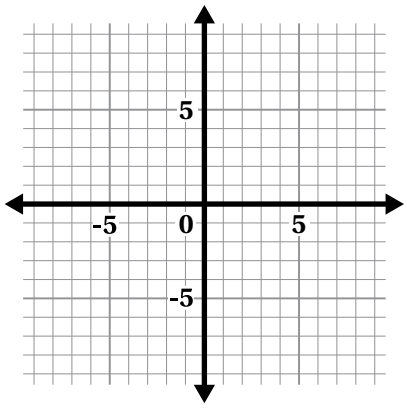
Explain your thinking.

Name: Date: Period:

Show What You Know

1.17

a Graph all the solutions to $y \leq -2x - 5$.



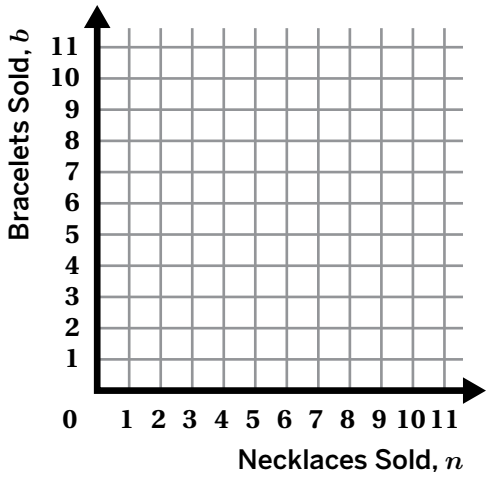
b Explain how you know.

Name: Date: Period:

Show What You Know

1.18

An artist at the Saturday market makes $4 on each necklace she sells and $2 on each bracelet. She wants to make at least $20.



a The artist wrote the inequality $b \geq -2n + 10$.

Graph all of the solutions to this inequality.

b Explain what the solutions to the inequality represent.

c Which of the solutions are realistic in this situation?

Show What You Know **Lesson 1**

Name: _____ Date: _____ Period: _____

Show What You Know 1.01

Solve $3(2x - 6) = -15$.

$x = \frac{1}{2}$ (or equivalent)

Show What You Know **Lesson 2**

Name: _____ Date: _____ Period: _____

Show What You Know 1.02

Solve each equation. Show your thinking. *Work varies.*

a. $-2(x + 5) = 3x + 5$

$x = -3$

$-2(x + 5) = 3x + 5$

$-2x - 10 = 3x + 5$

$-10 = 5x + 5$

$-15 = 5x$

$-3 = x$

b. $x - 2x + 10 = \frac{2x - 28}{2}$

$x = 12$

$x - 2x + 10 = \frac{2x - 28}{2}$

$-x + 10 = x - 14$

$10 = 2x - 14$

$24 = 2x$

$12 = x$

Show What You Know **Lesson 3**

Name: _____ Date: _____ Period: _____

Show What You Know 1.03

How many solutions does the equation $10x = 2.5x$ have? Circle one.

(One solution) No solution Infinitely many solutions

If there is one solution, what is the solution? $x = 0$

If there are no solutions or infinitely many solutions, show or explain how you know.

Show What You Know **Lesson 4**

Name: _____ Date: _____ Period: _____

Show What You Know 1.04

A subway's total capacity is modeled by $6x + 2y = 120$, where x is the seating capacity and y is the standing capacity.

a. Which equation represents the same relationship?

A. $y = 20 - 3x$ (B.) $y = 60 - 3x$ C. $y = 60 - \frac{1}{3}x$ D. $y = 20 - \frac{1}{3}x$

b. For each seating capacity, determine the standing capacity.

Seating Capacity, x	Standing Capacity, y
5	45
10	30

Show What You Know **Lesson 5**

Name: Date: Period:

Show What You Know 1.05

Solve each equation for x. Show or explain your thinking.

a. $2x + 8(3) = 16$

$x = -4$

Work varies.

$2x + 8(3) = 16$

$2x + 24 = 16$

$2x + 24 - 24 = 16 - 24$

$\frac{2x}{2} = \frac{-8}{2}$

$x = -4$

b. $2x + 8y = 16$

$x = 8 - 4y$ (or equivalent)

Work varies.

$2x + 8y = 16$

$2x + 8y - 8y = 16 - 8y$

$\frac{2x}{2} = \frac{16 - 8y}{2}$

$x = 8 - 4y$

Show What You Know **Lesson 6**

Name: Date: Period:

Show What You Know 1.06

Which equation is equivalent to $6x + 2y = 12$?

A. $y = 6 + 3x$

B. $y = 12 - 6x$

C. $y = 6 - 3x$

D. $y = 2 - \frac{1}{3}x$

Explain or show how you know.

Explanations vary. I subtracted $6x$ from both sides and got $2y = 12 - 6x$. Then I divided everything by 2.

Show What You Know **Lesson 7**

Name: Date: Period:

Show What You Know 1.07

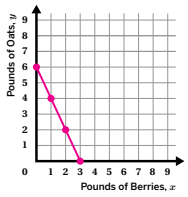
Ariana spent a total of $18 on dried berries and oats. Berries cost $6 per pound and oats cost $3 per pound.

a. Write an equation for this relationship where:

- x represents the number of pounds of berries.
- y represents the number of pounds of oats.

$6x + 3y = 18$

b. Graph the equation. Make a table if it helps with your thinking.



Show What You Know **Lesson 8**

Name: Date: Period:

Show What You Know 1.08

The equation for Line S is $y = 2x - 7$.

a. What is the slope of a line parallel to Line S?

2

b. What is the equation of the line parallel to Line S that passes through the point $(3, -5)$?

$y = 2x - 11$

c. What is the equation of the line parallel to Line S that passes through the origin?

$y = 2x$

Show What You Know **Lesson 9**

Name: _____ Date: _____ Period: _____

Show What You Know 1.09

The equation for Line T is $y = \left(\frac{1}{3}\right)x + 5$.

a. What is the slope of a line perpendicular to Line T?
-3

b. What is the equation of the line perpendicular to Line T that passes through the origin?
$y = -3x$

c. What is the equation of the line perpendicular to Line T that passes through the point (6, 2)?
$y = -3x + 20$

Show What You Know **Lesson 10**

Name: _____ Date: _____ Period: _____

Show What You Know 1.10

Amoli can spend as much as $4 on oranges.

Each orange, x, costs $0.50.

a. Which inequality represents this situation?

A. $0.5x \leq 4$
B. $0.5x \geq 4$
C. $4x \leq 0.5$
D. $4x \geq 0.5$

b. Show or describe all the numbers of oranges, x, that Amoli can purchase with $4.

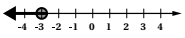
Responses vary.
- Amoli can purchase 0, 1, 2, 3, 4, 5, 6, 7, or 8 oranges.
- Amoli can purchase any number of oranges from 0 to 8 oranges.

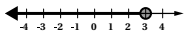
Show What You Know **Lesson 11**

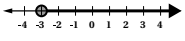
Name: _____ Date: _____ Period: _____

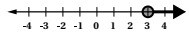
Show What You Know 1.11

Which graph represents the solutions to the inequality $-5x \geq 15$?

A. 

B. 

C. 

D. 

Explain your thinking.

Explanations vary. The boundary point is at -3 because -5(-3) = 15. I need to shade to the left because -4 makes the inequality true, but 0 does not.

Show What You Know **Lesson 12**

Name: _____ Date: _____ Period: _____

Show What You Know 1.12

Solve this inequality: $-5x + 2 \leq 12$

Use the number line if it helps with your thinking.

$x \geq -2$ or $-2 \leq x$

Show What You Know **Lesson 13**

Name: _____ Date: _____ Period: _____

Show What You Know 1.13

Kayla is going to the bookstore. She wants to buy 4 books plus a $20 gift certificate. She wants to spend between $60 and $100.

a. Let x represent the price Kayla pays for each book. Write an inequality that can be used to determine the minimum and maximum price of the books Kayla can buy and stay in her budget.

$60 \le 4x + 20 \le 100$ or $40 \le 4x \le 80$

b. Plot the solution set on a line graph.

c. How do you interpret the maximum and minimum?

Responses vary. The maximum is the greatest price she can pay for each book and stay in her budget, and the minimum is the least amount she can pay for each book and stay in her budget.

Show What You Know **Lesson 14**

Name: _____ Date: _____ Period: _____

Show What You Know 1.14

Solve the absolute value equation $|x + 1| = 2$.

$x =$ -3 or $x =$ 1

Show What You Know **Lesson 15**

Name: _____ Date: _____ Period: _____

Show What You Know 1.15

The temperature in a room starts at 70 degrees. The temperature then changes 5 degrees.

a. Write an absolute value equation that represents the possible current temperature, x.

$|x - 70| = 5$

b. Without solving, how many solutions does your equation have?

2

c. Explain your thinking.

Responses vary. There are two solutions because the absolute value is equal to a positive number.

d. Solve your equation.

$x =$ 65 or $x =$ 75

Show What You Know **Lesson 16**

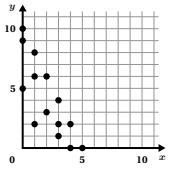
Name: _____ Date: _____ Period: _____

Show What You Know 1.16

The graph shows some solutions to $2x + y \le 10$.

Which of these other points is also a solution?

A. (6, 0)
B. (3, 3)
C. Both
D. Neither



Explain your thinking.

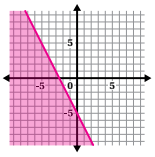
Explanations vary.
- (3, 3) is between two solutions, so I think it must be a solution too.
- Substituting $x = 3$ and $y = 3$ into the inequality makes a true statement: $2(3) + (3) = 9$, and $9 \le 10$.

Show What You Know **Lesson 17**

Name: _____ Date: _____ Period: _____

Show What You Know 1.17

a. Graph all the solutions to $y \leq -2x - 5$.



b. Explain how you know.

Explanations vary. The line should be solid because the inequality sign is $\leq$. When I substituted $(0, 0)$ into the inequality, I got a false statement, so I shaded the other side of the line.

Show What You Know **Lesson 18**

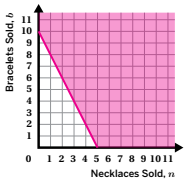
Name: _____ Date: _____ Period: _____

Show What You Know 1.18

An artist at the Saturday market makes $4 on each necklace she sells and $2 on each bracelet. She wants to make at least $20.

a. The artist wrote the inequality $b \geq -2n + 10$.

Graph all of the solutions to this inequality.



b. Explain what the solutions to the inequality represent.

Responses vary. The solutions are all the possible combinations of necklaces and bracelets that the artist has to sell to make at least $20.

c. Which of the solutions are realistic in this situation?

Responses vary. Positive whole number values of n and b that are in the solution region are realistic.

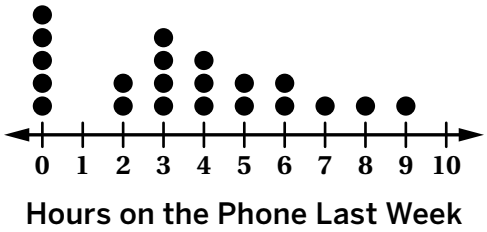
Unit 2
Assessments and Rubrics

Name: ..... Date: ..... Period: .....

Pre-Unit Check

Unit 2

1. This dot plot shows the number of hours students in Dylan's class spent on their phones last week. Dylan spent 4 hours on his phone last week.

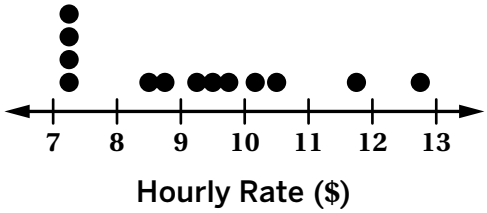


a Circle a dot that could represent Dylan's data.

b Is this the only dot that could represent Dylan's data?

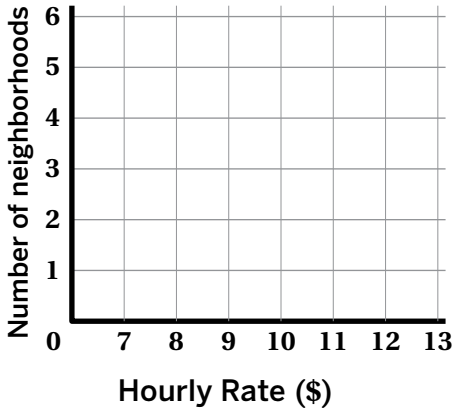
Explain your thinking.

2. This dot plot shows hourly rate for babysitting charged by babysitters in 13 different neighborhoods.

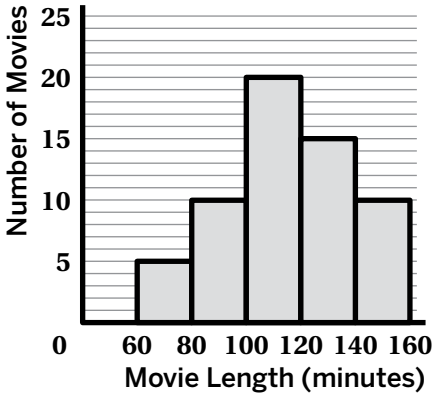


Source: *U.S. Department of Labor*

Make a histogram using the data from the dot plot.



3. Kadeem wants to know how long his favorite movies are. Here is a histogram of the data he collected.



a How many movies did Kadeem consider?

b How many of the movies are less than 2 hours long (120 minutes)?

Pre-Unit Check (continued)

Unit 2

4. The table shows how many brownies Omari ate.

Calculate the mean (average) of this data.

Day	Number of Brownies
Monday	4
Tuesday	0
Wednesday	3
Thursday	5
Friday	4

5. The middle value of an ordered data set is called the *median*.

Determine the median of each data set.

a 14, 19, 15, 20, 17

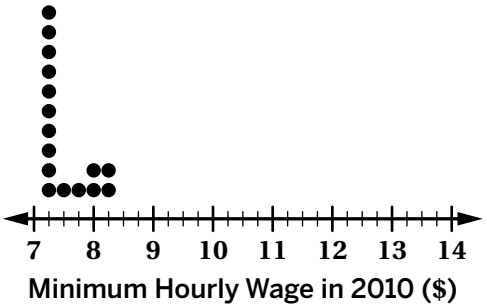
b 25, 22, 19, 21, 14, 14

c 18, 12, 24, 12, 18, 22, 22

Pre-Unit Check (continued)

Unit 2

6. Here are the minimum hourly wages in 16 states in 2010 and 2020.

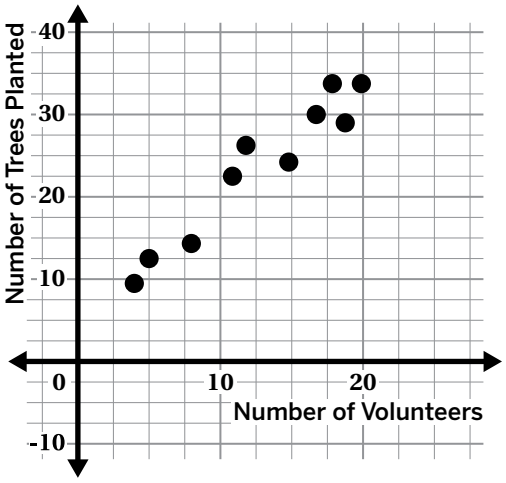


Source: *U.S. Department of Labor*

a Which year has a greater *mean* wage?

b Which year has a larger spread of wages?

7. DesPlant is an organization that gets groups of volunteers to plant trees. Here is data from their 10 most recent events.



a Circle one data point on the graph. Approximate its coordinates.

b Describe what the coordinates tell you.

c Draw a line that fits the data.

d Here is an equation for a line that fits the data: $y = 1.5x + 5$.

Based on the model, about how many trees were planted for an event with 10 volunteers?

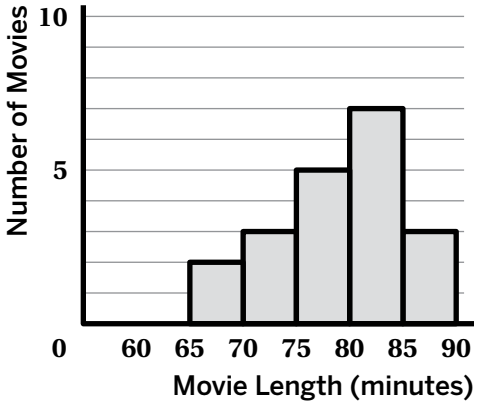
Explain your thinking.

Name: ..... Date: ..... Period: .....

Sub-Unit Quiz

Unit 2

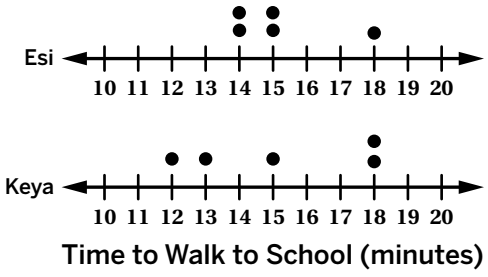
1. Kweku made a histogram showing the length, in minutes, of all his favorite movies.



Select *all* the statements that are definitely true about Kweku's favorite movies.

- ☐ **A.** Kweku has 5 favorite movies.
- ☐ **B.** There are 3 movies that are exactly 70 minutes long.
- ☐ **C.** Exactly 10 of these movies are 80 minutes or longer.
- ☐ **D.** There are 5 movies that are exactly 77 minutes long.
- ☐ **E.** Kweku has 20 favorite movies.

2. Here are two dot plots showing the number of minutes it took Esi and Keya to walk to school last week.



a Whose data has a larger mean? Circle one.

Esi Keya They're the same

b Whose data has a larger range? Circle one.

Esi Keya They're the same

3. Here are the points scored by two basketball players over the last 10 games.

Player A

7, 0, 4, 5, 3, 4, 1, 4, 4, 5

Player B

2, 1, 0, 1, 3, 3, 3, 8, 20, 6

Martina used the median to help decide which player had a higher typical score.

Why might the median be more helpful than the mean for describing the typical score?

Sub-Unit Quiz (continued)

4. A company is analyzing the number of customer support calls received per day over a two-week period. The data is shown.

22, 25, 27, 30, 30, 32, 34, 35, 37, 38, 40, 40, 42, 45

a Make a data display to represent this data. Choose from a histogram, stem-and-leaf plot, box plot, and line plot.

b Estimate the total number of calls the company would receive in a year. Show your work.

5. A company surveys 20 randomly selected customers about their experience with its online support system. The results are shown.

Satisfaction ratings (on a scale of 1–5) from 20 customers: 2, 3, 4, 4, 5, 5, 3, 4, 4, 2, 5, 4, 3, 5, 5, 2, 4, 4, 4, 3

a Is this data numerical or categorical? Is it univariate or bivariate? Explain your reasoning.

b If there were 5,000 callers, how many ratings of 3 or higher would you expect to find in the population? Show your work.

Standard	MA.912.DP.1.1	MA.912.DP.1.2	MA.912.DP.1.4
Problem(s)	2a, 2b, 4a, 5a	1, 3	4b, 5b

Problem 1

Standards: MA.912.DP.1.2, MTR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • Exactly 10 of these movies are 80 minutes or longer. • Kweku has 20 favorite movies.	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice. Students who select *Kweku has 5 favorite movies* may have noticed that there are 5 bins in the histogram.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2a

Standard: MA.912.DP.1.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: They're the same			**Incorrect** choice. Students who select *Keya* may have noticed that Keya's data has two days where she took 18 minutes to walk to school.

Problem 2b

Standard: MA.912.DP.1.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: Keya			**Incorrect** choice. Students who select there the same may have confused range with maximum.

Problem 3

Standards: MA.912.DP.1.2, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** **The median might be more helpful than the mean because the mean is affected by values that are far from the rest of the data. Player B's score of 20 is far from the rest of the data, so the mean for Player B will be a lot higher than the median, and it will not be representative of the center of the data set.**	Response shows **conceptual understanding** with minor errors. E.g., Response includes that Player B's score of 20 is far from the rest of the data but doesn't describe its impact on the mean.	Response shows **incomplete understanding** with significant errors. E.g., Response includes the calculated mean or median but doesn't relate the values to the context.	Response shows **limited understanding**.

Problem 4a

Standard: MA.912.DP.1.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** **Student creates a data display that accurately represents the given data set.**	Response shows **conceptual understanding** with minor errors. E.g., Response misses one data point.	Response shows **incomplete understanding** with significant errors. E.g., Student misunderstands how to construct the diagram of their choosing.	Response shows **limited understanding**.

Problem 4b

Standard: MA.912.DP.1.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **The estimated total number of calls in a year is about 12,436.**	Response shows **conceptual understanding** with minor errors. E.g., Errors in mathematical calculations but not the set-up of the problem.	Response shows **incomplete understanding** with significant errors. E.g., Student misunderstands how to find calls in a year.	Response shows **limited understanding**.

Problem 5a			**Standard:** MA.912.DP.1.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: **The data is numerical because the satisfaction ratings are numbers (1–5) that measure how happy customers are with the service. The data is univariate because we are only looking at one thing—customer ratings.**	Response shows **conceptual understanding** with minor errors. E.g., Student is able to identify but does not explain their reasoning.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 5b			**Standard:** MA.912.DP.1.4
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: **The company would expect about 4,250 callers to give a rating of 3 or higher.**	Response shows **conceptual understanding** with minor errors. E.g., Errors in mathematical calculations but not the set-up of the problem.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 2

1. Here is information about how many text messages two students sent on each day last week.

Number of Text Messages Amara Sent
0, 2, 5, 6, 9, 10, 15

Number of Text Messages Marquis Sent
0, 9, 10, 10, 10, 11, 16

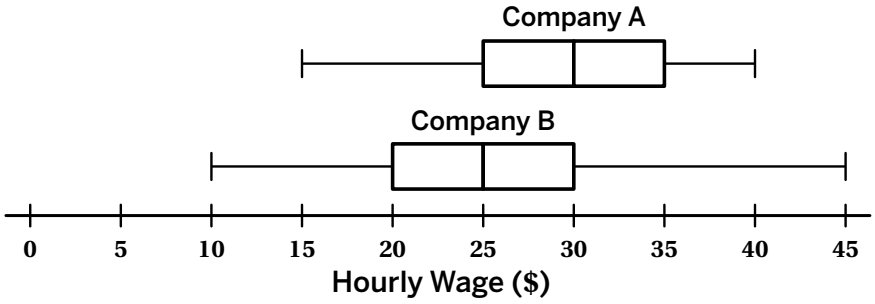
a Whose data has a smaller mean? Circle one.

Amara Marquis They're the same

b Which data display would be best to find the range of the number of text messages sent? Circle one.

dot plot histogram bar graph

2. Two companies analyzed the hourly wages for their employees. Here are the results.



Select *all* the true statements.

- ☐ **A.** All of the employees have an hourly wage of at least $10.
- ☐ **B.** The median hourly wage for Company B is $20.
- ☐ **C.** The IQR of Company A's hourly wage is $35.
- ☐ **D.** The IQR of Company B's hourly wage is $10.
- ☐ **E.** The employees at Company B typically have a greater hourly wage than the employees at Company A.

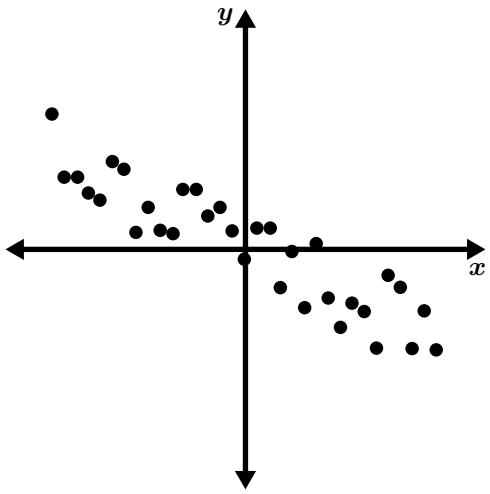
	Math	Science	English	Social Studies
Number of Students	21	37	15	27

3. A school conducted a survey of 100 students to estimate how many students in the entire school prefer different academic subjects. The school has 1,200 students in total.

Based on the survey results, approximately how many students in the school prefer science?

A. 180 **B.** 252 **C.** 370 **D.** 444

4. The scatter plot shows the relationship between two variables. Which statement best describes the correlation in the scatter plot?



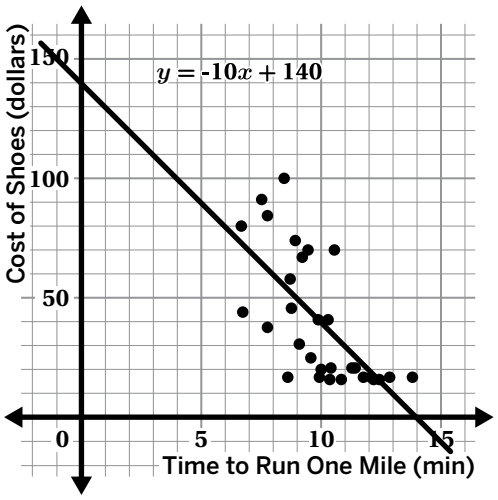
(A.) There is a weak positive correlation.

(B.) There is a strong positive correlation.

(C.) There is a weak negative correlation.

(D.) There is a strong negative correlation.

5. The scatter plot shows the number of minutes it took different people on a track team to run one mile, along with the cost of their shoes.



a According to the model, how much would a person who runs a mile in 10 minutes pay for their shoes?

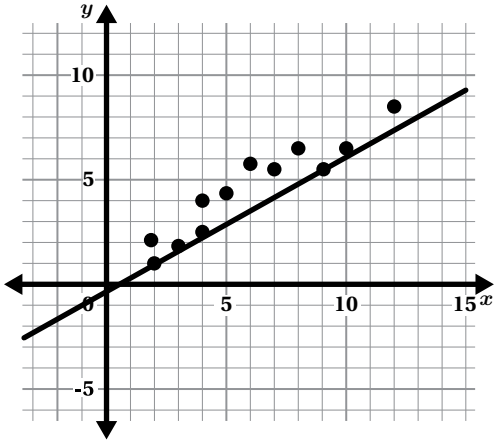
b Makayla says: *Based on this data, you'll run faster if you spend more money on your shoes.*

Is Makayla's claim accurate?

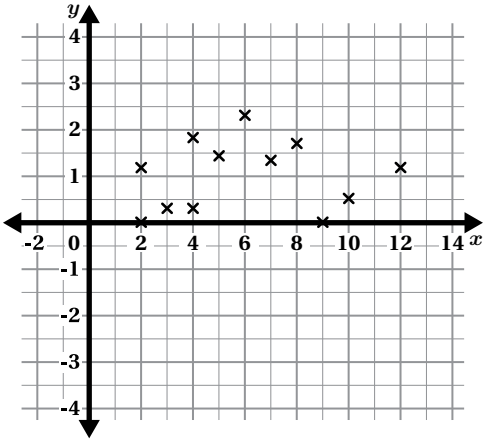
Explain your thinking.

6. Here is the line of fit Rafael made for this scatter plot as well as the residual plot.

Scatter Plot



Residual Plot



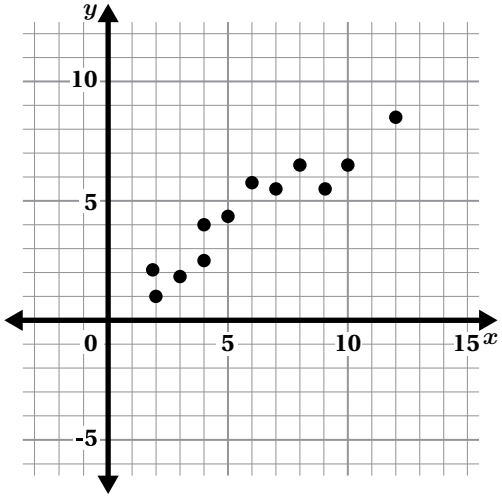
a List one thing Rafael did well when making his line of fit and one thing he could improve.

Did Well

Could Improve

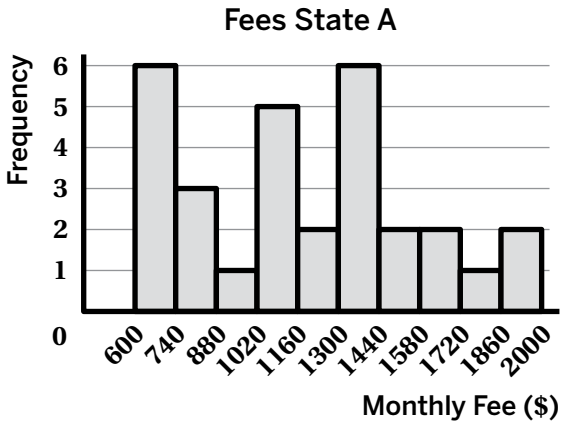
b Draw a line that is a better fit for the data.

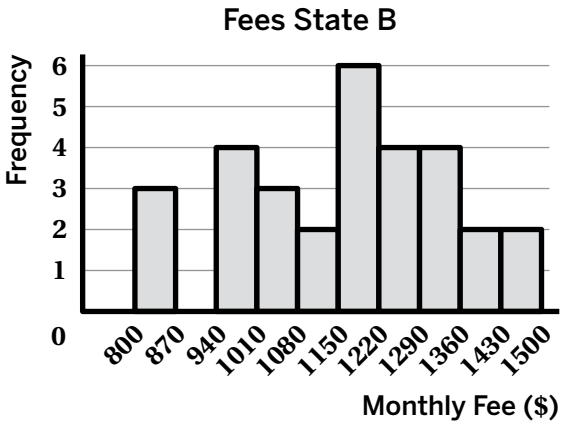
c Describe what the residual plot for your line might look like.



7. The Department of Transportation is analyzing vehicle registration fees in two different states.

The histograms below show the monthly registration fees for vehicles in two states, along with some statistics about the data.





	Mean	Median	Minimum	Q1	Q3	Maximum
State A	$1,192	$1,204	$620	$808	$1,424	$1959
State B	$1,164	$1,159	$821	$1,024	$1,332	$1,481

a State A has a larger interquartile range (IQR) than State B. What does this tell you about the monthly registration fees in these states?

b Why might someone think the registration fees in State A are lower?

c Why might someone think the registration fees in State B are lower?

8. The table below shows the results of a survey of 232 students about their entertainment preferences.

	Listens to Music More	Plays Video Games More	Total
Prefers Computer	68	68	136
Prefers Game Console	39	57	96
Total	107	125	232

a What percent of students who prefer a computer spend more time listening to music than playing video games?

(A.) 25.3%

(B.) 50.0%

(C.) 61.4%

(D.) 68.0%

b Based on the data in the table, make a claim about whether students who listen to music more are more likely to prefer a computer or a game console. Use percentages to support your answer.

Standard	MA.912.DP.1.1	MA.912.DP.1.2	MA.912.DP.1.3	MA.912.DP.1.4	MA.912.DP.2.4	MA.912.DP.2.6	MA.912.DP.3.1
Problem(s)	2	1a, 1b, 7a, 7b, 7c	5b	3	5a, 6a, 6c	4, 6b	8, 8b

Problem 1a

Standard: MA.912.DP.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: Amara			**Incorrect** choice. Students who select *They're the same* may have counted the number of values in each set.

Problem 1b

Standard: MA.912.DP.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: dot plot			**Incorrect** choice. **histogram:** A student might mistakenly choose this because it represents numerical data, but since it groups values into bins, it doesn't show the exact minimum and maximum needed for calculating the range. **bar graph:** A student might select this because they are familiar with bar graphs displaying comparisons. However, bar graphs are used for categorical data, not numerical data like the number of text messages.

Problem 2

Standards: MA.912.DP.1.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • All of the employees have an hourly wage of at least $10. • The IQR of Company B's hourly wage is $10.	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 3

Standards: MA.912.DP.1.4, MTR.45

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: D. 444			**Incorrect** choice. Students could have calculated for the wrong subject or set up their proportions incorrectly.

Problem 4

Standard: MA.912.DP.2.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: D. There is a strong negative correlation.			**Incorrect** choice. A student might recognize the negative trend but believe the correlation is weak because the points are not perfectly aligned.

Problem 5a

Standards: MA.912.DP.1.3, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: 40 dollars	Response shows **conceptual understanding** with minor errors. Students who write 13 dollars may have determined the time predicted by the model for a person whose shoes cost 10 dollars.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 5b

Standards: MA.912.DP.2.6, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. No. *Explanations vary.* While the data shows a strong negative association, that doesn't mean there is a causal relationship. You won't necessarily run faster if you spend more money on shoes, and even if it were true, you would need to test this theory in order to prove a causal relationship.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**. E.g., Yes. This data shows that there is a correlation between people whose shoes cost more and their time to run one mile. I don't think that I will always run faster if I have shoes that cost more though.	**Correct** response with **incomplete** explanation. E.g., No. Makayla is wrong.	**Incorrect** response with **no** explanation.

Problem 6a

Standards: MA.912.DP.2.6, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* One thing Rafael did well was draw his line of fit through some of the points and also in the general direction of the points. One thing Rafael could improve is to make the line go more through the middle of the points so that about half the points are above the line and half are below. This change would lead to a residual plot that is clustered closer to the x-axis with residuals above and below the x-axis.	Response shows **conceptual understanding** with minor errors. E.g., Rafael drew a line through some points but not all of them.	Response shows **incomplete understanding** with significant errors. E.g., Rafael drew a line through some points but not all of them.	Response shows **limited understanding.**

Problem 6b

Standard: MA.912.DP.2.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Lines vary.*** **Student draws a line of fit that is representative of the data.**	Response shows **conceptual understanding** with minor errors. E.g., Response includes a line of fit that shows a positive association but does not match the trend of the data.	Response shows **incomplete understanding** with significant errors. E.g., Response includes a line of fit similar to Rafael's.	Response shows **limited understanding**.

Problem 6c

Standard: MA.912.DP.2.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** **The residual plot for my line of fit would have residuals that are scattered both above and below the x-axis, and they are all close to the x-axis.**	Response shows **conceptual understanding** with minor errors. E.g., The residuals would all be close to the x-axis.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 7a

Standards: MA.912.DP.1.2, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** **State A has a larger IQR, meaning its middle 50% of registration fees vary more compared to State B. This suggests more inconsistency in registration fees in State A, while State B's fees are more consistent.**	Response shows **conceptual understanding** with minor errors. E.g., The student correctly identifies that **State A has a larger IQR**, but the explanation is unclear, lacks depth, or has a small misunderstanding of what IQR represents.	Response shows **incomplete understanding** with significant errors. The student may mention IQR but incorrectly describe its meaning or confuse it with overall range or another measure of spread.	Response shows **limited understanding**. The student does not correctly address IQR or makes a completely incorrect or unrelated statement.

Problem 7b–7c

Standards: MA.912.DP.1.2, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* The student accurately explains why someone might think State A's fees are lower (lower minimum, wider spread including low values) and why someone might think State B's fees are lower (lower median, lower max, more consistency).	Response shows **conceptual understanding** with minor errors. The student correctly identifies one or both reasons but lacks depth, does not compare both states well, or makes a small calculation mistake.	Response shows **incomplete understanding** with significant errors. The student provides a vague or partially incorrect explanation, possibly mixing up mean, median, min, max, or IQR.	Response shows **limited understanding**. The student does not correctly use the data to support their reasoning, gives an unrelated or incorrect answer, or only makes a general statement without data.

Problem 8a

Standards: MA.912.DP.3.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: B. 50%			**Incorrect** choice. Students could have calculated for the wrong topic or made calculation errors.

Problem 8b

Standards: MA.912.DP.3.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* The response correctly identifies that students who listen to music more are more likely to prefer PC. The student calculates percentages correctly, compares them explicitly, and explains why the data supports the conclusion. The response may also include a real-world reasoning for the trend.	Response shows **conceptual understanding** with minor errors. The response correctly identifies PC as the preferred platform for music listeners and provides some numerical support, but may have a small calculation error, lack a clear comparison, or miss a reasoning statement.	Response shows **incomplete understanding** with significant errors. The student attempts to use data but makes a major calculation error, incorrectly interprets the table, or fails to compare percentages.	Response shows **limited understanding**. The student gives a general or incorrect statement with no numerical support, misinterprets the data, or does not provide a valid comparison.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 2

1. Here is information about how many minutes two students spent on phone calls per day last week.

Number of Minutes Yolanda Spent
10, 15, 6, 8, 5, 7, 12

Number of Minutes Lucia Spent
25, 10, 15, 5, 0, 2, 6

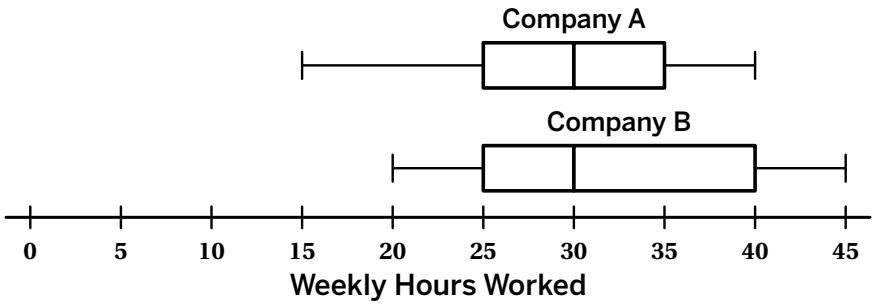
a Whose data has a larger mean? Circle one.

Yolanda Lucia They're the same

b Which data display would be best to find the median number of minutes spent on phone calls per day last week? Circle one.

dot plot histogram box plot

2. Two companies analyzed the weekly hours worked by their employees. Here are the results.



Select *all* the true statements.

- ☐ **A.** All employees worked less than 40 hours per week.
- ☐ **B.** Company A's and B's median weekly hours worked is 30 hours.
- ☐ **C.** The IQR of Company A's weekly hours worked is 5 hours.
- ☐ **D.** The IQR of Company B's weekly hours worked is 15 hours.
- ☐ **E.** The minimum number of weekly hours worked for Company B is greater than Company A.

	Math	Science	English	Social Studies
Number of Students	21	37	15	27

3. A school conducted a survey of 100 students to estimate student subject preferences. The school has 1,200 students in total.

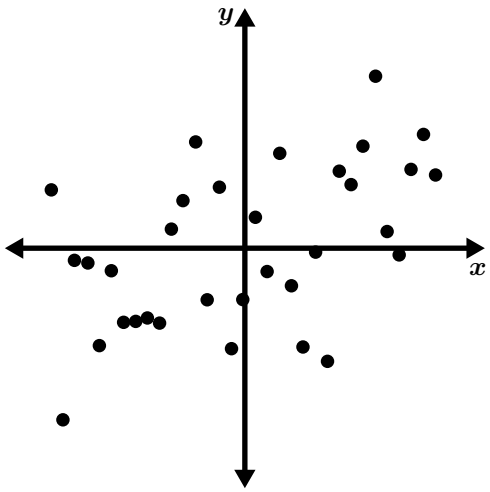
Based on the survey results, what is the best estimate for the percentage of students in the school who prefer social studies?

(A.) 15 (B.) 21 (C.) 27 (D.) 32

End-of-Unit Assessment (continued)

Unit 2

4. The scatter plot shows the relationship between two variables. Which statement best describes the correlation in the scatter plot?



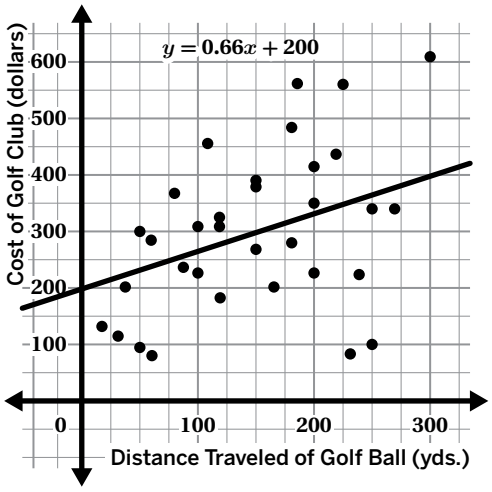
(A.) There is no correlation.

(B.) There is a strong positive correlation.

(C.) There is a weak positive correlation.

(D.) There is a strong negative correlation.

5. This scatter plot shows the distance many golf balls traveled, along with the cost of the golf club used to hit each ball.



a According to the model, how much would a person who hits a golf ball 300 yards pay for the golf club?

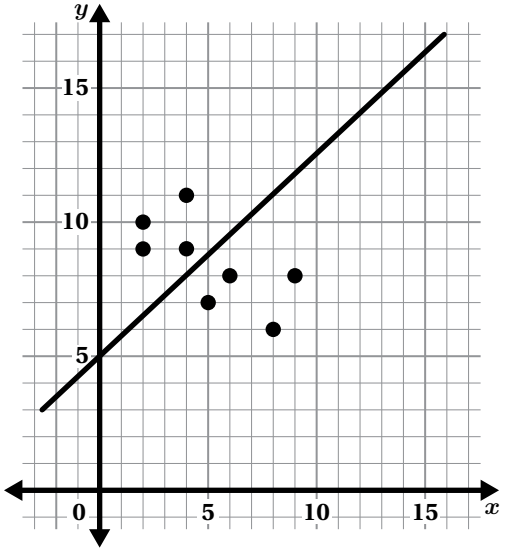
b Malik says: *Based on this data, you'll hit a golf ball farther if you spend more money on your club.*

Is Malik's claim accurate?

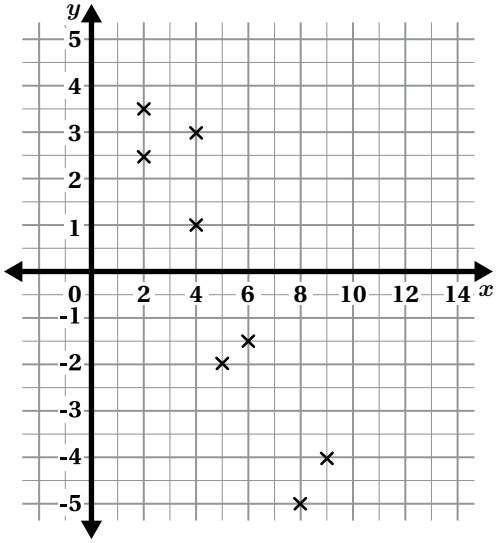
Explain your thinking.

6. Here is the line of fit Vicente made for this scatter plot as well as the residual plot.

Scatter Plot



Residual Plot



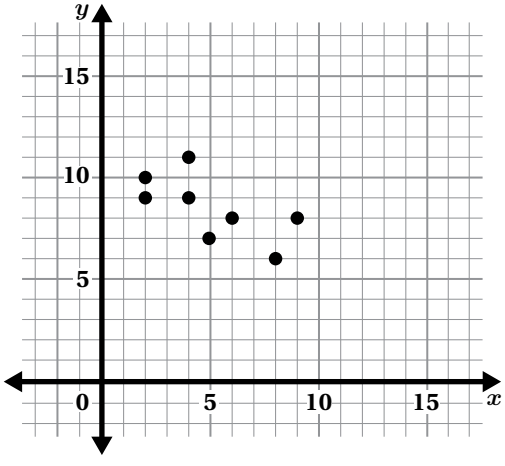
a List one thing Vicente did well when making his line of fit and one thing he could improve.

Did Well

Could Improve

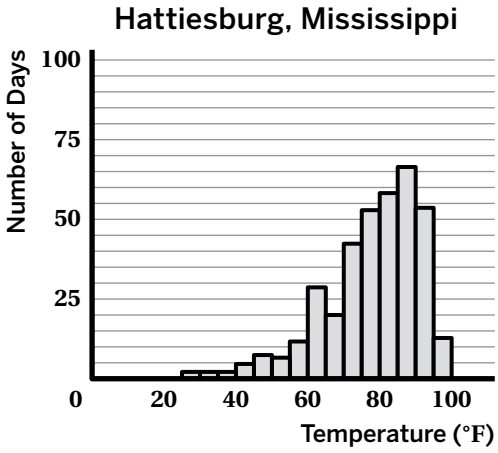
b Draw a line that is a better fit for the data.

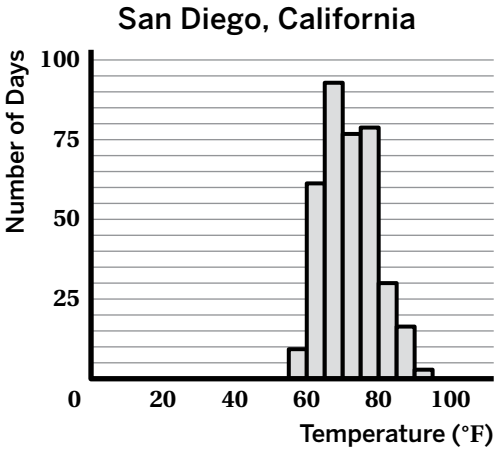
c Describe what the residual plot for your line might look like.



7. A family is trying to decide which of two cities has warmer weather.

Here are histograms that show the daily high temperatures in degrees Fahrenheit on each day in 2021, along with some statistics about the data.





	Mean (°F)	Median (°F)	Minimum (°F)	Q1 (°F)	Q3 (°F)	Maximum (°F)
Hattiesburg, MS	77.7	80	25	71	88	96
San Diego, CA	71.5	71	56	66	77	92

a Hattiesburg has a large interquartile range (IQR) than San Diego. What does that tell you about the daily high temperatures in the two cities?

b Why might someone think the temperatures in San Diego are lower?

c Why might someone think the temperatures in Hattiesburg are lower?

8. The table below shows the results of a survey of 239 students about their favorite school subject and book preference.

	Prefers Fiction Books	Prefers Non-Fiction Books	Total
Favorite Subject is Math/Science	78	49	127
Favorite Subject is English/History	78	34	112
Total	156	83	239

a What percent of students whose favorite subject is math/science prefer non-fiction books?

(A.) 38.6%

(B.) 49.2%

(C.) 61.4%

(D.) 78%

b Based on the data in the table, make a claim about whether students who prefer fiction books are more likely to enjoy math/science or English/history. Use percentages to support your answer.

Standard	MA.912.DP.1.1	MA.912.DP.1.2	MA.912.DP.1.3	MA.912.DP.1.4	MA.912.DP.2.4	MA.912.DP.2.6	MA.912.DP.3.1
Problem(s)	2	1a, 1b, 7a, 7b, 7c	5b	3	5a, 6a, 6c	4, 6b	8, 8b

Problem 1a

Standard: MA.912.DP.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: They're the same			**Incorrect** choice. Students who select *Lucia* may have not included 0 in their calculation of Lucia's mean.

Problem 1b

Standard: MA.912.DP.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: box plot			**Incorrect** choice. **dot plot:** A student might choose this because it shows individual data points, but it does not provide a clear visual representation of the median as a box plot does. **histogram:** A student might pick this because it represents numerical data, but since it groups values into bins, it does not explicitly display the median. They may mistakenly believe the tallest bar represents the median.

Problem 2

Standards: MA.912.DP.1.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • Company A's and B's median weekly hours worked is 30 hours. • The IQR of Company B's weekly hours worked is 15 hours. • The minimum number of weekly hours worked for Company B is greater than Company A.	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 3			**Standards:** MA.912.DP.1.4, MTR.5.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: C. 27%			**Incorrect** choice. Students could have calculated for the wrong subject or set up their fractions incorrectly.

Problem 4			**Standard:** MA.912.DP.2.6
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct choice: C. There is a weak positive correlation.			**Incorrect** choice. A student who chose option A may not recognize that even a subtle upward pattern still indicates a weak positive correlation.

Problem 5a			**Standards:** MA.912.DP.1.3, MTR.7.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: 400 dollars	Response shows **conceptual understanding** with minor errors. Students who write 150 dollars may have determined the distance traveled of a golf ball for a person whose club costs 300 dollars.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 5b

Standards: MA.912.DP.2.6, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation**. No. *Explanations vary.* While the data shows a strong positive association, that doesn't mean there is a causal relationship. I won't necessarily hit the golf ball farther if I spend more money on the club, and even if it were true, I would need to test this theory in order to prove a causal relationship.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**. E.g., Yes. This data shows that there is a correlation between people whose golf clubs cost more and the distance their golf ball traveled. I don't think that I will always hit the ball farther if I have clubs that cost more though.	**Correct** response with **incomplete** explanation. E.g., No. Malik is wrong. **Incorrect** response with explanation that shows **partial understanding**.	**Incorrect** response with **no** explanation.

Problem 6a

Standards: MA.912.DP.2.6, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* One thing Vicente did well was he drew his line of fit through some of the points so that about half the points are above the line and half are below. One thing Vicente could improve is to make the line trend downwards instead of upwards since the points show a negative association.	Response shows **conceptual understanding** with minor errors. E.g., Vicente could improve his work by drawing a better line of fit.	Response shows **incomplete understanding** with significant errors. E.g., Vicente drew a line through some points but not all of them.	Response shows **limited understanding**.

Problem 6b

Standard: MA.912.DP.2.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Lines* vary. Student draws a line of fit that is representative of the data.**	Response shows **conceptual understanding** with minor errors. E.g., Response includes a line of fit that shows a negative association but does not match the trend of the data.	Response shows **incomplete understanding** with significant errors. E.g., Response includes a line of fit similar to Vicente's but with a more accurate steepness.	Response shows **limited understanding**.

