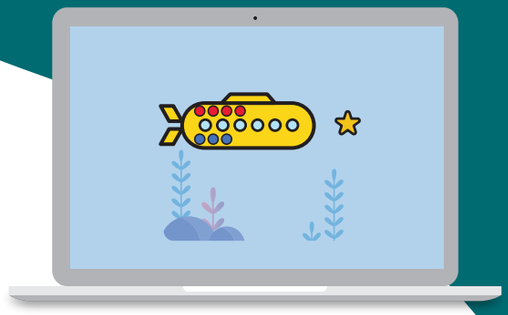
Unit 5

Lesson 1

Student Devices Recommended

This lesson uses digital student screens.
Print Student Edition pages are also available.



Floats and Anchors

Representing Adding and Subtracting

Let's use floats and anchors to represent values on a number line.

Focus and Coherence

Today's Goals

Students engage with a visual model for adding and subtracting positive and negative numbers. They investigate the results of adding or removing floats and anchors and connect these actions to numeric expressions.

1. **Goal:** Use a visual model to represent adding and subtracting positive and negative numbers.
2. **Goal:** Use a visual model to represent that pairs of numbers can be combined to make 0.
3. **Language Goal:** Identify different ways to represent the same change (e.g., removing 2 floats or adding 2 anchors). **(Writing, Speaking, and Listening)**

Prior Learning

In Grade 6, students identified and plotted positive and negative numbers on the number line and explained what these numbers mean in context.

Future Learning

In Lesson 2, students will use floats and anchors to reason about adding and subtracting positive and negative numbers. Students will identify different addition and subtraction expressions that have the same value.

Rigor and Balance

- Students build **conceptual understanding** of the effects of adding positive and negative numbers.
- Students **apply** their understanding of positions on a number line to represent adding and subtracting positive and negative numbers.

Lesson at a Glance

~ 45 min



Why digital?

Students use digital interactions to make sense of adding and subtracting positive and negative numbers.

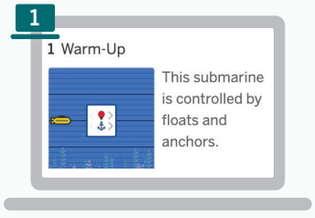
Warm-Up

Pairs Sharing a Device | 5 min

Pacing: Screen 1

Students are introduced to the context of controlling a submarine's position on a vertical number line by adding or removing floats and anchors.

Routine: Notice and Wonder



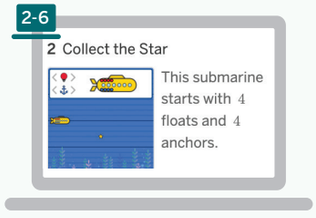
Activity 1

Pairs Sharing a Device | 12 min

Pacing: Screens 2–4, Screens 5–6

Students explore the impact of adding or removing floats and anchors, including situations where there is an equal number of floats and anchors.

Key Takeaway (Screen 6): Visual models like submarines with floats and anchors can be used to represent sums and differences on a number line. Adding 1 float and adding 1 anchor are opposite actions and do not move the submarine.



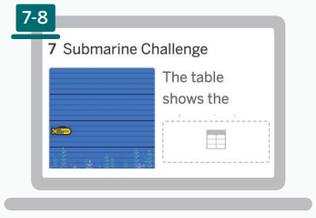
Activity 2

Pairs Sharing a Device | 10 min

Pacing: Screens 7–8

Students determine the final position of the submarine based on adding or removing floats and anchors and connect those actions to numeric expressions.

Routine: Decide and Defend



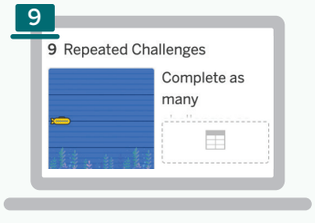
Activity 3

Pairs Sharing a Device | 8 min

Pacing: Screen 9

Students complete Repeated Challenges to determine the final position of a submarine with different starting positions and actions.