Problem 6c

Standard: MA.912.DP.2.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.* The residual plot for my line of fit would have residuals that are scattered both above and below the x-axis, and they are all close to the x-axis.**	Response shows **conceptual understanding** with minor errors. E.g., The residuals would all be close to the x-axis.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 7a

Standards: MA.912.DP.1.2, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** **The response accurately explains that Hattiesburg has a larger IQR, meaning its middle 50% of daily high temperatures are more spread out compared to San Diego. The student connects IQR to temperature variability and correctly interprets what this means about the consistency of temperatures in each city.**	Response shows **conceptual understanding** with minor errors. The student correctly identifies that Hattiesburg has a larger IQR, but the explanation is unclear, lacks depth, or has a small misunderstanding of what IQR represents.	Response shows **incomplete understanding** with significant errors. The student may mention IQR but incorrectly describe its meaning or confuse it with overall range or another measure of spread.	Response shows **limited understanding**. The student does not correctly address IQR or makes a completely incorrect or unrelated statement.

Problem 7b–7c

Standard: MA.912.DP.1.3

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** **Someone might think the temperatures in San Diego are lower because the mean and median are both lower than Hattiesburg's. Also, there aren't any days where the temperature is over 92° like there are in Hattiesburg.** **Someone might think the temperatures in Hattiesburg are lower because the minimum temperature is lower. Also, Hattiesburg has days where the temperature is less than 56°, while San Diego doesn't have days like that.**	Response shows **conceptual understanding** with minor errors. E.g., Someone might think the temperatures in San Diego are lower because the maximum temperature is lower.	Response shows **incomplete understanding** with significant errors. E.g., Someone might think the temperatures in San Diego are lower because they had many days lower than 60°F there. E.g., Someone might think the temperatures in Hattiesburg are lower because the temperature is lower there.	Response shows **limited understanding**.

Problem 8a

Standards: MA.912.DP.3.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **A. 38.6%**			**Incorrect** choice. Students could have calculated for the wrong topic or made calculation errors.

Problem 8b			Standards: MA.912.DP.3.1, MTR.4.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: ***Responses vary.*** **The response correctly identifies that students who prefer fiction books are equally likely to enjoy math/science or English/history.** **The student calculates percentages correctly, compares them explicitly, and explains why the data supports the conclusion.**	Response shows **conceptual understanding** with minor errors. The response correctly identifies that fiction book readers are split evenly between the two subjects and provides some numerical support, but may have a small calculation error, lack a clear comparison, or miss a reasoning statement.	Response shows **incomplete understanding** with significant errors. The student attempts to use data but makes a major calculation error, incorrectly interprets the table, or fails to compare percentages.	Response shows **limited understanding**. The student gives a general or incorrect statement with no numerical support, misinterprets the data, or does not provide a valid comparison.

Unit 2
Show What You Know PDFs

Name: Date: Period:

Show What You Know

2.01

Which type of data would each of these questions produce?

Question	Categorical or Numerical?
How many pets do you have?	
What language is spoken most in your home?	
What city do you live in?	

Name: Date: Period:

Show What You Know

2.02

Label each data set as either **univariate** or **bivariate**.

1. Wingspan of birds compared to their weight

2. Number of cars in your neighborhood

3. Temperature in your city over a week

4. Relationship between ice cream sales and temperature

5. Customer satisfaction rating on a product

6. Connection between hours spent exercising and body mass index

Name: Date: Period:

Show What You Know

2.03

A teacher surveyed 20 students to determine how many hours they spend on homework each week.

The data collected is as follows:

1, 2, 2, 3, 4, 4, 5, 5, 5, 6, 6, 6, 7, 7, 8, 9, 10, 10, 10, 12

What type of data display would best represent the distribution of homework hours, and why?

Name: Date: Period:

Show What You Know

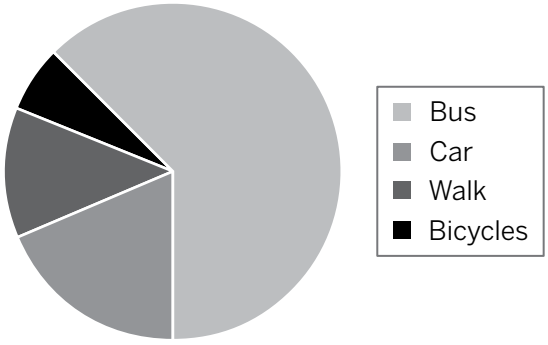
2.04

A survey of high school students asked how they typically get to school. The responses are provided in the following displays:

Frequency Table

Mode of Transportation	Frequency
Bus	50
Walk	10
Car	15
Bicycle	5

Circle Graph



a Which display gives you a better understanding of the relative proportions of each mode of transportation?

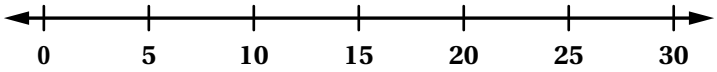
b Which display is most useful to determine how many students are in the survey?

Name: Date: Period:

Show What You Know

2.05

a Add dots to the line plot to create data set L with a median of 10 and a mean greater than 10.



b What are the mean and median of your data set L?

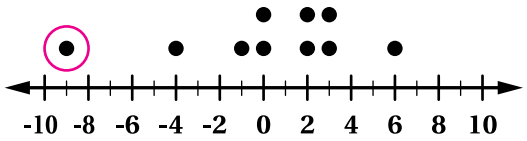
Name: ..... Date: ..... Period: .....

Show What You Know

2.06

Here is a new data set: [-9, -4, -1, 0, 0, 2, 2, 3, 3, 6].

Circle the point(s) on the dot plot that are outliers.



Name: Date: Period:

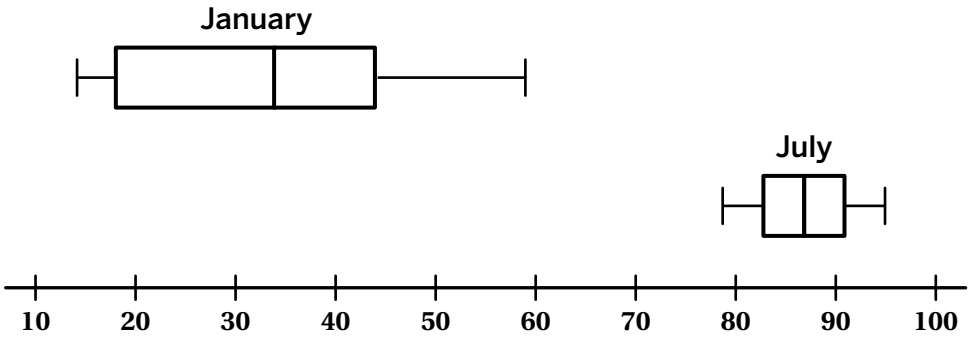
Show What You Know

2.07

Here are the high temperatures, in °F, for a certain town during part of 2024.

Month	Median	IQR
January	34	26
July	87	8

High Temperatures (°F)



How did the temperatures in January compare to the temperatures in July? Use statistics about center and spread to support your ideas.

Name: Date: Period:

Show What You Know

2.08

In a survey of 35 club members, 7 said they attend every meeting.

If the actual number of members who attend every meeting is 84, approximately how many members are in the club? Show your thinking.

Name: Date: Period:

Show What You Know

2.09

A survey was conducted among 20 students at a high school to estimate the average number of hours they spend on their phones daily. The survey data (in hours per day) is as follows:

Survey Data:
3, 5, 4, 6, 5, 4, 7, 3, 5, 6, 4, 6, 5, 3, 7, 5, 4, 6, 5, 3

The school has a total population of 1,200 students.

a What is the sample mean of the survey? Show or explain your thinking.

b Estimate the total daily screen time for the entire school population based on the sample mean. Show or explain your thinking.

Name: Date: Period:

Show What You Know

2.10

A company surveyed 300 people and found that 70 use public transportation regularly. They want to be 95% confident that the sample results accurately represent the local population within a margin of error of $\pm 5\%$.

a What is the 95% confidence interval for the proportion of people who use public transportation regularly? Show or explain your thinking.

b Estimate the number of people in a city of $100{,}000$ residents who regularly use public transportation based on this confidence interval. Show or explain your thinking.

Name: Date: Period:

Show What You Know

2.11

What is something happening in your community that might affect the residents? What data might you collect to help determine the level of impact?

Name: Date: Period:

Show What You Know

2.12

A group of people were asked about their favorite season and whether they like to swim. Here are the results.

	Winter	Spring	Summer	Fall	Total
Like to Swim	1%	5.7%	48.3%	15%	70%
Do Not Like to Swim	4%	9.3%	6.7%	10%	30%
Total	5%	15%	55%	25%	100%

a Interpret what 9.3% means in this situation.

b Determine whether there is an association between favorite season and liking to swim.

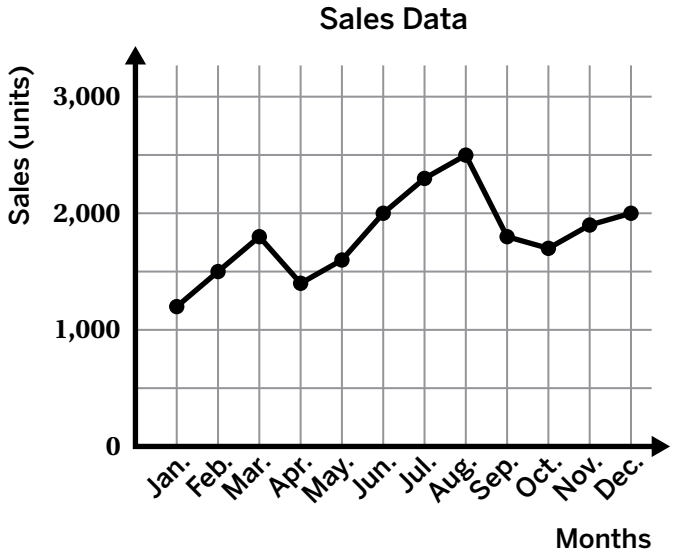
Name: Date: Period:

Show What You Know

2.13

A popular gadget company tracked monthly sales of their product for a year. The table below shows the sales data (in units) over 12 months:

Sales Data	
Month	**Sales (units)**
January	1,200
February	1,500
March	1,800
April	1,400
May	1,600
June	2,000
July	2,300
August	2,500
September	1,800
October	1,700
November	1,900
December	2,000



a What type of data are the months of the year?

b What type of data are the sales?

c Is this bivariate or univariate?

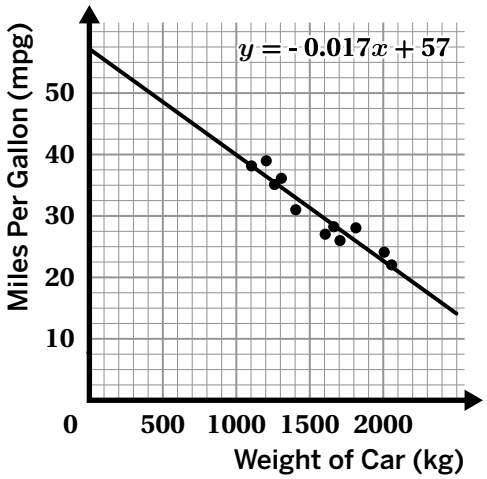
d What trends do you notice between the months of the year and gadget sales?

Name: Date: Period:

Show What You Know

2.14

a What does the slope mean for the relationship between fuel economy (mpg) and weight of car (kg)?



b A car weighs $1{,}500$ kg. Predict the fuel economy (mpg) of the car.

Name: Date: Period:

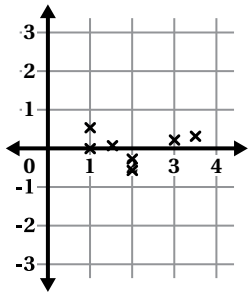
Show What You Know

2.15

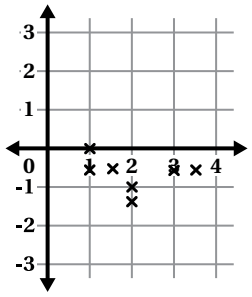
These residual plots are from the same data set, but each one uses a different line of fit.

Which graph is most likely to represent the residuals from the line formed by the x-axis that best fits the data?

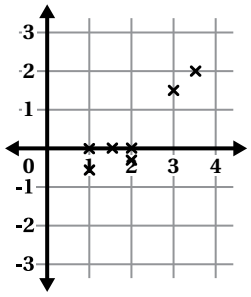
A.



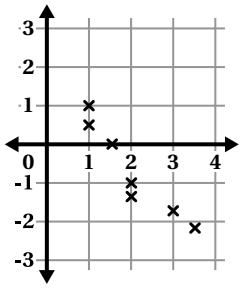
B.



C.



D.



Explain your thinking.

Name: Date: Period:

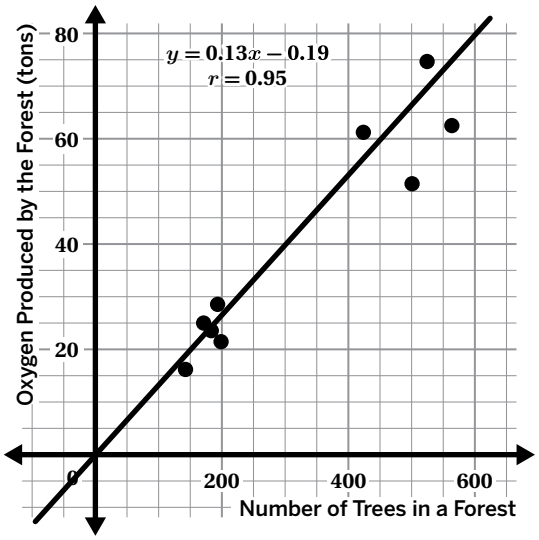
Show What You Know

2.16

Researchers collected data about the number of trees in a forest and the amount of oxygen the forest produced in a year.

A researcher counted 400 trees in a new forest.

How much oxygen does the line of best fit predict the forest will produce?

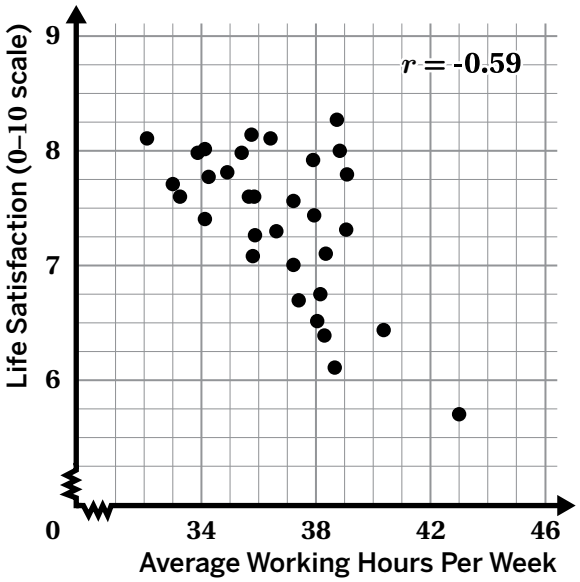


Name: Date: Period:

Show What You Know

2.17

Here is a scatter plot of life satisfaction on a scale of 0–10 and average working hours per week in countries around the world.



Sources: International Labor Organization; Organisation for Economic Co-operation and Development

a Write a headline that suggests causation between life satisfaction and working hours.

b Write a headline that suggests a correlation but *not* causation between the two variables.

Show What You Know **Lesson 1**

Name: _____ Date: _____ Period: _____

Show What You Know 2.01

Which type of data would each of these questions produce?

Question	Categorical or Numerical?
How many pets do you have?	Numerical
What language is spoken most in your home?	Categorical
What city do you live in?	Categorical

93

Show What You Know **Lesson 2**

Name: _____ Date: _____ Period: _____

Show What You Know 2.02

Label each data set as either **univariate** or **bivariate**.

1. Wingspan of birds compared to their weight
   bivariate
2. Number of cars in your neighborhood
   univariate
3. Temperature in your city over a week
   univariate
4. Relationship between ice cream sales and temperature
   bivariate
5. Customer satisfaction rating on a product
   univariate
6. Connection between hours spent exercising and body mass index
   bivariate

94

Show What You Know **Lesson 3**

Name: _____ Date: _____ Period: _____

Show What You Know 2.03

A teacher surveyed 20 students to determine how many hours they spend on homework each week.

The data collected is as follows:

1, 2, 2, 3, 4, 4, 5, 5, 5, 6, 6, 6, 7, 7, 8, 9, 10, 10, 10, 12

What type of data display would best represent the distribution of homework hours, and why?

Responses vary. A box plot would be the best way to display this data because it provides a clear summary of the data distribution, showing the median, quartiles, and potential outliers. It helps visualize the spread and median of homework hours, especially when dealing with a range of values.

95

Show What You Know **Lesson 4**

Name: _____ Date: _____ Period: _____

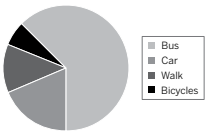
Show What You Know 2.04

A survey of high school students asked how they typically get to school. The responses are provided in the following displays:

Frequency Table

Mode of Transportation	Frequency
Bus	50
Walk	10
Car	15
Bicycle	5

Circle Graph



a. Which display gives you a better understanding of the relative proportions of each mode of transportation?
   circle graph

b. Which display is most useful to determine how many students are in the survey?
   frequency table

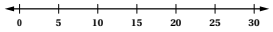
96

Show What You Know **Lesson 5**

Name: _____ Date: _____ Period: _____

Show What You Know 2.05

a. Add dots to the line plot to create data set L with a median of 10 and a mean greater than 10.



Responses vary. $L = [5, 10, 10, 10, 10, 10, 10, 10, 30]$

b. What are the mean and median of your data set L?

Responses vary. Check data set. Sample shown: Median = 10, Mean = 11.67

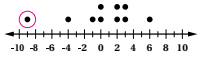
Show What You Know **Lesson 6**

Name: _____ Date: _____ Period: _____

Show What You Know 2.06

Here is a new data set: [-9, -4, -1, 0, 0, 2, 2, 3, 3, 6].

Circle the point(s) on the dot plot that are outliers.



Show What You Know **Lesson 7**

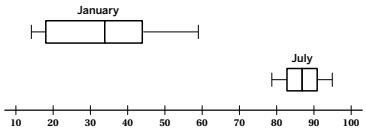
Name: _____ Date: _____ Period: _____

Show What You Know 2.07

Here are the high temperatures, in °F, for a certain town during part of 2024.

Month	Median	IQR
January	34	26
July	87	8

High Temperatures (°F)



How did the temperatures in January compare to the temperatures in July? Use statistics about center and spread to support your ideas.

Responses vary. The temperatures in January are a lot lower than the temperatures in July since the median is lower in January. The temperatures in January vary a lot more than the temperatures in July because the IQR is higher in January.

Show What You Know **Lesson 8**

Name: _____ Date: _____ Period: _____

Show What You Know 2.08

In a survey of 35 club members, 7 said they attend every meeting.

If the actual number of members who attend every meeting is 84, approximately how many members are in the club? Show your thinking.

There are about 420 members in the club.

Responses vary. I set up a proportion to find the total number of club members.

Show What You Know **Lesson 9**

Name: _____ Date: _____ Period: _____

Show What You Know 2.09

A survey was conducted among 20 students at a high school to estimate the average number of hours they spend on their phones daily. The survey data (in hours per day) is as follows:

Survey Data:
3, 5, 4, 6, 5, 4, 7, 3, 5, 6, 4, 6, 5, 3, 7, 5, 4, 6, 5, 3

The school has a total population of 1,200 students.

a. What is the sample mean of the survey? Show or explain your thinking.

Sample Mean = 4.8 hours/day Explanations vary. I added up the number of hours to get the total for the 20 students of the sample group and then divided that total by 20.

b. Estimate the total daily screen time for the entire school population based on the sample mean. Show or explain your thinking.

5760 hours. Explanations vary. I multiplied the sample mean of 4.8 hours of screen time a day for each student by 1200 to get the total daily screen time of 1200 students.

101

Show What You Know **Lesson 10**

Name: _____ Date: _____ Period: _____

Show What You Know 2.10

A company surveyed 300 people and found that 70 use public transportation regularly. They want to be 95% confident that the sample results accurately represent the local population within a margin of error of ±5%.

a. What is the 95% confidence interval for the proportion of people who use public transportation regularly? Show or explain your thinking.

0.18333 to 0.28333 Explanations vary.

b. Estimate the number of people in a city of 100,000 residents who regularly use public transportation based on this confidence interval. Show or explain your thinking.

18,333 to 28,333 people are estimated to regularly use public transportation.

102

Show What You Know **Lesson 11**

Name: _____ Date: _____ Period: _____

Show What You Know 2.11

What is something happening in your community that might affect the residents? What data might you collect to help determine the level of impact?

Responses vary. In my community, they're deciding whether to build a new high school. Some data that might be helpful to collect would be how many students are in each of the high schools.

103

Show What You Know **Lesson 12**

Name: _____ Date: _____ Period: _____

Show What You Know 2.12

A group of people were asked about their favorite season and whether they like to swim. Here are the results.

	Winter	Spring	Summer	Fall	Total
Like to Swim	1%	5.7%	48.3%	15%	70%
Do Not Like to Swim	4%	9.3%	6.7%	10%	30%
Total	5%	15%	55%	25%	100%

a. Interpret what 9.3% means in this situation.

Responses vary. 9.3% is the percentage of respondents whose favorite season is spring and who do not like to swim.

b. Determine whether there is an association between favorite season and liking to swim.

Responses vary. There is an association between favorite season and liking to swim because 48.3% of respondents like to swim and picked summer as their favorite season.

104

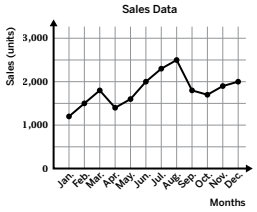
Show What You Know **Lesson 13**

Name: _____ Date: _____ Period: _____

Show What You Know 2.13

A popular gadget company tracked monthly sales of their product for a year. The table below shows the sales data (in units) over 12 months:

Sales Data	
Month	**Sales (units)**
January	1,200
February	1,500
March	1,800
April	1,400
May	1,600
June	2,000
July	2,300
August	2,500
September	1,800
October	1,700
November	1,900
December	2,000



a. What type of data are the months of the year? Categorical

b. What type of data are the sales? Numerical

c. Is this bivariate or univariate? Univariate

d. What trends do you notice between the months of the year and gadget sales?

Responses vary. The number of sales increase and peak in the summer months (June to August), and sales decrease from March to April and August to October.

105

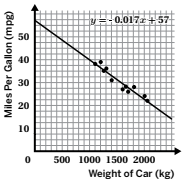
Show What You Know **Lesson 14**

Name: _____ Date: _____ Period: _____

Show What You Know 2.14

a. What does the slope mean for the relationship between fuel economy (mpg) and weight of car (kg)?

Responses vary. In this situation, the slope means that as the mass of a car increases by 1 kilogram, the fuel economy tends to decrease by about 0.017 miles per gallon.



b. A car weighs 1,500 kg. Predict the fuel economy (mpg) of the car.

Responses between 30 miles per gallon and 32 miles per gallon are considered correct.

106

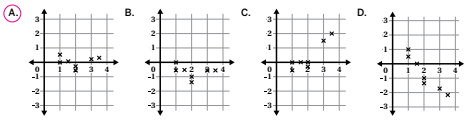
Show What You Know **Lesson 15**

Name: _____ Date: _____ Period: _____

Show What You Know 2.15

These residual plots are from the same data set, but each one uses a different line of fit.

Which graph is most likely to represent the residuals from the line formed by the x-axis that best fits the data?



Explain your thinking.

Explanations vary. The points on the residual plot are close to the x-axis and randomly dispersed both above and below the x-axis, which means it probably represents the best line of fit for the data.

107

Show What You Know **Lesson 16**

Name: _____ Date: _____ Period: _____

Show What You Know 2.16

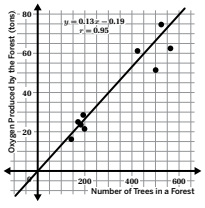
Researchers collected data about the number of trees in a forest and the amount of oxygen the forest produced in a year.

A researcher counted 400 trees in a new forest.

How much oxygen does the line of best fit predict the forest will produce?

0.13(400) − 0.19 (or equivalent)

Responses between 51 and 52 tons are considered correct.



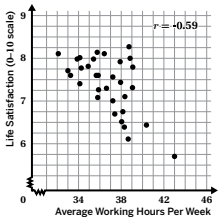
108

Show What You Know **Lesson 17**

Name: _____ Date: _____ Period: _____

Show What You Know 2.17

Here is a scatter plot of life satisfaction on a scale of 0–10 and average working hours per week in countries around the world.



Sources: International Labor Organization; Organisation for Economic Co-operation and Development

a. Write a headline that suggests causation between life satisfaction and working hours.

Responses vary. Want to Be More Satisfied With Your Life? Work Less!

b. Write a headline that suggests a correlation but *not* causation between the two variables.

Responses vary. World Data Shows Relationship Between Work Hours and Life Satisfaction

109

Unit 3
Assessments and Rubrics

Name: ..... Date: ..... Period: .....

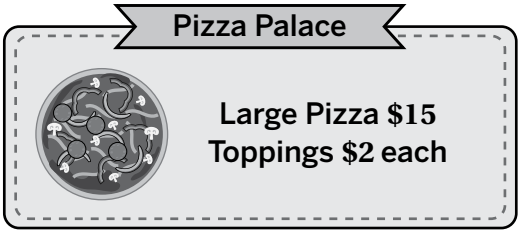
Pre-Unit Check

Unit 3

1. What are some things you know about functions, inside and outside of math class?

Draw a picture if it helps to show your thinking.

2. At Pizza Palace, a large pizza is $\$15$ and toppings are $\$2$ each.



a How much will a large pizza with 4 toppings cost?

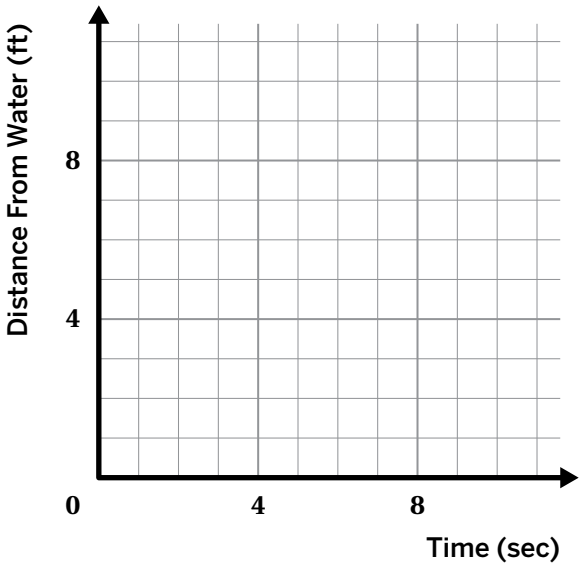
Explain your thinking.

b Write an equation for the total cost of a large pizza, c, with t toppings.

3. Here is a story about a turtle's journey:

A turtle begins at the edge of the water, walks 10 feet away from the water at a constant speed, then takes a nap.

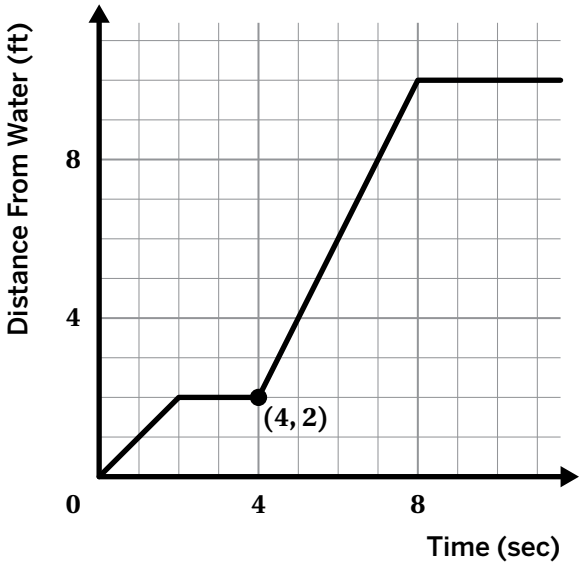
Draw a distance versus time graph of the turtle's journey.



Pre-Unit Check (continued)

Unit 3

4. Luca drew this graph to represent a new turtle.

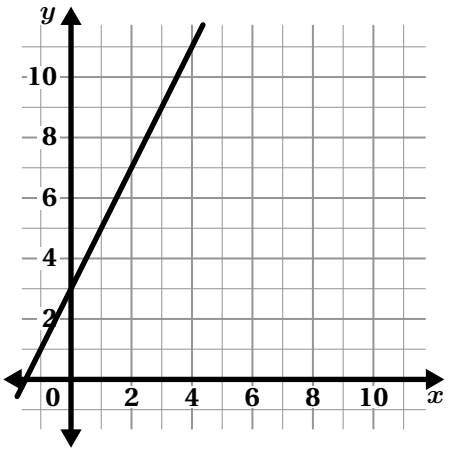


a What does the point $(4, 2)$ tell you about the turtle's journey?

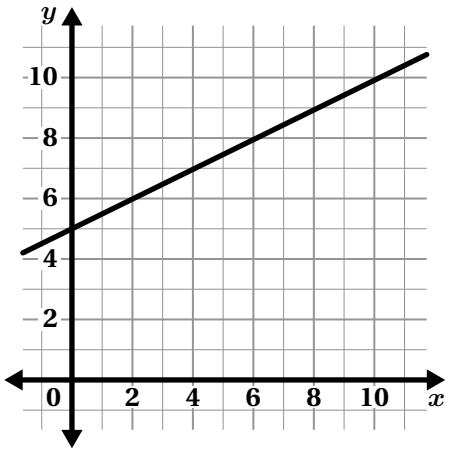
b What was the speed of the turtle from 4 to 8 seconds?

5. Determine the slope of each line.

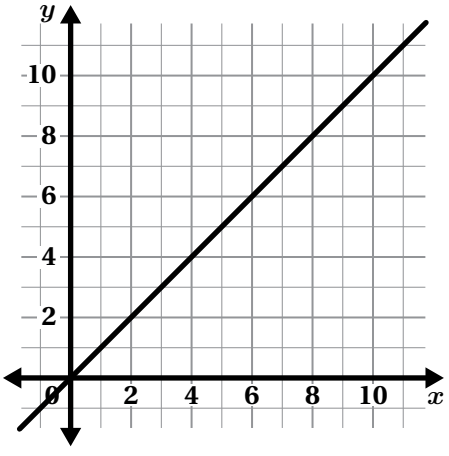
a



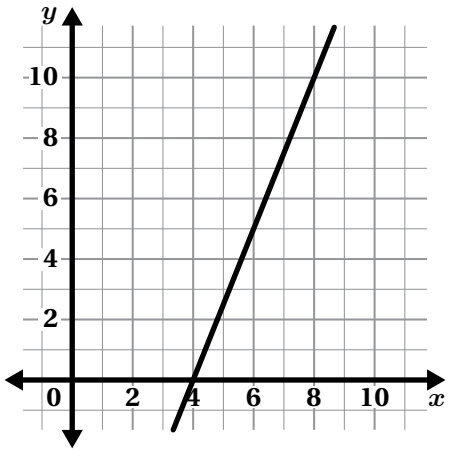
b



c



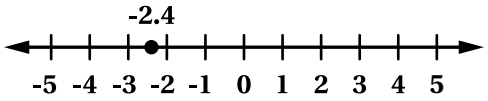
d



Pre-Unit Check (continued)

Unit 3

6. The absolute value of a number is its distance from 0 on the number line.



Prisha says $|-2.4| = 2.4$.

Rafael says $|-2.4| = -2.4$.

Whose thinking is correct?

Explain your thinking.

7. Make a true inequality using the numbers -2, -1, 1, or 2.

$$\left|\square\right| > \square$$

Explain how you know your inequality is true.

Name: ..... Date: ..... Period: .....

Sub-Unit Quiz

Unit 3

1. Which table shows a relationship that is *not* a function?

A.

Input	Output
-1	2
0	4
-1	2
-2	0

B.

Input	Output
1	2
3	4
1	6
3	8

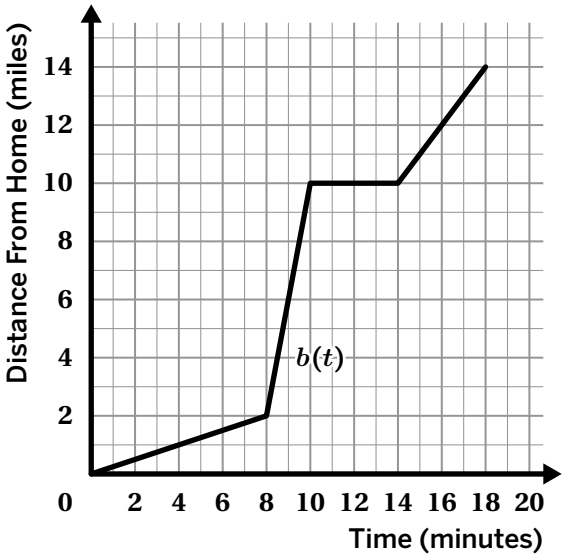
C.

Input	Output
2	2
4	2
6	4
8	6

D.

Input	Output
1	2
2	2
3	2
4	2

2. Here is a graph of $b(t)$. $b(t)$ represents Bao's distance from home after t minutes.



a Which is the *domain* of $b(t)$?

A. $0 \leq t \leq 14$

B. $0 \leq t \leq 18$

C. $t \leq 18$

D. $t \leq 14$

b What does the domain tell you about Bao's trip?

c Fill in the blanks to describe the *range* of $b(t)$. ..... $\leq b(t) \leq$ .....

3. Calculate the *average rate of change* of $b(t)$ from 8 to 14 minutes.

Explain what your answer means in context.

Sub-Unit Quiz (continued)

4. At a toy store, customers can buy a stuffed animal and add accessories, like hats and shoes.

$g(x)$ represents the cost of a stuffed giraffe with accessories. The giraffe costs $\$15$ and accessories cost $\$3.75$ each.

a What does $g(5) = 33.75$ say about this situation?

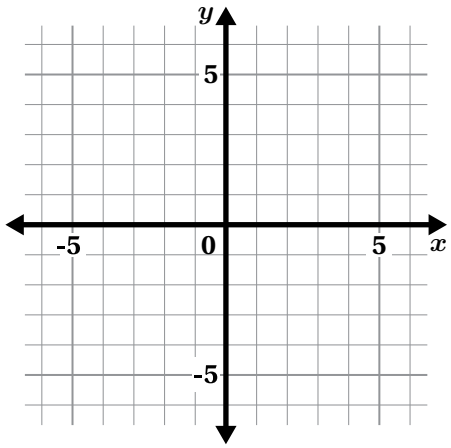
b Write an equation for $g(x)$, where x represents the number of accessories.

$g(x) =$

5. Here are features of a function, $f(x)$.

- The domain of $f(x)$ is $-3 \leq x \leq 4$.
- $f(x)$ is decreasing when $x < 2$.
- The minimum of $f(x)$ occurs at $(2, -2)$.

Sketch a graph that could be $f(x)$.



Standard	MA.912.F.1.1	MA.912.F.1.2	MA.912.F.1.3	MA.912.F.1.5	MA.912.F.1.6	MA.912.AR.2.2
Problem(s)	1	4a	3	2a, 2b, 2c	5	4b

Problem 1

Standard: MA.912.F.1.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: B			**Incorrect** choice. Students who select A may recognize the importance of noticing repeated values.

Problem 2a

Standard: MA.912.F.1.5

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $0 \leq t \leq 18$			**Incorrect** choice. Students who select $0 \leq t \leq 14$ may have described the range.

Problem 2b

Standards: MA.912.F.1.5, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. *Responses vary.* The domain tells me that Bao traveled for 18 minutes.	**Correct** response with **minor flaws** in explanation. E.g., The domain tells me time is 18 minutes. **Incorrect** response with logical and **complete explanation.** E.g., The domain tells me that Bao traveled for 14 minutes.	**Correct** response with **incomplete** explanation. E.g., 0 is the smallest amount of time and 18 is the biggest amount of time. **Incorrect** response with explanation that shows **partial understanding.** E.g., The domain tells me that Bao traveled 18 miles.	**Incorrect** response with **no** explanation.

Problem 2c

Standard: MA.912.F.1.5

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $0 \leq b(t) \leq 14$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., Bounds are in reverse order: $14 \leq b(t) \leq 0$.	Response shows **incomplete understanding** with significant errors. E.g., Response uses the domain: $0 \leq b(t) \leq 18$.	Response shows **limited understanding**.

Problem 3

Standard: MA.912.F.1.3

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. $\frac{4}{3}$ (or equivalent) *Explanations vary.* Between 8 and 14 minutes, Bao traveled an average of 1.33 miles per minute.	**Correct** response with **minor flaws** in explanation. E.g., $\frac{4}{3}$. Over the entire trip, Bao traveled an average of 1.33 miles per minute. **Incorrect** response with logical and **complete explanation.** E.g., Response includes a minor calculation error but correctly interprets the answer.	**Correct** response with **incomplete** explanation. E.g., Response includes $\frac{4}{3}$, but does not explain in context. **Incorrect** response with explanation that shows **partial understanding.** E.g., Response includes calculation of a rate of change for a different interval.	**Incorrect** response with **no** explanation.

Problem 4a

Standards: MA.912.F.1.2, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* A giraffe with 5 accessories costs $33.75	Response shows **conceptual understanding** with minor errors. E.g., The price for 5 is $33.75.	Response shows **incomplete understanding** with significant errors. E.g., The price is $33.75.	Response shows **limited understanding**.

Problem 4b			**Standards:** MA.912.AR.2.2, MTR.7.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: $g(x) = 15 + 3.75x$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors. E.g., $g(x) = 15 + 3.75$	Response shows **limited understanding**.

Problem 5			**Standards:** MA.912.F.1.6, MTR.3.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Function meets **all three** criteria. *Graphs vary.*	Response shows **conceptual understanding** with minor errors. E.g., Response meets **two** of the three criteria.	Response shows **incomplete understanding** with significant errors. E.g., Response meets **one** of the three criteria.	Response shows **limited understanding**. E.g., Response meets **zero** of the three criteria.

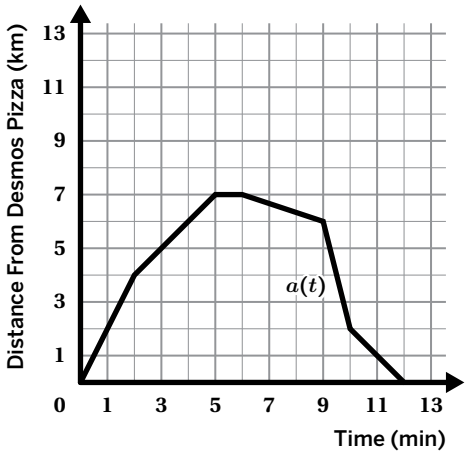
Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 3

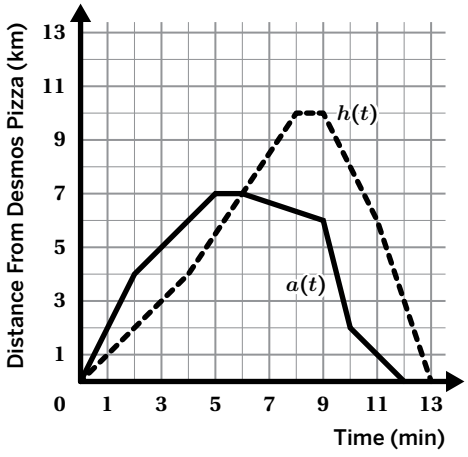
Adhira and Habib deliver pizzas for Desmos Pizza. They leave to deliver pizzas at the same time. $a(t)$ and $h(t)$ represent Adhira's and Habib's distance from Desmos Pizza (in kilometers) after t minutes.

1. Here is a graph of $a(t)$. *Select all* the true statements.



- ☐ **A.** Adhira's distance is 7 kilometers after 5 minutes.
- ☐ **B.** Adhira is the same distance from Desmos Pizza at 4 minutes and 9 minutes.
- ☐ **C.** $a(10) > a(2)$
- ☐ **D.** $a(0) = 12$
- ☐ **E.** $a(12) = 0$

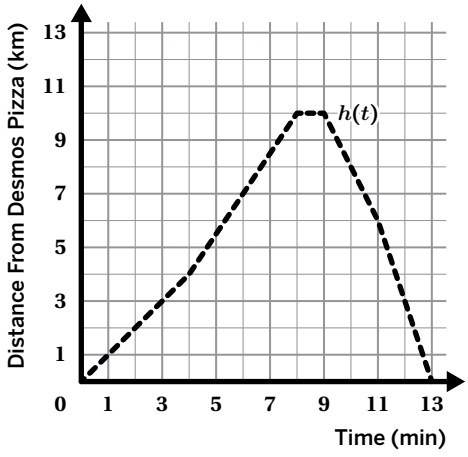
2. Here is a graph of $a(t)$ and $h(t)$. Which statement is true?



- (A.) $a(2) > h(2)$
- (B.) $a(2) < h(2)$
- (C.) $a(2) = h(2)$
- (D.) $a(2) = 2$

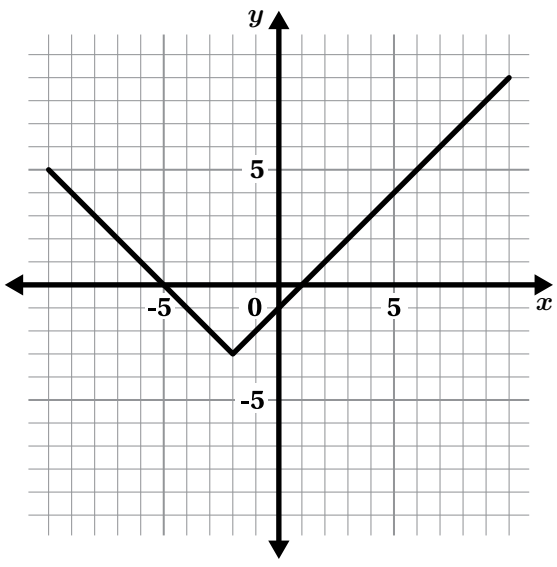
3. Write one value of t where $a(t) = h(t)$.

4. Calculate Habib's *average rate of change* from 4 to 9 minutes.



Explain what your answer means in this situation.

5. This is a graph of the function $f(x)$.



a Which equation represents this function?

(A.) $f(x) = |x| - 1$

(B.) $f(x) = |x - 3| + 2$

(C.) $f(x) = |x - 2| - 3$

(D.) $f(x) = |x + 2| - 3$

b When is $f(x)$ negative?

(A.) $x < 0$

(B.) $x < -2$

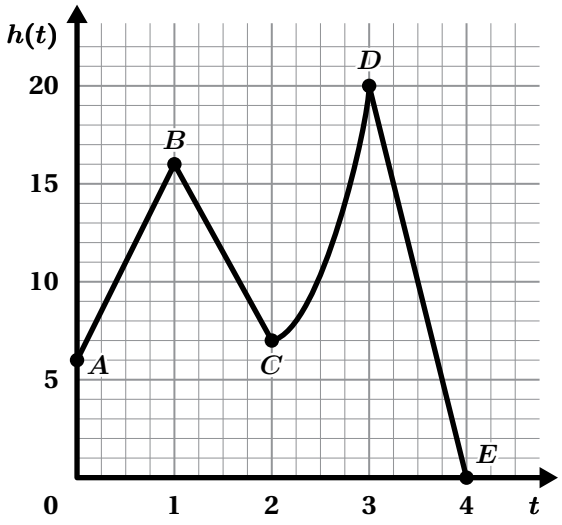
(C.) $-5 < x < 1$

(D.) $-2 < x < 1$

End-of-Unit Assessment (continued)

Unit 3

6. Here is a graph of $h(t)$, the height of a kite (in feet) after t minutes.



a Which point represents the minimum of $h(t)$? Circle one.

Point A Point B Point C

Point D Point E

b Which point represents when the kite is at its greatest height off the ground? Circle one.

Point A Point B Point C

Point D Point E

c Circle or describe *all* the intervals of the function that are decreasing.

d Fill in the blanks to describe the *domain* of $h(t)$.

..... $\leq t \leq$ .....

e Explain what the domain means in this situation.

Standard	MA.912.F.1.2	MA.912.F.1.3	MA.912.F.1.5	MA.912.F.1.6	MA.912.AR.4.3	MA.912.AR.9.1
Problem(s)	1, 2	4	2, 6d, 6e	1, 5b, 6a, 6b, 6c	5a	3

Problem 1

Standards: MA.912.F.1.2, MA.912.F.1.6, MTR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • **Adhira's distance is 7 kilometers after 5 minutes.** • **Adhira is the same distance from Desmos Pizza at 4 minutes and 9 minutes.** • $a(12) = 0$	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2

Standards: MA.912.F.1.2, MA.912.F.1.5

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $a(2) > h(2)$			**Incorrect** choice. Students who select $a(2) = 2$ may have evaluated $h(2)$.

Problem 3

Standard: MA.912.AR.9.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $t = 0$ or $t = 6$	Response shows **conceptual understanding** with minor errors. Students who write $(6, 7)$ may recognize that the intersection point is relevant to the solution.	Response shows **incomplete understanding** with significant errors. Students who write 7 may have given the output of the intersection point.	Response shows **limited understanding.**

Problem 4

Standards: MA.912.F.1.3, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. **1.2 kilometers per minute (or equivalent)** ***Explanations vary.* Between 4 and 9 minutes, Habib traveled an average of 1.2 kilometers per minute.**	**Correct** response with **minor flaws** in explanation. E.g., 1.2 kilometers per minute. Over the entire trip, Habib traveled an average of 1.2 kilometers per minute. **Incorrect** response with logical and **complete explanation.** E.g., Response includes a calculation error with a correct interpretation.	**Correct** response with **incomplete** explanation. E.g., Response includes 1.2, but does not explain the context. **Incorrect** response with explanation that shows **partial understanding.** E.g., Response includes calculation of a rate of change for a different interval.	**Incorrect** response with **no** explanation.

Problem 5a

Standard: MA.912.AR.4.3

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $f(x) = \|x + 2\| - 3$			**Incorrect** choice. Students who select $f(x) = \|x - 2\| - 3$ may have recognized the minimum as (-2, -3).

Problem 5b

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $-5 < x < 1$			**Incorrect** choice. Students who select $x < -2$ may have interpreted negative as decreasing.

Problem 6a

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: Point E			**Incorrect** choice. Students who select Point A may have interpreted the minimum to be the smallest x-coordinate.

Problem 6b

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: Point D			**Incorrect** choice. Students who select Point E may have thought the point farthest from the origin represents the greatest height.

Problem 6c

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. *Responses vary.* • From B to C and from D to E. • $1 < t < 2$ and $3 < t < 4$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 6d			**Standard:** MA.912.F.1.5
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: **$0 \leq t \leq 4$** **(or equivalent)**	Response shows **conceptual understanding** with minor errors. E.g., Bounds are in reverse order (e.g., $4 \leq t \leq 0$).	Response shows **incomplete understanding** with significant errors. E.g., Response uses the range bound instead (e.g., $0 \leq t \leq 20$).	Response shows **limited understanding.**

Problem 6e			**Standard:** MA.912.F.1.5
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: ***Responses vary.* The domain represents the minutes the kite was above the ground.**	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors. E.g., The kite was four feet in the air.	Response shows **limited understanding.**

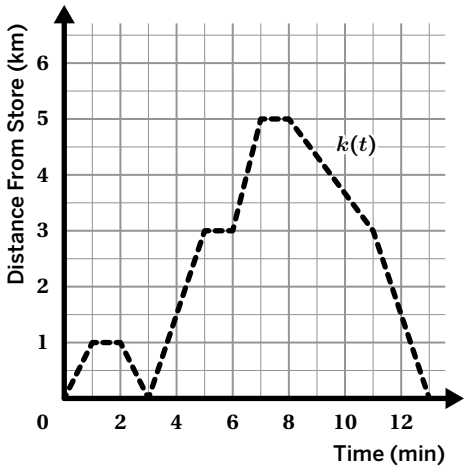
Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 3

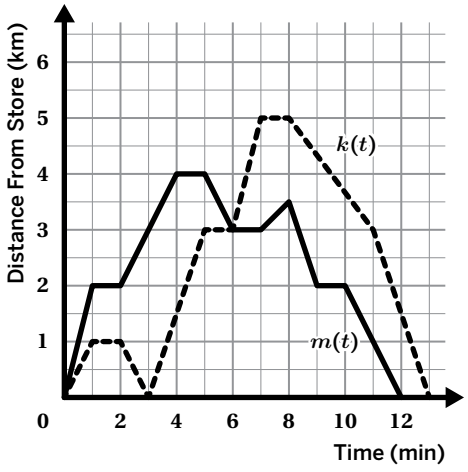
Kwasi and Mio deliver groceries for Descart. They leave to deliver groceries at the same time. $k(t)$ and $m(t)$ represent Kwasi's and Mio's distances from a store (in kilometers) after t minutes.

1. Here is a graph of $k(t)$. *Select all* the true statements.



- ☐ **A.** Kwasi's distance is 8 kilometers after 5 minutes.
- ☐ **B.** Kwasi is the same distance from the store at 5 minutes and 11 minutes.
- ☐ **C.** $k(11) > k(7)$
- ☐ **D.** $k(13) = 0$
- ☐ **E.** $k(0) = 3$

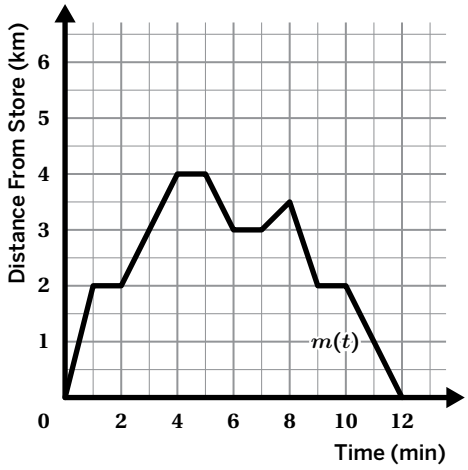
2. Here is a graph of $k(t)$ and $m(t)$. Which statement is true?



- (A.) $k(5) > m(5)$
- (B.) $k(5) < m(5)$
- (C.) $k(5) = m(5)$
- (D.) $k(5) = 5$

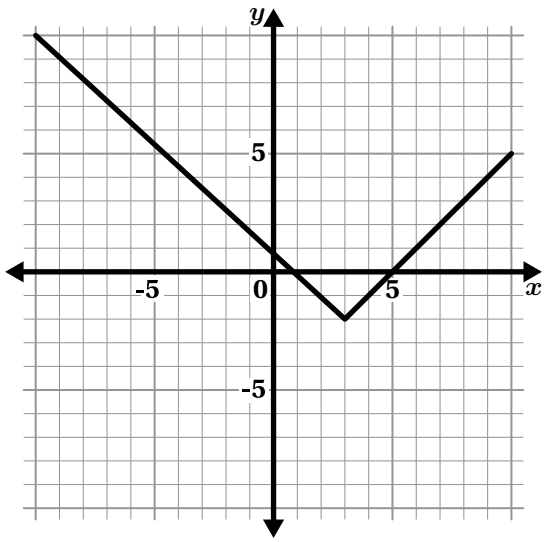
3. Write one value of t where $k(t) = m(t)$.

4. Here is a graph of $m(t)$. Calculate Mio's average *rate of change* from 1 to 5 minutes.



Explain what your answer means in this situation.

5. This is a graph of the function $f(x)$.



a Which equation represents this function?

(A.) $f(x) = |x - 3| - 2$

(B.) $f(x) = |x + 3| - 2$

(C.) $f(x) = |x + 2| - 3$

(D.) $f(x) = |x - 2| + 3$

b When is $f(x)$ increasing?

(A.) $x > -2$

(B.) $x > 3$

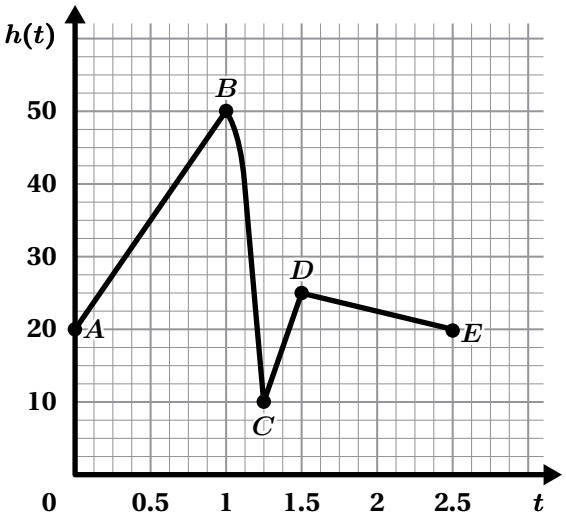
(C.) $x > 5$

(D.) $1 < x < 5$

End-of-Unit Assessment (continued)

Unit 3

6. Here is a graph of $h(t)$, the height above ground of a roller coaster (in meters) after t minutes.



a Which point represents the maximum of $h(t)$? Circle one.

Point A Point B Point C

Point D Point E

b Which point represents when the roller coaster is at its lowest height above the ground? Circle one.

Point A Point B Point C

Point D Point E

c Circle or describe *all* the intervals of the function that are increasing.

d Fill in the blanks to describe the *range* of $h(t)$.

..... $\leq h(t) \leq$ .....

e Explain what the range means in this situation.

Standard	MA.912.F.1.2	MA.912.F.1.3	MA.912.F.1.5	MA.912.F.1.6	MA.912.AR.4.3	MA.912.AR.9.1
Problem(s)	1, 2	4	2, 6d, 6e	1, 5b, 6a, 6b, 6c	5a	3

Problem 1

Standards: MA.912.F.1.2, MA.912.F.1.6, MTR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • **Kwasi is the same distance from the store at 5 minutes and 11 minutes.** • $k(13) = 0$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2

Standards: MA.912.F.1.2, MA.912.F.1.5

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $k(5) < m(5)$			**Incorrect** choice. Students who select $k(5) > m(5)$ may have compared the inputs when $k(t) = 5$.

Problem 3

Standard: MA.912.AR.9.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $t = 0$ or $t = 6$	Response shows **conceptual understanding** with minor errors. Students who write $(6, 3)$ may recognize that the intersection point is relevant to the solution.	Response shows **incomplete understanding** with significant errors. Students who write 3 may have given the output of the intersection point.	Response shows **limited understanding.**

Problem 4

Standards: MA.912.F.1.3, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. **0.5 kilometers per minute (or equivalent)** ***Explanations vary.* Between 1 and 5 minutes, Mio traveled and average of 0.5 kilometers per minute.**	**Correct** response with **minor flaws** in explanation. E.g., 0.5 kilometers per minute. Over the entire trip, Mio traveled an average of 0.5 kilometers per minute. **Incorrect** response with logical and **complete explanation**. E.g., Response includes a calculation error with a correct interpretation.	**Correct** response with **incomplete** explanation. E.g., Response includes 0.5, but does not explain the context. **Incorrect** response with explanation that shows **partial understanding.** E.g., Response includes calculation of a rate of change for a different interval.	**Incorrect** response with **no** explanation.

Problem 5a

Standard: MA.912.AR.4.3

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $f(x) = \|x - 3\| - 2$			**Incorrect** choice. Students who select $f(x) = \|x + 3\| - 2$ may have recognized the minimum to be $(3, -2)$.

Problem 5b

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $x > 3$			**Incorrect** choice. Students who select $x > 5$ may have interpreted negative as decreasing.

Problem 6a

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: Point B			**Incorrect** choice. Students who select Point E may have interpreted the maximum to be the largest x-coordinate.

Problem 6b

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: Point C			**Incorrect** choice. Students who select Point A may have thought the point closest to the origin represents the lowest height.

Problem 6c

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. *Responses vary.* • From A to B and from C to D. • $0 < t < 1$ and $1.25 < t < 1.5$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect choices** with some correct choices.

Problem 6d			**Standard:** MA.912.F.1.5
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: $10 \leq h(t) \leq 50$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., Bounds are in reverse order (e.g., $50 \leq h(t) \leq 10$).	Response shows **incomplete understanding** with significant errors. E.g., Response uses the range bound instead (e.g., $0 \leq h(t) \leq 2.5$).	Response shows **limited understanding.**

Problem 6e			**Standard:** MA.912.F.1.5
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: *Responses vary.* The range represents the heights at which the roller coaster was above the ground.	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors. E.g., The roller coaster was moving from 10 to 50 minutes.	Response shows **limited understanding.**

Unit 3
Show What You Know PDFs

Name: Date: Period:

Show What You Know

3.01

In the Northern Hemisphere, a year is divided into four seasons.

Rule A takes a season and outputs a date.

Rule B takes a date and outputs a season.

Which rule is a function? Circle one.

Rule A Rule B Both Neither

Explain your thinking.

Rule A	
Input	Output
Spring	May 1
Spring	May 8
Summer	August 5
Fall	October 23
Winter	December 25

Rule B	
Input	Output
May 1	Spring
May 8	Spring
August 5	Summer
October 23	Fall
December 25	Winter

Name: Date: Period:

Show What You Know

3.02

A veterinarian uses the function $p(x)$ to predict the weight, in pounds, of a poodle that is x months old.

What does $p(8) = 40$ mean in this situation?

Name: Date: Period:

Show What You Know

3.03

Determine the domain and range of $y = \sqrt{x - 9}$. Express the domain and range using set-builder notation.

Name: ..... Date: ..... Period: .....

Show What You Know

3.04

Here are some squares and their perimeters.

3 in.

Perimeter: 12 inches

4.5 in.

Perimeter: 18 inches

a Write an equation for $p(x)$ that outputs the perimeter of a square with a side length of x inches.

b What is the value of $p(5)$?

x in.

Perimeter: .....

Name: Date: Period:

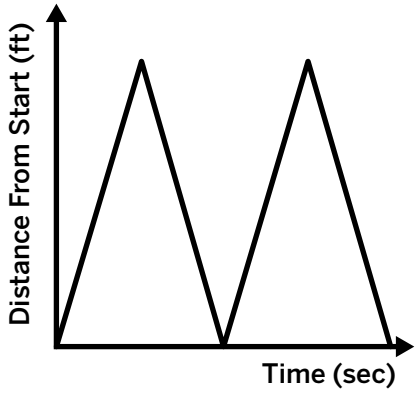
Show What You Know

3.05

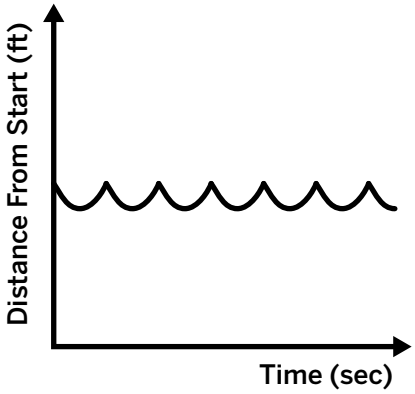
A fish is swimming in a tank. The fish swims away from the front of the tank, then turns around and swims back toward the front of the tank. The fish then swims away from the front of the tank, then turns around and swims back toward the front of the tank.

Select the graph that could represent $d(t)$, the fish's distance from the front of the tank, at time t.

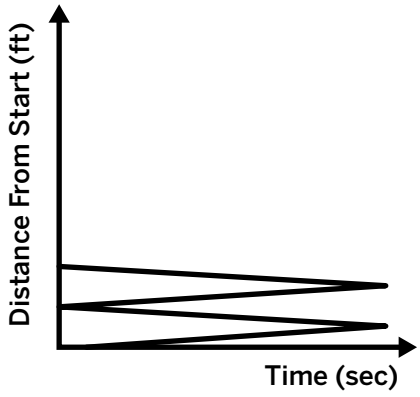
A.



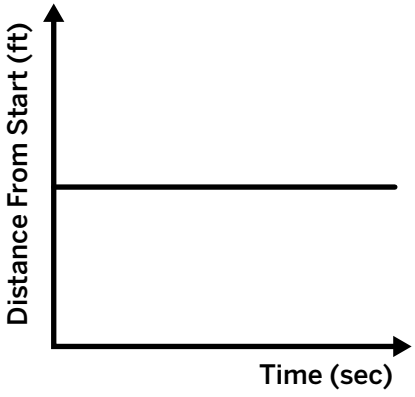
B.



C.



D.



Name: Date: Period:

Show What You Know

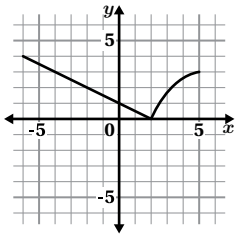
3.06

A function, $f(x)$, has these features:

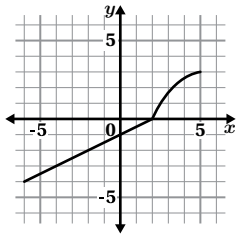
- Minimum is at $(2, 0)$
- Increasing when $x > 2$

Select *all* the graphs that could be $f(x)$.

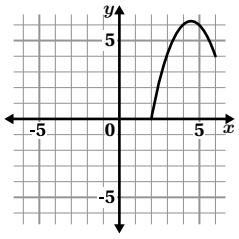
☐ **A.**



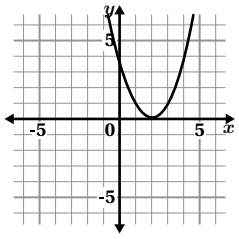
☐ **B.**



☐ **C.**



☐ **D.**



Name: Date: Period:

Show What You Know

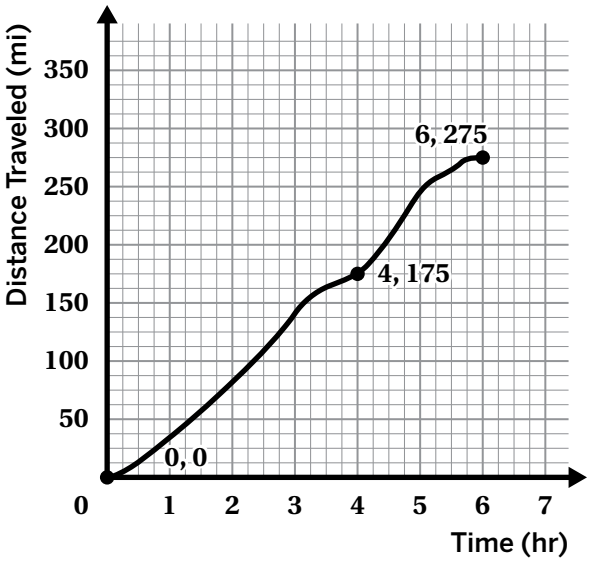
3.07

Eliza's family went on a long road trip.

This graph shows their distance over time.

Determine the average rate of change for each interval.

Interval	Average Rate of Change (mph)
0 to 6 hours	
0 to 4 hours	
4 to 6 hours	



Name: Date: Period:

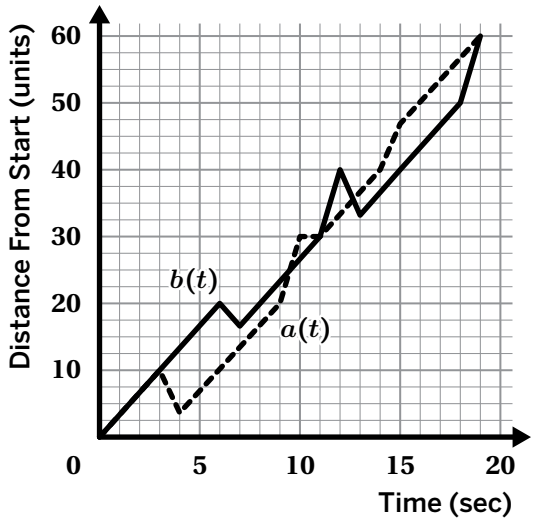
Show What You Know

3.08

$a(t)$ and $b(t)$ give the distance of two racers after t seconds.

Select *all* of the true statements.

- ☐ **A.** $a(2) > b(2)$
- ☐ **B.** $a(t)$ and $b(t)$ have the same maximum.
- ☐ **C.** $b(20) = 6$
- ☐ **D.** $a(5) < b(5)$
- ☐ **E.** $a(t)$ and $b(t)$ are both increasing from 14 to 16 seconds.



Name: Date: Period:

Show What You Know

3.09

To raise money for a trip, members of a high school math club are holding a game night in the gym. They sell tickets for $\$5$ per person. Due to the size of the room, they can sell no more than 250 tickets. The function $f(t) = 5t$ represents the amount of money raised for t tickets sold.

a Select *all* the numbers that are in the domain of $f(t)$.

☐ **A.** -5 ☐ **B.** 1 ☐ **C.** 10.5 ☐ **D.** 207 ☐ **E.** 300

b Describe the domain of $f(t)$.

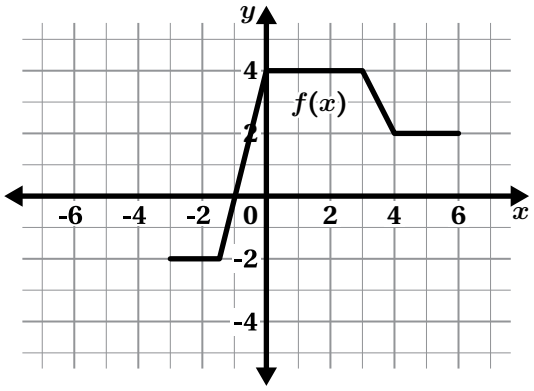
Name: Date: Period:

Show What You Know

3.10

Match the graph of $f(x)$ with its domain and range. Two inequalities will have no match.

$-3 \le x \le 6$	$-2 \le f(x) \le 4$	$-2 \le x \le 4$	$-2 \le f(x) \le 2$



Domain:

Range:

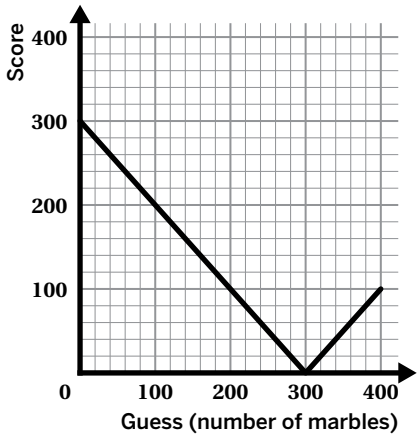
Name: Date: Period:

Show What You Know

3.11

There is a jar of marbles at a carnival, with a prize for guessing the correct number of marbles.

The function $f(x) = |x - 300|$ represents a person's score for a guess of x marbles.



a What is the value of $f(200)$?

b What does $f(200)$ mean in this situation?

Name: Date: Period:

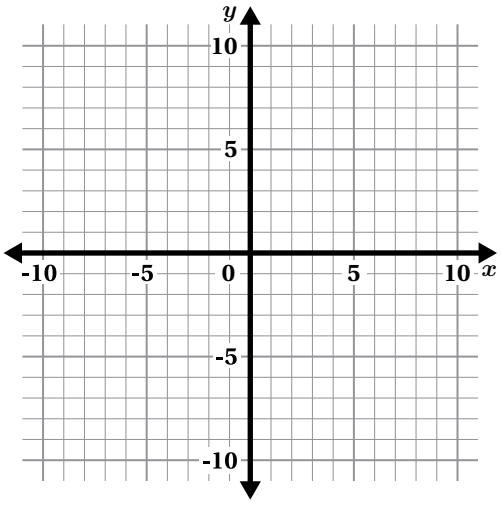
Show What You Know

3.12

Draw a graph of $f(x) = |x + 1| - 4$.

Use the table if it helps with your thinking.

x	$f(x)$



Show What You Know **Lesson 1**

Name: _____ Date: _____ Period: _____

Show What You Know 3.01

In the Northern Hemisphere, a year is divided into four seasons.

Rule A takes a season and outputs a date.

Rule B takes a date and outputs a season.

Which rule is a function? Circle one.

Rule A (Rule B) Both Neither

Explain your thinking.

Explanations vary. **Rule B is a function because each date has exactly one season that it could be matched up with. Rule A is not a function because "Spring" is an input that has many different outputs.**

Rule A

Input	Output
Spring	May 1
Spring	May 8
Summer	August 5
Fall	October 23
Winter	December 25

Rule B

Input	Output
May 1	Spring
May 8	Spring
August 5	Summer
October 23	Fall
December 25	Winter

Show What You Know **Lesson 2**

Name: _____ Date: _____ Period: _____

Show What You Know 3.02

A veterinarian uses the function $p(x)$ to predict the weight, in pounds, of a poodle that is x months old.

What does $p(8) = 40$ mean in this situation?

Responses vary. **The veterinarian predicts that an 8-month-old poodle will weigh 40 pounds.**

Show What You Know **Lesson 3**

Name: _____ Date: _____ Period: _____

Show What You Know 3.03

Determine the domain and range of $y = \sqrt{x - 9}$. Express the domain and range using set-builder notation.

Domain: $\{x \mid x \geq 9\}$

Range: $\{y \mid y \geq 0\}$

Show What You Know **Lesson 4**

Name: _____ Date: _____ Period: _____

Show What You Know 3.04

Here are some squares and their perimeters.

a. Write an equation for $p(x)$ that outputs the perimeter of a square with a side length of x inches.

$p(x) = 4x$ **(or equivalent)**


3 in.

Perimeter: 12 inches


4.5 in.

Perimeter: 18 inches

b. What is the value of $p(5)$?

20


x in.

Perimeter: _____

Show What You Know **Lesson 5**

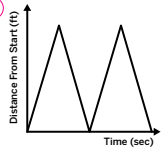
Name: _____ Date: _____ Period: _____

Show What You Know 3.05

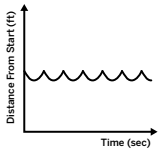
A fish is swimming in a tank. The fish swims away from the front of the tank, then turns around and swims back toward the front of the tank. The fish then swims away from the front of the tank, then turns around and swims back toward the front of the tank.

Select the graph that could represent $d(t)$, the fish's distance from the front of the tank, at time t.

A.



B.



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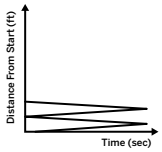
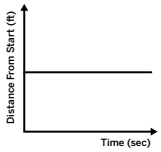


D.



Show What You Know **Lesson 6**

Name: _____ Date: _____ Period: _____

Show What You Know 3.06

A function, $f(x)$, has these features:

- Minimum is at $(2, 0)$
- Increasing when $x > 2$

Select *all* the graphs that could be $f(x)$.

☑ A.

☐ B.

☐ C.

☑ D.

Show What You Know **Lesson 7**

Name: _____ Date: _____ Period: _____

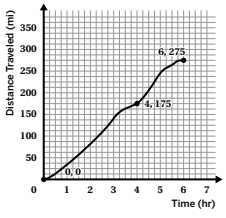
Show What You Know 3.07

Eliza's family went on a long road trip.

This graph shows their distance over time.

Determine the average rate of change for each interval.

Interval	Average Rate of Change (mph)
0 to 6 hours	45.83
0 to 4 hours	43.75
4 to 6 hours	50



Show What You Know **Lesson 8**

Name: _____ Date: _____ Period: _____

Show What You Know 3.08

$a(t)$ and $b(t)$ give the distance of two racers after t seconds.

Select *all* of the true statements.

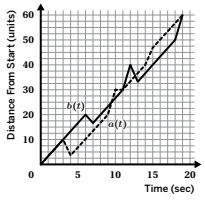
☐ A. $a(2) > b(2)$

☑ B. $a(t)$ and $b(t)$ have the same maximum.

☐ C. $b(20) = 6$

☑ D. $a(5) < b(5)$

☑ E. $a(t)$ and $b(t)$ are both increasing from 14 to 16 seconds.



Show What You Know **Lesson 9**

Name: _____ Date: _____ Period: _____

Show What You Know 3.09

To raise money for a trip, members of a high school math club are holding a game night in the gym. They sell tickets for $5 per person. Due to the size of the room, they can sell no more than 250 tickets. The function $f(t) = 5t$ represents the amount of money raised for t tickets sold.

a. Select *all* the numbers that are in the domain of $f(t)$.

☐ A. -5 ☑ B. 1 ☐ C. 10.5 ☑ D. 207 ☐ E. 300

b. Describe the domain of $f(t)$.

Responses vary. The domain is all whole numbers from 0 to 250.

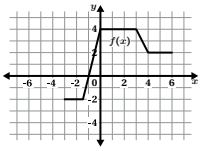
Show What You Know **Lesson 10**

Name: _____ Date: _____ Period: _____

Show What You Know 3.10

Match the graph of $f(x)$ with its domain and range. Two inequalities will have no match.

$-3 \le x \le 6$ $-2 \le f(x) \le 4$ $-2 \le x \le 4$ $-2 \le f(x) \le 2$



Domain: $-3 \le x \le 6$

Range: $-2 \le f(x) \le 4$

Show What You Know **Lesson 11**

Name: _____ Date: _____ Period: _____

Show What You Know 3.11

There is a jar of marbles at a carnival, with a prize for guessing the correct number of marbles.

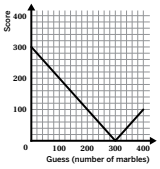
The function $f(x) = |x - 300|$ represents a person's score for a guess of x marbles.

a. What is the value of $f(200)$?

100

b. What does $f(200)$ mean in this situation?

Responses vary. A guess of 200 marbles is 100 off from the correct answer.



Show What You Know **Lesson 12**

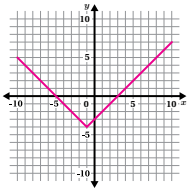
Name: _____ Date: _____ Period: _____

Show What You Know 3.12

Draw a graph of $f(x) = |x + 1| - 4$.

Use the table if it helps with your thinking.

x	$f(x)$



Unit 4
Assessments and Rubrics

Name: ..... Date: ..... Period: .....

Pre-Unit Check

Unit 4

1. Solve each equation.

a $7 + x = 11$

b $15 = 18 - 2x$

c $5(4 + x) = -35$

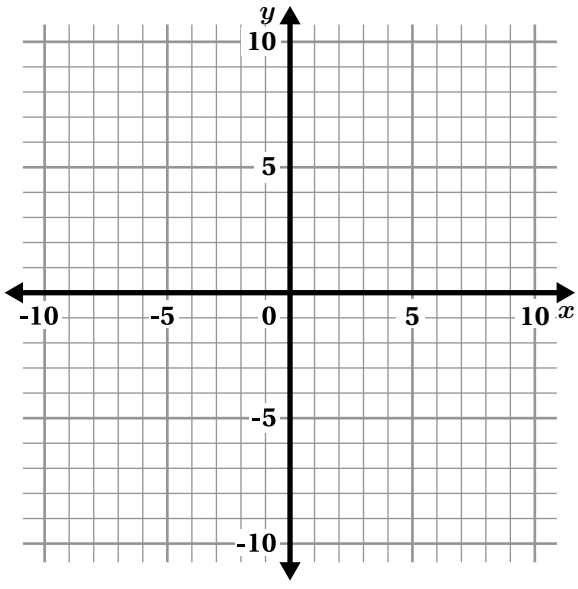
2. Select *all* the equations equivalent to $\frac{1}{2}x - 8 = -3$.

- ☐ **A.** $x = 2.5$
- ☐ **B.** $x - 16 = -3$
- ☐ **C.** $\frac{1}{2}x = 5$
- ☐ **D.** $x - 16 = -6$
- ☐ **E.** $2x - 32 = -12$

3. Graph the line $y = \frac{1}{3}x - 5$.

Use the table if it helps with your thinking.

x	y



Pre-Unit Check (continued)

Unit 4

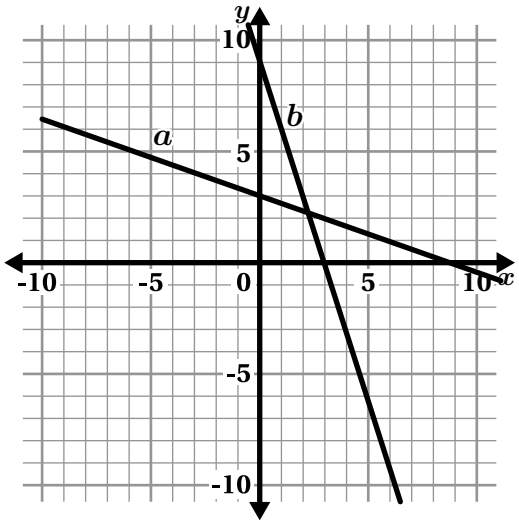
4. Which line represents the equation $3x + y = 9$?

(A.) Line a

(B.) Line b

(C.) Both

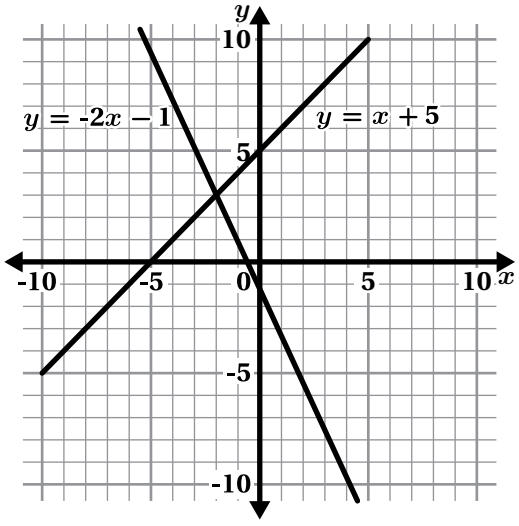
(D.) Neither



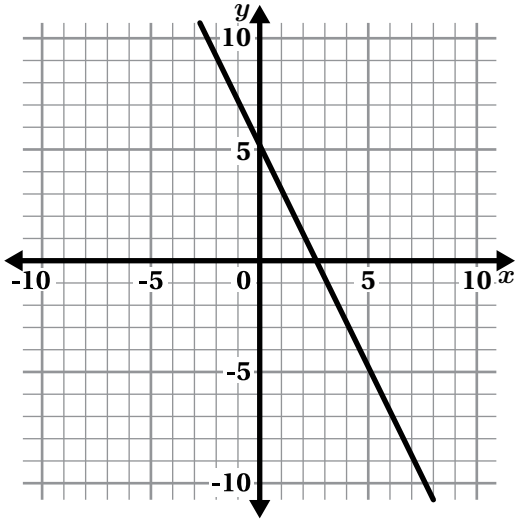
5. This graph shows a system of equations.

What are some things that you know about systems of equations?

Use this graph if it helps with your thinking.



6. Add a line to the graph to create a system of equations that has no solutions.

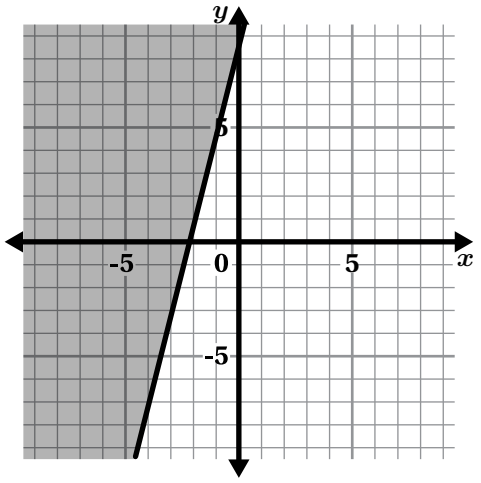


Pre-Unit Check (continued)

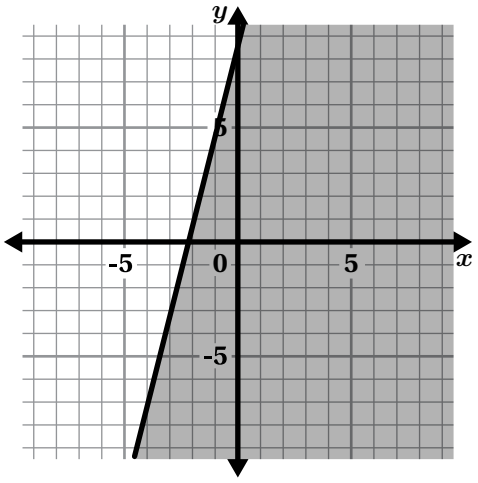
Unit 4

7. Which graph represents all the solutions to $y < 4x + 9$?

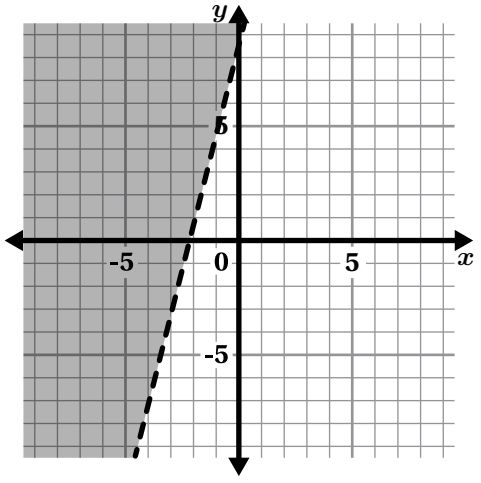
A.



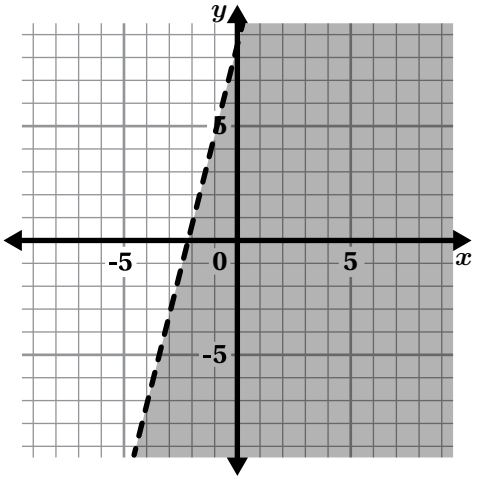
B.



C.



D.



8. Hamza is ordering pizza and sandwiches for his club meeting. He can spend at most $\$55$.

- Pizzas, x, cost $\$12$ each.
- Sandwiches, y, cost $\$7.50$ each.

Write an inequality to represent the number of pizzas and sandwiches Hamza can buy.

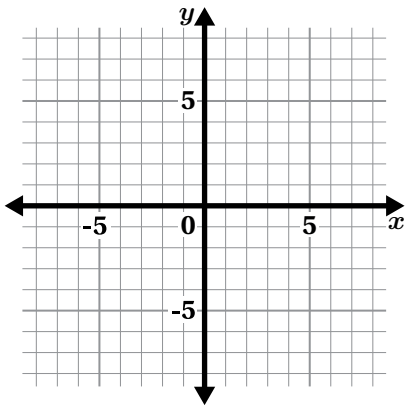
Name: ..... Date: ..... Period: .....

Sub-Unit Quiz

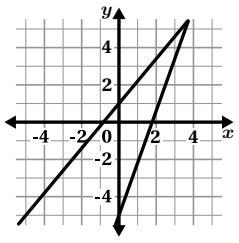
Unit 4

1. Select *all* of the systems of equations that have exactly *one solution*.

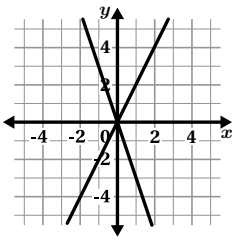
Use the graph if it helps with your thinking.



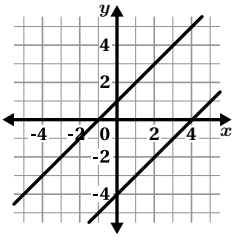
☐ **A.**



☐ **B.**



☐ **C.**



☐ **D.** $y = 5x - 2$
$y = -3x - 2$

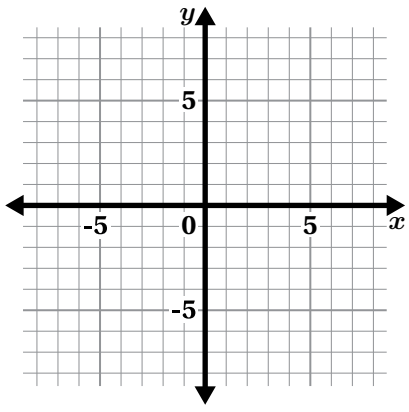
☐ **E.** $y = \frac{3}{2}x + 5$
$y = \frac{3}{2}x - 4$

2. Explain or show how you know that $(2, 3)$ is *not* a solution to this system of equations:

$2x + 4y = 16$

$y = \frac{1}{2}x - 1$

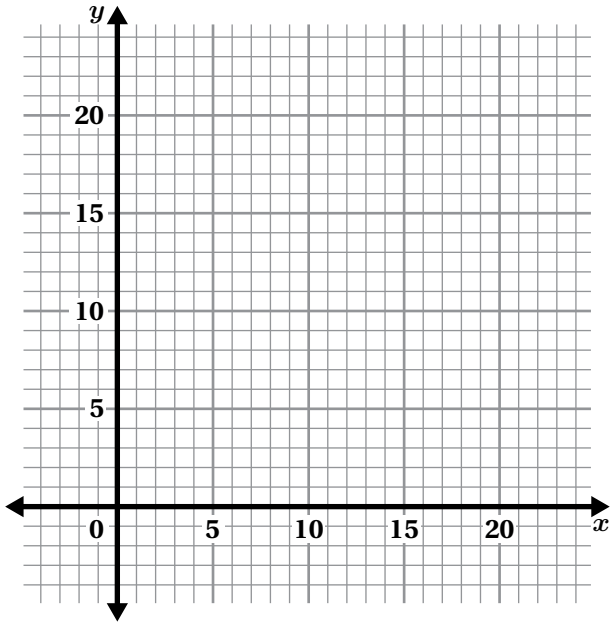
Use the graph if it helps with your thinking.



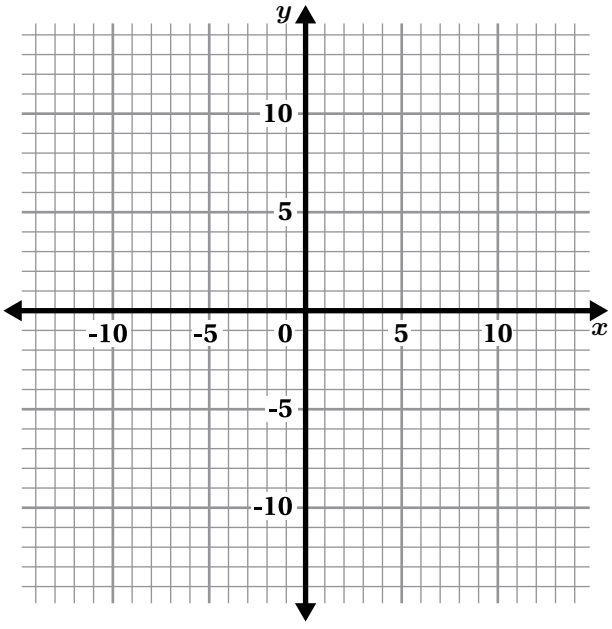
3. Solve each system of equations. Write the solution as an ordered pair.

Use the graphs if they help with your thinking.

a $3x + y = 21$
$3x + 2y = 27$



b $-3x - 3y = 6$
$y = 5x - 14$



Sub-Unit Quiz (continued)

Unit 4

4. Deja and Aniyah each planted a tree at the same time.

- Deja's tree is 1 foot tall and grows 2 feet per year.
- Aniyah's tree is 4 feet tall and grows $\frac{1}{2}$ foot per year.

a Write a system of equations to represent this situation. Use x for the number of years since they planted the tree and y for the tree's height (in feet).

b The solution to a system of equations for this situation is $(2, 5)$. Explain what the solution means in this situation.

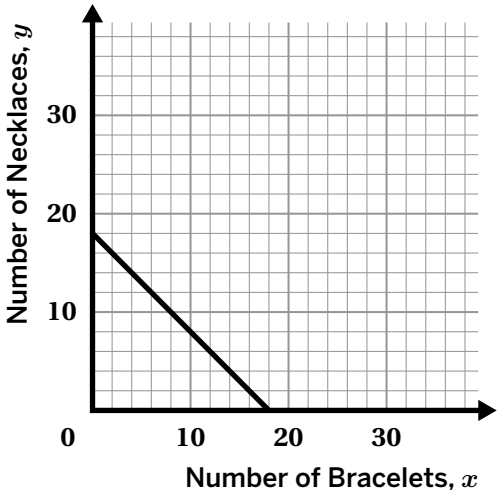
5. Raven wants to make a total of 18 bracelets and necklaces using all 120 of her beads. She will use 10 beads for each necklace and 4 beads for each bracelet.

Raven wrote a system of equations for the number of bracelets, x, and the number of necklaces, y:

$x + y = 18$

$4x + 10y = 120$

a Here is the graph of line $x + y = 18$. Graph the line $4x + 10y = 120$.



b How many bracelets should Raven make?

How many necklaces should Raven make?

Standard	MA.8.AR.4.1	MA.912.AR.2.4	MA.912.AR.9.1
Problem(s)	2	5a	1, 3a, 3b, 4a, 4b, 5b

Problem 1

Standards: MA.912.AR.9.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • A • B • D	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2

Standards: MA.8.AR.4.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Complete explanation. *Explanations vary.* Substituting 2 in place of x and 3 in place of y into $y = \frac{1}{2}x - 1$ doesn't make the equation true, so $(2, 3)$ can't be a solution to the system.	**Minor flaws** in explanation or demonstration. E.g., Response attempts to graph the lines to show that $(2, 3)$ is not a point of intersection, but makes minor graphing errors. E.g., Response reverses the variables when substituting $(2, 3)$ into the equations.	**Incomplete** explanation. E.g., Response substitutes $(2, 3)$ into the first equation but not the second.	**Incorrect** explanation.

Problem 3a

Standards: MA.912.AR.9.1, MTR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(5, 6)$	Response shows **conceptual understanding** with minor errors. E.g., Response correctly solves for both variables using any method, but makes a minor calculation error like a sign error.	Response shows **incomplete understanding** with significant errors. E.g., Response correctly solves for one variable but does not solve for the other variable.	Response shows **limited understanding**.

Problem 3b

Standards: MA.912.AR.9.1, MTR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **(2, -4)**	Response shows **conceptual understanding** with minor errors. E.g., Response correctly solves for both variables using any method, but makes a minor calculation error like a sign error.	Response shows **incomplete understanding** with significant errors. E.g., Response correctly solves for one variable but does not solve for the other variable.	Response shows **limited understanding**.

Problem 4a

Standards: MA.912.AR.9.1, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $y = 1 + 2x$ **(or equivalent)** $y = 4 + \frac{1}{2}x$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. Students who write $y = 1x + 2$ $y = 4x + \frac{1}{2}$ may need support with the relationship between equations and situations.	Response shows **incomplete understanding** with significant errors. E.g., Response correctly writes one equation of the system.	Response shows **limited understanding**.

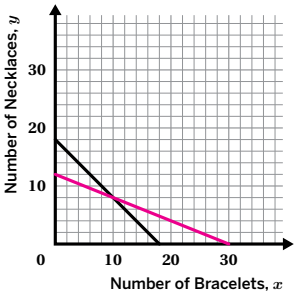
Problem 4b

Standards: MA.912.AR.9.1, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Complete explanation. ***Explanations vary.*** **In 2 years, both Deja's and Aniyah's trees will be 5 feet tall.**	**Minor flaws** in explanation. E.g., Response swaps the interpretations of the values.	**Incomplete** explanation. E.g., Response includes correct interpretation of one value.	**Incorrect** or **no** explanation.

Problem 5a

Standard: MA.912.AR.2.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response:  	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors. E.g., Response graphs one intercept correctly but not the other.	Response shows **limited understanding**.

Problem 5b

Standard: MA.912.AR.9.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **10 bracelets and 8 necklaces**	Response shows **conceptual understanding** with minor errors. E.g., Response swaps the values.	Response shows **incomplete understanding** with significant errors. E.g., Response correctly identifies one value.	Response shows **limited understanding**.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

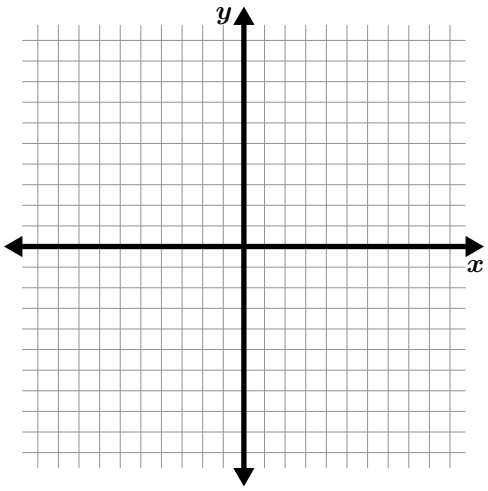
Unit 4

1. What is the solution to this system of equations?

$2x + y = 8$

$y = 3x - 7$

Use the graph if it helps with your thinking.



A. $(1, 6)$

B. $(-7, 8)$

C. $(5, 8)$

D. $(3, 2)$

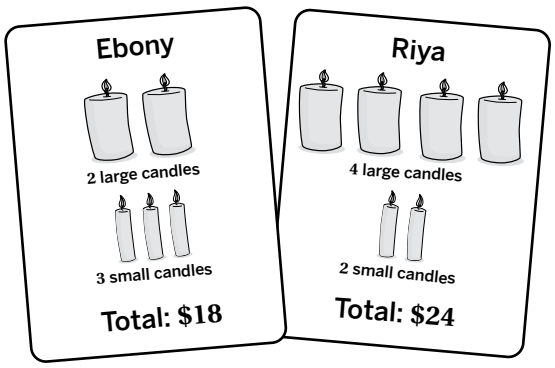
2. One equation in a system is $y = \frac{1}{4}x + 5$. Write another equation to create a system with:

a No solutions

b Infinitely many solutions

3. Ebony and Riya each bought some small and large candles from the same gift shop.

- Use x for the price of each large candle.
- Use y for the price of each small candle.



a Write a system of equations for this situation.

b The solution to a system of equations for this situation is $(4.5, 3)$. Explain what the solution means in this situation.

End-of-Unit Assessment (continued)

Unit 4

4. Victor made a mistake as he started to solve this system of equations:

$5x + 3y = 12$

$2x + y = 5$

Victor

$5x + 3y = 12$

$-3(2x + y = 5)$

$5x + 3y = 12$

$-6x - 3y = 5$

a Show or explain why the work is incorrect.

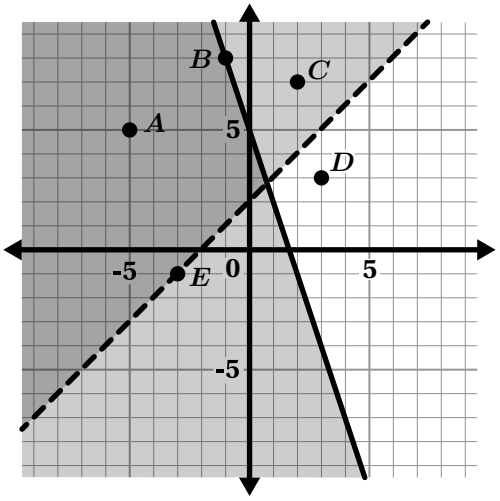
b Describe one thing that Victor did correctly.

c Solve the system of equations. Write the solution as an ordered pair.

5. Here is a system of inequalities and its graph.

$y > x + 2$

$y \leq -3x + 5$



a Select *all* of the labeled points that are in the solution region.

☐ A ☐ B ☐ C ☐ D ☐ E

b Circle a point that is a solution to only *one* of the inequalities.

A B C D E

Explain how you know.

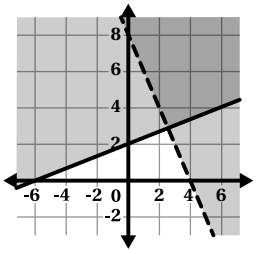
End-of-Unit Assessment (continued)

Unit 4

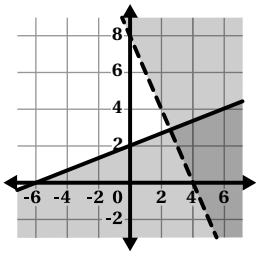
6. Which graph represents this system of inequalities?

$$y \leq \frac{1}{3}x + 2$$
$$4x + 2y > 16$$

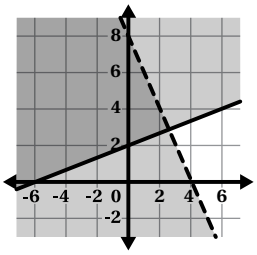
A.



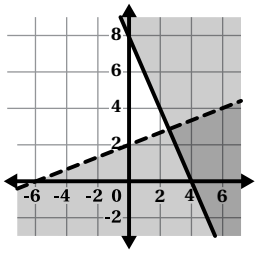
B.



C.



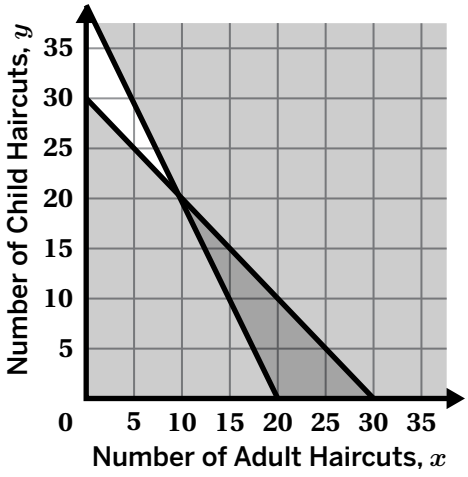
D.



7. A barber can do up to 30 haircuts per week.

- He earns \$18 for each adult haircut, x.
- He earns \$9 for each child haircut, y.

He wants to earn at least \$360 this week.



a Write the coordinates of a point in the solution region.

b Will the barber meet both constraints if he does 5 adult and 25 child haircuts this week?

Explain your thinking.

c Write a system of inequalities to represent this situation.

Standard	MA.912.AR.9.1	MA.912.AR.9.4	MA.912.AR.9.6
Problem(s)	1, 2a, 2b, 3a, 3b, 4a, 4b, 4c	5a, 5b, 6	7a, 7b, 7c

Problem 1

Standards: MA.912.AR.9.1, MTR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(3, 2)$			**Incorrect** choices. Students who select $(1, 6)$ may have substituted the values into the first equation but not the second.