Key Takeaway (Screen 9): Removing 5 anchors in our submarine model helps visualize subtracting the value of (-5) as an increase in 5 on the number line.



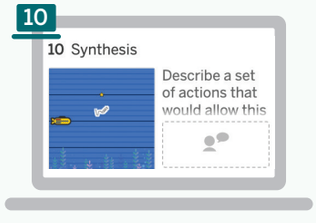
Synthesis

Whole Class | 5 min

Pacing: Screen 10

Students synthesize strategies for adding and subtracting positive and negative numbers by describing a series of actions to move a submarine.

Lesson Takeaway: Adding positive numbers (floats) and subtracting negative numbers (anchors) both make a greater value. Adding negative numbers and subtracting positive numbers both make a lesser value.

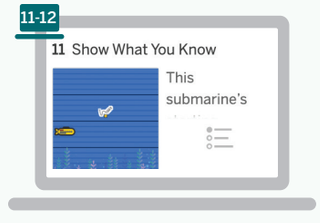


Show What You Know

Independent | 5 min

Pacing: Screens 11–12

Students demonstrate their understanding by using floats and anchors to represent adding and subtracting positive and negative numbers.



Prep Checklist

Assign the digital student screens. A print option is also available.

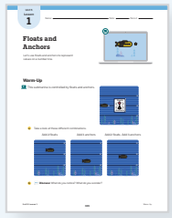
Students using digital:	Students using print:
Student Screens	Student Edition
Lesson Practice	Show What You Know

Consider using the **Math Language Development Resources** scaffolds (as needed).

Pairs Sharing a Device | 5 min | Pacing: Screen 1

Warm-Up

Purpose: Students are introduced to the context of controlling a submarine's position on a vertical number line by adding or removing floats and anchors.



Students using print

1 Launch

1 **Use the Notice and Wonder routine** to promote curiosity and help students make sense of how floats and anchors impact the submarine's position.

Demonstrate how to change the floats and anchors using the dashboard's Student View. Invite students to share what floats and anchors remind them of (e.g., "When I hear [float/anchor], I think . . ."). Consider sharing that floats help raise a submarine from its starting position and anchors lower a submarine from its starting position.

A **Accessibility: Visual-Spatial Processing**
Invite students to use their Student Edition or provide students with an enlarged copy to track the movement of the submarine as they change floats and anchors.

2 Connect

Create a record of the observations students noticed and wondered, along with the names of the students who shared them.

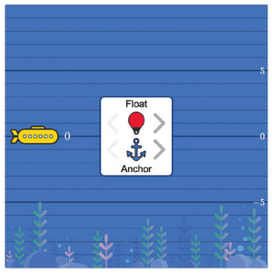
Consider asking:

- "Did anyone notice what happened when you added or removed a float? An anchor?"
- "Why might we wonder about combinations of floats and anchors?"

Students using digital

1

Warm-Up



This submarine is controlled by floats and anchors.

a. Try different combinations to see what we mean.

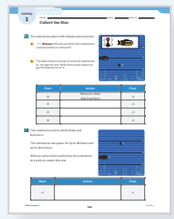
b. 💬 **Discuss:** What do you notice? What do you wonder?

Responses vary. I notice floats make the submarine go up, anchors make the submarine go down, and when both are added, whichever there's more of is the direction it moves.

Pairs Sharing a Device | 12 min | Pacing: Screens 2–4, Screens 5–6

Activity 1 Collect the Star

Purpose: Students explore the impact of adding or removing floats and anchors, including situations where there is an equal number of floats and anchors.



Students using print

1 Launch

2 **To generate excitement**, consider sharing with students that they will engage with a variety of challenges to collect stars.

Note: If it doesn't come up naturally, consider asking:

- "If there are 7 anchors on a submarine, what can be added to the submarine to move it to a position of 0 units?" 7 floats
- "How are these related to each other?" *Responses vary.* The two values are opposites.