Problem 2a

Standards: MA.912.AR.9.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* Slope is equivalent to $\frac{1}{4}$ and y-intercept is not 5. • $y = \frac{1}{4}x + 3$ • $y = \frac{1}{4}x$	Response shows **conceptual understanding** with minor errors. Students who write "parallel" or "same slope and different y-intercept" may have accurately described the correct equation.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 2b

Standards: MA.912.AR.9.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* Slope is equivalent to $\frac{1}{4}$ and y-intercept is equal to 5. • $y = \frac{1}{4}x + 5$ • $4y = x + 20$	Response shows **conceptual understanding** with minor errors. Students who write "same slope and y-intercept" may have accurately described the equation.	Response shows **incomplete understanding** with significant errors. Students who write "same line" may understand the relationship between lines and solutions in a system of equations.	Response shows **limited understanding**.

Problem 3a			**Standards:** MA.912.AR.9.1, MTR.6.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: $2x + 3y = 18$ (or equivalent) $4x + 2y = 24$ (or equivalent)	Response shows **conceptual understanding** with minor errors. Students who write $2y + 3x = 18$ $4y + 2x = 24$ may have swapped the variables.	Response shows **incomplete understanding** with significant errors. E.g., Student correctly writes one equation in the system.	Response shows **limited understanding**.

Problem 3b			**Standards:** MA.912.AR.9.1, MTR.6.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Complete explanation. *Explanations vary.* The price of a large candle is \$4.50 and a small candle is \$3.	**Minor flaws** in explanation. E.g., Response swaps the interpretations of the values.	**Incomplete** explanation. E.g., Response includes correct interpretation for one value.	**Incorrect** or **no** explanation.

Problem 4a			**Standards:** MA.912.AR.9.1, MTR.4.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Complete explanation. *Responses vary.* Victor did not multiply -3 to the right side of the equation $2x + y = 5$. His new equation is not equivalent to the original one.	**Minor flaws** in explanation. E.g., Response mentions missing multiplying 5, but doesn't state that the new equation is not equivalent.	**Incomplete** explanation. E.g., Response states "Victor multiplied wrong."	**Incorrect** or **no** explanation.

Problem 4b

Standards: MA.912.AR.9.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* Victor chose to multiply by -3, which will make the y-terms opposites, which will get the system of equations ready for elimination.	Response shows **conceptual understanding** with minor errors. E.g., Response states, "He multiplied by -3."	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 4c

Standard: MA.912.AR.9.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(3, -1)$	Response shows **conceptual understanding** with minor errors. E.g., Response correctly solves for both variables using any method but makes a minor calculation error, such as a sign error.	Response shows **incomplete understanding** with significant errors. E.g., Response correctly solves for one variable but does not solve for the other variable.	Response shows **limited understanding.**

Problem 5a

Standard: MA.912.AR.9.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • A • B	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 5b			**Standard:** MA.912.AR.9.4
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response and **complete** explanation. **C or E. *Explanations vary.* Point C is only in one shaded region.**	**Correct** response with **minor flaws** in explanation. E.g., Response does not specify that the point is in only one shaded region or does not mention that a point that lies on a dashed boundary line is not considered a solution. **Incorrect** response with logical and **complete explanation.**	**Correct** response with **incomplete** explanation. **Incorrect** response with explanation that shows **partial understanding.**	**Incorrect** response with **no** explanation.

Problem 6			**Standards:** MA.912.AR.9.4, MTR.3.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: **B**			**Incorrect** choice.

Problem 7a			**Standard:** MA.912.AR.9.6
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: ***Responses vary.* Coordinate point is in the solution region.** **$(20, 5)$**	Response shows **conceptual understanding** with minor errors. E.g., Response shows a correct answer on the graph, but switches the x and y in the ordered pair.	Response shows **incomplete understanding** with significant errors. E.g., Response identifies a point in just one shaded region.	Response shows **limited understanding**.

Problem 7b			**Standards:** MA.912.AR.9.6, MTR.6.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response and **complete** explanation. **No. *Explanations vary.* $(5, 25)$ is not in the solution region for both inequalities.**	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation.** Students who select "Yes" and state that the solution is in the solution region may have swapped the variables.	**Correct** response with **incomplete** explanation. E.g., Response includes "No" with no explanation. **Incorrect** response with explanation that shows **partial understanding.**	**Incorrect** response with **no** explanation.

Problem 7c			**Standards:** MA.912.AR.9.6, MTR.6.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: **$x + y \leq 30$ (or equivalent)** **$18x + 9y \geq 360$ (or equivalent)**	Response shows **conceptual understanding** with minor errors. E.g., Response swaps the variables or has non-inclusive inequality symbols.	Response shows **incomplete understanding** with significant errors. E.g., Response has the incorrect direction for the inequality symbols.	Response shows **limited understanding.**

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

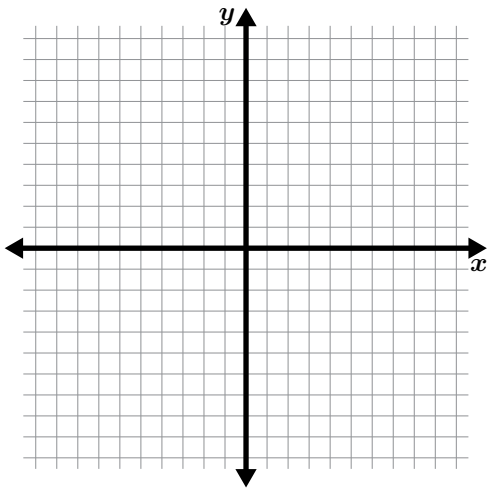
Unit 4

1. What is the solution to this system of equations?

$y = -2x + 1$

$-3x + y = 6$

Use the graph if it helps with your thinking.



A. $(2, 7)$

B. $(1, 9)$

C. $(-1, 3)$

D. $(5, -9)$

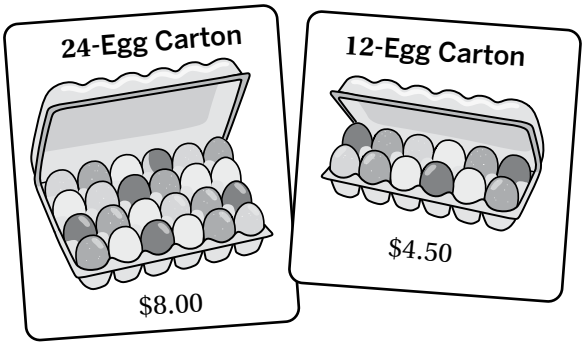
2. One equation in a system is $y = -\frac{1}{2}x + 5$. Write another equation to create a system with:

a Infinitely many solutions

b No solutions

3. A local farm sells 12-egg cartons for $\$4.50$ and 24-egg cartons for $\$8$. The farmer has 408 eggs to place in these cartons and hopes to make $\$138$.

- Use x for the number of 12-egg cartons.
- Use y for the number of 24-egg cartons.



a Write a system of equations for this situation.

b The solution to a system of equations for this situation is $(4, 15)$. Explain what the solution means in this situation.

End-of-Unit Assessment (continued)

Unit 4

4. Matias made a mistake as he started to solve this system of equations:

$2x - 3y = -6$

$x + 4y = 19$

Matias

$2x - 3y = -6$

$2(x + 4y = 19)$

$2x - 3y = -6$

$2x + 8y = 38$

$5y = 32$

a Show or explain why the work is incorrect.

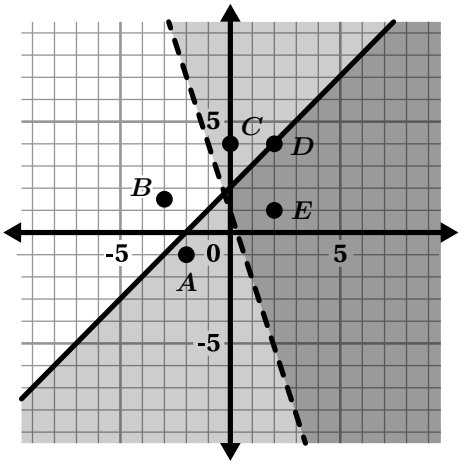
b Describe one thing that Matias did correctly.

c Solve the system of equations. Write the solution as an ordered pair.

5. Here is a system of inequalities and its graph.

$y \leq x + 2$

$y > -3x + 1$



a Select *all* of the labeled points that are in the solution region.

☐ A ☐ B ☐ C ☐ D ☐ E

b Circle a point that is *not* a solution to any of the inequalities.

A B C D E

Explain how you know.

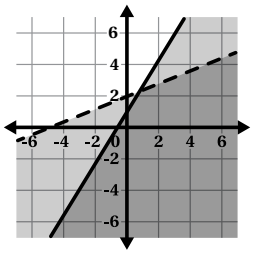
End-of-Unit Assessment (continued)

Unit 4

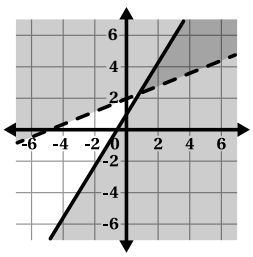
6. Which graph represents this system of inequalities?

$$-3x + 2y \leq 2$$
$$y < \frac{2}{5}x + 2$$

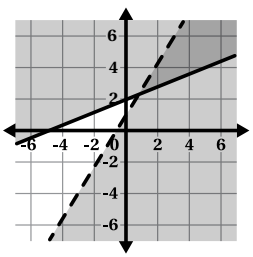
A.



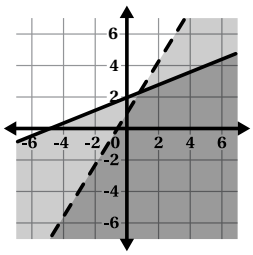
B.



C.



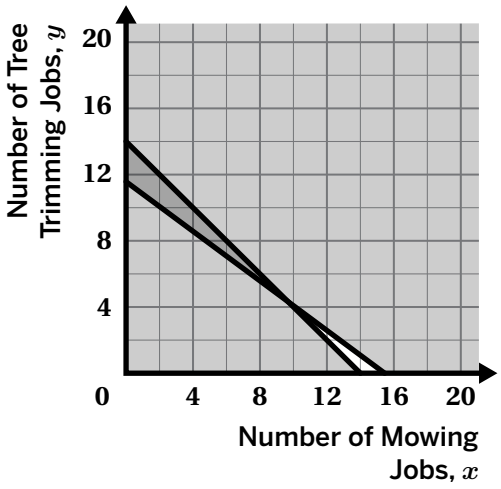
D.



7. A landscaper can do up to 14 jobs per week.

- She earns \$60 for each mowing job, x.
- She earns \$80 for each tree-trimming job, y.

She wants to earn at least \$940 this week.



a Write the coordinates of one point in the solution region.

b Will the landscaper meet both constraints if she does 4 mowing jobs and 9 tree-trimming jobs this week?

Explain your thinking.

c Write a system of inequalities to represent this situation.

Standard	MA.912.AR.9.1	MA.912.AR.9.4	MA.912.AR.9.6
Problem(s)	1, 2a, 2b, 3a, 3b, 4a, 4b, 4c	5a, 5b, 6	7a, 7b, 7c

Problem 1

Standards: MA.912.AR.9.1, MTR.2.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(-1, 3)$			**Incorrect** choice. Students who select $(5, -9)$ may have substituted the values into the first equation but not the second.

Problem 2a

Standards: MA.912.AR.9.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* Slope is equivalent to $-\frac{1}{2}$ and y-intercept is equal to 5. • $y = -\frac{1}{2}x + 5$ • $2y = -x + 10$	Response shows **conceptual understanding** with minor errors. Students who write "same line" or "same slope and same y-intercept" may have accurately described the correct equation.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 2b

Standards: MA.912.AR.9.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* Slope is equivalent to $-\frac{1}{2}$ and y-intercept is not 5. • $y = -\frac{1}{2}x + 10$ • $y = -\frac{1}{2}x$	Response shows **conceptual understanding** with minor errors. Students who write "parallel" or "same slope and different y-intercept" may have accurately described the equation.	Response shows **incomplete understanding** with significant errors. Students who write "same line" may understand the relationship between lines and solutions in a system of equations.	Response shows **limited understanding**.

Problem 3a

Standards: MA.912.AR.9.1, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $12x + 24y = 408$ (or equivalent) $4.5x + 8y = 138$ (or equivalent)	Response shows **conceptual understanding** with minor errors. Students who write $12y + 24x = 408$ and $4.5y + 8x = 138$ may have swapped the variables.	Response shows **incomplete understanding** with significant errors. E.g., Student correctly writes one equation in the system.	Response shows **limited understanding.**

Problem 3b

Standards: MA.912.AR.9.1, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. *Explanations vary.* The farmer needs to package the eggs into four 12-egg cartons and fifteen 24-egg cartons.	**Minor flaws** in explanation. E.g., Response swaps the interpretations of the values.	**Incomplete** explanation. E.g., Response includes correct interpretation for one value.	**Incorrect** response with **no** explanation.

Problem 4a

Standards: MA.912.AR.9.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. *Responses vary.* Matias subtracted $2x$ from the first equation but did not subtract $8y$ or 38.	**Minor flaws** in explanation. E.g., Response states, "Matias subtracted and added at the same time."	**Incomplete** explanation. E.g., Response states, "Matias subtracted wrong."	**Incorrect** response with **no** explanation.

Problem 4b

Standards: MA.912.AR.9.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* Matias chose to multiply by 2, which will make the x-terms the same, which will get the system of equations ready for elimination.	Response shows **conceptual understanding** with minor errors. E.g., Response states, "He multiplied by 2."	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding.**

Problem 4c

Standard: MA.912.AR.9.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(3, 4)$	Response shows **conceptual understanding** with minor errors. E.g., Response correctly solves for both variables using any method but makes a minor calculation error, such as a sign error.	Response shows **incomplete understanding** with significant errors. E.g., Response correctly solves for one variable but does not solve for the other variable.	Response shows **limited understanding.**

Problem 5a

Standard: MA.912.AR.9.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • D • E	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 5b			**Standard:** MA.912.AR.9.4
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response and **complete** explanation. B. ***Explanations vary.*** **Point B is not in any of the shaded regions.**	**Incorrect** response with logical and **complete explanation.**	**Correct** response with **incomplete** explanation. E.g., Students who select A, B, and C may explain that those points are not in the shaded solution region.	**Incorrect** response with no explanation.

Problem 6			**Standards:** MA.912.AR.9.4, MTR.3.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: A			**Incorrect** choice.

Problem 7a			**Standard:** MA.912.AR.9.6
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: ***Responses vary.*** **Coordinate point is in the solution region.** **$(2, 11)$**	Response shows **conceptual understanding** with minor errors. E.g., Response shows a correct answer on the graph, but switches the x and y in the ordered pair.	Response shows **incomplete understanding** with significant errors. E.g., Response identifies a point in just one shaded region.	Response shows **limited understanding for consistency**.

Problem 7b			**Standards:** MA.912.AR.9.6, MTR.6.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response and **complete** explanation. **Yes. *Explanations vary.* (4, 9) is in the solution region.**	**Correct** response with **minor flaws** in explanation. E.g., Response swaps the variables or has non-inclusive inequality symbols. **Incorrect** response with logical and **complete explanation.**	**Correct** response with **incomplete** explanation. E.g., Response is "Yes" with no explanation.	**Incorrect** response with **no** explanation.

Problem 7c			**Standards:** MA.912.AR.9.6, MTR.6.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: **$60x + 80y \geq 940$ (or equivalent)** **$x + y \leq 14$ (or equivalent)**	Response shows **conceptual understanding** with minor errors. E.g., Response swaps the variables or has non-inclusive inequality symbols.	Response shows **incomplete understanding** with significant errors. E.g., Response has the incorrect direction of the inequality symbols.	Response shows **limited understanding.**

Unit 4
Show What You Know PDFs

Name: ..... Date: ..... Period: .....

Show What You Know

4.01

Determine the solution to this system of equations.

$2x + 2y = 9$

$8x - 2y = 16$

$x =$ ....., $y =$ .....

Name: ..... Date: ..... Period: .....

Show What You Know

4.02

Solve the system of equations.

$2x - y = 1$

$-x + 5y = -5$

$x =$ ....., $y =$ .....

Name: ..... Date: ..... Period: .....

Show What You Know

4.03

Determine the solution to this system of equations.

$y = 4x - 45$

$6x + 2y = 78$

$x =$ ....., $y =$ .....

Name: ..... Date: ..... Period: .....

Show What You Know

4.04

Here is a system of equations:

$y = -5x + 7$

$y = -2x + 7$

Circle the number of solutions for this system of equations. Determine the solution if the system of equations has one solution.

No solution One solution Infinitely many solutions

(....., ...)

Name: Date: Period:

Show What You Know

4.05

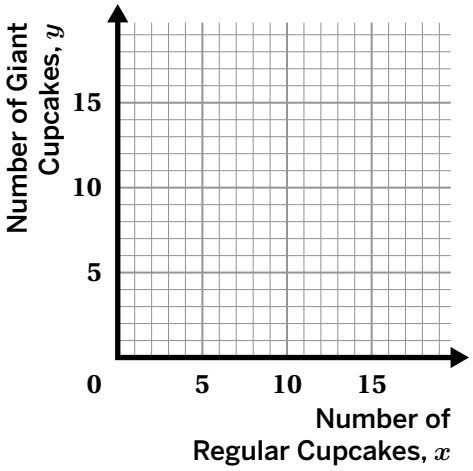
Ama has 8 cups of batter and wants to bake 10 cupcakes. A regular cupcake requires 0.5 cups of batter and a giant cupcake requires 2 cups of batter.

Here is a system of equations representing this situation.

- x is the number of regular cupcakes.
- y is the number of giant cupcakes.

$$x + y = 10$$
$$0.5x + 2y = 8$$

a Solve the system of equations graphically *or* symbolically.



b What does the solution to the system represent about Ama's baking project?

Name: Date: Period:

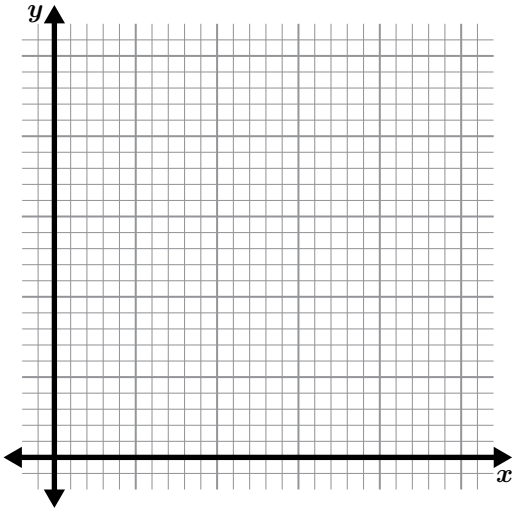
Show What You Know

4.06

A school has two types of tables: round tables with 6 seats and rectangular tables with 8 seats. For a fundraising event, they filled the gym with 25 tables, for a total of 190 seats.

a Write a system of equations to determine how many round tables, x, and how many rectangular tables, y, were used for the fundraising event.

b Solve your system of equations using any strategy. Show your thinking.



Name: Date: Period:

Show What You Know

4.07

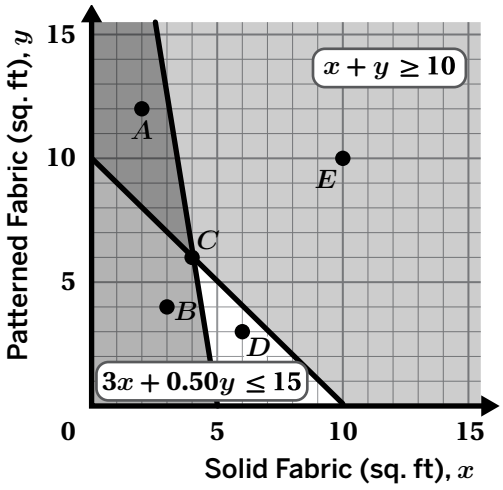
Juana is making a quilt that is at least 10 square feet using two fabrics that cost no more than \$15 total.

- Solid fabric costs \$3 per sq. ft.
- Patterned fabric costs \$0.50 per sq. ft.

She graphed these inequalities for this situation:

$x + y \geq 10$

$3x + 0.50y \leq 15$



Select *all* the points that are solutions to this system of inequalities.

- ☐ **A.** Point A: $(2, 12)$
- ☐ **B.** Point B: $(3, 4)$
- ☐ **C.** Point C: $(4, 6)$
- ☐ **D.** Point D: $(6, 3)$
- ☐ **E.** Point E: $(10, 10)$

Name: Date: Period:

Show What You Know

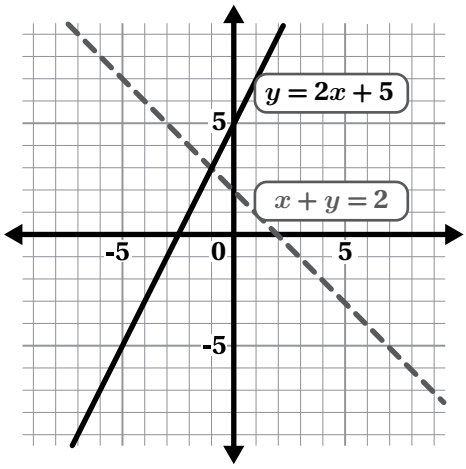
4.08

This graph shows the boundary lines and equations for this system of inequalities.

$x + y > 2$

$y \geq 2x + 5$

Plot a point in the solution region.



Name: Date: Period:

Show What You Know

4.09

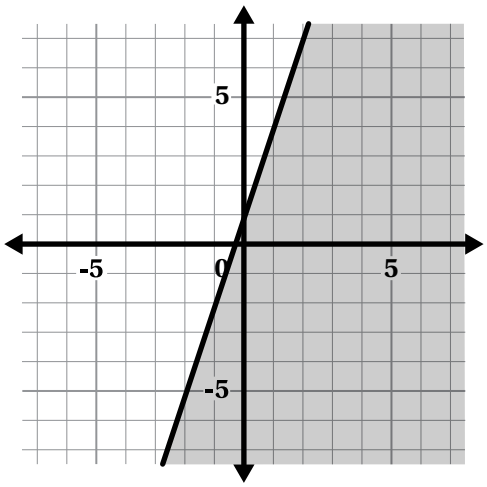
Here is a system of inequalities:

$y \leq 3x + 1$

$y < -\frac{1}{2}x + 4$

a Here is the graph of $y \leq 3x + 1$.

Graph the inequality $y < -\frac{1}{2}x + 4$.



b Highlight the solution region on the graph.

Name: Date: Period:

Show What You Know

4.10

There is an organization that provides at least 525 meals per day to the community. Based on data from the past month, the organization has calculated that it takes about 4 minutes to make a vegetarian meal and 7 minutes to make a non-vegetarian meal. The employees who make the meals work no more than a total of 48 hours ($2{,}880$ minutes) per day combined.

a Write a system of inequalities to represent these constraints. Let x represent the number of vegetarian meals, and let y represent the number of non-vegetarian meals.

b What questions do you have about providing meals for your community?

Show What You Know **Lesson 1**

Name: _____ Date: _____ Period: _____

Show What You Know 4.01

Determine the solution to this system of equations.

$2x + 2y = 9$

$8x - 2y = 16$

$x =$ 2.5, $y =$ 2

Algebra 1 191

Show What You Know **Lesson 2**

Name: _____ Date: _____ Period: _____

Show What You Know 4.02

Solve the system of equations.

$2x - y = 1$

$-x + 5y = -5$

$x =$ 0, $y =$ 1

Algebra 1 192

Show What You Know **Lesson 3**

Name: _____ Date: _____ Period: _____

Show What You Know 4.03

Determine the solution to this system of equations.

$y = 4x - 45$

$6x + 2y = 78$

$x =$ 12, $y =$ 3

Algebra 1 193

Show What You Know **Lesson 4**

Name: _____ Date: _____ Period: _____

Show What You Know 4.04

Here is a system of equations:

$y = -5x + 7$

$y = -2x + 7$

Circle the number of solutions for this system of equations. Determine the solution if the system of equations has one solution.

No solution (One solution) Infinitely many solutions

(0, 7)

Algebra 1 194

Show What You Know **Lesson 5**

Name: _____ Date: _____ Period: _____

Show What You Know 4.05

Ama has 8 cups of batter and wants to bake 10 cupcakes. A regular cupcake requires 0.5 cups of batter and a giant cupcake requires 2 cups of batter.

Here is a system of equations representing this situation.

- x is the number of regular cupcakes.
- y is the number of giant cupcakes.

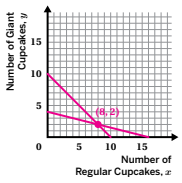
$x + y = 10$
$0.5x + 2y = 8$

a. Solve the system of equations graphically or symbolically. *Responses vary.*

$-0.5(x + y = 10)$
$+ 0.5x + 2y = 8$

$1.5y = 3$
$y = 2$

$x + (2) = 10$
$x = 8$



b. What does the solution to the system represent about Ama's baking project?
Responses vary. Ama has enough batter to make 8 regular cupcakes and 2 giant cupcakes.

Show What You Know **Lesson 6**

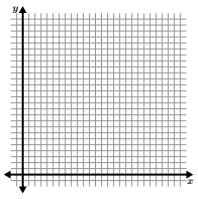
Name: _____ Date: _____ Period: _____

Show What You Know 4.06

A school has two types of tables: round tables with 6 seats and rectangular tables with 8 seats. For a fundraising event, they filled the gym with 25 tables, for a total of 190 seats.

a. Write a system of equations to determine how many round tables, x, and how many rectangular tables, y, were used for the fundraising event.
$x + y = 25$
$6x + 8y = 190$

b. Solve your system of equations using any strategy. Show your thinking.
$x = 5$ and $y = 20$



Show What You Know **Lesson 7**

Name: _____ Date: _____ Period: _____

Show What You Know 4.07

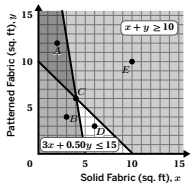
Juana is making a quilt that is at least 10 square feet using two fabrics that cost no more than $15 total.

- Solid fabric costs $3 per sq. ft.
- Patterned fabric costs $0.50 per sq. ft.

She graphed these inequalities for this situation:

$x + y \geq 10$

$3x + 0.50y \leq 15$



Select *all* the points that are solutions to this system of inequalities.

- ☑ **A.** Point A: (2, 12)
- ☐ **B.** Point B: (3, 4)
- ☑ **C.** Point C: (4, 6)
- ☐ **D.** Point D: (6, 3)
- ☐ **E.** Point E: (10, 10)

Show What You Know **Lesson 8**

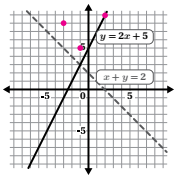
Name: _____ Date: _____ Period: _____

Show What You Know 4.08

This graph shows the boundary lines and equations for this system of inequalities.

$x + y > 2$
$y \geq 2x + 5$

Plot a point in the solution region.
Points vary.



Show What You Know **Lesson 9**

Name: _____ Date: _____ Period: _____

Show What You Know 4.09

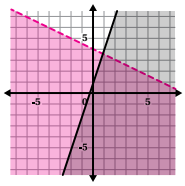
Here is a system of inequalities:

$y \leq 3x + 1$

$y < -\frac{1}{2}x + 4$

a. Here is the graph of $y \leq 3x + 1$.

Graph the inequality $y < -\frac{1}{2}x + 4$.



b. Highlight the solution region on the graph.

Show What You Know **Lesson 10**

Name: _____ Date: _____ Period: _____

Show What You Know 4.10

There is an organization that provides at least 525 meals per day to the community. Based on data from the past month, the organization has calculated that it takes about 4 minutes to make a vegetarian meal and 7 minutes to make a non-vegetarian meal. The employees who make the meals work no more than a total of 48 hours (2,880 minutes) per day combined.

a. Write a system of inequalities to represent these constraints. Let x represent the number of vegetarian meals, and let y represent the number of non-vegetarian meals.

$x + y \geq 525$

$4x + 7y \leq 2880$

b. What questions do you have about providing meals for your community?

Responses vary.

- I wonder if there are organizations in my community that serve free meals.
- Are there ways I can help provide meals in my community?

Unit 5
Assessments and Rubrics

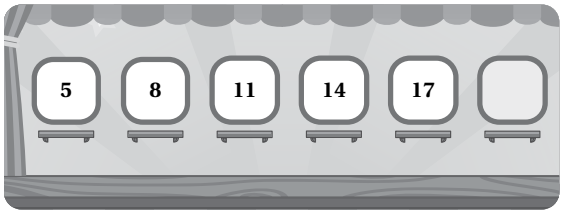
Name: ..... Date: ..... Period: .....

Pre-Unit Check

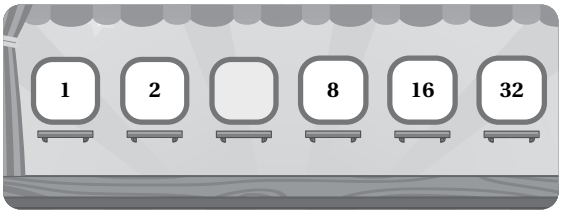
Unit 5

1. Each sequence follows a pattern and has a missing term. Write the missing term for each sequence.

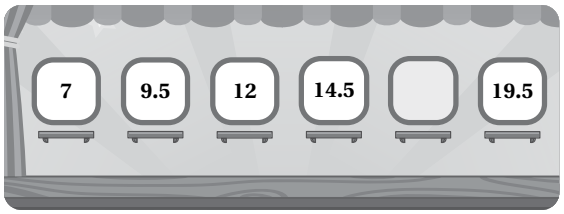
Sequence A



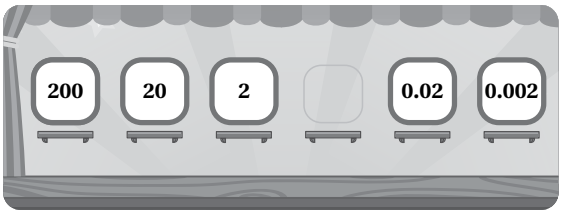
Sequence B



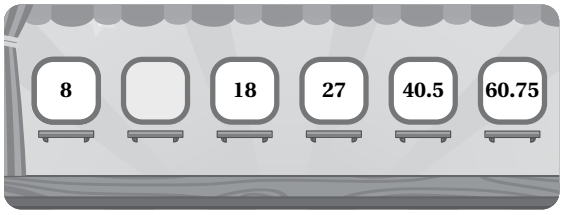
Sequence C



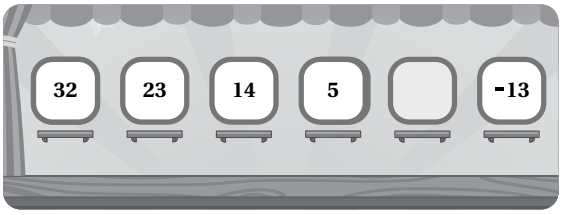
Sequence D



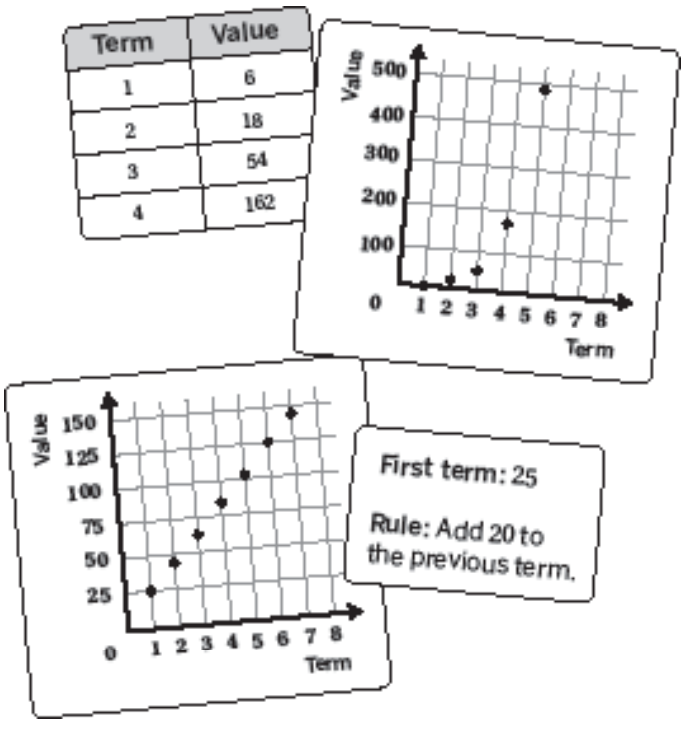
Sequence E



Sequence F



2. How can you decide whether a sequence has a constant difference, constant ratio, or neither?



Pre-Unit Check (continued)

3. Match each representation with a description.

Card A

Term	Value
0	80
1	240
2	720
3	2160
4	6480

Card B

Term	Value
0	80
1	83
2	86
3	89
4	92

Card C

$y = 80 \cdot 3^x$

Card D

$y = 80 + 3x$

Card E

$y = 80 + 3 + 3 + 3 + \ldots$

Card F

$y = 80 \cdot 3 \cdot 3 \cdot 3 \cdot \ldots$

A pond has 80 fish. The number of fish multiplies by 3 each year.	A tank has 80 gallons of water and fills by 3 gallons each minute.

4. The population of frogs in a lake is represented by the explicit expression $8 \cdot 3^t$, where t is the number of years since they were first counted.

a Explain what the 8 and the 3 represent in this situation.

The 8 represents. . .

The 3 represents. . .

b How many frogs are predicted 2 years after they were first counted?

Pre-Unit Check (continued)

5. Complete the table.

Exponent Form		5^2	5^1	5^0		5^{-2}	5^{-3}
Expanded Form	$5 \cdot 5 \cdot 5$	$5 \cdot 5$	5		$\frac{1}{5}$		

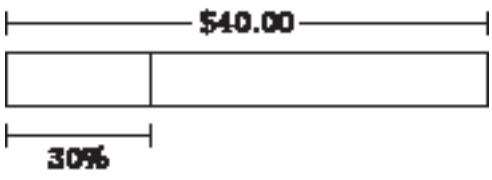
6. The expressions in each row are equivalent. Write a third equivalent expression in each row.

Expression 1	Expression 2	Expression 3
$3^2 \cdot 3 \cdot 3 \cdot 3$	3^5	
20^3	$5 \cdot 5 \cdot 5 \cdot 4 \cdot 4 \cdot 4$	
$\frac{(5 \cdot 5 \cdot 5)}{5 \cdot 5 \cdot 5}$	5^0	
5^{18}	$(5^3)^6$	
2^{-3}	$\frac{1}{2 \cdot 2 \cdot 2}$	

7. Ada and Bao run a clothing store. When they sell a T-shirt, 30% of the total price goes to running the store.

How much money goes to running the store when they sell a $40 T-shirt?

Use the tape diagram if it helps with your thinking.

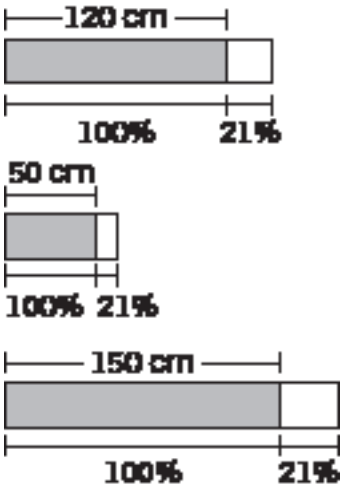


Pre-Unit Check (continued)

Unit 5

8. Each new rectangle is 21% longer than the original. Complete the table with the length of each new rectangle.

Original Rectangle Length (cm)	Length After 21% Increase (cm)
120	
50	
150	



9. Match the expressions with a description. You will have one expression left over.

In each expression, b represents the original value.

Expressions

$1.12b$	$0.12b$	$0.88b$	$1b + 0.12b$
$(1 + 0.12)b$	$(1 - 0.88)b$	$1b - 0.88b$	

An Increase of 12%	A Decrease of 88%	Neither

Name: ..... Date: ..... Period: .....

Sub-Unit Quiz

Unit 5

1. Select *all* of the exponential functions.

☐ **A.**

x	$f(x)$
-1	18
0	12
1	8
2	$5\frac{1}{3}$

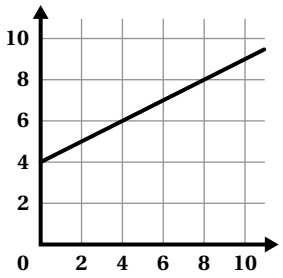
☐ **B.**

x	$f(x)$
-1	2
0	5
1	10
2	17

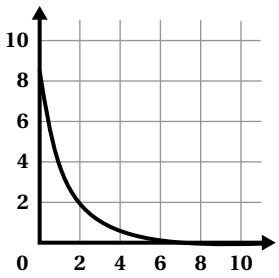
☐ **C.**

x	$f(x)$
-1	2
0	4
1	8
2	16

☐ **D.**



☐ **E.**



2. The population of a city increases by 6% every year. Its population today is 450,000.

Which expression represents its population in 3 years?

(A.) $450000 \cdot (0.06)^3$

(B.) $450000 \cdot (1.06)$

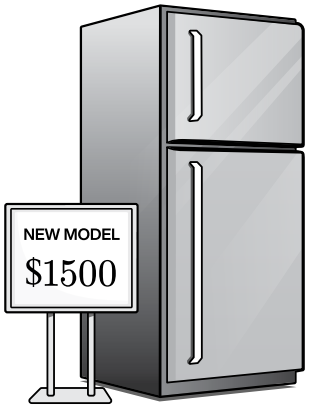
(C.) $450000 \cdot (1 + 0.06^3)$

(D.) $450000 \cdot (1.06)^3$

Sub-Unit Quiz (continued)

Unit 5

3. A new refrigerator costs $\$1{,}500$. The value of the refrigerator will decrease 40% each year.

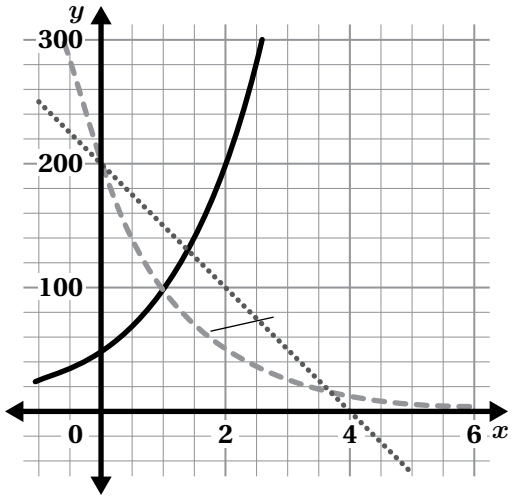


a Write an equation to represent this relationship.

- Use x to represent the time in years.
- Use $r(x)$ to represent the value of the refrigerator.

b Determine the value of the refrigerator after 5 years.

4. Here is a graph with three functions.



a Label each graph with its function.

- $a(x) = 200 \cdot 0.5^x$
- $b(x) = 200 - 50x$
- $c(x) = 50 \cdot 2^x$

b Explain your thinking.

5. In 1995, wolves were reintroduced to Yellowstone National Park.

The function $w(x) = 14 \cdot 1.08^x$ models the number of wolves, w, in the years since 1995, x.

a Select *all* the true statements.

- ☐ **A.** There were 8 wolves in 1995.
- ☐ **B.** There were 14 wolves in 1995.
- ☐ **C.** The number of wolves increased by 1.08% each year.
- ☐ **D.** The number of wolves increased by 8% each year.
- ☐ **E.** The number of wolves increased by 14% each year.

b Determine the value of $w(25)$.

c What does the value of $w(25)$ say about the wolf population?

Name: ..... Date: ..... Period: .....

Rubric | Sub-Unit Quiz

Unit 5

Standard	MA.912.AR. 1.1	MA.912.AR.5.4	MA.912.AR.5.6	MA.912.F.1.2	MA.912.F.1.8
Problem(s)	5a	2, 3a,	4a, 4b	3b, 5b, 5c	1

Problem 1

Standard: MA.912.F.1.8

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • A • C • E	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2

Standards: MA.912.AR.5.4, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $450000 \cdot (1.06)^3$			**Incorrect** choice. Students who select $450000 \cdot (0.06)^3$ may have converted 6% as 0.06 without recognizing to add the value to 1.

Problem 3a

Standards: MA.912.AR.5.4, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $r(x) = 1500 \cdot 0.6^x$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. Students who write $r(x) = 150 \cdot 0.6^x$ may have misread the initial value.	Response shows **incomplete understanding** with significant errors. Students who write $r(x) = 1500 \cdot (0.4)^x$ may have recognized a decay relationship.	Response shows **limited understanding**. E.g., Response includes an exponential growth equation instead of decay.

Problem 3b

Standard: MA.912.F.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **$116.64**	Response shows **conceptual understanding** with minor errors. E.g., Students substitute $x = 5$ into their exponential equation from Problem 3a.	Response shows **incomplete understanding** with significant errors. E.g., Students substitute $x = 5$ into their exponential equation and get a value greater than $\$1{,}500$.	Response shows **limited understanding**. Students who substitute $y = 5$ may have confused what the variables mean.

Problem 4

Standards: MA.912.AR.5.6, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** **Explanations vary. The line has to be $b(x)$ because that's a linear function. The decreasing exponential graph is $a(x)$ because the growth factor is less than 1. The increasing exponential graph is $c(x)$ because the growth factor is greater than 1.**	Response shows **conceptual understanding** with minor errors. E.g., Response includes two correctly matched functions and complete explanation. E.g., Response includes three correctly matched functions and an incomplete explanation.	Response shows **incomplete understanding** with significant errors. E.g., Response includes one correctly matched function and a complete explanation.	Response shows **limited understanding**.

Problem 5a

Standard: MA.912.AR.1.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • **There were 14 wolves in 1995.** • **The number of wolves increased by 8% each year.**	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 5b

Standard: MA.912.F.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $w(25) \approx 96$	Response shows **conceptual understanding** with minor errors. E.g., Response correctly substitutes but makes a minor calculation error.	Response shows **incomplete understanding** with significant errors. E.g., Response correctly substitutes but makes a major calculation error, like getting a value less than 25.	Response shows **limited understanding**. Students who write $25 = 14 \cdot 1.08^x$ may need support understanding function notation.

Problem 5c

Standard: MA.912.F.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* According to the model, there will be about 96 wolves in the park in 2020, which is 25 years after 1995.	Response shows **conceptual understanding** with minor errors. E.g., Response only mentions 96 wolves without interpreting 25.	Response shows **incomplete understanding** with significant errors. E.g., Response correctly interprets the year or number of wolves.	Response shows **limited understanding**.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 5

1. Select *all* of the exponential relationships.

- ☐ **A.** A population of bacteria begins with 6 cells and triples every hour.
- ☐ **B.** Jaylin puts $\$300$ into an account that earns $\$15$ interest per year.
- ☐ **C.**

x	y
1	3
2	6
3	11
4	18

- ☐ **D.** $f(x) = 1000 \cdot (0.98)^x$
- ☐ **E.** $g(x) = 500 + 0.10x$

2. A plant covers 5 square meters of Kayla's garden. Each year the plant grows by 30%. If it continues to grow at this rate, how large will the plant be in 4 years?

3. Mai is putting $\$100$ in a bank account. She will not add additional money or take any money out. Mai can choose from one of these accounts:

- Account A: The total amount will increase by 12% every year.
- Account B: The total amount will increase by $\$20$ every year.

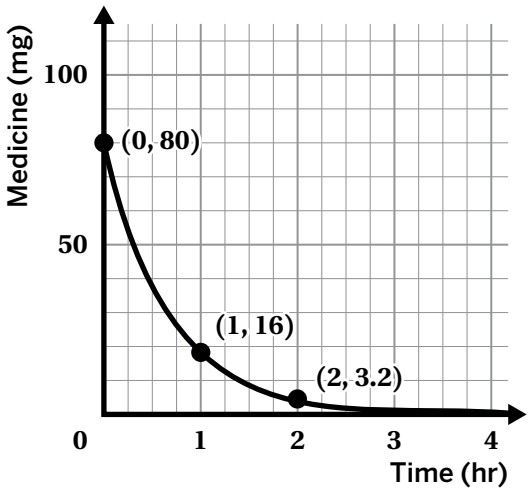
Will the value of Account B always be greater than the value of Account A?

Explain your thinking.

End-of-Unit Assessment (continued)

Unit 5

4. This graph shows the number of milligrams of medicine in a person's body after she takes it.



a What *percent* of the medicine is in the person's body after 1 hour?

b Write an equation of the form $m(x) = a \cdot b^x$ to represent this situation.

- Use x to represent the time in hours.
- Use $m(x)$ to represent the milligrams of medicine remaining.

5. Adnan puts \$200 in an account with a 1.5% monthly interest rate. The account earns interest 12 times per year. He does not add money into or take money out of the account.

a Select *all* of the equations that represent Adnan's account balance, $a(t)$, after t years.

- ☐ **A.** $a(t) = 200 \cdot (1.5)^t$
- ☐ **B.** $a(t) = 200 \cdot (1.015^{12})^t$
- ☐ **C.** $a(t) = 200 \cdot (1.015)^{12t}$
- ☐ **D.** $a(t) = 200 \cdot (1.1956)^t$
- ☐ **E.** $a(t) = 200 \cdot (1.1956)^{12t}$

b How much money will be in Adnan's account after 3 years?

c Kwabena says: *Adnan could earn more money if he puts the* \$200 *into an account that earns* 8% *annual interest (*1 *time per year)*.

Is Kwabena correct?

Explain your thinking.

6. The population of elk in a park x years after 1980 is represented by $f(x) = 1280 \cdot (0.75)^x$.

Years Since 1980	0	1	2	3	4
Number of Elk	1,280	960	720	540	405

a By what percent is the population decreasing each year?

b Explain what the $1{,}280$ and 0.75 in the equation represent about the situation.

- $1{,}280$ represents. . .

- 0.75 represents. . .

c Calculate $f(-2)$.

Explain what $f(-2)$ represents in this situation.

End-of-Unit Assessment (continued)

Unit 5

7. **a** Which expression is an equivalent form of $\sqrt[3]{4^5}$?

(A.) $4^{\frac{3}{5}}$

(B.) $4^{\frac{5}{3}}$

(C.) $2^{\frac{3}{5}}$

(D.) $2^{\frac{5}{3}}$

b Which expression is an equivalent form of $5^{\frac{2}{3}}$?

(A.) $\sqrt[3]{2^5}$

(B.) $\sqrt[2]{5^3}$

(C.) $\sqrt[3]{5^2}$

(D.) $\sqrt{5^2}$

8. Complete the operations. Choose the option that is an equivalent expression.

b $3\sqrt{8} + 2\sqrt{6} - \sqrt{32}$

(A.) $2\sqrt{6} - 2\sqrt{2}$

(B.) $10\sqrt{2} - 2\sqrt{6}$

(C.) $10\sqrt{2} + 2\sqrt{6}$

(D.) $2\sqrt{2} + 2\sqrt{6}$

b $3\sqrt{12}\,(2\sqrt{8})$

(A.) $12\sqrt{6}$

(B.) $24\sqrt{6}$

(C.) $12\sqrt{2}$

(D.) $24\sqrt{2}$

Standards	MA.912.NSO.			MA.912.AR.	MA.912.AR.	MA.912.F.			MA.912.F.
	1.1	1.2	1.4	1.1	5.4	1.2	1.6	1.8	3.2
Problem(s)	7a	7b	8a, 8b	6b	2, 4a, 4b, 6a	6c	3, 5c	1, 5b	5a

Problem 1

Standard: MA.912.F.1.8

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • A population of bacteria begins with 6 cells and triples every hour. • $f(x) = 1000 \cdot (0.98)^x$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2

Standard: MA.912.AR.5.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: Approximately 14.3 square meters	Response shows **conceptual understanding** with minor errors. E.g., Response includes $5(1.3)^4$ but makes a calculation error.	Response shows **incomplete understanding** with significant errors. E.g., Response solves $4 = 5(1.3)^x$. E.g., Response substitutes 4 into an incorrect equation, such as $y = 5(1.03)^4$.	Response shows **limited understanding**. E.g., Response includes an incorrect exponential equation with no attempt of solving.

Problem 3

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** No. *Explanations vary.* Eventually the exponential growth of Account A will surpass the linear growth of Account B.	Response shows **conceptual understanding** with minor errors. E.g., Correct response with incomplete explanation. E.g., Incorrect response with explanation that communicates understanding exponential functions eventually exceeding linear functions.	Response shows **incomplete understanding** with significant errors. E.g., Correct response with no explanation.	Response shows **limited understanding**. E.g., Incorrect response with no explanation.

Problem 4a

Standard: MA.912.5.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: 20%	Response shows **conceptual understanding** with minor errors. Students who write 0.2 without any units or context may have attempted to write the growth factor.	Response shows **incomplete understanding** with significant errors. Students who write 16 mg may have solved for the amount after 1 hour.	Response shows **limited understanding**.

Problem 4b

Standard: MA.912.5.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $m(x) = 80 \cdot (0.2)^x$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., Response includes the correct growth rate but incorrect initial value.	Response shows **incomplete understanding** with significant errors. E.g., Response includes the correct initial value but incorrect growth rate.	Response shows **limited understanding.**

Problem 5a

Standard: MA.912.F.3.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • $a(t) = 200 \cdot (1.015^{12})^t$ • $a(t) = 200 \cdot (1.015)^{12t}$ • $a(t) = 200 \cdot (1.1956)^t$	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 5b

Standard: MA.912.F.1.8

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: Approximately $341.83	Response shows **conceptual understanding** with minor errors. E.g., Response correctly substitutes $t = 3$ but makes a calculation error.	Response shows **incomplete understanding** with significant errors. E.g., Response uses an incorrect equation from Problem 6a but correctly substitutes $t = 3$.	Response shows **limited understanding.**

Problem 5c

Standard: MA.912.F.1.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** No. *Explanations vary.* The interest rate per year of the first option is 19.6%, since $1.015^{12} \approx 1.196$. This is higher than the 8% annual interest rate Kwabena mentioned.	Response shows **conceptual understanding** with minor errors. E.g., Correct response with incomplete explanation.	Response shows **incomplete understanding** with significant errors. E.g., Correct response with no explanation. E.g., Incorrect response with complete explanation that analyzes growth factor and compounding interval.	Response shows **limited understanding**. E.g., Incorrect response with no explanation.