2 Monitor

To support students getting started, consider asking, "Which direction does the submarine need to move to collect the star at -3? By how many spaces?"

3 **Listen for** student strategies combining floats and anchors.

D Differentiation

Look for students who:	Respond to Student Thinking
Need support getting started.	**Support** Invite students to guess, by changing the floats and anchors, and use the feedback to think of a strategy.
Guess and check float-and-anchor combinations in an attempt to collect stars.	**Support** Celebrate their persistence. Invite them to reflect on the feedback and strategically choose a next guess.
Recognize that adding a float or removing an anchor results in the submarine moving up one unit.	**Strengthen** Consider asking, "How might that noticing help to solve any challenge?" Invite students to think about how they might share their thinking during the Connect.
Recognize that removing a float or adding an anchor results in the submarine moving down one unit.	
Want to explore submarine challenges further.	**Stretch** Encourage students to try a combination of floats and anchors they think will be different from others and prepare to share during the Connect.

4 **Pause** briefly to discuss multiple strategies for moving the submarine, including unique or creative approaches students tried.

Math Identity and Community Celebrate creative responses, such as noticing that 6 floats cannot be added and using a combination of actions instead.

Activity 1 continued >

Students using digital

2

Collect the Star



This submarine starts with 4 floats and 4 anchors.

a. **Discuss:** Why do you think this submarine's current position is at 0 units?

b. Adjust the floats and anchors to collect the star at −3 units.

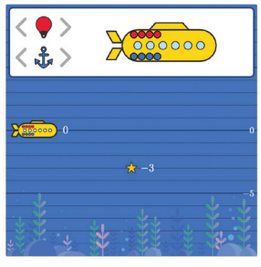
Start	Action	Final
0		

a. *Responses vary.* The anchors and floats are balanced so it doesn't go up or down.

b. *Responses vary.*
- Add 3 anchors
- Remove 3 floats
- Remove 2 floats and add 1 anchor

3

Multiple Solutions



The table shows one way to collect the star at −3 units.

Find at least two more ways.

Start	Action	Final
0	Add 3 anchors	−3
0		

Responses vary.
- Add 3 anchors
- Remove 3 floats
- Remove 2 floats and add 1 anchor
- Remove 4 floats and remove 1 anchor

4

Collect the Star



This submarine starts with 6 floats and 8 anchors.

The submarine has space for up to 10 floats and up to 10 anchors.

Adjust floats and anchors to collect the star at 4 units.

Start	Action	Final
−2		

Responses vary.
- Remove 6 anchors
- Add 4 floats and remove 2 anchors

Activity 1 Collect the Star (continued)

Purpose: Students explore the impact of adding or removing floats and anchors, including situations where there is an equal number of floats and anchors.



Students using print

2 Monitor

5 **To support making connections**, consider sharing that given the multiple solutions for the previous challenge, there are often a variety of approaches to move the submarine to a specific position.

D **Differentiation: (Support)** To support students getting started, invite students to sketch the actions to determine which ones move the submarine to -5 units.

6 **Encourage students** to share their reasoning with a partner and work together to reach an agreement about how to sort the cards describing sums and differences for the position of the submarine.

A **Accessibility: Executive Functioning** Invite students to place the three direction cards (Up, Down, and Same Position) at the top and then focus on sorting one set of actions at a time to support students in carrying out multiple steps.

3 Connect

Display the distribution of responses using the dashboard's Teacher View, calling attention to any conflict or consensus.

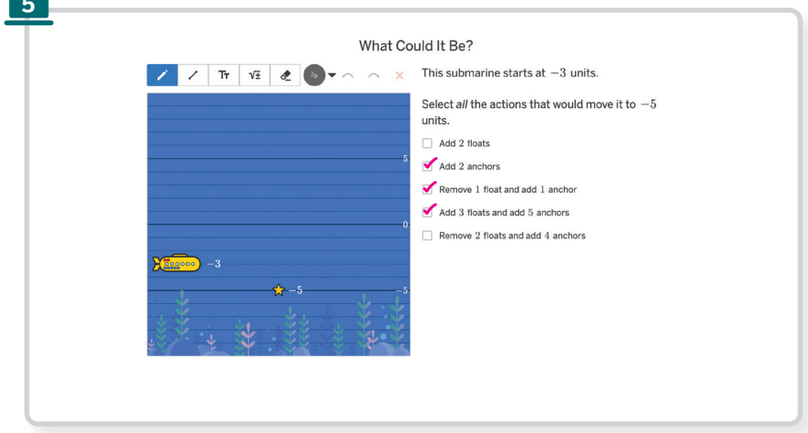
To surface the Key Takeaway, consider asking:

- "Why does adding 3 floats and adding 4 anchors result in the submarine moving down?"
- "Why does removing 5 floats and removing 5 anchors result in the submarine staying in the same position?"
- "Why does adding 8 floats and removing 8 anchors not keep the submarine in the same position?"

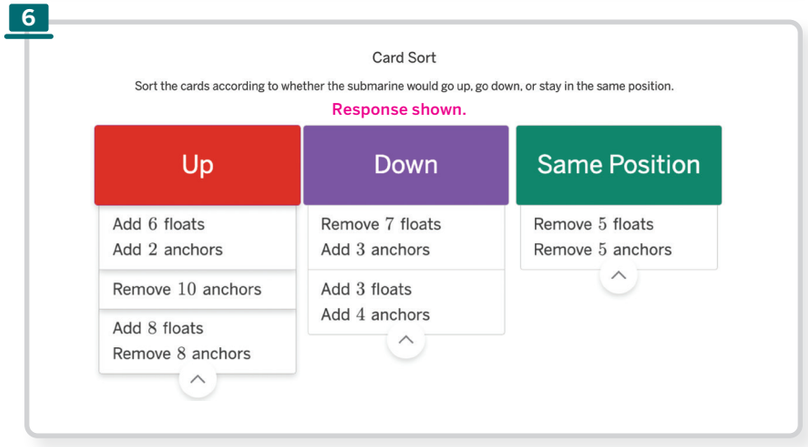
Note: If time allows, invite pairs of students to share their unique responses from the earlier screens in the activity.

Students using digital

5



6



Key Takeaway: Visual models like submarines with floats and anchors can be used to represent sums and differences on a number line. Adding 1 float and adding 1 anchor are opposite actions and do not move the submarine.

Pairs Sharing a Device | 10 min | Pacing: Screens 7–8

Activity 2 Sea-king Stars

Purpose: Students determine the final position of the submarine based on adding or removing floats and anchors and connect those actions to numeric expressions.



Students using print

1 Launch

7 **To support making connections**, consider starting with the activity paused and asking, "How is the problem on this screen different from the previous ones?"

2 Monitor

Listen for student explanations for determining the submarine's final position that may be close to Crow's and Mai's expressions.

D Differentiation

Look for students who:	Respond to Student Thinking
Need support getting started.	**Support** Consider asking, "Which direction does the submarine move when adding 3 floats?" Have students mark this on the vertical number line. Repeat this step for the second part of the action.
Think that removing 5 anchors would move the submarine down 5 units.	**Support** Remind students that removing signals subtraction but anchors also represent a negative number.
Determine the submarine's final position to be -4 units.	**Support** Consider asking, "What would happen to the submarine if you only removed 5 anchors?"

8 **Capture** explanations of what each expression would mean in terms of floats and anchors and why each may be correct to share during the Connect.

3 Connect

Display the distribution of responses using the dashboard's Teacher View, calling attention to any conflict or consensus.

Use the Decide and Defend routine to support students in making arguments and critiquing the reasoning of others.