Problem 6a

Standard: MA.912.AR.5.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **25%**	Response shows **conceptual understanding** with minor errors. E.g., Response includes $\frac{960}{1280}$.	Response shows **incomplete understanding** with significant errors. E.g., Response includes $\frac{1280}{960}$.	Response shows **limited understanding**.

Problem 6b

Standard: MA.912.AR.1.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** **1,280 represents the number of elk in the park in 1980.** **0.75 represents that 75% of the elk are left each year.**	Response shows **conceptual understanding** with minor errors. E.g., Response correctly explains one value.	Response shows **incomplete understanding** with significant errors. E.g., Response partially explains one value.	Response shows **limited understanding**.

Problem 6c

Standard: MA.912.F.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** **Responses from 2,275 to 2,276 are considered correct. *Explanations vary.* This means that 2 years before 1980, there were about 2,276 elk in the park.**	Response shows **conceptual understanding** with minor errors. E.g., Correct response with incomplete explanation.	Response shows **incomplete understanding** with significant errors. E.g., Correct response with no explanation. E.g., Incorrect response and explanation that correctly interprets the meaning of $f(-2)$.	Response shows **limited understanding.** E.g., Incorrect response with no explanation.

Problem 7a

Standard: MA.912.NSO.1.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: B $4^{\frac{5}{3}}$			**Incorrect** choice.

Problem 7b

Standard: MA.912.NSO.1.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: C $\sqrt[3]{5^2}$			**Incorrect** choice.

Problem 8a

Standard: MA.912.NSO.1.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: D $2\sqrt{2} + 2\sqrt{6}$			**Incorrect** choice.

Problem 8b

Standard: MA.912.NSO.1.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: F $24\sqrt{6}$			**Incorrect** choice.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 5

1. Select *all* of the exponential relationships.

☐ **A.** $f(x) = 1.1x^2$

☐ **B.** $g(x) = 200(0.75)^x$

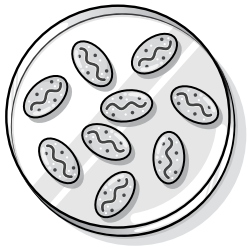
☐ **C.**

x	y
1	200
2	100
3	50
4	25

☐ **D.** A population of deer begins with 100 deer and decreases by 10 every year.

☐ **E.** Dalia puts \$300 into an account that earns 2% annual interest.

2. A petri dish contains 100 cells of bacteria and is increasing by 20% per hour. If it continues to grow at this rate, how many bacteria cells will be present in 4 hours?



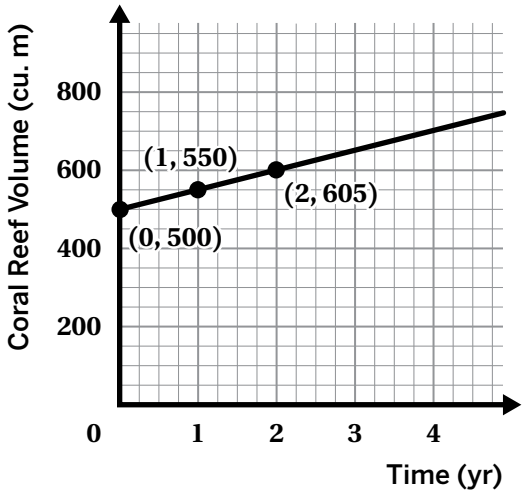
3. Jaleel is putting \$200 in a bank account. He will not add additional money or take any money out. Jaleel can choose from one of these accounts:

- Account A: The total amount will increase by \$15 every year.
- Account B: The total amount will increase by 5% every year.

Will the value of Account A always be greater than the value of Account B?

Explain your thinking.

4. This graph shows the volume of a section of the ocean's coral reef under restoration from 2010 to 2015.



a What percent of the coral reef's volume is present after 1 year?

b Write an equation of the form $c(x) = a \cdot b^x$ to represent this situation.

- Use x to represent the time in years.
- Use $c(x)$ to represent the cubic meters of coral reef present.

5. Darius puts $\$400$ in an account with a 1.1% weekly interest rate. The account earns interest 52 times per year. He does not add money into or take money out of the account.

a Select *all* of the equations that could represent Darius' account balance, $d(t)$, after t years.

- ☐ **A.** $d(t) = 400 \cdot (1.7663)^t$
- ☐ **B.** $d(t) = 400 \cdot (1.7663)^{52t}$
- ☐ **C.** $d(t) = 400 \cdot (1.011)^{52t}$
- ☐ **D.** $d(t) = 400 \cdot (1.011)^t$
- ☐ **E.** $d(t) = 400 \cdot (1.7663^{52})^t$

b How much money will be in Darius's account after 4 years?

c Fabiana says: *Darius could earn more money if he puts the* $\$400$ *into an account that earns* 6% *annual interest (*1 *time per year).*

Is Fabiana correct?

Explain your thinking.

6. The population of sea urchins in a region of an ocean x years after 1990 is represented by $f(x) = 2500 \cdot (0.6)^x$.

Years Since 1990	0	1	2	3	4
Number of Sea Urchins	2,500	1,500	900	540	324

a By what percent is the population decreasing each year?

b Explain what the $2{,}500$ and 0.6 in the equation represent about the situation.

- $2{,}500$ represents . . .

- 0.6 represents . . .

c Calculate $f(-3)$.

Explain what $f(-3)$ represents in this situation.

End-of-Unit Assessment (continued)

Unit 5

7. **a** Which expression is an equivalent form of $\sqrt[3]{9^5}$?

(A.) $3^{\frac{3}{5}}$

(B.) $3^{\frac{5}{3}}$

(C.) $9^{\frac{3}{5}}$

(D.) $9^{\frac{5}{3}}$

b Which expression is an equivalent form of $7^{\frac{2}{3}}$?

(A.) $\sqrt[3]{2^7}$

(B.) $\sqrt[3]{7^2}$

(C.) $\sqrt{7^2}$

(D.) $\sqrt{7^3}$

8. Complete the operations. Choose the option that is an equivalent expression.

a $6\sqrt{12} + 2\sqrt{6} - \sqrt{27}$

(A.) $15\sqrt{3} - 2\sqrt{6}$

(B.) $9\sqrt{3} - 2\sqrt{6}$

(C.) $9\sqrt{3} + 2\sqrt{6}$

(D.) $15\sqrt{3} + 2\sqrt{6}$

b $2\sqrt{18}\,(2\sqrt{12})$

(A.) $24\sqrt{6}$

(B.) $48\sqrt{6}$

(C.) $24\sqrt{5}$

(D.) $48\sqrt{5}$

Standard	MA.912.NSO.			MA.912.AR.	MA.912.AR.	MA.912.F.			MA.912.F.
	1.1	1.2	1.4	1.1	5.4	1.2	1.6	1.8	3.2
Problem(s)	7a	7b	8a, 8b	6b	2, 4a, 4b, 6a	6c	3, 5c	1, 5b	5a

Problem 1

Standard: MA.912.F.1.8

4 Meeting

All correct choices and **no incorrect** choices.

- $g(x) = 200(0.75)^x$
- **Dalia puts $300 into an account that earns 2% annual interest.**
-

x	y
1	200
2	100
3	50
4	25

3 Approaching

One or two correct choices and **no incorrect** choices.

All correct choices and **one incorrect** choice.

2 Developing

One or two correct choices and one **incorrect** choice.

1 Beginning

Only incorrect choices.

Two or more incorrect choices with some correct choices.

Problem 2

Standard: MA.912.AR.5.4

4 Meeting

Correct response:

Approximately 207 cells

3 Approaching

Response shows **conceptual understanding** with minor errors.

E.g., Response includes $100(1.2)^4$ but makes a calculation error.

2 Developing

Response shows **incomplete understanding** with significant errors.

E.g., Response solves $4 = 100(1.3^2)$ instead.

E.g., Response substitutes 4 into an incorrect equation, such as $y = 100(1.02)^x$.

1 Beginning

Response shows **limited understanding**.

E.g., Response includes an incorrect exponential equation with no attempt of solving.

Problem 3

Standards: MA.912.F.1.6, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** No. *Explanations vary.* Eventually exponential growth will surpass linear growth.	Response shows **conceptual understanding** with minor errors. E.g., Correct response with incomplete explanation. E.g., Incorrect response with explanation that communicates understanding that exponential functions eventually exceed linear functions.	Response shows **incomplete understanding** with significant errors. E.g., Correct response with no explanation.	Response shows **limited understanding.** E.g., Incorrect response with no explanation.

Problem 4a

Standards: MA.912.AR.5.4, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: 110%	Response shows **conceptual understanding** with minor errors. Students who write 1.10 without any units or context may have attempted to write the growth factor.	Response shows **incomplete understanding** with significant errors. Students who write 550 cubic meters may have solved for the volume after 1 hour.	Response shows **limited understanding.**

Problem 4b

Standard: MA.912.AR.5.4

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $c(x) = 500 \cdot (1.1)^x$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., Response includes the correct growth rate but incorrect initial value.	Response shows **incomplete understanding** with significant errors. E.g., Response includes the correct initial value but incorrect growth rate.	Response shows **limited understanding**.

Problem 5a

Standard: MA.912.FL.3.2

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices **and no incorrect** choices. • $d(t) = 400 \cdot (1.7663)^t$ • $d(t) = 400 \cdot (1.011)^{52t}$	**One correct** choice and **no incorrect** choices. **Both** correct choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 5b

Standard: MA.912.F.1.8

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: Approximately $3,893.14	Response shows **conceptual understanding** with minor errors. E.g., Response correctly substitutes $t = 4$, but makes a calculation error.	Response shows **incomplete understanding** with significant errors. E.g., Response uses an incorrect equation from Problem 6a but correctly substitutes $t = 4$.	Response shows **limited understanding**.

Problem 5c

Standards: MA.912.F.1.6, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** No. *Explanations vary.* The interest rate per year of the first option is 76.6%, since $1.011^{52} \approx 1.766$. This is higher than the 6% annual interest rate Fabiana mentioned.	Response shows **conceptual understanding** with minor errors. E.g., Correct response with incomplete explanation.	Response shows **incomplete understanding** with significant errors. E.g., Correct response with no explanation. E.g., Incorrect response with complete explanation that analyzes growth factor and compounding interval.	Response shows **limited understanding**. E.g., Incorrect response with no explanation.

Problem 6a

Standards: MA.912.AR.5.4, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **40%**	Response shows **conceptual understanding** with minor errors. E.g., Response includes $\frac{1500}{2500}$.	Response shows **incomplete understanding** with significant errors. E.g., Response includes $\frac{2500}{1500}$.	Response shows **limited understanding**.

Problem 6b

Standards: MA.912.AR.1.1, MTR.6.1, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: ***Responses vary.*** **2,500 represents the number of sea urchins in a part of an ocean in 1990.** **0.6 represents that 60% of the sea urchins are left each year.**	Response shows **conceptual understanding** with minor errors. E.g., Response correctly explains one value.	Response shows **incomplete understanding** with significant errors. E.g., Response partially explains one value correctly.	Response shows **limited understanding**.

Problem 6c

Standards: MA.912.F.1.2, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** **Responses from 11,574 to 11,575 are considered correct.** ***Explanations vary.* This means that 3 years before 1990, there were about 11,574 sea urchins in that part of the ocean.**	Response shows **conceptual understanding** with minor errors. E.g., Correct response with incomplete explanation.	Response shows **incomplete understanding** with significant errors. E.g., Correct response with no explanation. E.g., Incorrect response and explanation that correctly interprets the meaning of $f(-3)$.	Response shows **limited understanding**. E.g., Incorrect response with no explanation.

Problem 7a			Standard: MA.912.NSO.1.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct choice: D $9^{\frac{5}{3}}$			**Incorrect** choice.

Problem 7b			Standard: MA.912.NSO.1.2
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct choice: B $\sqrt[3]{7^2}$			**Incorrect** choice.

Problem 8a			Standard: MA.912.NSO.1.4
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct choice: C $9\sqrt{3} + 2\sqrt{6}$			**Incorrect** choice.

Problem 8b			Standard: MA.912.NSO.1.4
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct choice: A $24\sqrt{6}$			**Incorrect** choice.

Unit 5
Show What You Know PDFs

Name: Date: Period:

Show What You Know

5.01

Here are two tables showing the number of blue and orange globs each day.

Day	Blue Globs
0	1
1	3
2	9
3	27
4	81

Day	Orange Globs
0	80
1	100
2	120
3	140
4	160

a Which type of function could represent the blue globs? Circle one.

Linear Exponential Neither

b Which type of function could represent the orange globs? Circle one.

Linear Exponential Neither

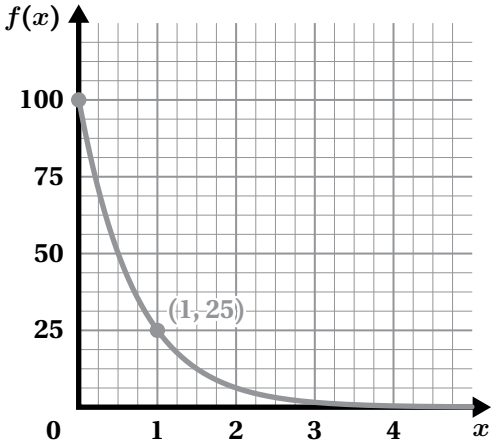
c Explain why the number of blue globs will eventually exceed the number of orange globs.

Name: Date: Period:

Show What You Know

5.02

Here is a graph of an exponential relationship. Write a function that represents this graph.



Name: Date: Period:

Show What You Know

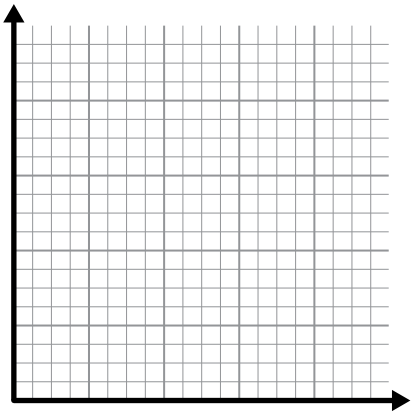
5.03

a Circle one function to graph.

$j(x) = 4 \cdot 2^x$ $k(x) = 4\left(\frac{1}{2}\right)^x$

b Sketch a graph of the function you selected. Be sure to label and number the axes.

Use the table if it helps with your thinking.



Name: Date: Period:

Show What You Know

5.04

Complete the table using the function $f(x) = 12 \cdot 3^x$.

x	$f(x)$
-2	
0	
1	

Name: Date: Period:

Show What You Know

5.05

Here is a linear function: $h(x) = 3x + 2$.

x	0	1	2	3	4
$h(x)$	2	5	8	11	14

Here is an exponential function: $k(x) = 4^x$.

x	0	1	2	3	4
$k(x)$	1	4	16	64	256

a How does $h(x)$ change when x increases by 2?

b How does $k(x)$ change when x increases by 2?

Name: Date: Period:

Show What You Know

5.06

An ant colony has $30{,}000$ ants and is growing by 12% each month.

Which function, $a(x)$, represents the number of ants in the colony after x months?

Months, x	Number of Ants, $a(x)$
0	30,000
1	33,600
2	37,632

A. $a(x) = 30000 \cdot 1.12^x$

B. $a(x) = 30000 \cdot 1.2^x$

C. $a(x) = 12 \cdot 30000^x$

D. $a(x) = 30000 \cdot 0.12^x$

Name: Date: Period:

Show What You Know

5.07

A town has a population of $200{,}000$ people. The population is decreasing by 3% each year.

a Write a function that represents the population of the town, $p(x)$, after x years.

b Use the function you wrote to determine how many people will be in the town after 10 years.

Name: Date: Period:

Show What You Know

5.08

a Rewrite $19^{\frac{1}{3}}$ as a radical expression.

b Rewrite $\sqrt[7]{12}$ as an exponential expression.

Name: Date: Period:

Show What You Know

5.09

Write at least two expressions that are equivalent to $49^{\frac{3}{2}}$.
Use a radical in at least one of your expressions.

Name: Date: Period:

Show What You Know

5.10

Multiply or divide the radicals. Write your answer as an exact quantity using only a single radical. Show your thinking.

a $-2\sqrt{3} \cdot 5\sqrt{6}$

b $\frac{20\sqrt{24}}{5\sqrt{6}}$

Name: Date: Period:

Show What You Know

5.11

Simplify the radical expressions. Write each answer as an exact quantity using only a single radical.

a $4\sqrt{18} - 5\sqrt{8}$

b $4\sqrt{32} + 2\sqrt{50}$

Name: Date: Period:

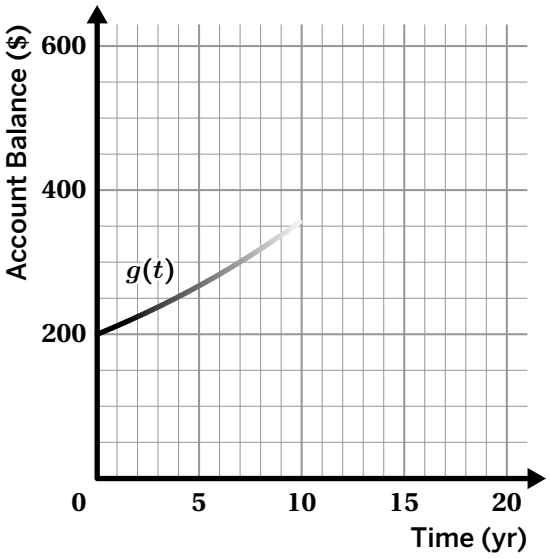
Show What You Know

5.12

Anushka invests $\$200$ in an account that earns 6% compound interest.

The function $g(t) = 200(1.06)^t$ gives the account balance after t years.

About how many years will it take for her account balance to reach $\$500$?



Name: Date: Period:

Show What You Know

5.13

A bank account with a balance of $\$500$ earns 4% monthly interest.

Select *all* of the expressions that can be used to represent the balance after 5 years of no payments or withdrawals.

- ☐ **A.** $500 \cdot (1.04)^{60}$
- ☐ **B.** $500 \cdot (1.04)^{5}$
- ☐ **C.** $500 \cdot (1.46)^{5}$
- ☐ **D.** $500 \cdot (1.601)^{5}$
- ☐ **E.** $500 \cdot (1.04^{12})^{5}$

Name: Date: Period:

Show What You Know

5.14

A person put $\$100$ into an account with a 6% annual interest rate compounded quarterly.

What is the balance in the account after 2 years?

Name: Date: Period:

Show What You Know

5.15

Theo invests $\$3{,}000$ in an account that earns 3% interest compounded semiannually.

a Write a growth function $f(x)$ for the account balance of Theo's money in x years.

b How much money will be in the account after 5 years?

c How many years will it take for the account to reach $\$4{,}000$?

Show What You Know **Lesson 1**

Name: _____ Date: _____ Period: _____

Show What You Know 5.01

Here are two tables showing the number of blue and orange globs each day.

Day	Blue Globs
0	1
1	3
2	9
3	27
4	81

Day	Orange Globs
0	80
1	100
2	120
3	140
4	160

a. Which type of function could represent the blue globs? Circle one.

Linear (Exponential) Neither

b. Which type of function could represent the orange globs? Circle one.

(Linear) Exponential Neither

c. Explain why the number of blue globs will eventually exceed the number of orange globs.

Explanations vary. Exponential functions grow by multiplying the previous value by a constant value. Linear functions grow by adding a constant value to the previous value. Multiplying by a number greater than 1 will always eventually get larger than adding a number larger than 1.

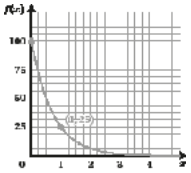
Show What You Know **Lesson 2**

Name: _____ Date: _____ Period: _____

Show What You Know 5.02

Here is a graph of an exponential relationship. Write a function that represents this graph.

$f(x) =$ $100 \cdot \left(\frac{1}{4}\right)^x$ (or equivalent)



Show What You Know **Lesson 3**

Name: _____ Date: _____ Period: _____

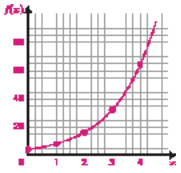
Show What You Know 5.03

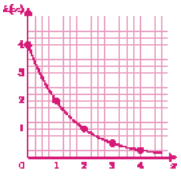
a. Circle one function to graph.

$j(x) = 4 \cdot 2^x$ $k(x) = 4\left(\frac{1}{2}\right)^x$

b. Sketch a graph of the function you selected. Be sure to label and number the axes.

Use the table if it helps with your thinking.





Show What You Know **Lesson 4**

Name: _____ Date: _____ Period: _____

Show What You Know 5.04

Complete the table using the function $f(x) = 12 \cdot 3^x$.

x	$f(x)$
-2	$\frac{4}{3}$ (or equivalent)
0	12
1	36

Show What You Know **Lesson 5**

Name: _____ Date: _____ Period: _____

Show What You Know 5.05

Here is a linear function: $h(x) = 3x + 2$.

x	0	1	2	3	4
$h(x)$	2	5	8	11	14

Here is an exponential function: $k(x) = 4^x$.

x	0	1	2	3	4
$k(x)$	1	4	16	64	256

a. How does $h(x)$ change when x increases by 2?

Responses vary. When x grows by 2, $h(x)$ always increases by 6.

b. How does $k(x)$ change when x increases by 2?

Responses vary. When x grows by 2, $k(x)$ always multiplies by 16.

Show What You Know **Lesson 6**

Name: _____ Date: _____ Period: _____

Show What You Know 5.06

An ant colony has 30,000 ants and is growing by 12% each month.

Which function, $a(x)$, represents the number of ants in the colony after x months?

Months, x	Number of Ants, $a(x)$
0	30,000
1	33,600
2	37,632

A. $a(x) = 30000 \cdot 1.12^x$

B. $a(x) = 30000 \cdot 1.2^x$

C. $a(x) = 12 \cdot 30000^x$

D. $a(x) = 30000 \cdot 0.12^x$

Show What You Know **Lesson 7**

Name: _____ Date: _____ Period: _____

Show What You Know 5.07

A town has a population of 200,000 people. The population is decreasing by 3% each year.

a. Write a function that represents the population of the town, $p(x)$, after x years.

$p(x) = 200000(0.97)^x$ or $p(x) = 200000(1 - 0.03)^x$

b. Use the function you wrote to determine how many people will be in the town after 10 years.

About 147,485 people

Show What You Know **Lesson 8**

Name: _____ Date: _____ Period: _____

Show What You Know 5.08

a. Rewrite $19^{\frac{1}{3}}$ as a radical expression.

$\sqrt[3]{19}$

b. Rewrite $\sqrt{12}$ as an exponential expression.

$12^{\frac{1}{2}}$

Show What You Know **Lesson 9**

Name: _____ Date: _____ Period: _____

Show What You Know 5.09

Write at least two expressions that are equivalent to $49^{\frac{1}{2}}$.
Use a radical in at least one of your expressions.

Responses vary.

343 $\sqrt{49^2}$ $(\sqrt{49})^3$ $(49^{\frac{1}{2}})^3$

$(49^3)^{\frac{1}{2}}$ $\sqrt{49 \cdot 49 \cdot 49}$ $\sqrt{49} \cdot \sqrt{49} \cdot \sqrt{49}$ $49^{\frac{1}{2}} \cdot 49^{\frac{1}{2}} \cdot 49^{\frac{1}{2}}$

Show What You Know **Lesson 10**

Name: _____ Date: _____ Period: _____

Show What You Know 5.10

Multiply or divide the radicals. Write your answer as an exact quantity using only a single radical. Show your thinking.

a. $-2\sqrt{3} \cdot 5\sqrt{6}$
$-30\sqrt{2}$

b. $\frac{20\sqrt{24}}{5\sqrt{6}}$
8

Show What You Know **Lesson 11**

Name: _____ Date: _____ Period: _____

Show What You Know 5.11

Simplify the radical expressions. Write each answer as an exact quantity using only a single radical.

a. $4\sqrt{18} - 5\sqrt{8}$
$2\sqrt{2}$

b. $4\sqrt{32} + 2\sqrt{50}$
$26\sqrt{2}$

Show What You Know **Lesson 12**

Name: _____ Date: _____ Period: _____

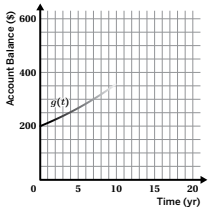
Show What You Know 5.12

Anushka invests $200 in an account that earns 6% compound interest.

The function $g(t) = 200(1.06)^t$ gives the account balance after t years.

About how many years will it take for her account balance to reach $500?

Responses from 15 and 16 years are considered correct.



Show What You Know **Lesson 13**

Name: _____ Date: _____ Period: _____

Show What You Know 5.13

A bank account with a balance of $500 earns 4% monthly interest.

Select *all* of the expressions that can be used to represent the balance after 5 years of no payments or withdrawals.

- ☑ A. $500 \cdot (1.04)^{60}$
- ☐ B. $500 \cdot (1.04)^{5}$
- ☐ C. $500 \cdot (1.46)^{5}$
- ☑ D. $500 \cdot (1.601)^{5}$
- ☑ E. $500 \cdot (1.04^{12})^{5}$

Show What You Know **Lesson 14**

Name: _____ Date: _____ Period: _____

Show What You Know 5.14

A person put $100 into an account with a 6% annual interest rate compounded quarterly.

What is the balance in the account after 2 years?

$112.65

Show What You Know **Lesson 15**

Name: _____ Date: _____ Period: _____

Show What You Know 5.15

Theo invests $3,000 in an account that earns 3% interest compounded semiannually.

a. Write a growth function $f(x)$ for the account balance of Theo's money in x years.

$f(x) = 3000\left(1 + \frac{.03}{2}\right)^{2x}$

b. How much money will be in the account after 5 years?

$3481.62

c. How many years will it take for the account to reach $4,000?

Between 9 and 10 years.

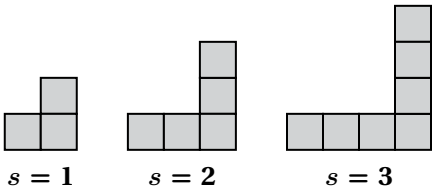
Unit 6
Assessments and Rubrics

Name: ..... Date: ..... Period: .....

Pre-Unit Check

Unit 6

1. Here is a pattern.



a How many tiles will there be when $s = 10$?

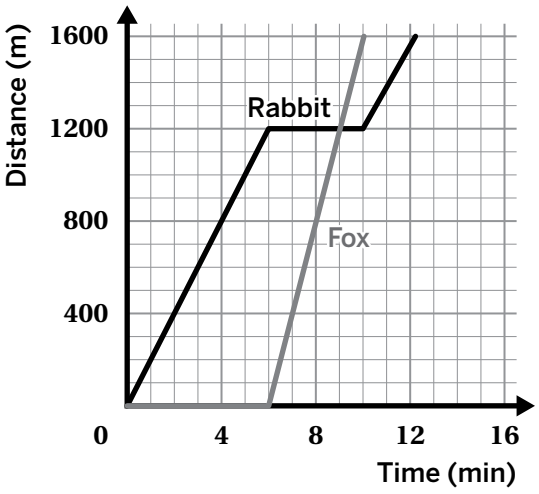
b What type of relationship is there between s and the number of tiles?

(A.) Linear (B.) Exponential (C.) Neither

Explain how you know.

2. A rabbit and a fox competed in a race.

Use the graph to tell a story about the race.

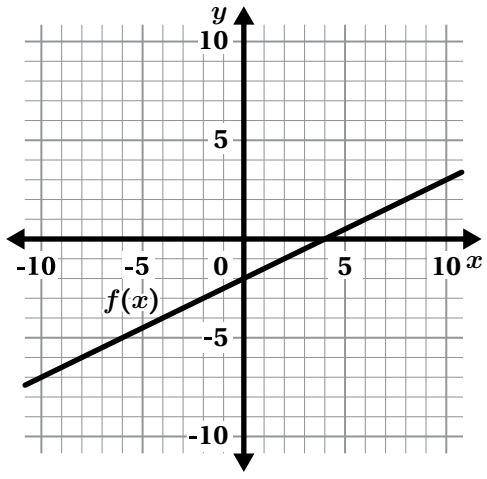


Pre-Unit Check (continued)

Unit 6

3. $f(x)$ and $g(x)$ are two functions.

- $f(x)$ is shown in the graph.
- $g(x) = \frac{1}{2}x + 3$



a Which function has a larger y-intercept? Circle one.

$f(x)$ $g(x)$ They have the same y-intercept

b Which function is increasing at a faster rate? Circle one.

$f(x)$ $g(x)$ They are increasing at the same rate

Explain how you know.

4. Determine the value of each expression.

a $(x + 5)^2$ when $x = 2$ **b** $3x^2$ when $x = 5$ **c** $(2x)^2$ when $x = 4$

5. Here is a function: $h(x) = 4 + x^2$.

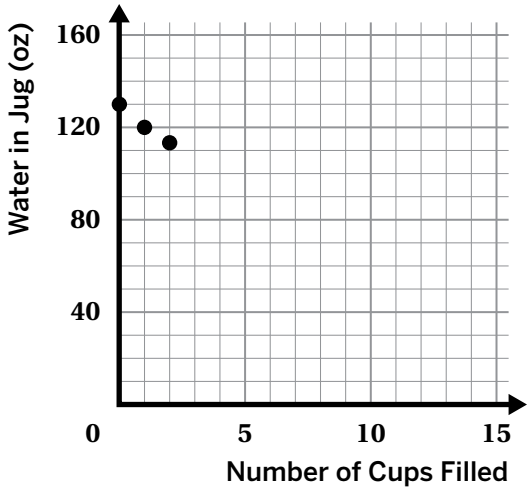
a What is the value of $h(5)$?

b What is the value of $h(-3)$?

Pre-Unit Check (continued)

Unit 6

6. This graph shows the amount of water left in a jug after filling up different numbers of cups.



Complete the table.

Number of Cups Filled	Water in Jug (oz)
0	128
1	120
2	112
3	
10	
x	

Name: ..... Date: ..... Period: .....

Sub-Unit Quiz

Unit 6

1. Select *all* the relationships that are quadratic.

☐ **A.**

x	y
0	1
1	4
2	7
3	10
4	13

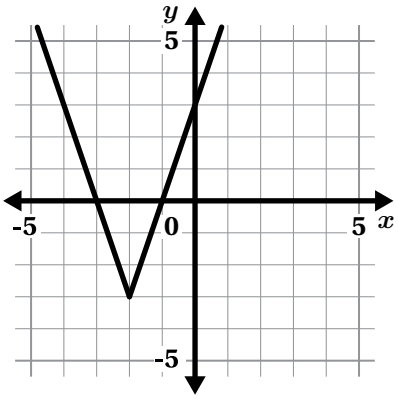
☐ **B.**

x	y
0	1
1	4
2	9
3	16
4	25

☐ **C.**

x	y
0	1
1	4
2	10
3	19
4	31

☐ **D.**



☐ **E.**

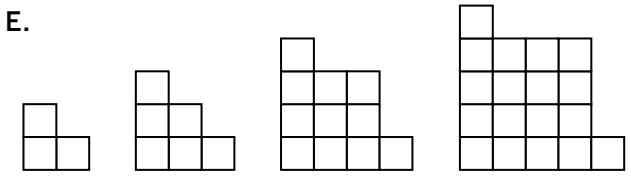
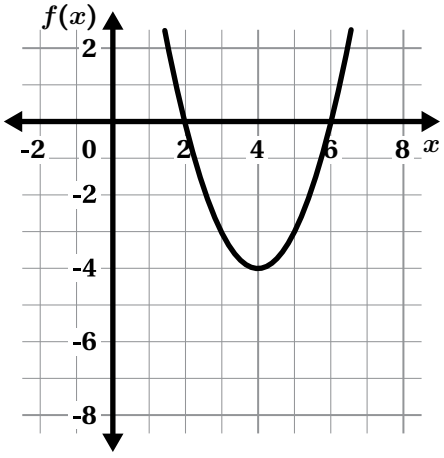


Figure 1 Figure 2 Figure 3 Figure 4

2. Here is the graph of $f(x)$.



Which could be its equation?

(A.) $f(x) = (x - 2)(x - 6)$

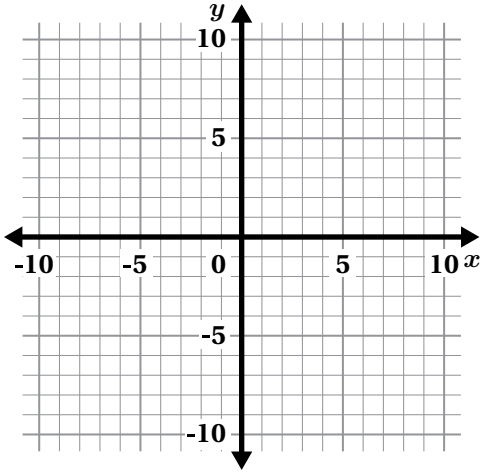
(B.) $f(x) = (-x - 2)(x + 6)$

(C.) $f(x) = (-x + 2)(x - 6)$

(D.) $f(x) = (x + 2)(x + 6)$

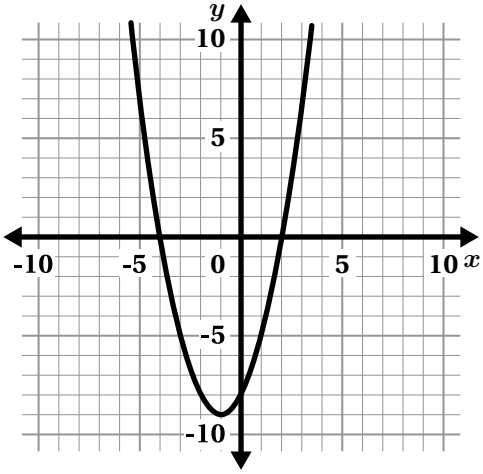
3. **a** Sketch a parabola that has both:

- a line of symmetry at $x = -4$.
- a y-intercept at $(0, 6)$.



b Write a quadratic function to match this graph.

$y =$ .....



4. Yolanda and Jordan launched stomp rockets at a playground.

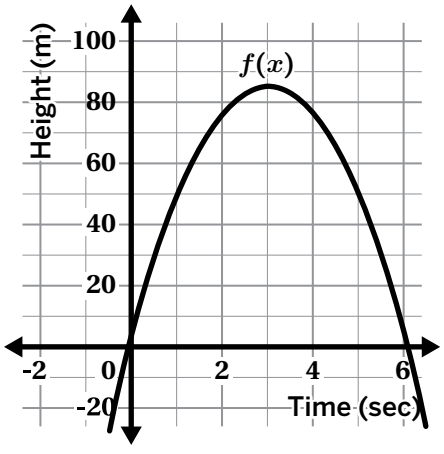
The heights of the rockets can be modeled by quadratic functions, $f(x)$ and $g(x)$, where x is the time in seconds since the rocket was launched.

a Whose rocket traveled higher? Circle one.

Yolanda's Jordan's Both rockets traveled to the same height

Explain your thinking.

Yolanda's Rocket



b Whose rocket was in the air for *less* time? Circle one.

Yolanda's Jordan's Both rockets were in the air for the same amount of time

Explain your thinking.

Jordan's Rocket

Time (sec), x	Height (m), $g(x)$
0	0
1	45
2	75

5. Liam wondered about the price of sandwiches at his deli. He surveyed his customers to see how many of them would buy a sandwich at different prices.

a Here is some data from the survey.

For each price, determine Liam's revenue.

Sandwich Price ($)	Number of Customers	Revenue ($)
5	100	
12	30	

Liam used the results of the survey to create the model $f(x) = x(150 - 10x)$. x represents the price of a sandwich. $f(x)$ represents the money Liam would make.

b According to the model, there are two prices where Liam would make $\$0$.

One of the prices is $\$0$. What is the other price?

Explain how you know the revenue will be $\$0$.

c According to the model, what should the price of sandwiches be for Liam to make the most money?

At that price, how much money will Liam make?

Standard	MA.912.F.1.8	MA.912.AR.3.6	MA.912.AR.3.7	MA.912.AR.3.8
Problem(s)	1	5a, 5b, 5c	2, 3a, 3b	4a, 4b

Problem 1

Standards: MA.912.F.1.8, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • Table that contains the point $(2, 9)$ • Table that contains the point $(2, 10)$ • Visual pattern with squares	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice. Students who do not select the table with the point $(2, 10)$ may have been looking for square numbers. Students who select the graph may have noticed the graph has a vertex and symmetry.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2

Standard: MA.912.AR.3.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $f(x) = (x - 2)(x - 6)$			**Incorrect** choice. Students who select $f(x) = (x + 2)(x + 6)$ may have noticed that the x-intercepts are at 2 and 6.

Problem 3a			**Standards:** MA.912.AR.3.7, MTR.5.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Sketch shows a parabola that meets both criteria.	Response shows **conceptual understanding** with a minor error. E.g., Response includes both correct key features, but one has a sign error, such as an axis of symmetry at $x = 4$ or a y-intercept at $(0, -6)$.	Response shows **incomplete understanding** with significant errors. E.g., Sketch shows a parabola that meets **one criteria** or meets **both criteria** but is **not a parabola**. E.g., Response includes a parabola with an y-intercept at $(6, 0)$.	Response shows **limited understanding**. E.g., Sketch shows a parabola that meets **no criteria** or sketch meets **one criteria** but is **not a parabola**.

Problem 3b			**Standards:** MA.912.AR.3.7, MTR.3.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: $y = (x + 4)(x - 2)$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. Students who write $y = (x - 4)(x + 2)$ may understand that factored form reveals the x-intercepts.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**. E.g., Equation does not represent a parabola.

Problem 4a

Standards: MA.912.AR.3.8, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. Jordan's. *Explanations vary.* The highest point the rocket travels to is the maximum of the parabola. The maximum of $f(x)$ is less than 90 m, and the maximum of $g(x)$ is more than 90 m.	**Correct** response with **minor flaws** in explanation. E.g., Response only identifies the maximum of one of the rockets. **Incorrect** response with logical and **complete explanation**. E.g., Response includes a minor calculation error.	**Correct** response with **incomplete** explanation. E.g., "Jordan's rocket went higher." **Incorrect** response with explanation that shows **partial understanding**. E.g., Response includes using the maximum to calculate the highest point.	**Incorrect** response with **no** explanation.

Problem 4b

Standards: MA.912.AR.3.8, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. Yolanda's. *Explanations vary.* The rocket's time in the air is represented by the second x-intercept. The second x-intercept of $f(x)$ is between 6 and 7 and the second x-intercept of $g(x)$ is 7.	**Correct** response with **minor flaws** in explanation. E.g., Response only identifies the second x-intercept of one of the rockets. **Incorrect** response with logical and **complete explanation**. E.g., Response includes a minor calculation error.	**Correct** response with **incomplete** explanation. E.g., "Yolanda's rocket was in the air for less time." **Incorrect** response with explanation that shows **partial understanding**. E.g., Response includes using the second x-intercept to calculate the time in the air.	**Incorrect** response with **no** explanation.

Problem 5a

Standards: MA.912.AR.3.6, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: • **500** • **360**	Response shows **conceptual understanding** with a minor error. E.g., Response shows correct conceptual understanding but makes a computation error.	Response shows **incomplete understanding** with significant errors. **One** of the responses is correct.	Response shows **limited understanding.** **None** of the responses are correct. E.g., Response adds the number of customers and sandwich price.

Problem 5b

Standards: MA.912.AR.3.6, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. **$15. *Explanations vary.*** • **If Liam charges $15, then the model predicts that he will make $15(150 - 10(15)) = 0$ dollars.** • **At $15, Liam will have no customers because $150 - 10(15) = 0$, and if he has no customers, then he will make no money.**	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**. E.g., Response includes a minor calculation error.	**Correct** response with **incomplete** explanation. E.g., "Liam will have no customers." or "Liam will make $0." **Incorrect** response with explanation that shows **partial understanding**.	**Incorrect** response with **no** explanation.

Problem 5c

Standards: MA.912.AR.3.6, MTR.5.1

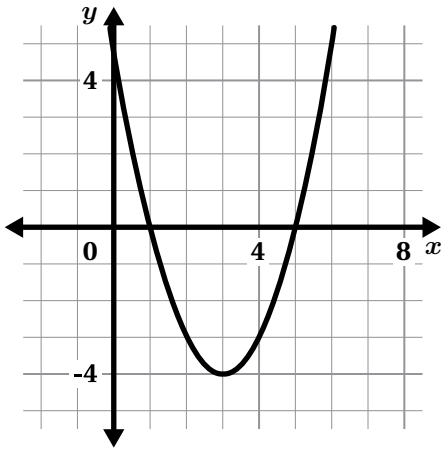
4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct responses: **Sandwich Price: $7.50** **Revenue: $562.50**	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors. **One** of the responses is correct.	Response shows **limited understanding**. **None** of the responses are correct but some thinking is shown.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

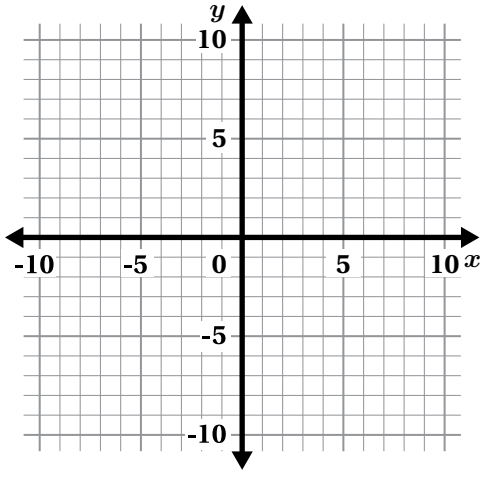
Unit 6

1. Select *all* the equations that represent this graph.



- ☐ **A.** $y = x^2 - 6x - 5$
- ☐ **B.** $y = (x + 1)(x + 5)$
- ☐ **C.** $y = (x - 3)^2 + 4$
- ☐ **D.** $y = (x - 3)^2 - 4$
- ☐ **E.** $y = (x - 1)(x - 5)$

2. Here is a function: $g(x) = (x + 4)^2 + 7$.
Use the graph if it helps with your thinking.

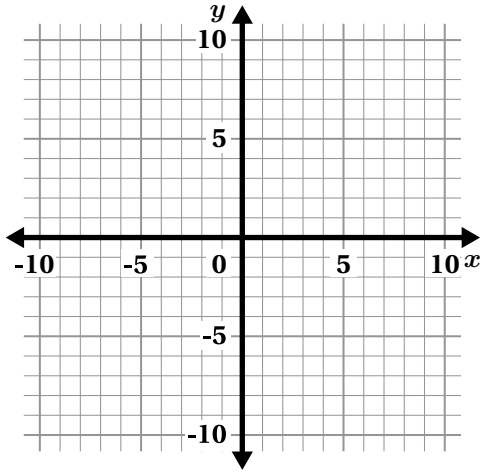


a What is the vertex of the graph of the function g?

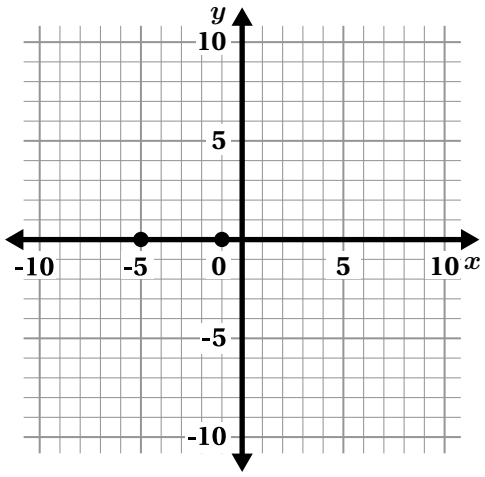
b Does the vertex represent the *minimum* or the *maximum* value of the function?

Explain or show how you know.

3. Sketch the graph of $p(x) = (x - 1)(2x - 6)$.
Include the x-intercepts, y-intercept, and vertex.



4. Here are the points $(-1, 0)$ and $(-5, 0)$.



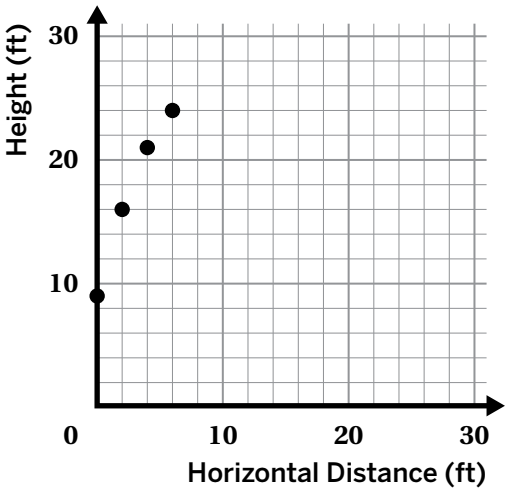
a Write a quadratic equation whose graph passes through the points $(-1, 0)$ and $(-5, 0)$.

b Write a different quadratic equation whose graph passes through the points $(-1, 0)$ and $(-5, 0)$.

How are the parabolas of the two equations you wrote alike? How are they different?

5. A robot launches a ball into the air. The table and graph show some of the ball's horizontal distances from the robot and its heights above the ground.

Horizontal Distance (ft)	Height (ft)
0	9
2	16
4	21
6	24



a What type of relationship is represented?

(A.) Linear (B.) Exponential (C.) Quadratic (D.) Something else

b What is the greatest height the ball reaches?

c At what distance from the robot does the ball land?

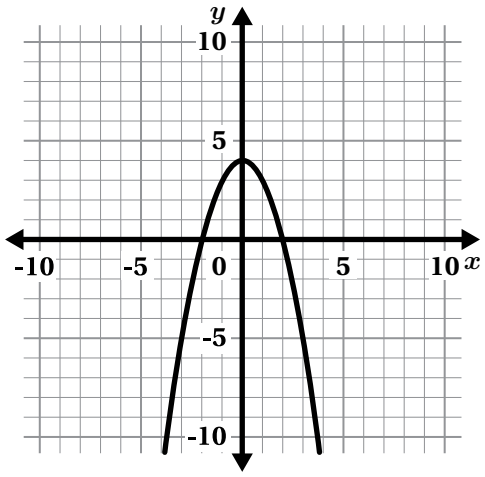
6. Esteban says the equation of this graph is $y = -(x + 2)(x - 2)$.

Josiah says the equation is $y = x^2 + 4$.

Whose thinking is correct? Circle one.

Esteban's Josiah's Both Neither

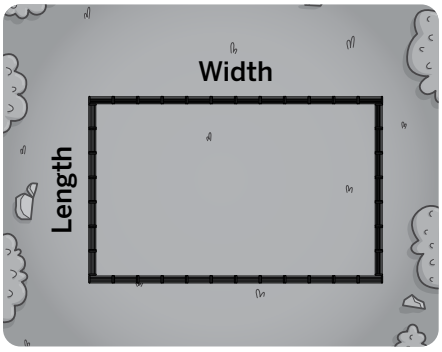
Explain your thinking.



7. A garden club is building a rectangular garden made from 60 feet of fencing.

a Determine the length, width, and area of three different gardens that will use exactly 60 feet of fencing.

	Length (ft)	Width (ft)	Area (sq. ft)
Garden 1			
Garden 2			
Garden 3			



The function $f(x) = x(30 - x)$ models the area of the garden, where x is the garden's length.

b According to the model, what is the largest possible area for the garden?

Explain your thinking.

Standard	MA.912.F.1.1	MA.912.F.1.2	MA.912.F.1.8	MA.912.AR.3.4	MA.912.AR.3.5	MA.912.AR.3.6	MA.912.AR.3.7
Problem(s)	5a	5b, 5c	5a	1, 4a, 4b, 6	1, 4a, 4b	2a, 2b, 3, 7a, 7b	2a, 2b, 3, 5b, 5c

Problem 1

Standards: MA.912.AR.3.4, MA.912.AR.3.5, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • $y = (x - 3)^2 - 4$ • $y = (x - 1)(x - 5)$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice. Students who select $y = (x + 1)(x + 5)$ may have noticed that the x-intercepts are at $(1, 0)$ and $(5, 0)$.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2a

Standards: MA.912.AR.3.6, MA.912.AR.3.7, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(-4, 7)$	Response shows **conceptual understanding** with a minor error. E.g., Response includes an incorrect sign, such as $(4, 7)$.	Response shows **incomplete understanding** with significant errors or multiple minor errors. E.g., Response switches the x- and y-values and includes an incorrect sign $(7, 4)$.	Response shows **limited understanding.** E.g., Response does not identify a point or the point does not include values from the equation.