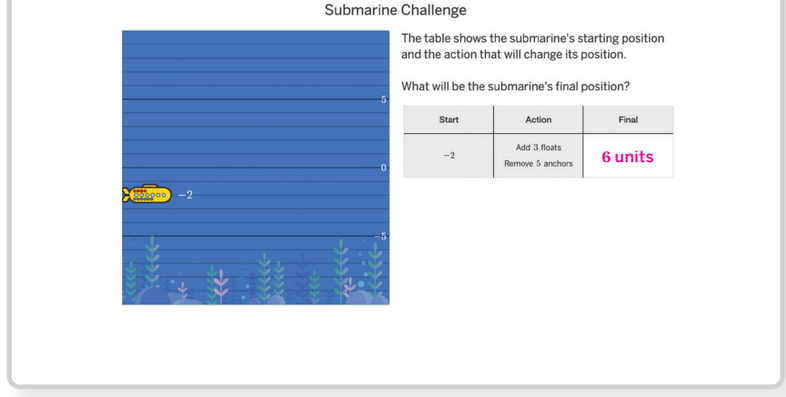
Invite students who made different choices to use reasoning to convince their classmates. Consider asking, "What reasoning or evidence supports your claim?"

Note: If everyone is in agreement, consider making a class argument using different students' reasoning.

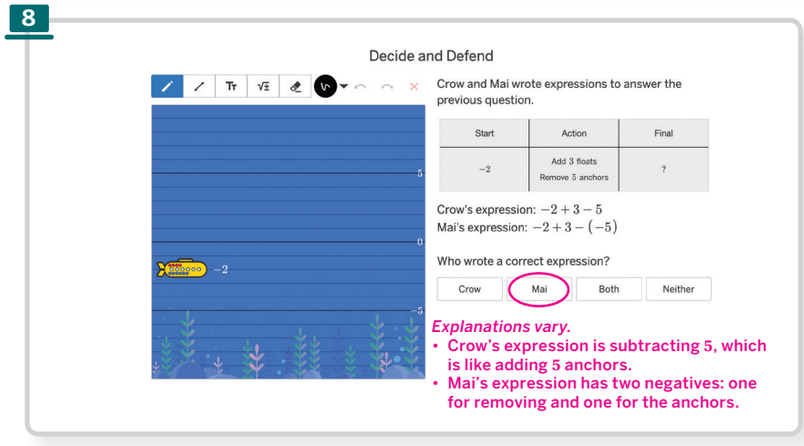
Math Identity and Community Invite students to share what they think we can learn from both correct and incorrect thinking.

Students using digital

7



8



Explanations vary.
- Crow's expression is subtracting 5, which is like adding 5 anchors.
- Mai's expression has two negatives: one for removing and one for the anchors.

Pairs Sharing a Device | 8 min | Pacing: Screen 9

Activity 3 Captain's Challenge

Purpose: Students complete Repeated Challenges to determine the final position of a submarine with different starting positions and actions.

Short on time? Consider inviting students to complete fewer challenges.



Students using print

1 Launch

9

Invite students to set a goal for how many stars they hope to collect as they work on the Repeated Challenges. Share that it's more important to make sense of the challenges than it is to work quickly.

Students using print will need a partner for this activity. They will solve and compare their solutions to problems instead of receiving Responsive Feedback.

A **Accessibility: Memory and Attention** Invite students to use their Student Edition or additional paper to draw the initial submarine position and the actions in each problem.

2 Monitor

Listen for strategies students use while discussing how to solve the problems, such as generalizing how different actions with floats and anchors impact the final position.

Note: Use the dashboard's Teacher View to see how many problems each student has completed correctly.

D **Differentiation**

Look for students who:	Respond to Student Thinking
Need support getting started.	**Support** Consider asking, "Which direction does the submarine move when adding __ floats?" Have students mark this on the vertical number line. Repeat this step for the second part of the action, if appropriate.
Repeatedly guess the final position of their submarine.	**Support** Consider asking, "What strategy shared from Activities 1–2 could you use to try to get the next challenge star?"