Problem 2b

Standards: MA.912.AR.3.6, MA.912.AR.3.7, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. Minimum. *Explanations vary.* The graph of g is concave up.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**.	**Correct** response with **incomplete** explanation. E.g., Response states minimum because the vertex is at $(-4, 7)$, and 7 is a positive number. **Incorrect** response with explanation that shows **partial understanding**.	**Incorrect** response with **no** or **incorrect** explanation. E.g., Response states maximum because this would be the highest point on the parabola.

Problem 3

Standards: MA.912.AR.3.6, MA.912.AR.3.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Sketch shows a parabola that matches the equation, with x-intercepts, y-intercept, and vertex plotted precisely.	Response shows **conceptual understanding** with minor errors. E.g., Sketch matches the equation but at least one key feature is not precisely plotted. E.g., Sketch includes correct key features, but is not continuous.	Response shows **incomplete understanding** with significant errors. E.g., Sketch shows one correct x-intercept but not both.	Response shows **limited understanding**. E.g., Sketch includes a correct x-intercept or vertex but is not a parabola.

Problem 4a

Standards: MA.912.AR.3.4, MA.912.AR.3.5, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Equations vary.* • $y = (x + 1)(x + 5)$ • $y = (x + 3)^2 - 4$ • $y = -2(x + 1)(x + 5)$	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**. E.g., Equation does not describe a parabola.

Problem 4b

Standards: MA.912.AR.3.4, MA.912.AR.3.5, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *See equations in 4a.* *Responses vary.* • Alike: The parabolas have the same x-intercepts. • Different: One parabola is concave up; the other is concave down.	Response shows **conceptual understanding** with minor errors. E.g., Equation in 4b is different and has the same x-intercepts as the equation in 4a, even if the equation in 4a is not correct.	Response shows **incomplete understanding** with significant errors. E.g., Equation is equivalent to the previous equation with the factors reversed.	Response shows **limited understanding**. E.g., Equation does not describe a parabola.

Problem 5a

Standards: MA.912.F.1.1, MA.912.F.1.8

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: Quadratic			**Incorrect** choice. Students who select *Something else* may have noticed that the horizontal distances are not increasing by 1 foot.

Problem 5b

Standards: MA.912.AR.3.7, MA.912.F.1.2, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: 25 feet	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors. Students who write "24 feet" may have noticed the maximum height in the table.	Response shows **limited understanding**. Students who write "31 feet" may have noticed $9 + 7 = 16$ and $24 + 7 = 31$.

Problem 5c

Standards: MA.912.AR.3.7, MA.912.F.1.2, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: 18 feet	Response shows **conceptual understanding** with minor errors. Students who write "16 feet" may have noticed the line of symmetry is at 8 feet.	Response shows **incomplete understanding** with significant errors. Students who write "8 feet" may have noticed the eighth point on the graph.	Response shows **limited understanding**. Students who write "9 feet" may have noticed the point $(0, 9)$ on the graph.

Problem 6

Standards: MA.912.AR.3.4, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** Esteban's. *Explanations vary.* Esteban's thinking is correct because his equation has the correct x-intercepts and is concave down. Josiah's equation can't be right because its graph will be concave up.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**.	**Correct** response with **incomplete explanation**. **Incorrect** response with explanation that shows **partial understanding**.	**Incorrect** response with **no explanation**.

Problem 7a

Standards: MA.912.AR.3.6, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* 20, 10, 200 15, 15, 225 25, 5, 125	Response shows **conceptual understanding** with minor errors. E.g., One response does not total 60 feet of fencing.	Response shows **incomplete understanding** with significant errors. E.g., Response includes correct lengths and widths, but incorrect areas.	Response shows **limited understanding.** E.g., Response does not show a connection between the lengths and widths to 60 feet of fencing.

Problem 7b

Standards: MA.912.AR.3.6, MTR.6.1

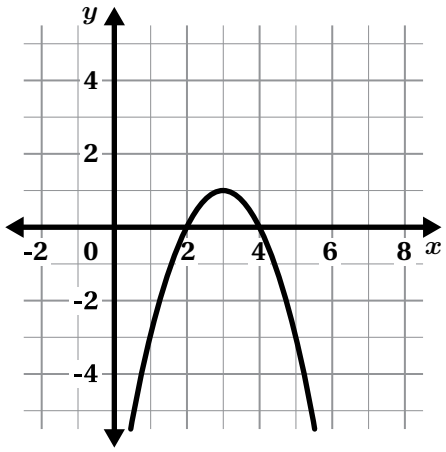
4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. 225. *Explanations vary.* The x-intercepts of the function are at $(0, 0)$ and $(30, 0)$. This means the vertex has an x-value of 15. If I plug in 15, i get the maximum value, which is 225 square feet.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**.	**Correct** response with **incomplete** explanation. **Incorrect** response with explanation that shows **partial understanding**. E.g., Response incorrectly identifies 15 as the maximum value because of the axis of symmetry.	**Incorrect** response with **no** explanation.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

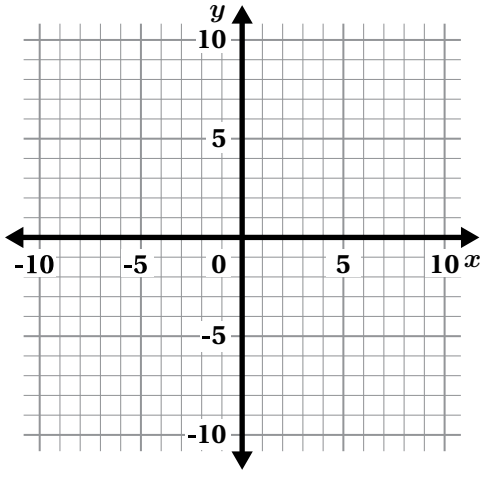
Unit 6

1. Select *all* the equations that represent this graph.



- ☐ **A.** $y = -(x - 2)(x - 4)$
- ☐ **B.** $y = -(x + 2)(x + 4)$
- ☐ **C.** $y = -(x - 3)^2 + 1$
- ☐ **D.** $y = -(x + 3)^2 - 1$
- ☐ **E.** $y = -x^2 + 6x - 8$

2. Here is a function: $g(x) = -(x + 3)^2 + 4$.
Use the graph if it helps with your thinking.

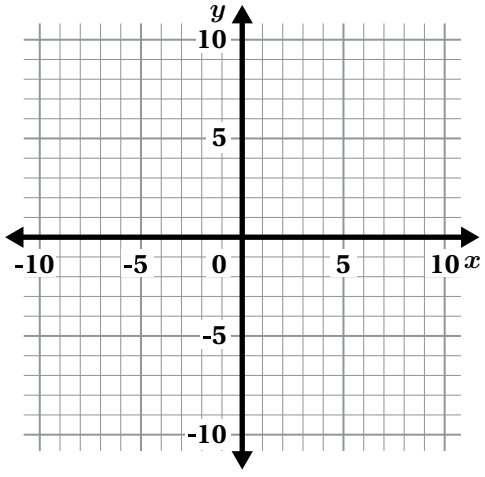


a What is the vertex of the graph of the function g?

b Does the vertex represent the *minimum* or the *maximum* value of the function?

Explain or show how you know.

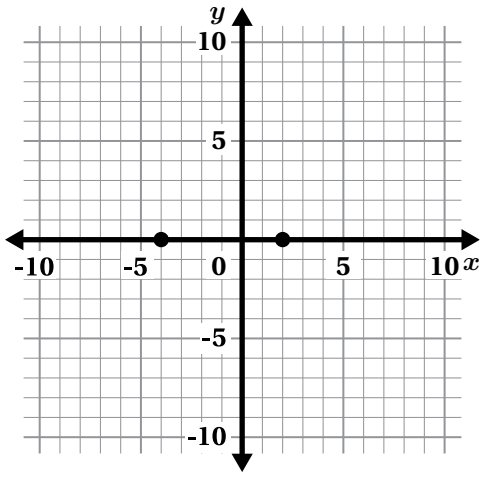
3. Sketch the graph of $p(x) = (3x - 9)(x - 1)$.
Include the x-intercepts, y-intercept, and vertex.



End-of-Unit Assessment (continued)

Unit 6

4. Here are the points $(2, 0)$ and $(-4, 0)$.



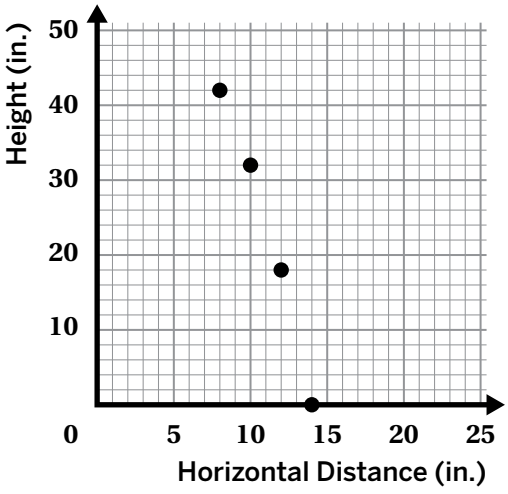
a Write a quadratic equation whose graph passes through the points $(2, 0)$ and $(-4, 0)$.

b Write a different quadratic equation whose graph passes through the points $(2, 0)$ and $(-4, 0)$.

How are the parabolas of the two equations you wrote alike? How are they different?

5. A robot launches a ball into the air. The table and graph show the ball's horizontal distances from the robot and its heights above the ground.

Horizontal Distance (in.)	Height (in.)
8	42
10	32
12	18
14	0



a What type of relationship is represented?

(A.) Linear (B.) Exponential (C.) Quadratic (D.) Something else

b What is the greatest height the ball reaches?

c What is the ball's height above the ground when its horizontal distance from the robot is 0?

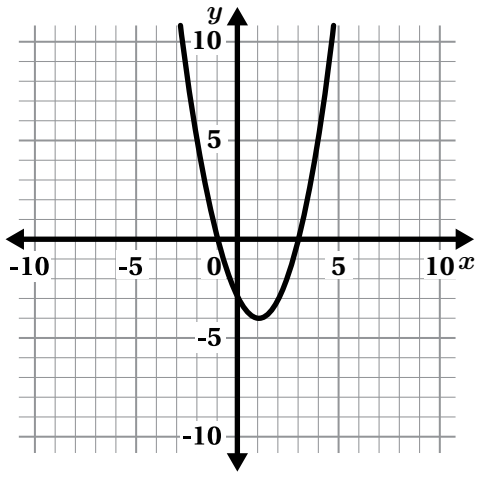
6. Emiliano says the equation of this graph is $y = (x + 1)(x - 3)$.

Dhruv says the equation is $y = x^2 - 2x - 3$.

Whose thinking is correct? Circle one.

Esteban's Dhruv's Both Neither

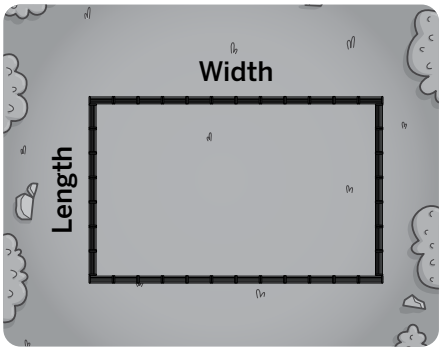
Explain your thinking.



7. A farmer is building a rectangular sheep pen made from 48 feet of fencing.

a Determine the length, width, and area of three different sheep pens that will use exactly 48 feet of fencing.

	Length (ft)	Width (ft)	Area (sq. ft)
Pen 1			
Pen 2			
Pen 3			



The function $f(x) = x(24 - x)$ models the area of the sheep pen, where x is the pen's width.

b According to the model, what is the largest possible area for the pen?

Explain your thinking

Standard	MA.912.F.1.1	MA.912.F.1.2	MA.912.F.1.8	MA.912.AR.3.4	MA.912.AR.3.5	MA.912.AR.3.6	MA.912.AR.3.7
Problem(s)	5a	5b, 5c	5a	1, 4a, 4b, 6	1, 4a, 4b	2a, 2b, 3, 7a, 7b	2a, 2b, 3, 5b, 5c

Problem 1

Standards: MA.912.AR.3.4, MA.912.AR.3.5, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • $y = -(x-2)(x-4)$ • $y = -(x-3)^2 + 1$ • $y = -x^2 + 6x - 8$	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice.	**One or two correct** choices and **one incorrect** choice. Students who select $-(x+3)^2 - 1$ may have noticed the vertex of the parabola at $(3, 1)$ and that it opens down.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 2a

Standards: MA.912.AR.3.6, MA.912.AR.3.7, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(-3, 4)$	Response shows **conceptual understanding** with a minor error. E.g., Response includes an incorrect sign, such as $(3, 4)$.	Response shows **incomplete understanding** with significant errors or multiple minor errors. E.g., Response switches the x- and y-values and includes an incorrect sign $(4, 3)$.	Response shows **limited understanding.** E.g., Response does not identify a point or the point does not include values from the equation.

Problem 2b

Standards: MA.912.AR.3.6, MA.912.AR.3.7, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. Maximum. *Explanations vary.* The graph of g is concave down.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**.	**Correct** response with **incomplete** explanation. E.g., Response states minimum because the vertex is at $(-3, 4)$, and 4 is a positive number. **Incorrect** response with explanation that shows **partial understanding**.	**Incorrect** response with **no** or **incorrect** explanation. E.g., Response states minimum because this would be the lowest point on the parabola.

Problem 3

Standards: MA.912.AR.3.6, MA.912.AR.3.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Sketch shows a parabola that matches the equation, with x-intercepts, y-intercept, and vertex plotted precisely.	Response shows **conceptual understanding** with minor errors. E.g., Sketch matches the equation but at least one key feature is not precisely plotted. E.g., Sketch includes correct key features, but is not continuous.	Response shows **incomplete understanding** with significant errors. E.g., Sketch shows one correct x-intercept but not both.	Response shows **limited understanding**. E.g., Sketch includes a correct x-intercept or vertex but is not a parabola.

Problem 4a

Standards: MA.912.AR.3.4, MA.912.AR.3.5, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Equations vary.* • $y = (x - 2)(x + 4)$ • $y = (x + 1)^2 - 9$ • $y = -(x - 2)(x + 4)$	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**. E.g., Equation does not describe a parabola.

Problem 4b

Standards: MA.912.AR.3.4, MA.912.AR.3.5, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *See equations in 4a. Responses vary.* • **Alike: The parabolas have the same x-intercepts.** • **Different: One parabola is concave up; the other is concave down.**	Response shows **conceptual understanding** with minor errors. E.g., Equation in 4b is different and has the same x-intercepts as the equation in 4a, even if the equation in 4a is not correct.	Response shows **incomplete understanding** with significant errors. E.g., Equation is equivalent to the previous equation with the factors reversed.	Response shows **limited understanding**. E.g., Equation does not describe a parabola.

Problem 5a	**Standard:** Standards: MA.912.F.1.1, MA.912.F.1.8		
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct choice: Quadratic			**Incorrect** choice. Students who select *Something else* may have noticed that the horizontal distances are not increasing by 1 inch.

Problem 5b	**Standards:** MA.912.AR.3.7, MA.912.F.1.2, MTR.6.1		
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: 50 inches	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors. Students who write "42 inches" may have noticed the maximum height in the table.	Response shows **limited understanding**. Students who write "52 inches" may have noticed $32 + 10 = 42$ and $42 + 10 = 52$.

Problem 5c	**Standards:** MA.912.AR.3.7, MA.912.F.1.2, MTR.6.1		
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: 42 inches	Response shows **conceptual understanding** with minor errors. Students who write "18 inches" may have noticed the line of symmetry is at 6 inches.	Response shows **incomplete understanding** with significant errors. Students who write "-22 inches" may have noticed that it would be the eighth point on the graph.	Response shows **limited understanding**. Students who write "14 inches" may have noticed the point $(14, 0)$ is on the graph.

Problem 6

Standards: MA.912.AR.3.4, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete explanation.** Both. *Explanations vary.* Both are correct because both equations have the same intercepts and are concave up.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**.	**Correct** response with **incomplete explanation**. **Incorrect** response with explanation that shows **partial understanding**. E.g., Response states Emiliano is correct because his equation is in factored form.	**Incorrect** response with **no explanation**.

Problem 7a

Standards: MA.912.AR.3.6, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: 4, 20, 80 9, 15, 135 10, 14, 140	Response shows **conceptual understanding** with minor errors. E.g., One response does not total 48 feet of fencing.	Response shows **incomplete understanding** with significant errors. E.g., Response includes correct lengths and widths, but incorrect areas.	Response shows **limited understanding.** E.g., Response does not show a connection between the lengths and widths to 48 feet of fencing.

Problem 7b

Standards: MA.912.AR.3.6, MTR.6.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response and **complete** explanation. 144. *Explanations vary.* The x-intercepts of the function are at $(0, 0)$ and $(24, 0)$. This means the vertex has an x-value of 24. If I plug in 24, I get the maximum value, which is 144 square feet.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**.	**Correct** response with **incomplete** explanation. **Incorrect** response with explanation that shows **partial understanding**. E.g., Response incorrectly identifies 12 as the maximum value because of the axis of symmetry.	**Incorrect** response with **no** explanation.

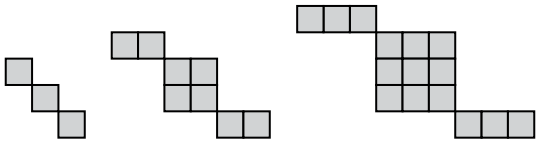
Unit 6
Show What You Know PDFs

Name: Date: Period:

Show What You Know

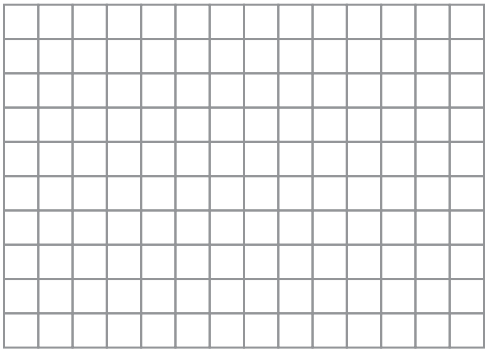
6.01

Here is a pattern.



$s = 1$ $s = 2$ $s = 3$

Draw the pattern when $s = 4$.



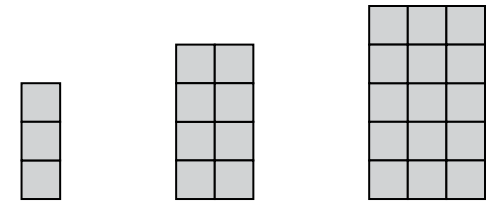
Name: Date: Period:

Show What You Know

6.02

Is this pattern a quadratic relationship?

Explain your thinking.



Name: Date: Period:

Show What You Know

6.03

a Determine whether the relationship in this table is linear, exponential, quadratic, or something else. Explain your thinking.

b Complete the table.

x	$m(x)$
1	2
2	8
3	18
4	32
5	
6	

Name: Date: Period:

Show What You Know

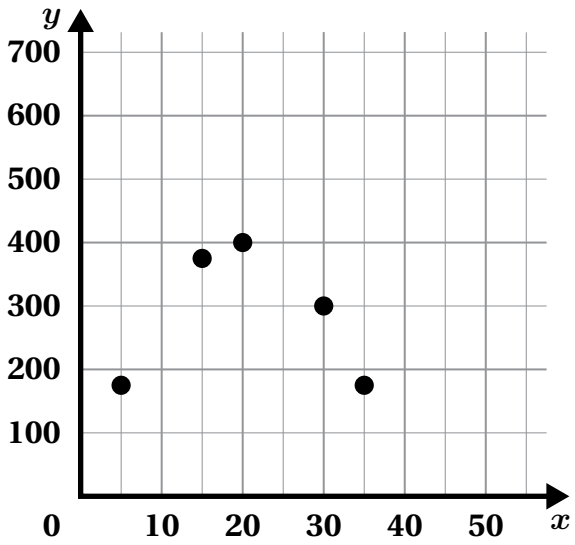
6.04

The table and graph represent a quadratic relationship.

a Complete the table.

x	y
5	175
10	
15	375
20	400
25	
30	300
35	175

b Draw the line of symmetry.



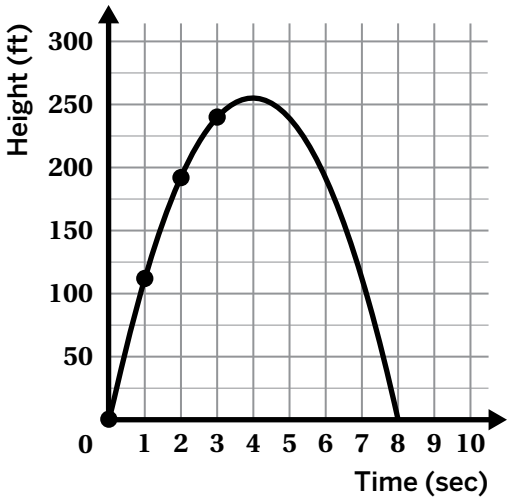
Name: Date: Period:

Show What You Know

6.05

The table and graph show the height of a stomp rocket at various times.

Time (sec)	Height (ft)
0	0
1	112
2	192
3	240



a How high was the rocket after 5 seconds?

b How long did it take for the rocket to land?

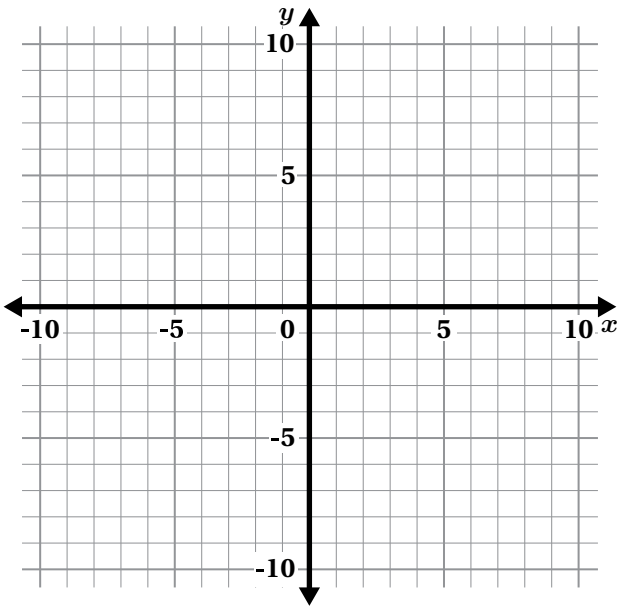
Name: Date: Period:

Show What You Know

6.06

Draw a parabola with these characteristics:

- Concave down
- Vertex at $(5, 3)$
- An x-intercept at $(2, 0)$

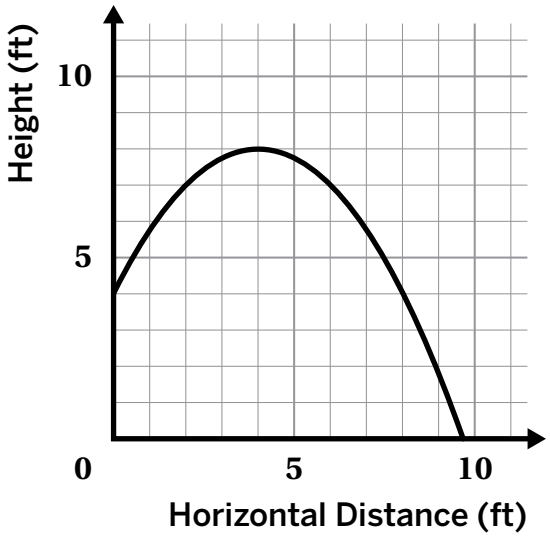


Name: Date: Period:

Show What You Know

6.07

The graph shows the height of a ball after it is launched.



a Label the vertex of this parabola.

b What does the vertex tell you about the movement of the ball?
Use values from the graph.

c Label the x-intercept(s) of this parabola.

d What do the x-intercept(s) tell you about the movement of the ball?
Use values from the graph.

Name: Date: Period:

Show What You Know

6.08

Here are three statements about the graph of $j(x) = (2x - 1)(x + 3)$.

Two are true and one is false. Circle the statement that is false.

Use the table if it helps with your thinking.

x			

A. The point $(-2, -5)$ is on the graph.

B. The point $(0, -3)$ is on the graph.

C. The point $(2, 8)$ is on the graph.

Name: Date: Period:

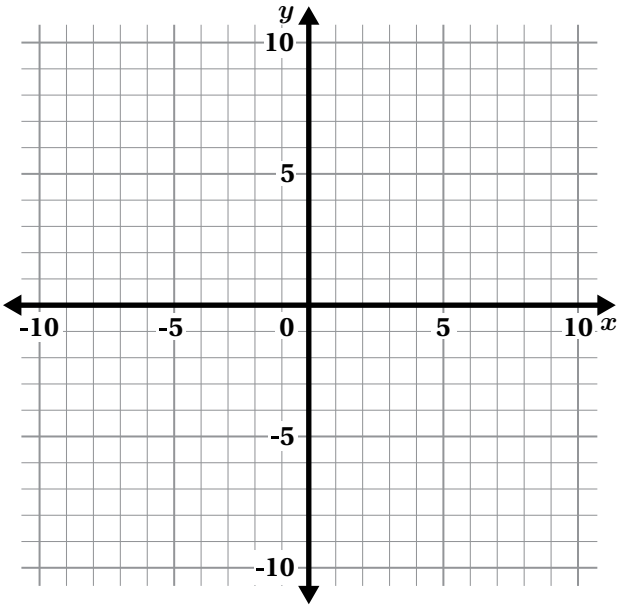
Show What You Know

6.09

Choose one equation. Graph it on the coordinate plane and show your thinking.

$f(x) = (x - 5)(x + 1)$

$g(x) = x^2 - 4x - 5$



Name: ..... Date: ..... Period: .....

Show What You Know

6.10

The same function is written in factored and standard form.

Factored form: $g(x) = (3x - 6)(x + 4)$

Standard form: $g(x) = 3x^2 + 6x - 24$

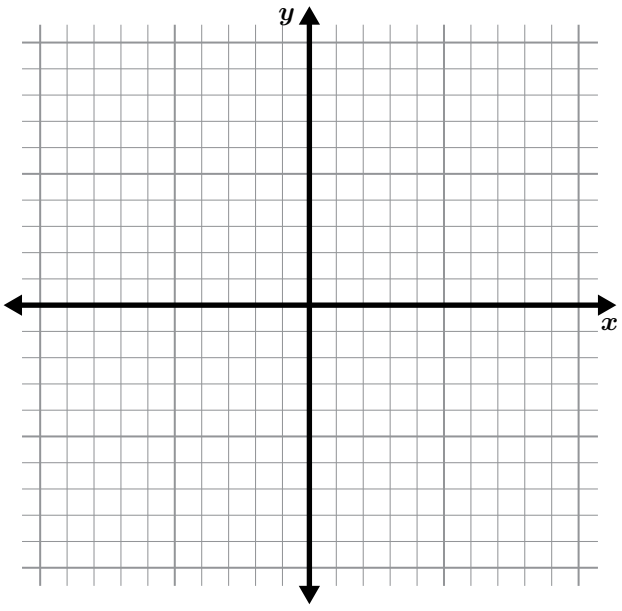
What are the x- and y-intercepts of the function?

Use the graph if it helps with your thinking.

x-intercept: .....

x-intercept: .....

y-intercept: .....



Name: Date: Period:

Show What You Know

6.11

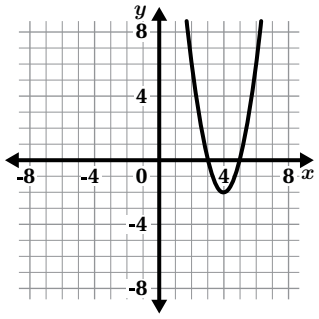
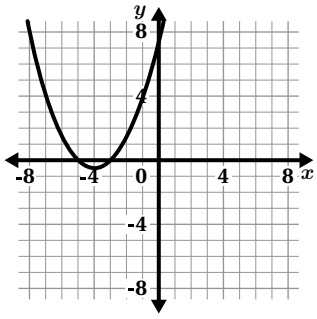
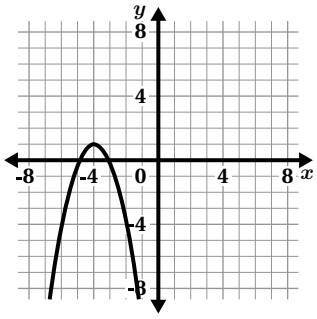
Match each graph with its equation. One equation will have no match.

A. $y = 2(x - 3)(x - 5)$

B. $y = \frac{1}{2}(x + 3)(x + 5)$

C. $y = -(x + 3)(x + 5)$

D. $y = 2(x + 3)(x + 5)$

Graph 1	Graph 2	Graph 3
		

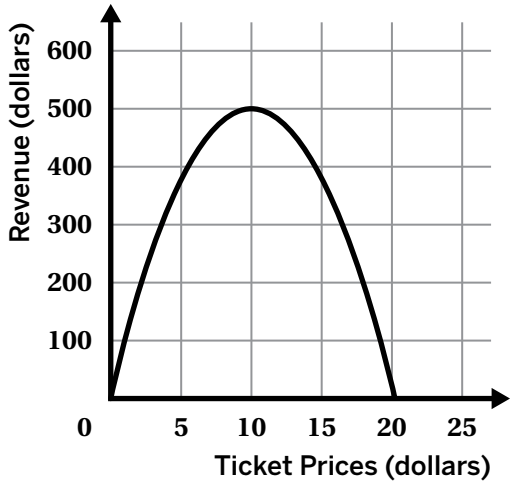
Name: Date: Period:

Show What You Know

6.12

Two movie theaters created models to predict their revenue based on the price of a movie ticket.

Des Theaters



CineMos

$x(120 - 6x) = r(x)$

$x =$ ticket prices

$r(x) =$ revenue

Which company's model shows a higher maximum revenue?

How do you know?

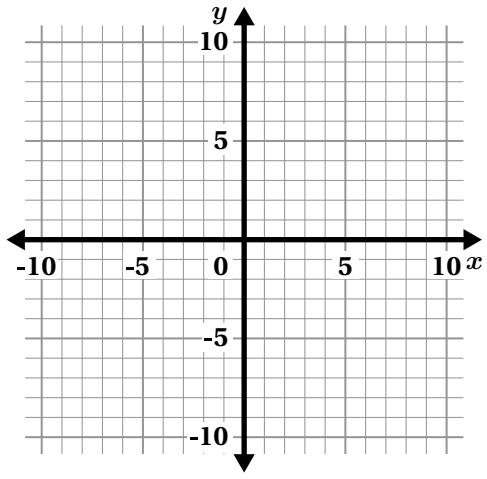
Name: Date: Period:

Show What You Know

6.13

Write an equation of a quadratic function with its vertex at $(6, 7)$.

Use the graph if it helps with your thinking.



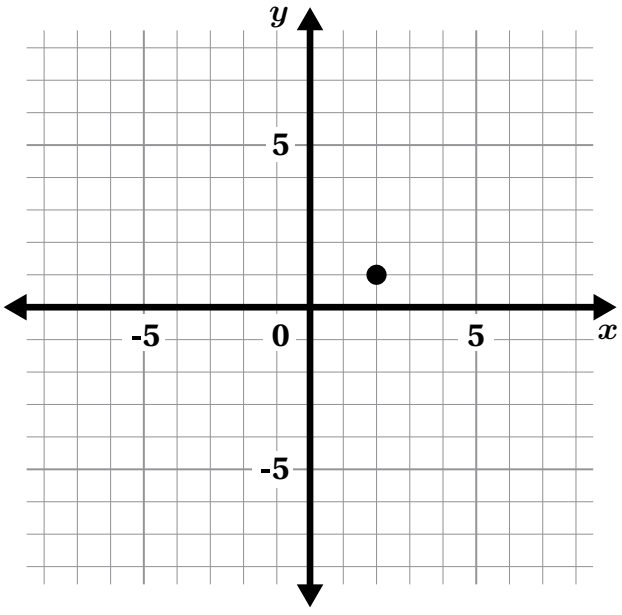
Name: Date: Period:

Show What You Know

6.14

Draw the graph of $f(x) = -(x-2)^2 + 1$.

The vertex is drawn for you.



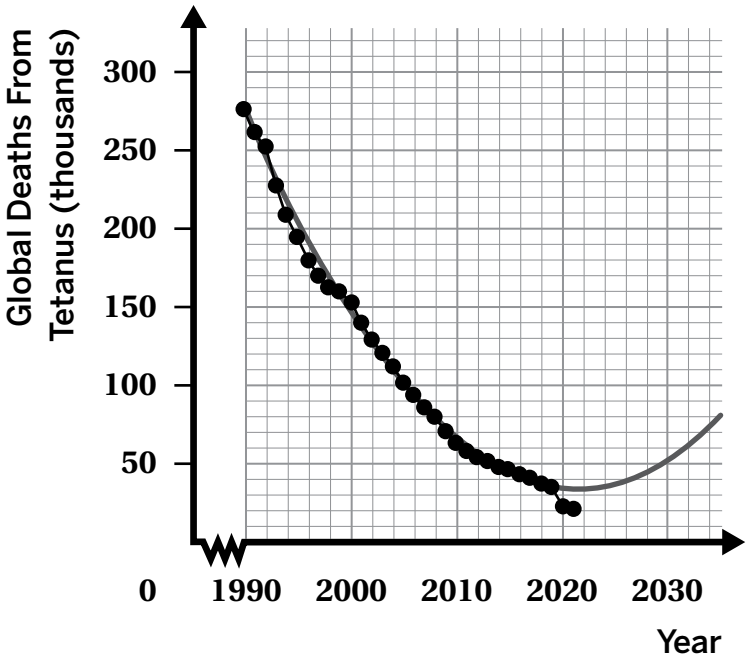
Name: Date: Period:

Show What You Know

6.15

Here is a graph showing the number of tetanus cases from 1990–2021 and a quadratic model.

Explain how the model is wrong and how it is useful.

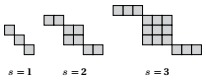


Show What You Know **Lesson 1**

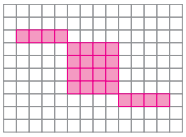
Name: _____ Date: _____ Period: _____

Show What You Know 6.01

Here is a pattern.



Draw the pattern when $s = 4$.



Show What You Know **Lesson 2**

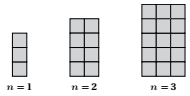
Name: _____ Date: _____ Period: _____

Show What You Know 6.02

Is this pattern a quadratic relationship? Yes

Explain your thinking.

Explanations vary. Each figure is made up of a square plus two rows. You can represent this pattern with the expression $n^2 + 2n$. Since there is an n^2 in the expression, this pattern is quadratic.



Show What You Know **Lesson 3**

Name: _____ Date: _____ Period: _____

Show What You Know 6.03

a. Determine whether the relationship in this table is linear, exponential, quadratic, or something else. Explain your thinking.

Quadratic. *Explanations vary.* The second differences are constant, 4.

b. Complete the table.

x	$m(x)$
1	2
2	8
3	18
4	32
5	50
6	72

Show What You Know **Lesson 4**

Name: _____ Date: _____ Period: _____

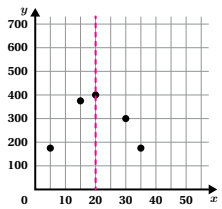
Show What You Know 6.04

The table and graph represent a quadratic relationship.

a. Complete the table.

x	y
5	175
10	300
15	375
20	400
25	375
30	300
35	175

b. Draw the line of symmetry.



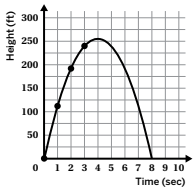
Show What You Know **Lesson 5**

Name: _____ Date: _____ Period: _____

Show What You Know 6.05

The table and graph show the height of a stomp rocket at various times.

Time (sec)	Height (ft)
0	0
1	112
2	192
3	240



a. How high was the rocket after 5 seconds?
240 feet

b. How long did it take for the rocket to land?
8 seconds

Show What You Know **Lesson 6**

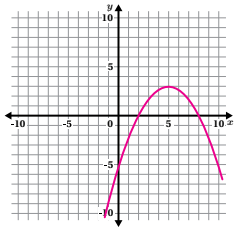
Name: _____ Date: _____ Period: _____

Show What You Know 6.06

Draw a parabola with these characteristics:

- Concave down
- Vertex at $(5, 3)$
- An x-intercept at $(2, 0)$

Responses vary.

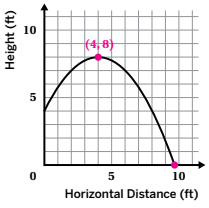


Show What You Know **Lesson 7**

Name: _____ Date: _____ Period: _____

Show What You Know 6.07

The graph shows the height of a ball after it is launched.



a. Label the vertex of this parabola.

b. What does the vertex tell you about the movement of the ball?
Use values from the graph.
Responses vary. **The ball is at its maximum height of 8 feet when it is horizontally 4 feet away from where it launched.**

c. Label the x-intercept(s) of this parabola.
Coordinates vary. **The y-coordinate should be 0.**

d. What do the x-intercept(s) tell you about the movement of the ball?
Use values from the graph.
Responses vary. **The x-intercept tells me that the ball lands between 9 and 10 feet away from where it was launched.**

Show What You Know **Lesson 8**

Name: _____ Date: _____ Period: _____

Show What You Know 6.08

Here are three statements about the graph of $j(x) = (2x - 1)(x + 3)$.

Two are true and one is false. Circle the statement that is false.

Use the table if it helps with your thinking. ***Tables vary.***

x	$(2x - 1)$	$(x + 3)$	$(2x - 1)(x + 3)$
-2	-5	1	-5
0	-1	3	-3
2	3	5	15

A. The point (-2, -5) is on the graph.

B. The point (0, -3) is on the graph.

C. The point (2, 8) is on the graph.

Show What You Know **Lesson 9**

Name: _____ Date: _____ Period: _____

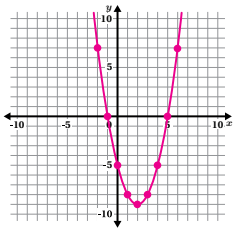
Show What You Know 6.09

Choose one equation. Graph it on the coordinate plane and show your thinking.

$f(x) = (x - 5)(x + 1)$

$g(x) = x^2 - 4x - 5$

Choices vary. The graph of both functions is the same.



Show What You Know **Lesson 10**

Name: _____ Date: _____ Period: _____

Show What You Know 6.10

The same function is written in factored and standard form.

Factored form: $g(x) = (3x - 6)(x + 4)$

Standard form: $g(x) = 3x^2 + 6x - 24$

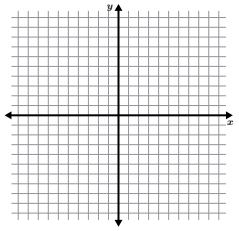
What are the x- and y-intercepts of the function?

Use the graph if it helps with your thinking.

x-intercept: (2, 0)

x-intercept: (-4, 0)

y-intercept: (0, -24)



Show What You Know **Lesson 11**

Name: _____ Date: _____ Period: _____

Show What You Know 6.11

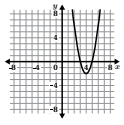
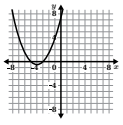
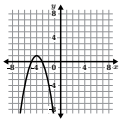
Match each graph with its equation. One equation will have no match.

A. $y = 2(x - 3)(x - 5)$

B. $y = \frac{1}{2}(x + 3)(x + 5)$

C. $y = -(x + 3)(x + 5)$

D. $y = 2(x + 3)(x + 5)$

Graph 1	Graph 2	Graph 3
		
A	B	C

Equation with no match: D

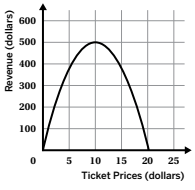
Show What You Know **Lesson 12**

Name: _____ Date: _____ Period: _____

Show What You Know 6.12

Two movie theaters created models to predict their revenue based on the price of a movie ticket.

Des Theaters



CineMos

$x(120 - 6x) = r(x)$

x = ticket prices

$r(x)$ = revenue

Which company's model shows a higher maximum revenue? CineMos

How do you know?

Explanations vary. The graph of Des Theaters shows that the maximum revenue is $500. I can use the equation for CineMos to find the x-intercepts at 0 and 20, which means the maximum revenue is when ticket prices are $10. The maximum revenue is $600.

Show What You Know **Lesson 13**

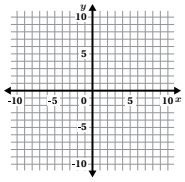
Name: _____ Date: _____ Period: _____

Show What You Know 6.13

Write an equation of a quadratic function with its vertex at (6, 7).

Use the graph if it helps with your thinking.

$y = (x - 6)^2 + 7$ (or equivalent)



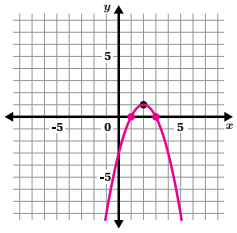
Show What You Know **Lesson 14**

Name: _____ Date: _____ Period: _____

Show What You Know 6.14

Draw the graph of $f(x) = -(x - 2)^2 + 1$.

The vertex is drawn for you.



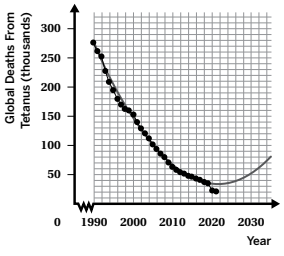
Show What You Know **Lesson 15**

Name: _____ Date: _____ Period: _____

Show What You Know 6.15

Here is a graph showing the number of tetanus cases from 1990–2021 and a quadratic model.

Explain how the model is wrong and how it is useful. *Responses vary.*



- The model is wrong because I know there is a vaccine for tetanus, so I expect cases do decline over time, but the model shows tetanus cases will increase as time goes on.
- The model is useful because it does a good job of fitting the data on the interval 1990–2021.

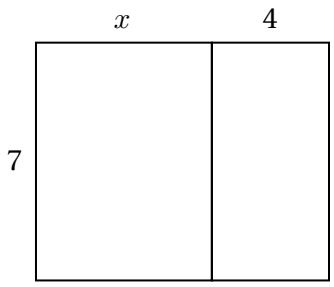
Unit 7
Assessments and Rubrics

Name: ..... Date: ..... Period: .....

Pre-Unit Check

Unit 7

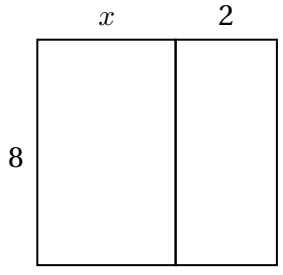
1. Select *all* the expressions that represent the area of this rectangle.



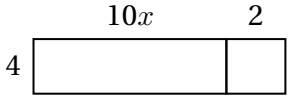
- ☐ **A.** $4(7 + x)$
- ☐ **B.** $7(x + 4)$
- ☐ **C.** $7x + 28$
- ☐ **D.** $7x + 4$
- ☐ **E.** $7 + x + 4$

2. Write an expression for the area of each rectangle.

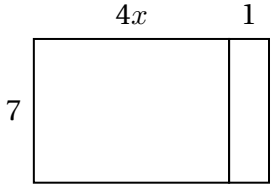
a



b



c



Pre-Unit Check (continued)

Unit 7

3. Make an expression by filling each blank with one of the numbers below.

$$\square\left(\square+\square\right)=\ ?$$

-1	2	3	4
-5	6	7	8

a Determine the value of your expression.

b Can you fill in the blanks with the listed numbers to create an expression with a greater value? Explain your thinking.

4. 36 and 48 have six common factors. 4 is one of them. List as many other common factors as you can.

5. Solve each equation.

a $5x - 20 + 3x = 0$

b $-3(x - 11) = 0$

6. Order these numbers by value:

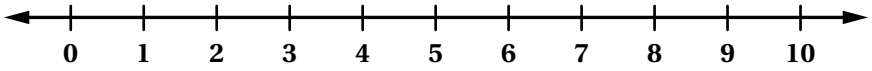
$\sqrt{35}$	$\sqrt{24}$	6	5.5	5

Least **Greatest**

Pre-Unit Check (continued)

Unit 7

7. x and y are positive numbers where $x^2 = 8$ and $y^2 = 50$. Plot x and y on the number line.



8. Determine the value of each expression.

a $(x + 2)^2$ when $x = 6$

b $6x^2$ when $x = 3$

c $(5x)^2$ when $x = 2$

9. Evaluate each expression for $a = 9$, $b = -5$, and $c = -2$.

Expression	Value
$-b$	
b^2	
$b^2 - 4ac$	
$-b + \sqrt{a}$	

Name: ..... Date: ..... Period: .....

Sub-Unit Quiz

Unit 7

1. Which expression is equivalent to $(x - 5)^2$?

A. $x^2 + 25$ **B.** $x^2 - 25$ **C.** $x^2 - 5x + 10$ **D.** $x^2 - 10x + 25$

2. Select *all* the expressions that are equivalent to $(2x - 4)(x + 3)$.

- ☐ **A.** $2x^2 - 4x + 3x - 12$
- ☐ **B.** $2(x - 2)(x + 3)$
- ☐ **C.** $2x(x + 3) - 4(x + 3)$
- ☐ **D.** $2(x^2 + x - 12)$
- ☐ **E.** $2x^2 + 2x - 12$

3. Determine the x-intercepts of each function.

a $f(x) = (x - 3)(x + 5)$

x-intercept	Ordered Pair
x-intercept #1	
x-intercept #2	

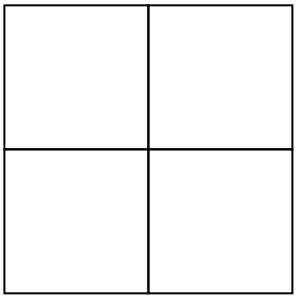
b $h(x) = (2x - 1)(5x - 2)$

x-intercept	Ordered Pair
x-intercept #1	
x-intercept #2	

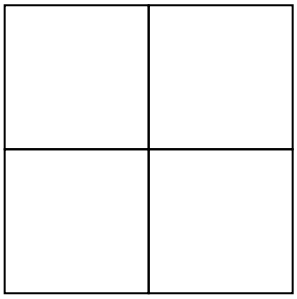
Sub-Unit Quiz (continued)

4. Rewrite each expression in factored form. Use the diagrams if they help with your thinking.

a $x^2 - 3x - 28$



b $3x^2 + 11x - 4$



5. **a** Determine the solutions to $x^2 - 10x = 24$.

b Write a quadratic equation with solutions $x = -2$ and $x = 6$. Explain your thinking.

Standard	MA.912.AR.1.3	MA.912.AR.1.7	MA.912.AR.3.1	MA.912.AR.3.5	MA.912.AR.3.6
Problem(s)	1, 2	4a, 4b	5a	5b	3a, 3b

Problem 1

Standard: MA.912.AR.1.3

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $x^2 - 10x + 25$			**Incorrect** choice. Students who select $x^2 + 25$ may have thought exponents could be distributed.

Problem 2

Standards: MA.912.AR.1.3, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
All correct choices and **no incorrect** choices. • $2(x-2)(x+3)$ • $2x(x+3) - 4(x+3)$ • $2x^2 + 2x - 12$	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice.	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.

Problem 3a

Standard: MA.912.AR.3.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(3, 0)$ and $(-5, 0)$	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response includes $(-3, 0)$ and $(5, 0)$. E.g., Response includes one correct x-intercept.	Response shows **limited understanding**. Students who set the function equal to 0 may have recognized what an x-intercept is but are unsure of how to determine the answer.

Problem 3b

Standard: MA.912.AR.3.6

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $\left(\frac{1}{2}, 0\right)$ and $\left(\frac{2}{5}, 0\right)$	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response includes $\left(-\frac{1}{2}, 0\right)$ and $\left(-\frac{2}{5}, 0\right)$. E.g., Response includes one correct x-intercept.	Response shows **limited understanding**. Students who set the function equal to 0 may have recognized what an x-intercept is but are unsure of how to determine the answer.

Problem 4a

Standard: MA.912.AR.1.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(x - 7)(x + 4)$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., Response mixes up the signs in $(x + 7)$ and $(x - 4)$.	Response shows **incomplete understanding** with significant errors. Students who write $(x + 14)(x - 2)$ may understand how to attend to the value of c when factoring.	Response shows **limited understanding**.

Problem 4b

Standard: MA.912.AR.1.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $(3x - 1)(x + 4)$ (or equivalent)	Response shows **conceptual understanding** with minor errors. E.g., Response mixes up the signs in $(3x + 1)$ and $(x - 4)$.	Response shows **incomplete understanding** with significant errors. Students who write $(3x + 2)(x - 2)$ may understand how to attend to the value of a- and c-values when factoring.	Response shows **limited understanding**.

Problem 5a			**Standard:** MA.912.AR.3.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response: $x = 12$ and $x = -2$	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response includes one correct solution. E.g., Response includes $x = -7$ and $x = 4$.	Response shows **limited understanding**. E.g., Response manipulates the equation to be equal to 0 but does not rewrite it in factored form.

Problem 5b			**Standards:** MA.912.AR.3.5, MTR.5.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response and **complete** explanation. *Responses and explanations vary.* $(x + 2)(x - 6) = 0$. When I use the zero-product property, I know that $x + 2 = 0$ or $x - 6 = 0$. When I solve these equations, I get $x = -2$ and $x = 6$.	**Correct** response with **minor flaws** in explanation. **Incorrect** response with logical and **complete explanation**. E.g., Response has a minor calculation error.	**Correct** response with **incomplete** explanation. E.g., Response includes a correct equation with no explanation. **Incorrect** response with explanation that shows **partial understanding**. E.g., Response mentions the zero-product property.	**Incorrect** response with **no** explanation.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 7

1. Which expression is equivalent to $x^2 + 9x - 36$?

A. $(x - 6)^2$

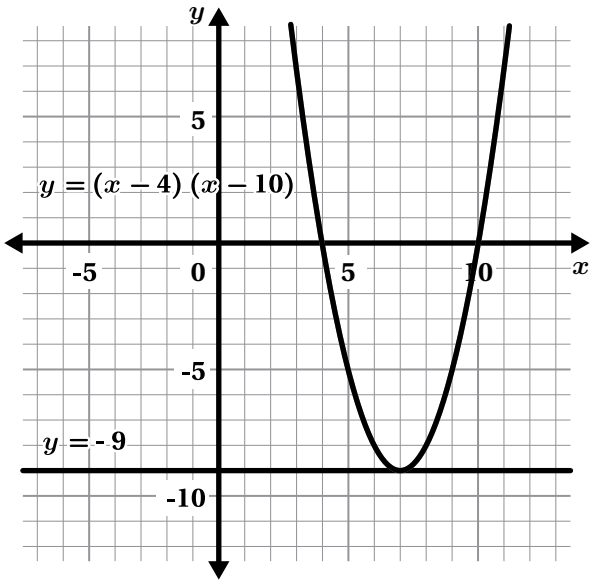
B. $(x + 6)(x - 6)$

C. $(x - 9)(x + 4)$

D. $(x - 3)(x + 12)$

2. Here is the graph that Ivan made to solve $(x - 4)(x - 10) = -9$.

Determine the solution(s) to this equation.



3. Select *all* the equations that have:

a No solutions.

- ☐ **A.** $x^2 = 16$
- ☐ **B.** $4x^2 + 1 = 0$
- ☐ **C.** $x^2 = -16$
- ☐ **D.** $x^2 + 1 = 1$
- ☐ **E.** $(x - 8)(x - 8) = 0$

b Exactly one solution.

- ☐ **A.** $x^2 = 16$
- ☐ **B.** $4x^2 + 1 = 0$
- ☐ **C.** $x^2 = -16$
- ☐ **D.** $x^2 + 1 = 1$
- ☐ **E.** $(x - 8)(x - 8) = 0$

End-of-Unit Assessment (continued)

Unit 7

4. Jalen made a mistake when solving $x^2 - 10x + 9 = 0$ by completing the square.

$$x^2 - 10x + 9 = 0$$
$$x^2 - 10x = -9$$
$$x^2 - 10x + 25 = -9$$
$$(x - 5)^2 = -9$$
$$x - 5 = \pm\sqrt{-9}$$

no solution

a Describe one thing that Jalen did correctly.

b Show or explain why Jalen's work is incorrect.

c Determine the solution(s) to the equation.

5. Complete the table with equivalent forms of each expression.

	Vertex Form	Standard Form	Factored Form
Expression A	$(x + 3)^2 - 4$	$x^2 + 6x + 5$	
Expression B	$(x - 4)^2 - 1$		$(x - 5)(x - 3)$
Expression C		$x^2 + 2x - 8$	$(x - 2)(x + 4)$

End-of-Unit Assessment (continued)

6. Determine the exact solution(s) for each equation.

a $x^2 + 10x - 24 = 0$

b $5x^2 + 13x = 6$

c $(x - 3)^2 = 5$

7. $h(x) = -5x^2 + 10x + 2$ represents the height of a football, in meters, x seconds after it was thrown.

a Write an equation that can be solved to determine when the football will touch the ground at a height of 0 meters.

b Determine the number of seconds it will take for the football to touch the ground.

c The vertex form of this function is $h(x) = -5(x - 1)^2 + 7$.
Determine the coordinates of the vertex and explain what it means about this situation.

Standard	MA.912.AR.1.3	MA.912.AR.1.7	MA.912.AR.3.1	MA.912.AR.3.4	MA.912.AR.3.6	MA.912.AR.3.7	MA.912.AR.3.8
Problem(s)	5	1, 5	3a, 3b, 4a, 4b, 4c, 5, 6a, 6b, 6c	7a	2, 7c	2	7b

Problem 1

Standard: MA.912.AR.1.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $(x-3)(x+12)$			**Incorrect** choice. Students who select $(x-6)^2$ may have noticed the squared term, 36.

Problem 2

Standards: MA.912.AR.3.6, MA.912.AR.3.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x=7$	Response shows **conceptual understanding** with minor errors. E.g., Response includes $x=7$ and $x=-9$.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**. Students who write $x=4$ and $x=10$ may have solved $(x-4)(x-10)=0$.

Problem 3a

Standards: MA.912.AR.3.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • $4x^2+1=0$ • $x^2=-16$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Two or more incorrect** choice.

Problem 3b

Standards: MA.912.AR.3.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • $x^2 + 1 = 1$ • $(x - 8)(x - 8) = 0$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Two or more incorrect** choice.

Problem 4a

Standards: MA.912.AR.3.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* Jalen correctly added 25 to make $x^2 - 10x$ into a perfect square.	Response shows **conceptual understanding** with minor errors. E.g., Response states, "Jalen did the left side correctly."	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 4b

Standards: MA.912.AR.3.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Explanations vary.* Jalen did not add 25 to both sides of the equation.	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors. E.g., Response states, "Jalen added wrong."	Response shows **limited understanding**.

Problem 4c

Standard: MA.912.AR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = 1$ and $x = 9$	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response includes one correct solution. E.g., Response includes $x = -1$ and $x = -9$.	Response shows **limited understanding**.

Problem 5

Standards: MA.912.AR.1.3, MA.912.AR.1.7, MA.912.AR.3.1, MTR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **Factored Form:** $(x + 5)(x + 1)$ **(or equivalent)** **Standard Form:** $x^2 - 8x + 15$ **Vertex Form:** $(x + 1)^2 - 9$	Response shows **conceptual understanding** with minor errors. **Two correct** answers. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. **One correct** answer.	Response shows **limited understanding**. **No correct** answer.

Problem 6a

Standard: MA.912.AR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = -12$ and $x = 2$	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response includes one correct solution. E.g., Response includes $x = 12$ and $x = -2$.	Response shows **limited understanding**.

Problem 6b

Standard: MA.912.AR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = -3$ and $x = 0.4$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response includes one correct solution. E.g., Response includes $x = 3$ and $x = -0.4$.	Response shows **limited understanding**. Students who manipulate the equation to equal zero may understand that this is a necessary step to solve the equation algebraically.

Problem 6c

Standard: MA.912.AR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = 3 \pm \sqrt{5}$	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response uses a solving technique somewhat correctly, like undoing, factoring, graphing, or the quadratic formula.	Response shows **limited understanding**. Students who manipulate the equation to equal zero may understand that this is a necessary step to solve the equation algebraically.

Problem 7a

Standards: MA.912.AR.3.4, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $0 = -5x^2 + 10x + 2$	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**. Students who write $h(0) = -5x^2 + 10x + 2$ may have switched the inputs and outputs.

Problem 7b

Standards: MA.912.AR.3.8, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **2.183 seconds** **(or equivalent, e.g.,** $1 + \sqrt{\frac{7}{5}}, \frac{-10 - \sqrt{140}}{-10}$**)**	Response shows **conceptual understanding** with minor errors. E.g., Response includes the negative value of the two solutions.	Response shows **incomplete understanding** with significant errors. E.g., Response uses a solving technique somewhat correctly, like undoing, factoring, graphing, or the quadratic formula.	Response shows **limited understanding**.

Problem 7c			**Standards:** MA.912.AR.3.6, MTR.7.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response and **complete** explanation. **The coordinates of the vertex are (1, 7). *Explanations vary.* After 1 second, the football reaches its maximum height of 7 meters.**	**Correct** response with **minor flaws** in explanation. E.g., Response identifies the correct vertex but switches the interpretation of values. **Incorrect** response with logical and **complete explanation**. E.g., The vertex identified has a minor error.	**Correct** response with **incomplete** explanation. E.g., Response includes the correct vertex and only correctly interprets one value. **Incorrect** response with explanation that shows **partial understanding**. E.g., Response includes a correct interpretation of an incorrect vertex.	**Incorrect** response with **no** explanation.

Name: ..... Date: ..... Period: .....

End-of-Unit Assessment

Unit 7

1. Which expression is equivalent to $x^2 - 10x + 16$?

A. $(x - 4)^2$

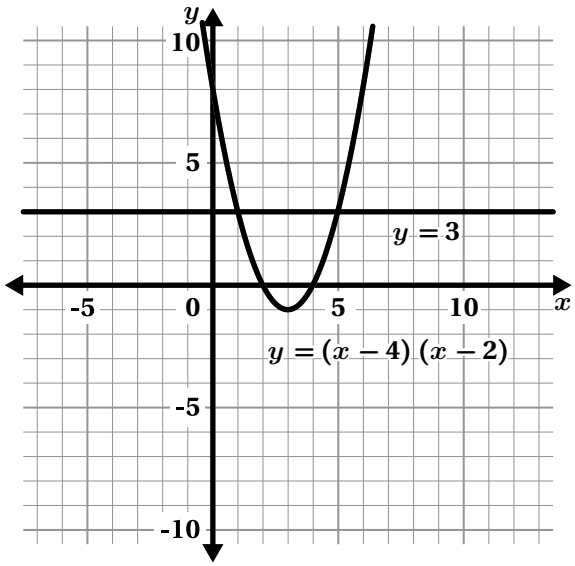
B. $(x - 8)(x - 2)$

C. $(x + 10)(x + 6)$

D. $(x - 16)(x + 1)$

2. Here is the graph that Ivan made to solve $(x - 4)(x - 2) = 3$.

Determine the solution(s) to this equation.



3. Select *all* the equations that have:

a One solution.

- ☐ **A.** $x^2 = 64$
- ☐ **B.** $(x - 9)^2 = 0$
- ☐ **C.** $x^2 + 6 = 2$
- ☐ **D.** $x^2 + 4 = 4$
- ☐ **E.** $(x + 3)(x - 6) = 0$

b Two solutions.

- ☐ **A.** $x^2 = 64$
- ☐ **B.** $(x - 9)^2 = 0$
- ☐ **C.** $x^2 + 6 = 2$
- ☐ **D.** $x^2 + 4 = 4$
- ☐ **E.** $(x + 3)(x - 6) = 0$

End-of-Unit Assessment (continued)

Unit 7

4. Felipe made a mistake when solving $x^2 - 8x + 3 = 0$ by completing the square.

$x^2 - 8x + 3 = 0$
$x^2 - 8x = -3$
$x^2 - 8x + 64 = -3 + 64$
$(x - 8)^2 = 61$
$x - 8 = \pm\sqrt{61}$
$x = 8 \pm \sqrt{61}$

a Describe one thing that Felipe did correctly.

b Show or explain why Felipe's work is incorrect.

c Determine the solution(s) to the equation.

5. Complete the table with equivalent forms of each expression.

	Factored Form	Standard Form	Vertex Form
Expression A		$x^2 - 2x - 3$	$(x - 1)^2 - 4$
Expression B	$(x + 12)(x + 6)$		$(x + 9)^2 - 9$
Expression C	$(x - 6)(x - 4)$	$x^2 - 10x + 24$	

End-of-Unit Assessment (continued)

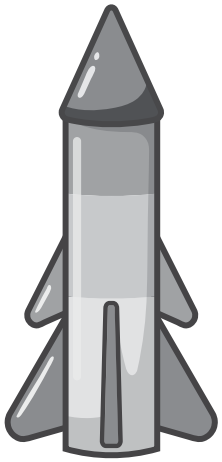
6. Determine the exact solution(s) for each equation.

a $x^2 - 6x = 16$

b $2x^2 + 13x + 15 = 0$

c $(x - 2)^2 = 10$

7. $h(x) = -3x^2 + 18x + 10$ represents the height of a stomp rocket, in meters, x seconds after it was thrown on another planet.



a Write an equation that can be solved to determine when the rocket will touch the ground at a height of 0 meters.

b Determine the number of seconds it will take for the rocket to touch the ground.

c The vertex form of this function is $h(x) = -3(x - 3)^2 + 37$.
Determine the coordinates of the vertex and explain what it means about this situation.

Standard	MA.912.AR.1.3	MA.912.AR.1.7	MA.912.AR.3.1	MA.912.AR.3.4	MA.912.AR.3.6	MA.912.AR.3.7	MA.912.AR.3.8
Problem(s)	5	1, 5	3a, 3b, 4a, 4b, 4c, 5, 6a, 6b, 6c	7a	2, 7c	2	7b

Problem 1

Standard: MA.912.AR.1.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct choice: $(x-8)(x-2)$			**Incorrect** choice. Students who select. $(x-4)^2$ may have noticed the squared term, 16.

Problem 2

Standards: MA.912.AR.3.6, MA.912.AR.3.7

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x=1$ and $x=5$	Response shows **conceptual understanding** with minor errors. E.g., Response includes either $x=1$ or $x=5$.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**. Students who write $x=4$ and $x=2$ may have solved $(x-4)(x-2)=0$.

Problem 3a

Standards: MA.912.AR.3.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • $(x-9)^2=0$ • $x^2+4=4$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Two or more incorrect** choice.

Problem 3b

Standards: MA.912.AR.3.1, MTR.5.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Both correct choices and **no incorrect** choices. • $x^2 = 64$ • $(x + 3)(x - 6) = 0$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Two or more incorrect** choice.

Problem 4a

Standards: MA.912.AR.3.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Responses vary.* **Felipe correctly took the square root of both sides after factoring, including adding a $\pm$ on the right side.**	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**.

Problem 4b

Standards: MA.912.AR.3.1, MTR.4.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: *Explanations vary.* **Felipe did not divide by 2 before squaring the second coefficient to find the perfect square.**	Response shows **conceptual understanding** with minor errors. E.g., Response states, "Felipe needed to add 16."	Response shows **incomplete understanding** with significant errors. E.g., Response states, "Felipe added wrong."	Response shows **limited understanding**.

Problem 4c

Standard: MA.912.AR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = 4 \pm \sqrt{13}$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. E.g., Response includes a minor sign error or calculator error such as $x = -4 \pm \sqrt{13}$ or $x = 4 \pm \sqrt{19}$.	Response shows **incomplete understanding** with significant errors. E.g., Response includes one correct solution.	Response shows **limited understanding**.

Problem 5

Standards: MA.912.AR.1.3, MA.912.AR.1.7, MA.912.AR.3.1, MTR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: **Factored Form:** $(x-3)(x+1)$ **(or equivalent)** **Standard Form:** $x^2+18x+72$ **Vertex Form:** $(x-5)^2-1$	Response shows **conceptual understanding** with minor errors. **Two correct** responses. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. **One correct** response.	Response shows **limited understanding**. **No correct** responses.

Problem 6a

Standard: MA.912.AR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = -2$ and $x = 8$	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response includes one correct solution. E.g., Response includes $x = 2$ and $x = -8$.	Response shows **limited understanding**.

Problem 6b

Standard: MA.912.AR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = -5$ and $x = -1.5$ **(or equivalent)**	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response includes one correct solution. E.g., Response includes $x = 5$ and $x = 1.5$.	Response shows **limited understanding**. Students who manipulate the equation to equal zero may understand that this is a necessary step to solve the equation algebraically.

Problem 6c

Standard: MA.912.AR.3.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $x = 2 \pm \sqrt{10}$	Response shows **conceptual understanding** with minor errors. E.g., Work includes a minor arithmetic error.	Response shows **incomplete understanding** with significant errors. E.g., Response uses a solving technique somewhat correctly, like undoing, factoring, graphing, or the quadratic formula.	Response shows **limited understanding**. Students who manipulate the equation to equal zero may understand that this is a necessary step to solve the equation algebraically.

Problem 7a

Standards: MA.912.AR.3.4, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: $0 = -3x^2 + 18x + 10$	Response shows **conceptual understanding** with minor errors.	Response shows **incomplete understanding** with significant errors.	Response shows **limited understanding**. Students who write $h(0) = -3x^2 + 18x + 10$ may have switched the inputs and outputs.

Problem 7b

Standards: MA.912.AR.3.8, MTR.7.1

4 Meeting	3 Approaching	2 Developing	1 Beginning
Correct response: 6.512 seconds (or equivalent, e.g., $3 + \sqrt{\frac{37}{3}}, \frac{-18 - \sqrt{444}}{-6}$)	Response shows **conceptual understanding** with minor errors. E.g., Response includes the negative value of the two solutions.	Response shows **incomplete understanding** with significant errors. E.g., Response uses a solving technique somewhat correctly, like undoing, factoring, graphing, or the quadratic formula.	Response shows **limited understanding**.

Problem 7c			**Standards:** MA.912.AR.3.6, MTR.7.1
4 Meeting	**3 Approaching**	**2 Developing**	**1 Beginning**
Correct response and **complete** explanation. **The coordinates of the vertex are (3, 37). *Explanations vary.* After 3 seconds, the rocket reaches its maximum height of 37 meters.**	**Correct** response with **minor flaws** in explanation. E.g., Response identifies the correct vertex but switches the interpretation of values. **Incorrect** response with logical and **complete explanation**. E.g., The vertex identified has a minor error.	**Correct** response with **incomplete** explanation. E.g., Response includes the correct vertex and only correctly interprets one value. **Incorrect** response with explanation that shows **partial understanding**. E.g., Response includes a correct interpretation of an incorrect vertex.	**Incorrect** response with **no** explanation.

Unit 7
Show What You Know PDFs

Name: Date: Period:

Show What You Know

7.01

Here is a function: $b(x) = (-6x^2 - x + 8) + (3x + 2)$.

Write $b(x)$ using the fewest number of terms.

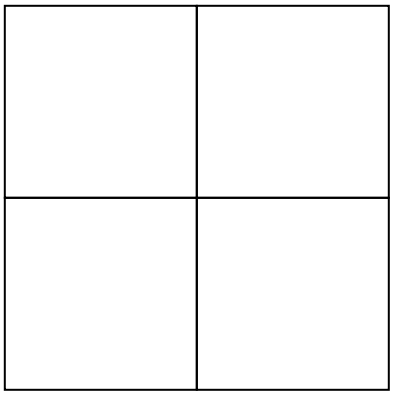
Name: Date: Period:

Show What You Know

7.02

Multiply to rewrite $(x + 4)(2x - 10)$ in standard form.

Use the diagram if it helps with your thinking.



Name: Date: Period:

Show What You Know

7.03

Write an expression in factored form that has a *negative* b*-value* and a *negative* c*-value* when written in standard form.

Factored Form:

Standard Form:

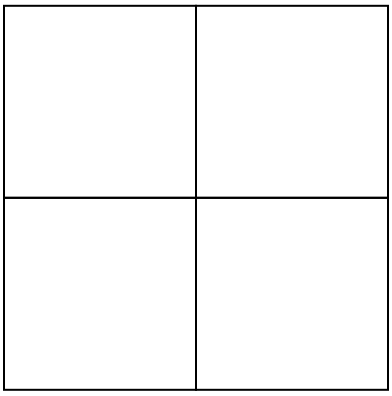
Name: Date: Period:

Show What You Know

7.04

Rewrite $x^2 + 3x - 28$ in factored form.

Use the diagram if it helps with your thinking.



Name: Date: Period:

Show What You Know

7.05

Factor the expression $2x^2 - 8x - 10$.

Name: Date: Period:

Show What You Know

7.06

Simplify each expression. State whether the resulting expression is a polynomial or not.

a $\frac{15x^5 + 20x^4 - 30x^3}{5x^3}$

b $\frac{8x^4 + 16x^3 - 32x^2}{8x^4}$

Name: Date: Period:

Show What You Know

7.07

Factor each expression completely.

a $4b^3 + 6b^2 + 10b + 15$

b $4y^3 + 8y^2 + 12y$

c $36a^2 - 49b^2$

Name: Date: Period:

Show What You Know

7.08

Here is a function written in two forms:

Standard form: $c(x) = 2x^2 - 6x - 36$

Factored form: $c(x) = (2x + 6)(x - 6)$

What are the x-intercepts of the function?

x-intercepts	Ordered Pair
x-intercept #1	
x-intercept #2	

Name: ..... Date: ..... Period: .....

Show What You Know

7.09

Solve the equation: $2x^2 - x - 6 = 0$.

$x =$ ..... $x =$ .....

Name: ..... Date: ..... Period: .....

Show What You Know

7.10

Here is a new equation: $(x + 2)(x + 2) = 9$.

How many solutions does this equation have? Circle one.

No solutions One solution Two solutions

Record any solution(s) here:

$x =$ .....

$x =$ .....

If you circled *No solutions*, complete the statement:
The equation has no solutions because . . .

Name: ..... Date: ..... Period: .....

Show What You Know

7.11

Use any strategy to solve $(x - 5)(2x + 1) = 6$.

How many solutions does this equation have? Circle one.

No solutions One solution Two solutions

Record any solution(s) here:

$x =$ .....

$x =$ .....

If you circled *No solutions*, complete the statement:
The equation has no solutions because . . .

Name: Date: Period:

Show What You Know

7.12

Determine the *exact* solution(s) to this equation:

$$2(x + 8)^2 = 70$$

Name: ..... Date: ..... Period: .....

Show What You Know

7.13

Complete each expression so that it is a perfect square.

$x^2 + 8x +$ .....

$x^2 -$ ..... $+ 25$

$x^2 - 20x +$ .....

Name: Date: Period:

Show What You Know

7.14

Solve the equation $x^2 - 16x = -5$.

Name: Date: Period:

Show What You Know

7.15

A quadratic function is defined by the expression $x^2 - 20x + 60$.

a Rewrite the expression in vertex form.

b Determine the vertex of the function.

c Is this vertex the maximum or minimum?

Name: Date: Period:

Show What You Know

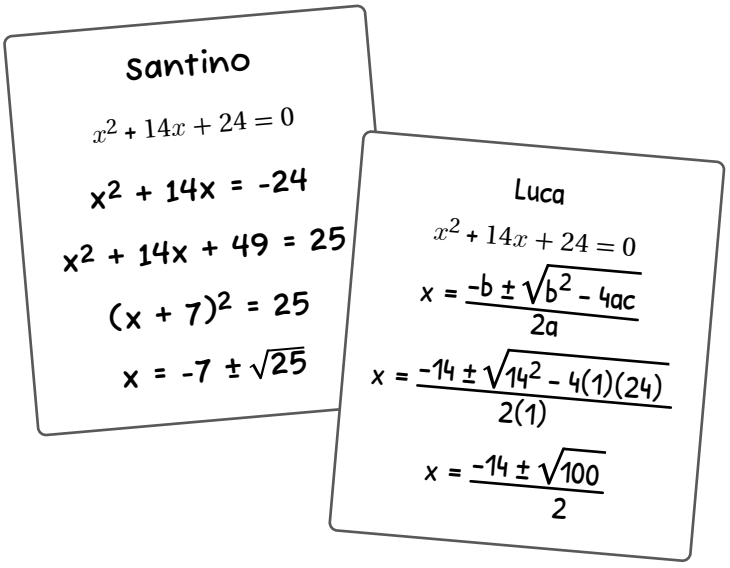
7.16

Santino and Luca used two different strategies to solve $x^2 + 14x + 24 = 0$.

Santino started to solve the equation by completing the square.

Luca started to solve the equation using the quadratic formula.

Explain why the two last equations of each strategy are equivalent and will lead to the same solutions.



Name: Date: Period:

Show What You Know

7.17

The Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Use the quadratic formula to solve the equation $2x^2 + 5x - 12 = 0$. Show your thinking.

Name: Date: Period:

Show What You Know

7.18

The function $h(t) = -5t^2 + 10t + 1$ represents the height of an apple, in meters, t seconds after it is tossed straight up in the air.

How many seconds will it take for the apple to reach the ground?

Round to three decimal places if necessary.

Show What You Know **Lesson 1**

Name: _____ Date: _____ Period: _____

Show What You Know 7.01

Here is a function: $b(x) = (\text{-}6x^2 - x + 8) + (3x + 2)$.

Write $b(x)$ using the fewest number of terms.

$b(x) = \text{-}6x^2 + 2x + 10$

Show What You Know **Lesson 2**

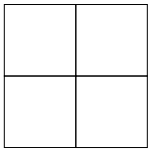
Name: _____ Date: _____ Period: _____

Show What You Know 7.02

Multiply to rewrite $(x + 4)(2x - 10)$ in standard form.

Use the diagram if it helps with your thinking.

$2x^2 - 2x - 40$



Show What You Know **Lesson 3**

Name: _____ Date: _____ Period: _____

Show What You Know 7.03

Write an expression in factored form that has a *negative* b-*value* and a *negative* c-*value* when written in standard form.

Factored Form:

Standard Form:

Responses vary.

- Factored form: $(x - 6)(x + 3)$; Standard form: $x^2 - 3x - 18$
- Factored form: $(5x - 4)(2x + 1)$; Standard form: $10x^2 - 3x - 4$

Show What You Know **Lesson 4**

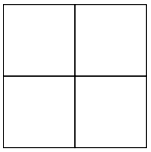
Name: _____ Date: _____ Period: _____

Show What You Know 7.04

Rewrite $x^2 + 3x - 28$ in factored form.

Use the diagram if it helps with your thinking.

$(x + 7)(x - 4)$ (or equivalent)



Show What You Know **Lesson 5**

Name: _____ Date: _____ Period: _____

Show What You Know 7.05

Factor the expression $2x^2 - 8x - 10$.

$2(x + 1)(x - 5)$ (or equivalent)

Show What You Know **Lesson 6**

Name: _____ Date: _____ Period: _____

Show What You Know 7.06

Simplify each expression. State whether the resulting expression is a polynomial or not.

a. $\frac{15x^5 + 20x^4 - 30x^3}{5x^3}$

$3x^2 + 4x - 6$ is a polynomial

b. $\frac{8x^4 + 16x^3 - 32x^2}{8x^4}$

$1 + \frac{2}{x} - \frac{4}{x^2}$ is not a polynomial

Show What You Know **Lesson 7**

Name: _____ Date: _____ Period: _____

Show What You Know 7.07

Factor each expression completely.

a. $4b^3 + 6b^2 + 10b + 15$

$(2b + 3)(2b^2 + 5)$

b. $4y^3 + 8y^2 + 12y$

$4y(y^2 + 2y + 3)$

c. $36a^2 - 49b^2$

$(6a + 7b)(6a - 7b)$

Show What You Know **Lesson 8**

Name: _____ Date: _____ Period: _____

Show What You Know 7.08

Here is a function written in two forms:

Standard form: $c(x) = 2x^2 - 6x - 36$

Factored form: $c(x) = (2x + 6)(x - 6)$

What are the x-intercepts of the function?

x-intercepts	Ordered Pair
x-intercept #1	(6, 0)
x-intercept #2	(-3, 0)

Show What You Know **Lesson 9**

Name: _____ Date: _____ Period: _____

Show What You Know 7.09

Solve the equation: $2x^2 - x - 6 = 0$.

$x =$ 2 $x =$ $-\frac{3}{2}$ (or equivalent)

Show What You Know **Lesson 10**

Name: _____ Date: _____ Period: _____

Show What You Know 7.10

Here is a new equation: $(x + 2)(x + 2) = 9$.

How many solutions does this equation have? Circle one.

No solutions One solution (Two solutions)

Record any solution(s) here:

$x =$ -5

$x =$ 1

If you circled *No solutions*, complete the statement:
The equation has no solutions because . . .

Show What You Know **Lesson 11**

Name: _____ Date: _____ Period: _____

Show What You Know 7.11

Use any strategy to solve $(x - 5)(2x + 1) = 6$.

How many solutions does this equation have? Circle one.

No solutions One solution (Two solutions)

Record any solution(s) here:

$x =$ -1

$x =$ 5.5

If you circled *No solutions*, complete the statement:
The equation has no solutions because . . .

Show What You Know **Lesson 12**

Name: _____ Date: _____ Period: _____

Show What You Know 7.12

Determine the *exact* solution(s) to this equation:

$$2(x + 8)^2 = 70$$

$x = -8 \pm \sqrt{35}$ (or equivalent)

Show What You Know **Lesson 13**

Name: _____ Date: _____ Period: _____

Show What You Know 7.13

Complete each expression so that it is a perfect square.

$x^2 + 8x +$ ..16..

$x^2 -$ ..10x.. $+ 25$

$x^2 - 20x +$ ..100..

Show What You Know **Lesson 14**

Name: _____ Date: _____ Period: _____

Show What You Know 7.14

Solve the equation $x^2 - 16x = -5$.

$x = 8 \pm \sqrt{59}$ (or equivalent)

Show What You Know **Lesson 15**

Name: _____ Date: _____ Period: _____

Show What You Know 7.15

A quadratic function is defined by the expression $x^2 - 20x + 60$.

a. Rewrite the expression in vertex form.
$(x - 10)^2 - 40$

b. Determine the vertex of the function.
$(10, -40)$

c. Is this vertex the maximum or minimum?
Minimum

Show What You Know **Lesson 16**

Name: _____ Date: _____ Period: _____

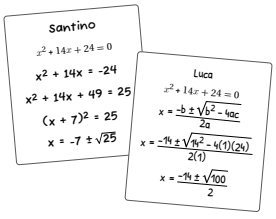
Show What You Know 7.16

Santino and Luca used two different strategies to solve $x^2 + 14x + 24 = 0$.

Santino started to solve the equation by completing the square.

Luca started to solve the equation using the quadratic formula.

Explain why the two last equations of each strategy are equivalent and will lead to the same solutions.



Responses vary.

- When Santino simplifies his last step to $x = -7 \pm 5$ he will arrive at $x = -12$ or $x = -2$.
- When Luca simplifies his last step to $x = \frac{(-14 \pm 10)}{2}$, he will arrive at $x = -\frac{24}{2}$ or -12 and $x = -\frac{4}{2}$ or -2. They will both arrive at the same solutions for x.

Show What You Know **Lesson 17**

Name: _____ Date: _____ Period: _____

Show What You Know 7.17

The Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Use the quadratic formula to solve the equation $2x^2 + 5x - 12 = 0$. Show your thinking.

$x = -4$ and $x = 1.5$

Show What You Know **Lesson 18**

Name: _____ Date: _____ Period: _____

Show What You Know 7.18

The function $h(t) = -5t^2 + 10t + 1$ represents the height of an apple, in meters, t seconds after it is tossed straight up in the air.

How many seconds will it take for the apple to reach the ground?

Round to three decimal places if necessary.

$t = \frac{(-10 \pm \sqrt{(120)})}{-10}$ or 2.095 seconds

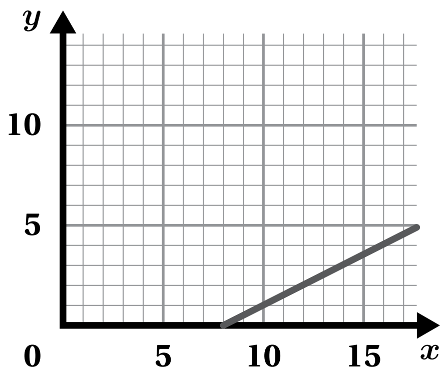
Lesson Resources

Unit 1
Activity Sheets and Cards

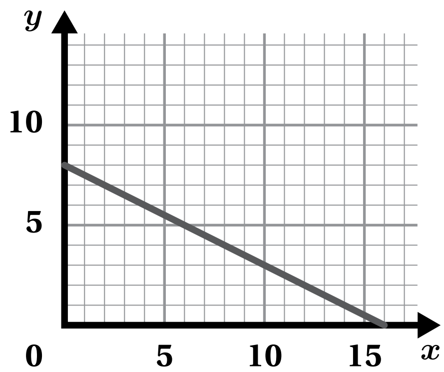
Match It

Directions: Make one copy per three pairs of students. Then pre-cut the cards and give each pair of students one set.

Card A



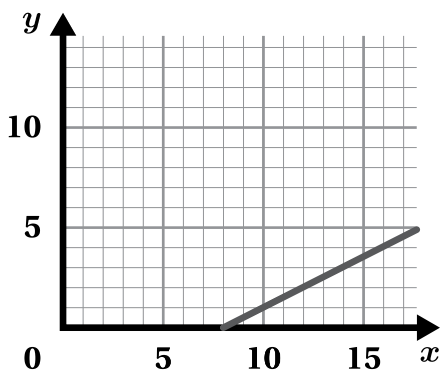
Card B



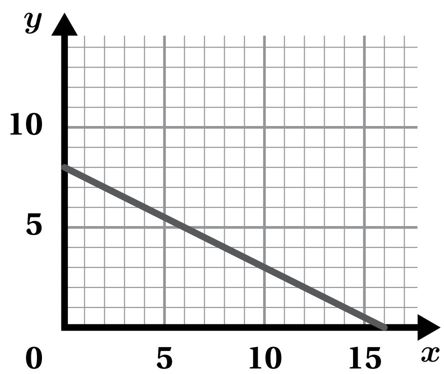
Card C

$4x - 8y = 32$

Card A



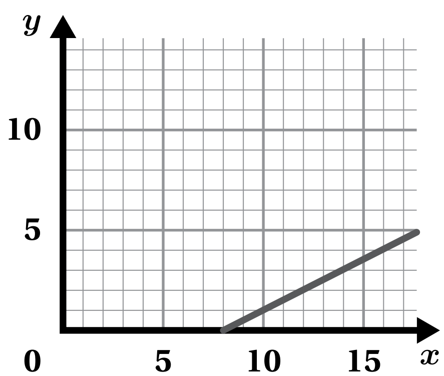
Card B



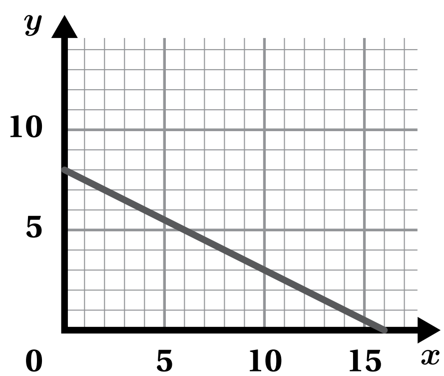
Card C

$4x - 8y = 32$

Card A



Card B



Card C

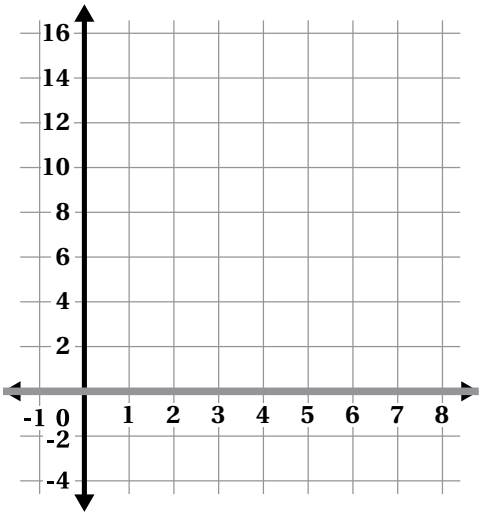
$4x - 8y = 32$

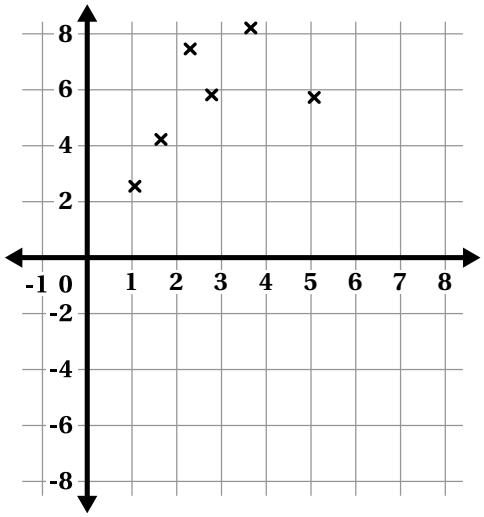
Unit 2
Activity Sheets and Cards

Explore More

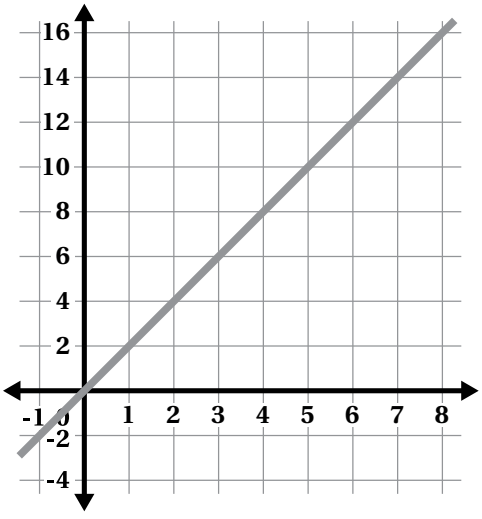
11. The data on each scatter plot is hidden. Use the residual plot to draw a line that fits the data better.

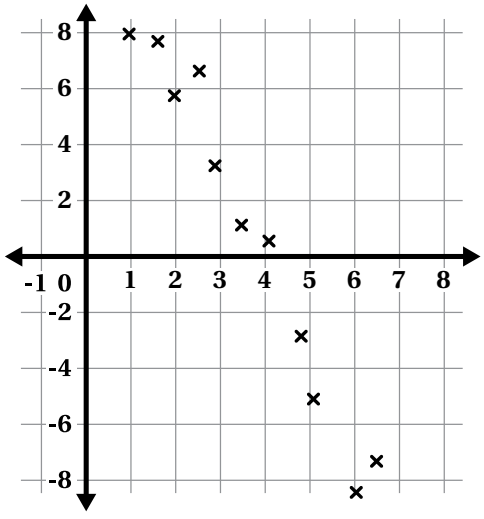
a



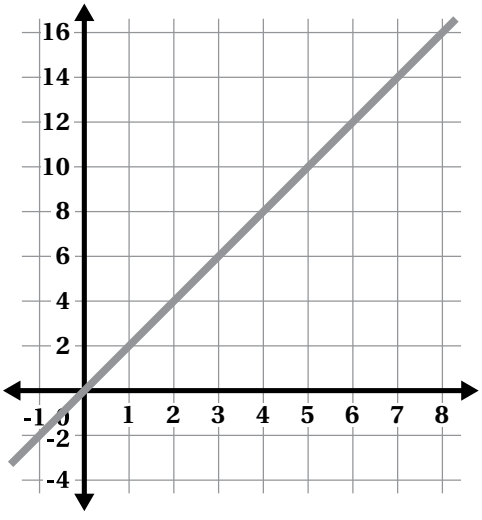


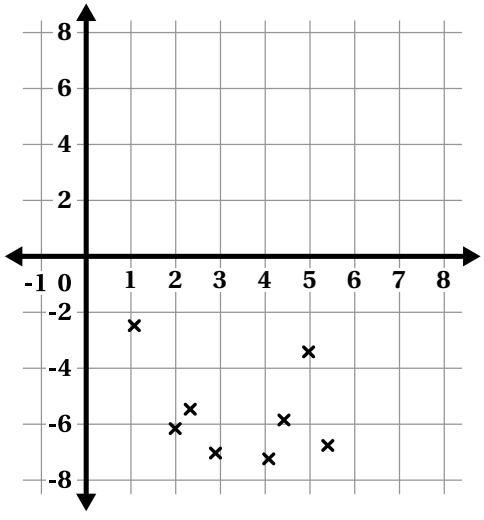
b





c

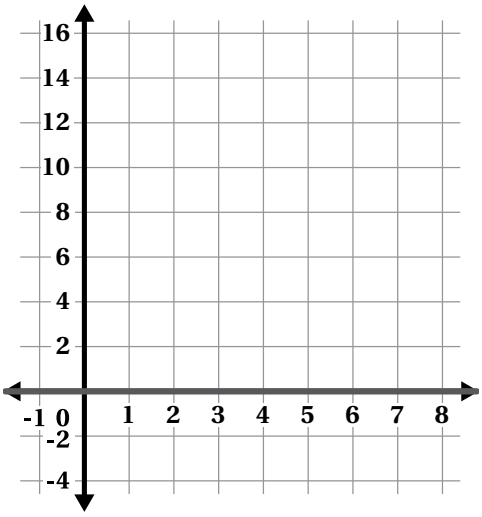


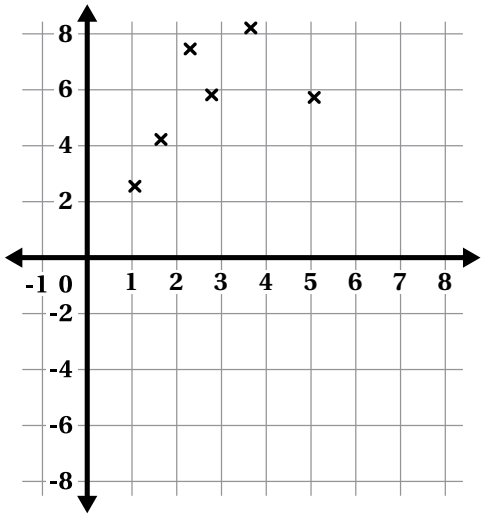


Explore More (answers)

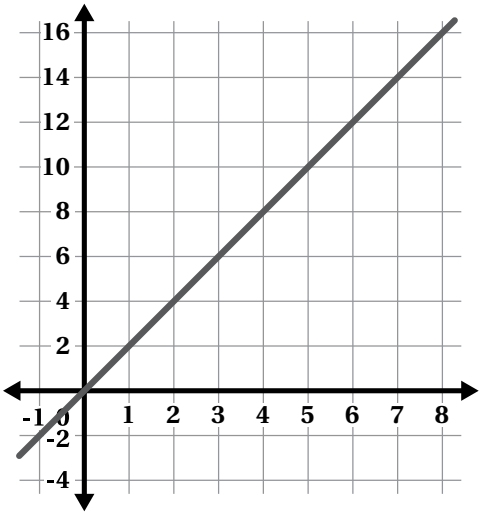
11. The data on each scatter plot is hidden. Use the residual plot to draw a line that fits the data better.

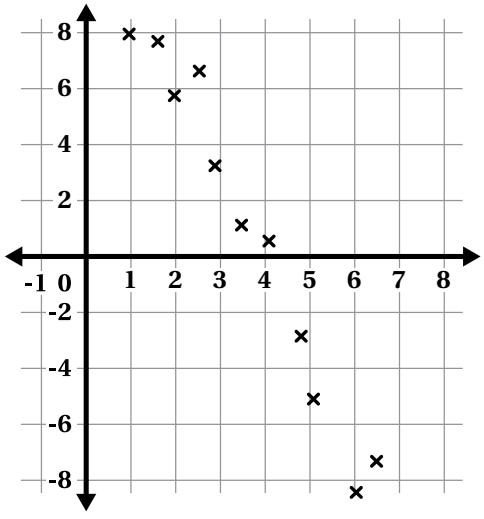
a





b





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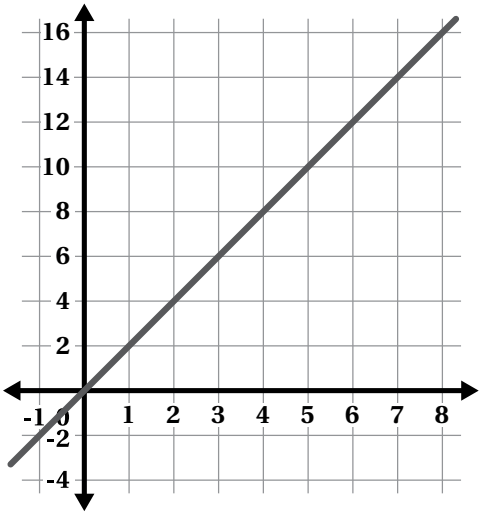
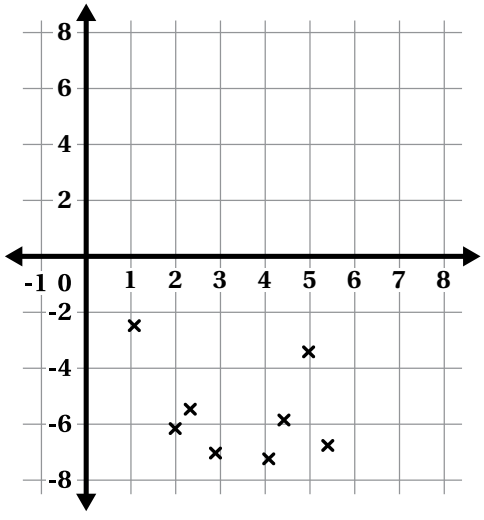




Card Sort

Directions: Make one copy per pair of students. Then pre-cut the cards and give each pair of students one set.

Card A

Watching Too Much TV Can Be Deadly

Card B

Want to Beat Aging? Exercise Two Minutes a Week

Card C

Empathy Increases Along With Time Spent Playing Video Games

Card D

Owning a Dog Linked to Positive Health Benefits

Article Summary Sheet

Select two cards. Read the article summaries for your headlines.

Card A: Watching Too Much TV Can Be Deadly

Dozens of people are killed by falling TVs in the home each year. Researchers estimate 32% of U.S. households do not anchor TVs to walls. Between the years of 2000 and 2019, there were at least 338 deaths involving a TV.

Source: *United States Consumer Product Safety Commission*

Card B: Want to Beat Aging? Exercise Two Minutes a Week

Researchers conducted a study to examine exercise habits in adults 65 years and older. Participants were divided into two groups. One group exercised for 60 seconds twice a week for one month. The other group (the control) did not exercise. Participants in the exercise group made significant progress in getting up from a chair faster than the participants in the non-exercise group.

Source: *Sport Sciences for Health*

Card C: Empathy Increases Along With Time Spent Playing Video Games

Video games aimed at promoting compassion and empathy are becoming more popular. In a small randomized trial, 150 adolescents were split into two groups: one group played a game called Crystals, which promotes empathy. The other played the game Bastion, which does not promote empathy. Researchers found that participants who played Crystals had higher levels of activity in the part of the brain associated with empathy.

Source: *NPJ Science of Learning*

Card D: Owning a Dog Linked to Positive Health Benefits

In a randomized study of 500 participants, researchers found that dog ownership was correlated to a decreased risk of heart disease. Researchers said that the relationship is likely linked to increased physical activity.

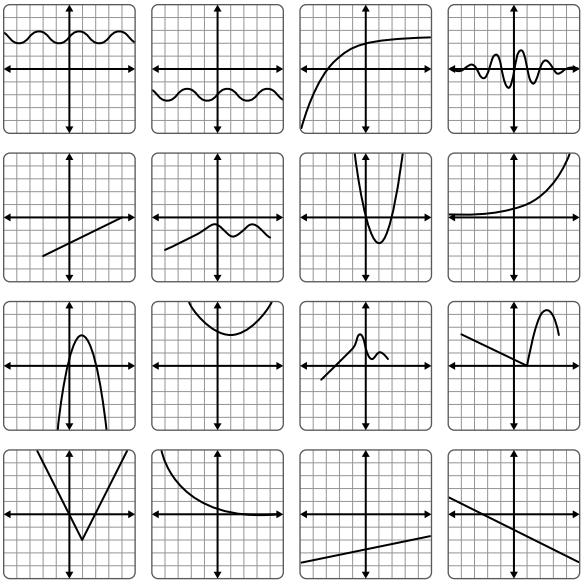
Source: *Cardiovascular Quality and Outcomes*

Unit 3
Activity Sheets and Cards

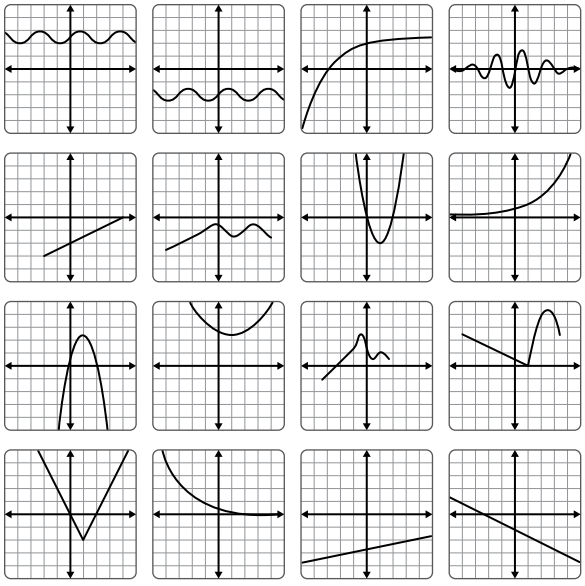
Name: ..... Date: ..... Period: .....

Polygraph Set A

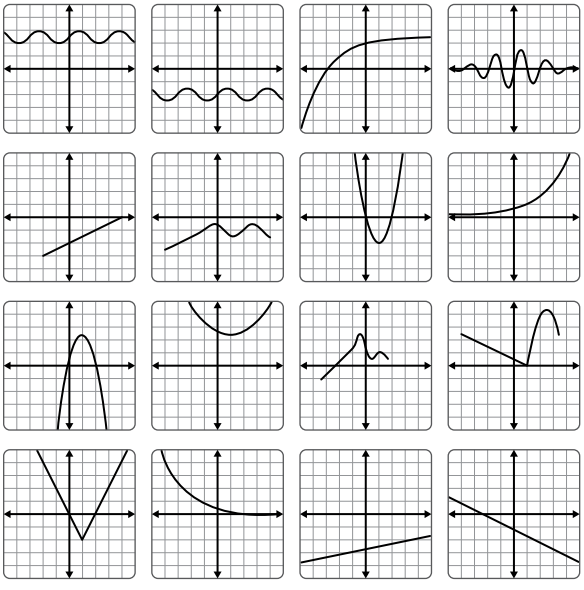
Round 1



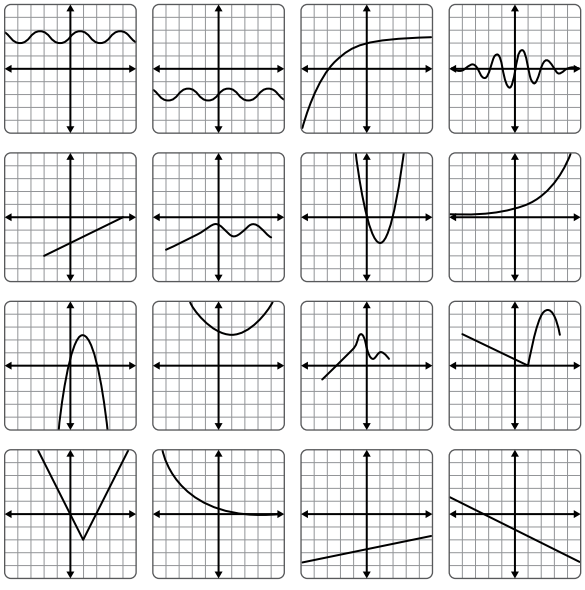
Round 2



Round 3



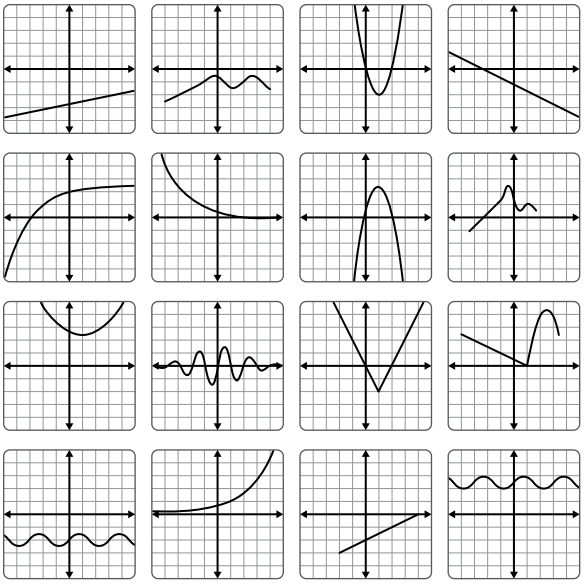
Round 4



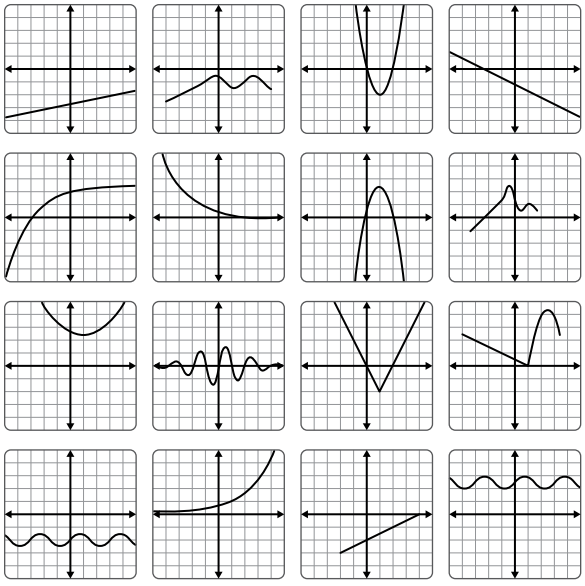
Name: ..... Date: ..... Period: .....

Polygraph Set B

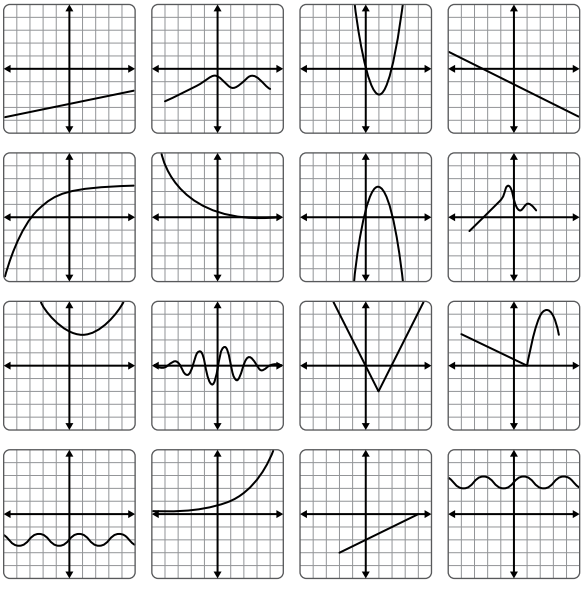
Round 1



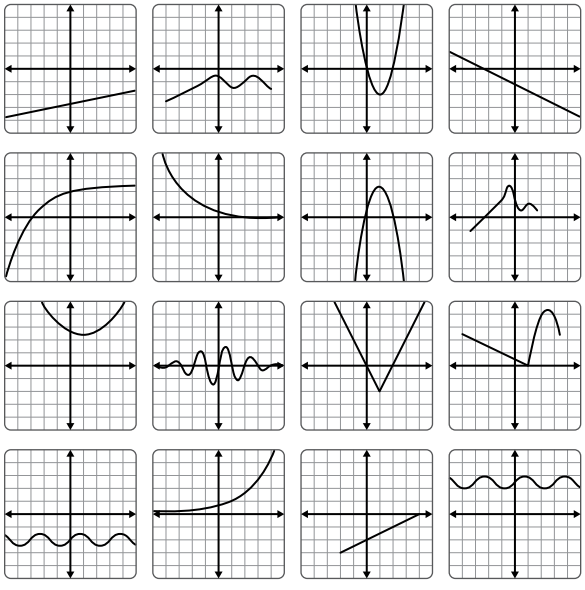
Round 2



Round 3



Round 4



Possible or Impossible?

Directions: Make one copy per pair of students. Then pre-cut the cards and give each pair of students one set.

-3	1	$\frac{1}{2}$
10	$\sqrt{2}$	4
0	π	0.8
-10	12.50	14

Unit 4
Activity Sheets and Cards

Rounds of Systems

Directions: Make one copy per pair of students. Then pre-cut the cards and give each pair of students one set.

Card A

$$x + y > 3$$

Card B

$$3x - y > 6$$

Card C

$$y > 2$$

Card D

$$4x + 2y < 8$$

Card E

$$y \geq \frac{3}{4}x + 1$$

Card F

$$y < x - 1$$

Unit 5
Activity Sheets and Cards

Explore More

Here are Figures 1–4 of a pattern.

Figure 1

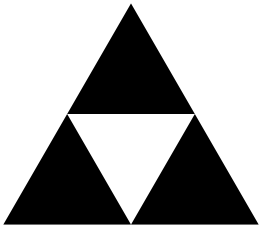


Figure 2

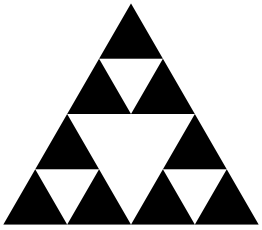


Figure 3

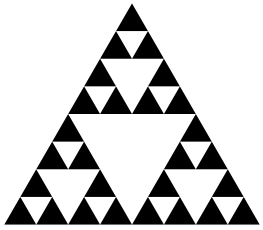
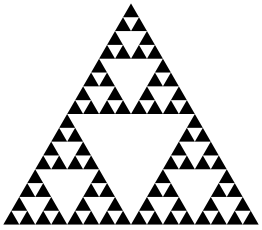


Figure 4



a Complete the table.

Figure	Number of Black Triangles	Fraction of Shaded Area
1	3	$\frac{3}{4}$
2	9	$\frac{9}{16}$
3	27	$\frac{27}{64}$
4		

b How could you figure out the number of black triangles and the fraction of shaded area for Figure 10?

Sorting Percents

Directions: Make one copy per student. Then pre-cut the cards and give each student one set.

Card 1

$a(x) = 800(0.25)^x$

Card 2

$b(x) = 800(0.75)^x$

Card 3

90%

Card 4

$c(x) = 800(1 - 0.75)^x$

Card 5

$d(x) = 200(1 - 0.1)^x$

Card 6

75%

Card 7

$f(x) = 800(1 - 0.25)^x$

Card 8

10%

Card 9

$g(x) =$ _____

Card 10

$h(x) = 200\left(1 - \frac{9}{10}\right)^x$

Card 11

25%

Equivalent Expressions

Directions: Make one copy per student. Then pre-cut the cards and give each student one set.

Expression A	Expression B	Expression C	Expression D
$4^{\frac{2}{5}}$	$4^{\frac{5}{2}}$	$27^{\frac{2}{3}}$	$27^{\frac{3}{2}}$
$(\sqrt[3]{27})^2$	$(4^5)^{\frac{1}{2}}$	$(\sqrt{4})^5$	32
$\left(27^{\frac{1}{3}}\right)^2$	$\sqrt[5]{4^2}$	$(\sqrt[5]{4})^2$	9
$4^{\frac{1}{5}} \cdot 4^{\frac{1}{5}}$	$\left(27^{\frac{1}{2}}\right)^3$	$(27^3)^{\frac{1}{2}}$	$\sqrt{27 \cdot 27 \cdot 27}$

Find the Matching Pair

Directions: Make one copy per pair of students. Then pre-cut the cards and give each pair of students one set.

Set A: Unsimplified Expressions

Card A

$\sqrt{72}$

Card B

$\sqrt[3]{54}$

Card C

$-3\sqrt{5} \times 2\sqrt{10}$

Card D

$-5\sqrt{125} + 4\sqrt{20}$

Card E

$\sqrt[3]{250} - \sqrt{32}$

Card F

$\frac{6\sqrt{75}}{\sqrt{3}}$

Find the Matching Pair

Directions: Make one copy per pair of students. Then pre-cut the cards and give each pair of students one set.

Set B: Unsimplified Expressions

Card 1

$3\sqrt[3]{2}$

Card 2

$6\sqrt{2}$

Card 3

30

Card 4

$5\sqrt[3]{2} - 4\sqrt{2}$

Card 5

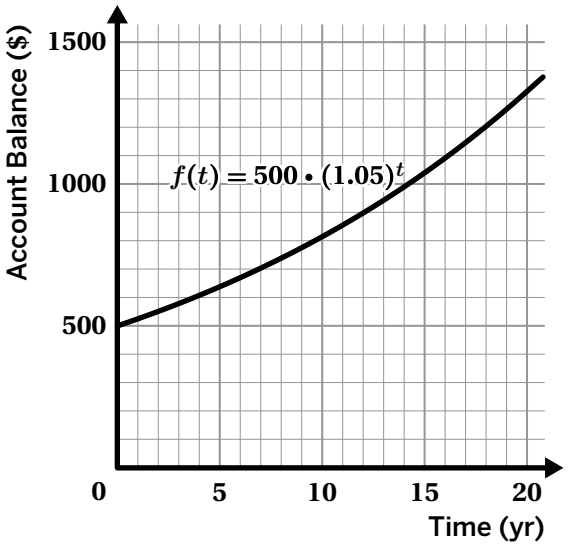
$-30\sqrt{2}$

Card 6

$-17\sqrt{5}$

Explore More

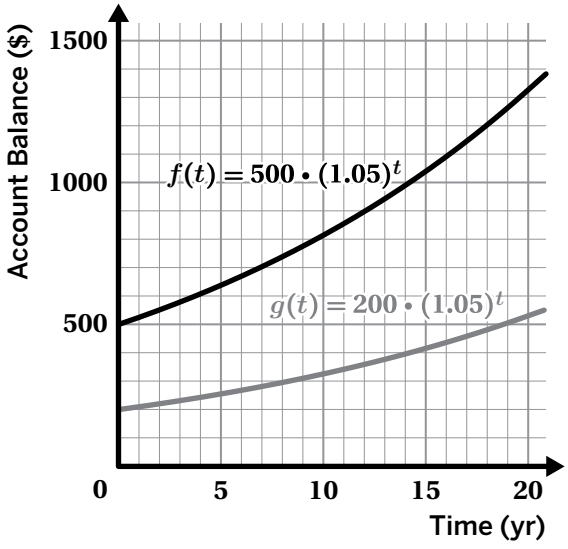
An account with $500 that earns 5% compound interest doubles its value in about 14 years. The function $f(t)$ gives the account balance after t years.

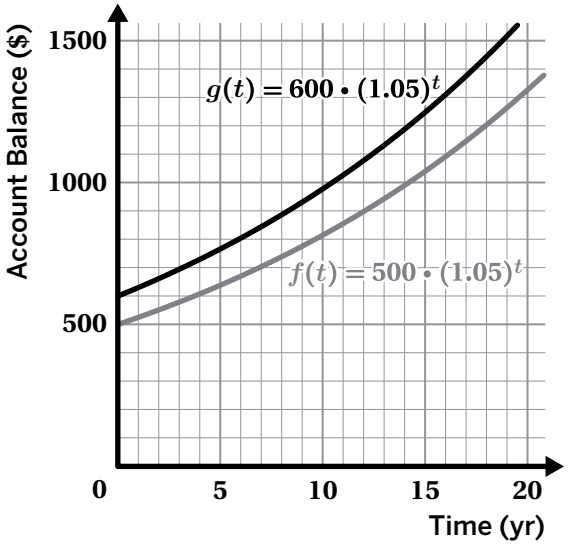


a **Discuss:**

- What does it mean to double in value?
- Where do you see that in the graph?

b Here are two different graphs with different initial account balances.





c **Discuss:** How long does it take the initial account balance to double? Compare with a partner. Is the amount of time it takes to double the same or different?

Unit 6
Activity Sheets and Cards

Activity 2 Cards

Directions: Make one copy per pair of students. Then pre-cut the cards and give each pair of students one set.

Card A

x	$a(x)$
8	
10	13
12	21
14	29
16	37
18	

Card B

x	$b(x)$
2	3
4	-1
6	3
8	15
10	35
12	

Card C

x	$c(x)$
1	
2	6
3	9
4	14
5	21

Card D

x	$d(x)$
0	4
1	12
2	36
3	108
4	

Card E

x	$e(x)$
1	3
2	2
3	1
4	
5	3

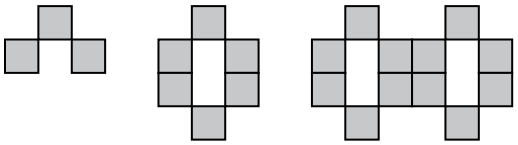
Card F

x	$f(x)$
2	10
4	9
6	6
8	1
10	

Activity 2 Cards

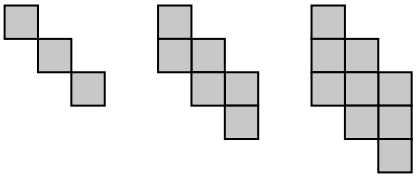
Card G

Figure 1 Figure 2 Figure 3



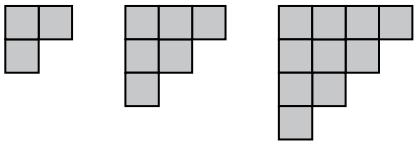
Card H

Figure 1 Figure 2 Figure 3



Card I

Figure 1 Figure 2 Figure 3



Card J

$j(x) = 2(4^x)$

Card K

$k(x) = x^3$

Card L

$l(x) = 4x^2$

Activity 2 Cards (answers)

Card A

x	$a(x)$
8	
10	13
12	21
14	29
16	37
18	

Card B

x	$b(x)$
2	3
4	-1
6	3
8	15
10	35
12	

Card C

x	$c(x)$
1	
2	6
3	9
4	14
5	21

Card D

x	$d(x)$
0	4
1	12
2	36
3	108
4	

Card E

x	$e(x)$
1	3
2	2
3	1
4	
5	3

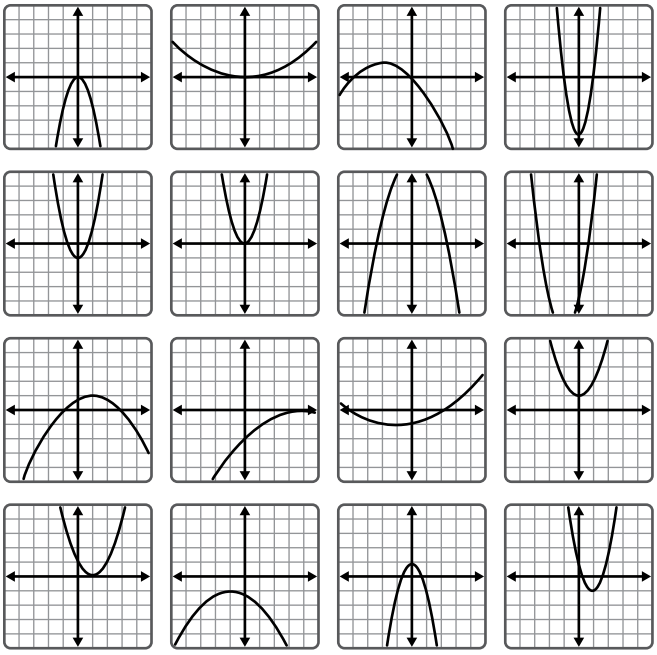
Card F

x	$f(x)$
2	10
4	9
6	6
8	1
10	

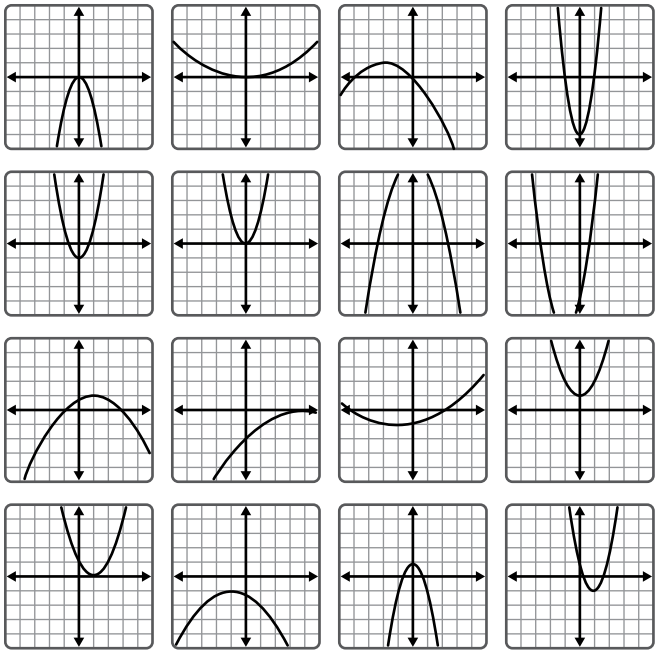
Name: ..... Date: ..... Period: .....

Polygraph Set A

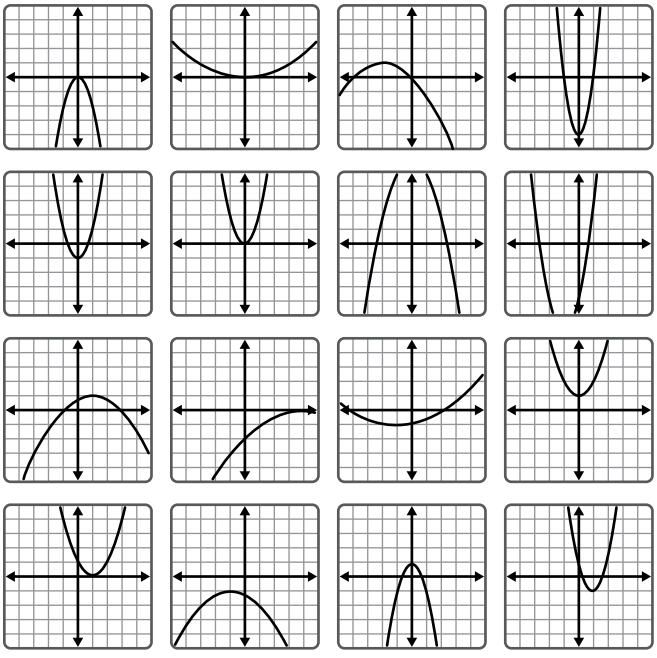
Round 1



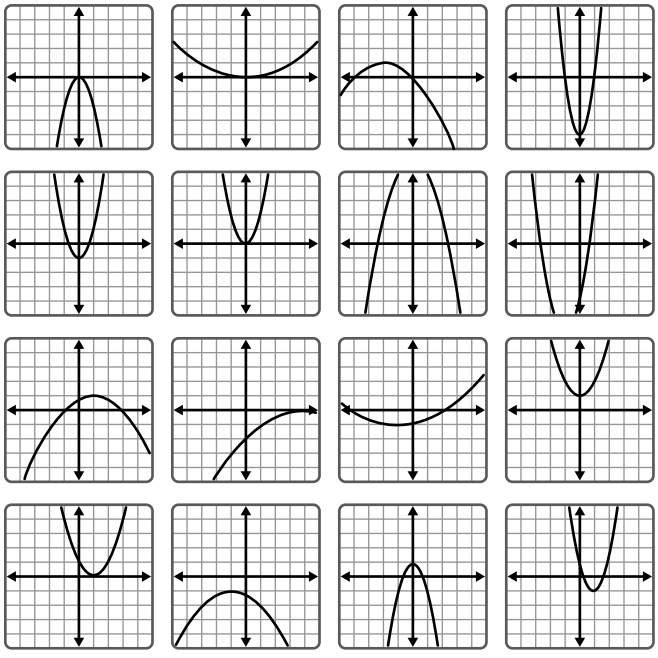
Round 2



Round 3



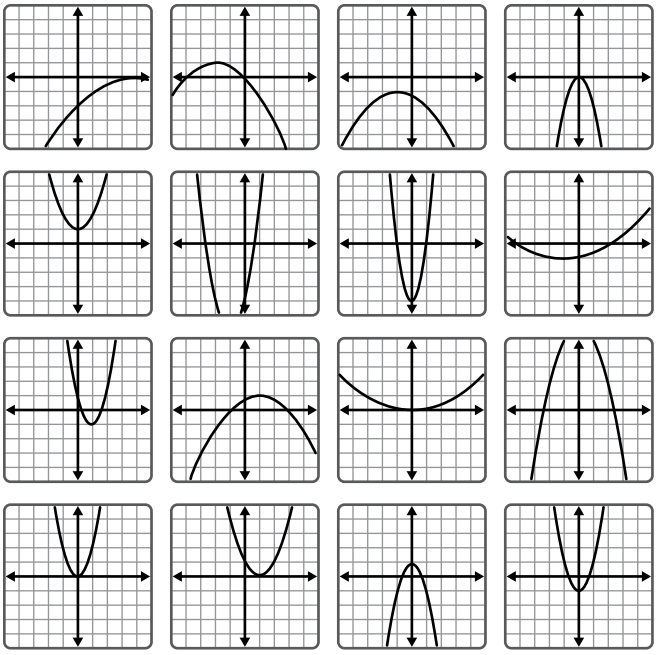
Round 4



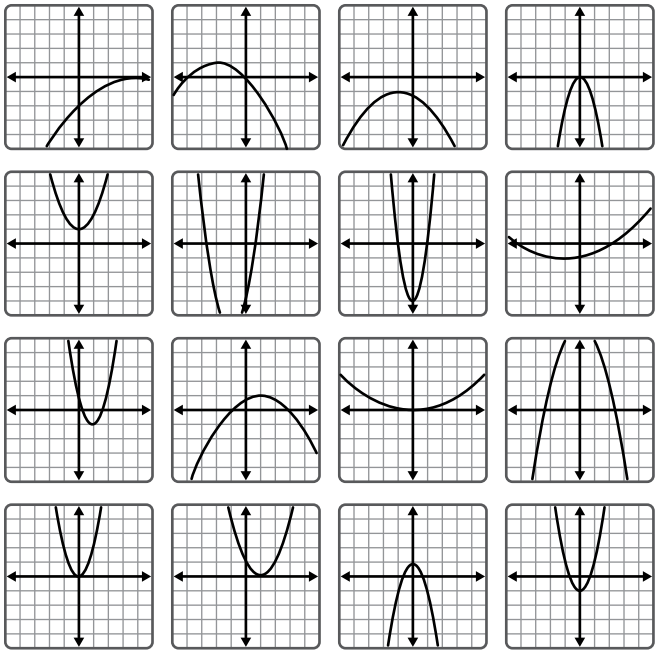
Name: ..... Date: ..... Period: .....

Polygraph Set B

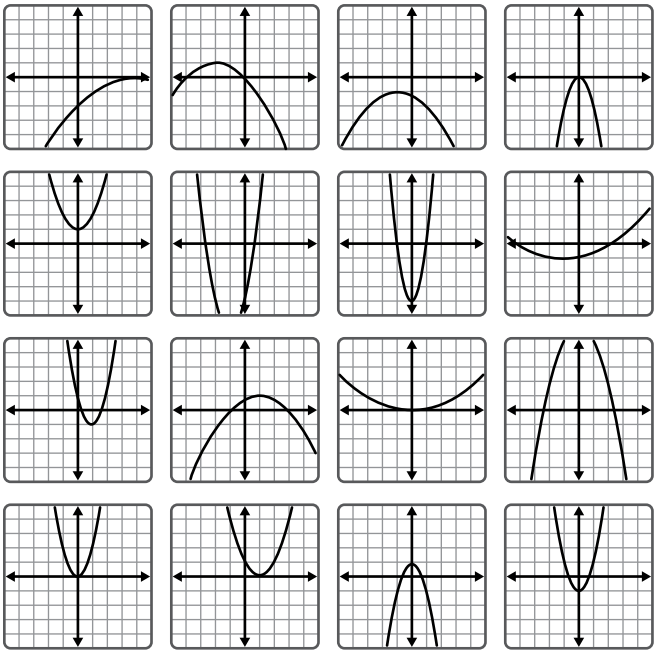
Round 1



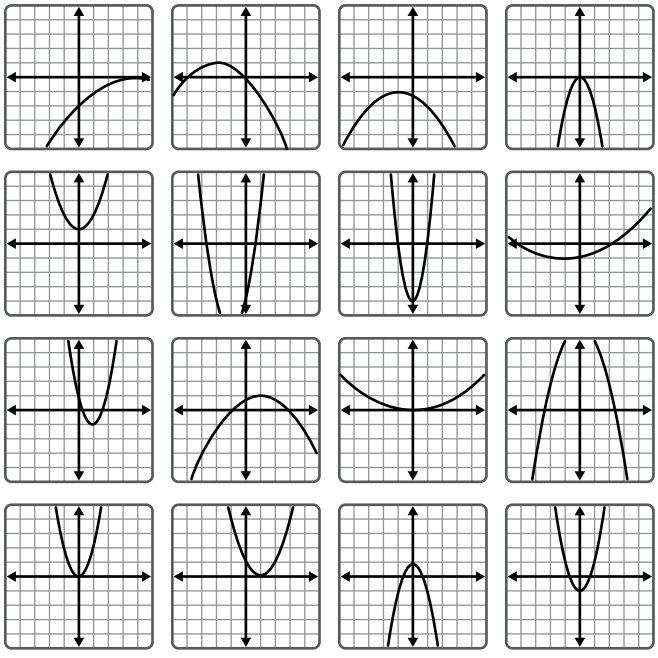
Round 2



Round 3



Round 4



Ball Launch

Directions: Make one copy per pair of students. Then pre-cut the 6 cards and give each pair of students one set.

Card A

The ball hits the ground 15 feet from where it is launched.

Card B

The maximum height of the ball is 15 feet.

Card C

Vertex at $(3, 13)$

Card D

The range of this graph is $0 \leq f(x) \leq 15$.

Card E

$f(2) = 12$

Card F

y-intercept at $(0, 15)$

Coordinate Co-Op

Directions: Make one copy per group of students. Then pre-cut the cards and give each group of students one set of cards.

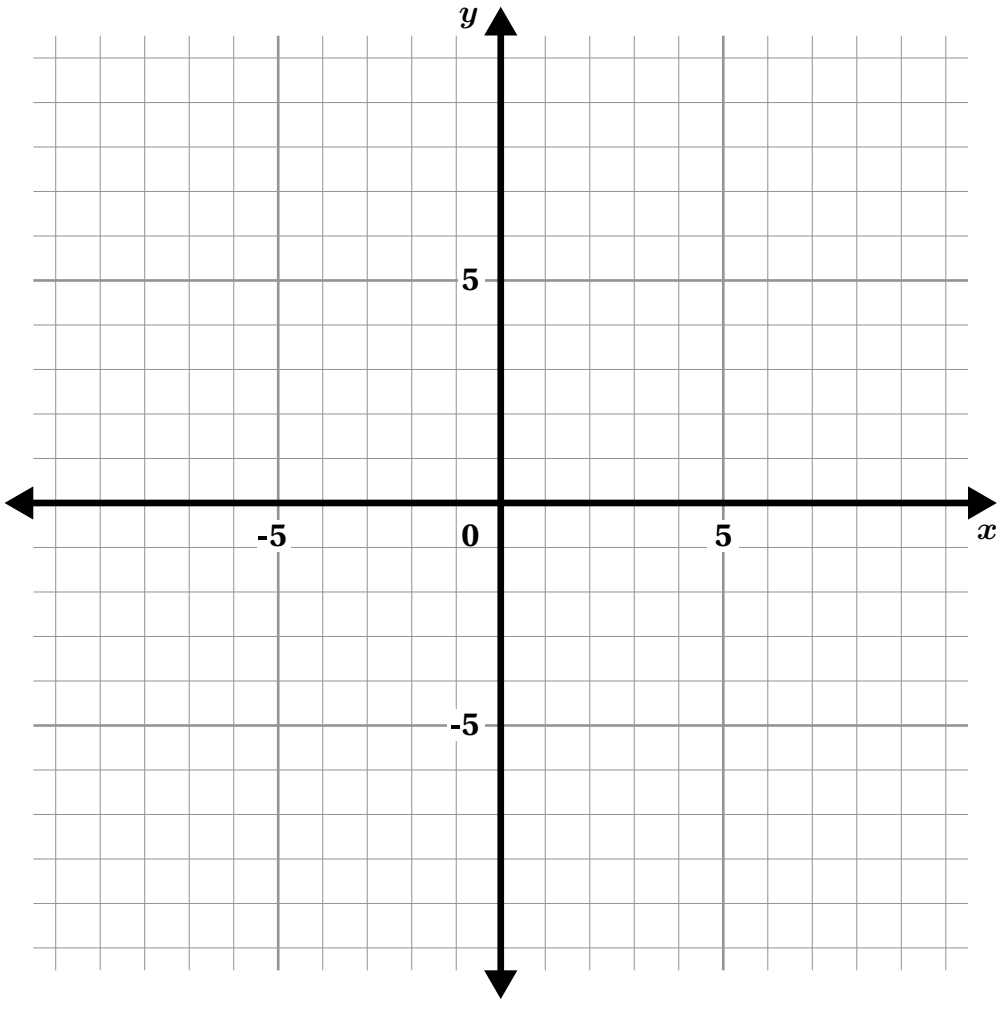
$x = -3$	$x = -2$
$x = -1$	$x = 0$
$x = 1$	$x = 2$
$x = 3$	

Name: ..... Date: ..... Period: .....

Coordinate Co-Op

Graph #1

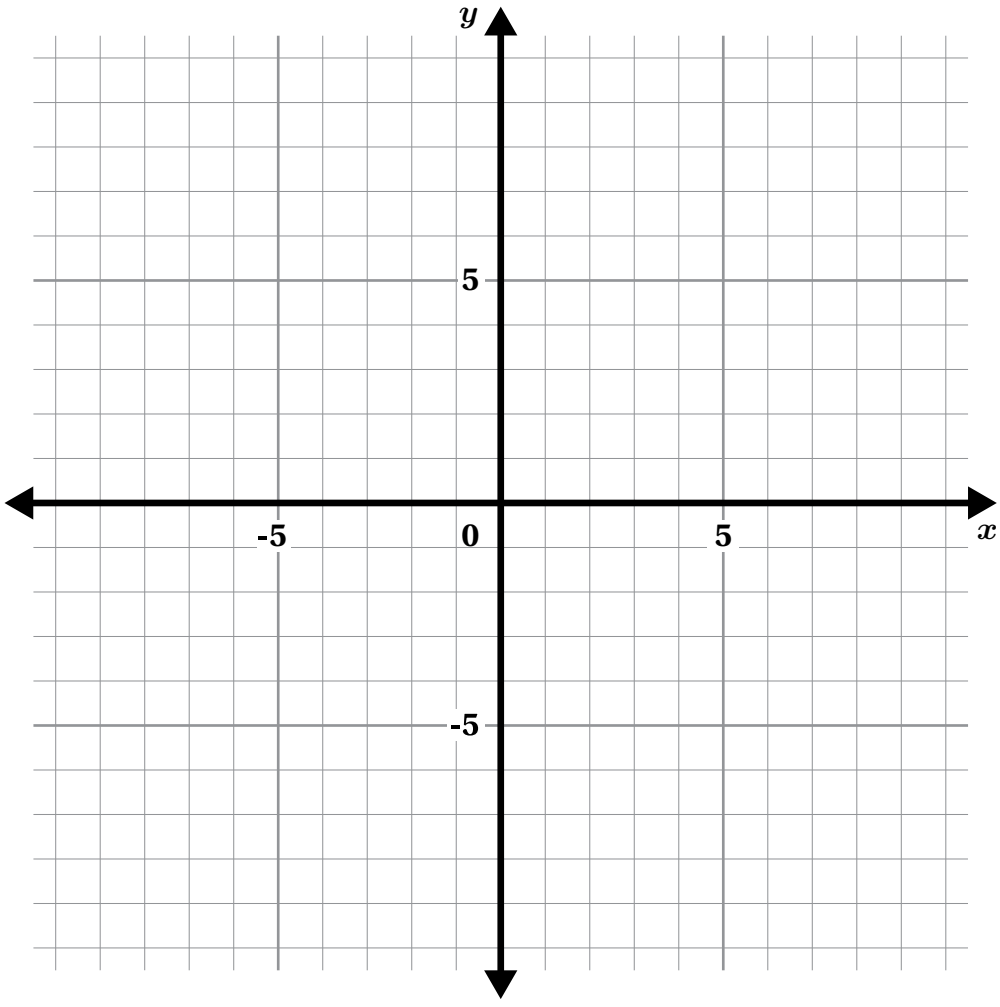
$$f(x) = x^2 - 2x - 6$$



Coordinate Co-Op

Graph #2

$$g(x) = (x + 4)(x - 2)$$

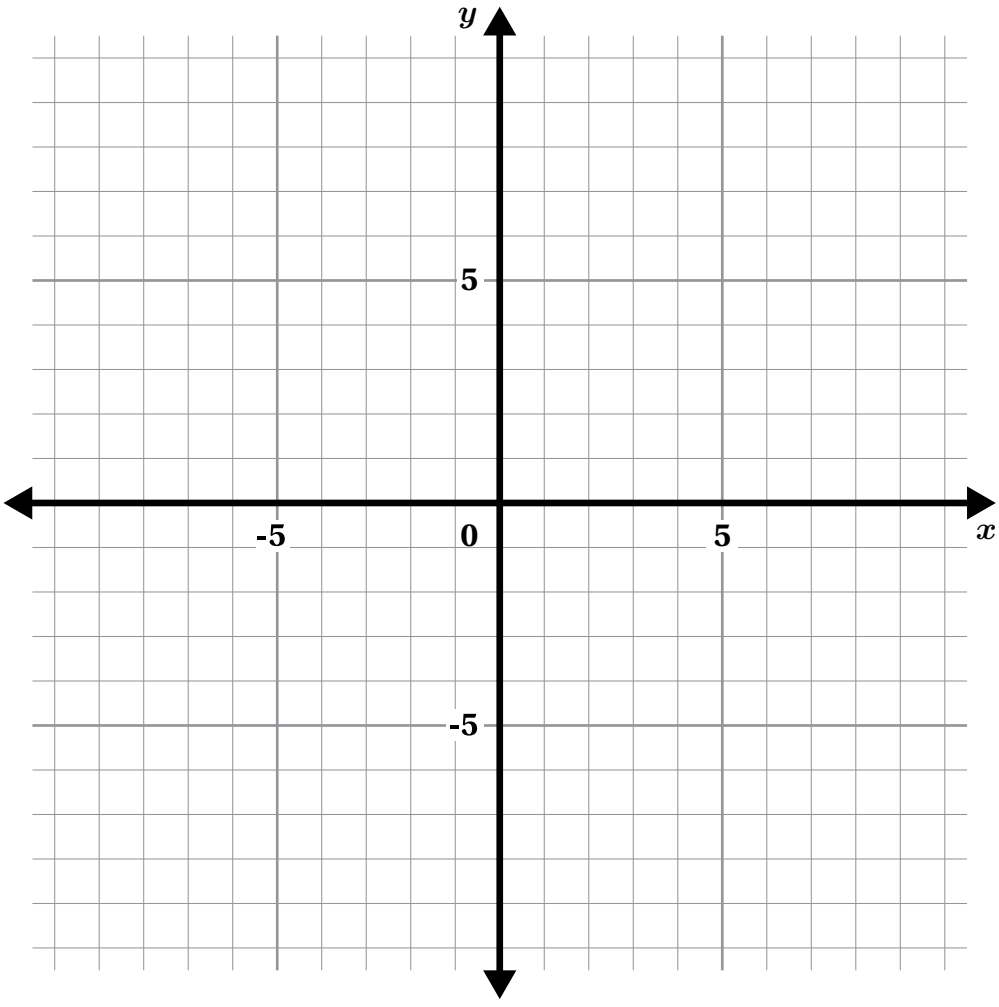


Name: Date: Period:

Coordinate Co-Op (answers)

Graph #1

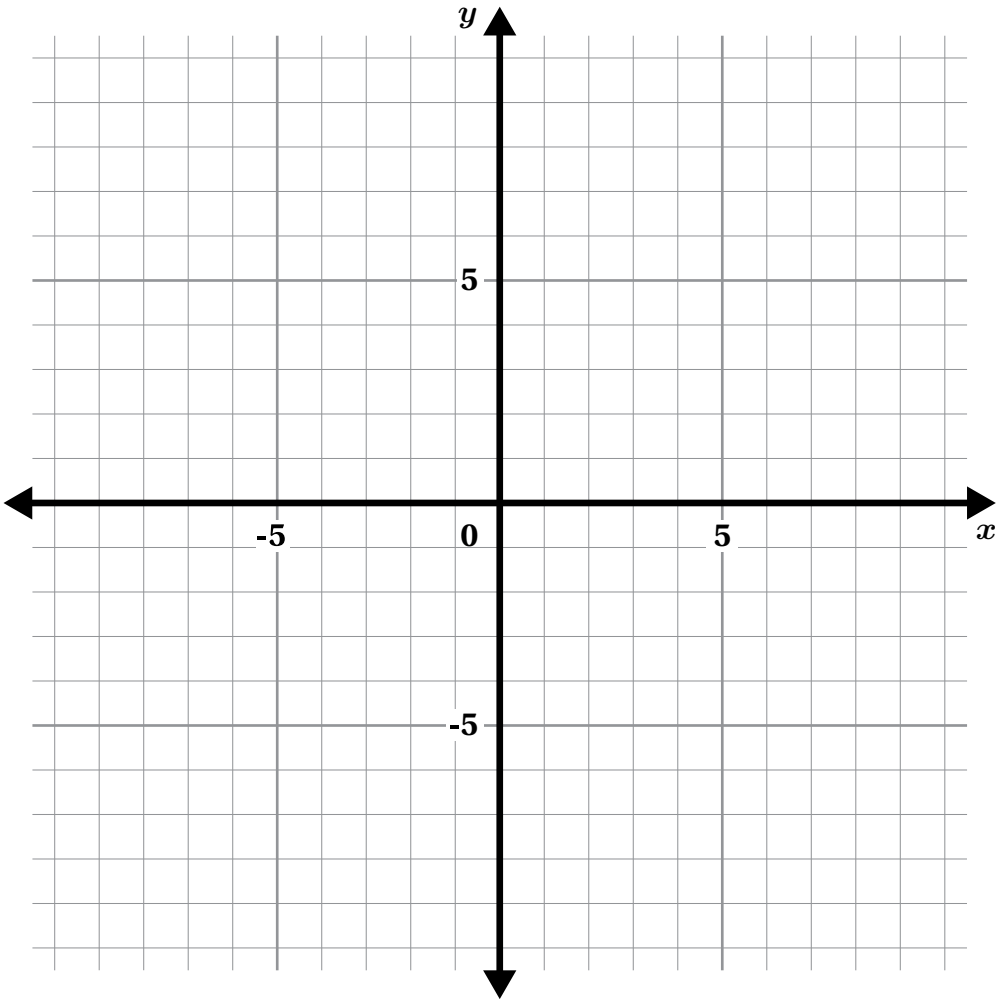
$$f(x) = x^2 - 2x - 6$$



Coordinate Co-Op (answers)

Graph #2

$$g(x) = (x + 4)(x - 2)$$



Card Sort

Directions: Make one copy per pair of students. Then pre-cut the cards and give each pair of students one set.

$a(x) = x^2 - x - 6$	$b(x) = x + 3$	$c(x) = (2x - 2)(x + 3)$
$d(x) = (x - 3)(x + 2)$	$e(x) = 2^x$	$f(x) = (x + 2)(2x - 6)$
$g(x) = -2x^2 + x + 6$	$h(x) = (x - 2)^2 + 6$	$j(x) = 2x^2 + 4x - 6$

Unit 7
Activity Sheets and Cards

Trading Cards

Directions: Make one copy per 32 students. Then pre-cut the cards and give each student one card.

Card 1 $x^2 + 5x - 6$	**Card 2** $2x^2 - 13x - 24$	**Card 3** $-2x^2 + 2x + 4$	**Card 4** $x^2 + 18x + 80$
Card 5 $x^2 + 3x - 10$	**Card 6** $100x^2 - 9$	**Card 7** $6x^2 - 6x - 36$	**Card 8** $4x^2 + 13x + 10$
Card 9 $4x^2 - 8x - 5$	**Card 10** $9x^2 - 1$	**Card 11** $x^2 - 15x + 56$	**Card 12** $3x^2 + 8x - 16$
Card 13 $x^2 - 25$	**Card 14** $x^2 - 100$	**Card 15** $x^2 + 5x - 14$	**Card 16** $2x^2 + 20x + 18$

Trading Cards

Card 17

$25x^2 - 64$

Card 18

$5x^2 - 15x - 20$

Card 19

$3x^2 + 13x + 12$

Card 20

$x^2 - 4$

Card 21

$x^2 - 16$

Card 22

$x^2 - 6x - 40$

Card 23

$2x^2 + 15x + 18$

Card 24

$15x^2 - 5x - 20$

Card 25

$-6x^2 + 21x$

Card 26

$x^2 + 11x + 18$

Card 27

$x^2 - 36$

Card 28

$10x^2 - 60x + 80$

Card 29

$x^2 + 8x - 9$

Card 30

$5x^2 - 45$

Card 31

$2x^2 - 17x - 9$

Card 32

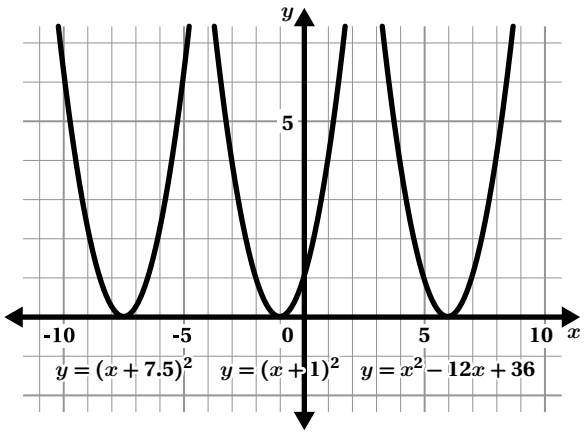
$10x^2 + 30x + 20$

Explore More

Sothy noticed that when he graphs perfect square equations, each parabola's vertex is on the x-axis. Will this *always* be true?

Explain your thinking.

Use a graphing calculator if it helps with your thinking.



Warm-Up & Activity 2 Cards

Directions: Make 1 copy per pair of students. Then pre-cut the cards and give each pair of students one set.

$a(x) = 2x^2 + 8x + 6$	$b(x) = (2x + 6)(x - 3)$	$c(x) = 3(x - 2)^2 + 6$
$d(x) = x^2 - 5x - 6$	$f(x) = x^2 + 4x + 10$	$g(x) = (x + 2)(x + 6)$
y-intercept: $(0, -6)$	y-intercept: $(0, -18)$	y-intercept: $(0, 10)$
y-intercept: $(0, 6)$	y-intercept: $(0, 18)$	vertex: $(-2, -2)$
vertex: $(2, 6)$	vertex: $(-2, 6)$	vertex: $(-4, -4)$
x-intercepts: $(-1, 0)$ and $(6, 0)$	x-intercepts: $(-2, 0)$ and $(-6, 0)$	x-intercepts: $(-3, 0)$ and $(3, 0)$

Error Analysis

a $x^2 - 8x + 15 = 0$

$a = 1, b = \text{-}8, c = 15$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(15)}}{2(1)}$$

$$x = \frac{8 \pm \sqrt{-64 - 60}}{2}$$

$$x = \frac{8 \pm \sqrt{-124}}{2}$$

No solutions

b $x^2 + 10x + 18 = 0$

$a = 1, b = 10, c = 18$

$$x = \frac{-10 \pm \sqrt{10^2 - 4(1)(18)}}{2(1)}$$

$$x = \frac{-10 \pm \sqrt{100 - 72}}{2}$$

$$x = \frac{-10 \pm \sqrt{28}}{2}$$

$x = \text{-}5 \pm \sqrt{14}$

c $9x^2 - 6x = \text{-}1$

$a = 9, b = \text{-}6, c = \text{-}1$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(9)(-1)}}{2(9)}$$

$$x = \frac{6 \pm \sqrt{36 + 36}}{18}$$

$$x = \frac{6 \pm \sqrt{72}}{18}$$

d $2x^2 + 6x + 5 = 0$

$a = 2, b = 6, c = 5$

$$x = \frac{-6 \pm \sqrt{(6)^2 - 4(2)(5)}}{2(2)}$$

$$x = \frac{-6 \pm \sqrt{36 - 40}}{4}$$

$$x = \frac{-6 \pm \sqrt{-4}}{4}$$

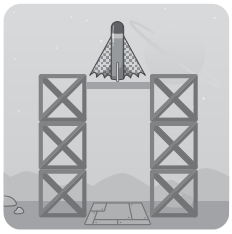
$$x = \frac{-6 \pm 2}{4}$$

$x = \text{-}2$ and $x = \text{-}1$

Rocket Scientist

- Choose one stomp rocket.
- Select one of the questions about your stomp rocket.
- Solve the question you chose on the lesson page.

Rocket 1



Gravity

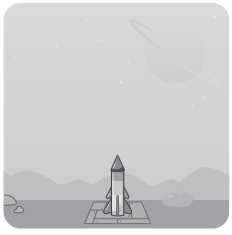
Launch Velocity

Launch Height

$h(t) = -2t^2 + 6t + 6$

- When will the rocket touch the ground?
- When will the rocket reach its maximum height of 10.5 meters?
- When will the rocket return to its original height of 6 meters?

Rocket 2



Gravity

Launch Velocity

Launch Height

$h(t) = -2.5t^2 + 24t$

- When will the rocket land on the ground?
- When will the rocket reach its maximum height of 57.6 meters?

Rocket 3

Gravity

Launch Velocity

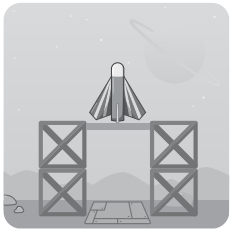
Launch Height

$h(t) = -t^2 + 12t - 4$

- When will the rocket touch the ground?
- When will the rocket reach its maximum height of 32 meters?

Rocket Scientist

Rocket 4



Gravity

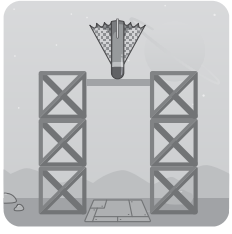
Launch Velocity

Launch Height

$h(t) = -3t^2 + 12t + 4$

- When will the rocket touch the ground?
- When will the rocket reach its maximum height of 16 meters?
- When will the rocket return to its original height of 4 meters?

Rocket 5



Gravity

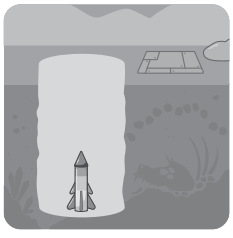
Launch Velocity

Launch Height

$h(t) = -t^2 - 6t + 8$

- When will the rocket touch the ground?

Rocket 6



Gravity

Launch Velocity

Launch Height

$h(t) = -t^2 + 18t - 8$

- When will the rocket touch the ground?
- When will the rocket reach its maximum height of 73 meters?

Rocket 7

Gravity

Launch Velocity

Launch Height

$h(t) = -1.5t^2 + 6t + 2$

- When will the rocket touch the ground?
- When will the rocket reach its maximum height of 8 meters?
- When will the rocket return to its original height of 2 meters?

ISBN 9798895804766

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