3 Connect

Invite students to share strategies that they found helpful or what they learned from the mistakes they made while solving these challenges.

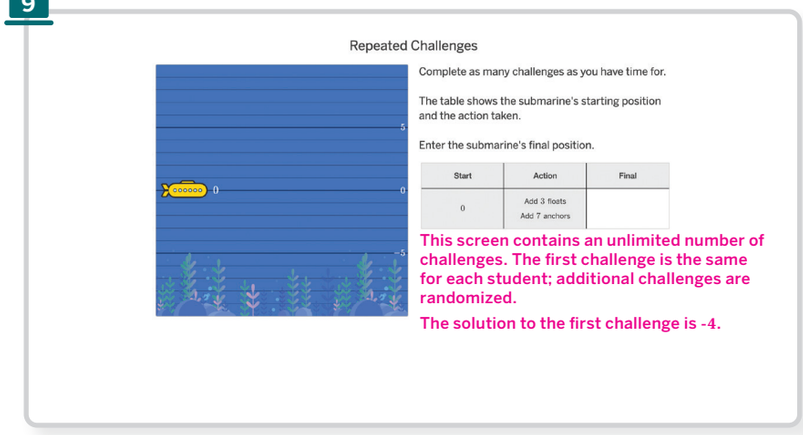
Math Identity and Community Celebrate students who describe general methods or shortcuts for the problems as they progress through the challenges.

To surface the Key Takeaway, consider asking:

- "How can we use floats and anchors to represent subtracting a positive value? How would you write that as an expression?"
- "How does the submarine display subtracting a negative value? How would you write that as an expression?"

Students using digital

9

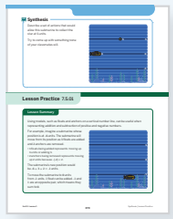


Key Takeaway: Removing 5 anchors in our submarine model helps visualize subtracting the value of (-5) as an increase in 5 on the number line.

Whole Class | 5 min | Pacing: Screen 10

Synthesis

Purpose: Students synthesize strategies for adding and subtracting positive and negative numbers by describing a series of actions to move a submarine.



Students using print

10 **Invite students** to respond independently, and then share their thinking with a partner.

Capture and share a variety of ideas, such as:

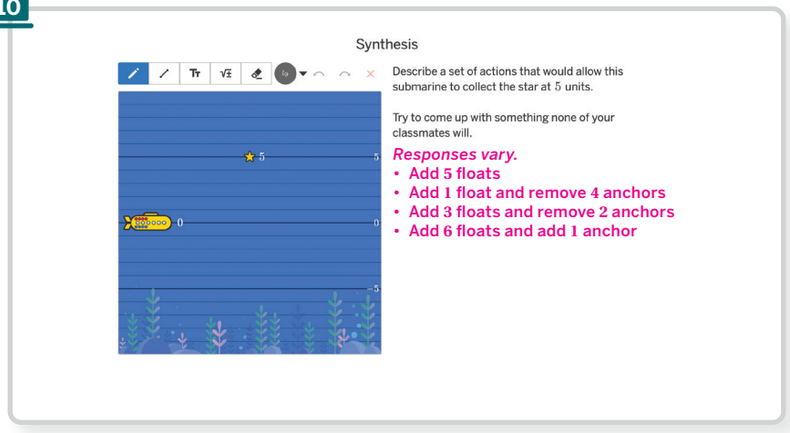
- Adding floats to raise the submarine 5 units.
- Adding and/or removing a combination of floats and anchors that moves the submarine to 5 units.

Math Identity and Community Invite students to celebrate classmates' responses they found creative and unique.

Note: If time allows, invite students to revise their previous thinking based on the discussion.

Students using digital

10



Lesson Takeaway: Adding positive numbers (floats) and subtracting negative numbers (anchors) both make a greater value. Adding negative numbers and subtracting positive numbers both make a lesser value.

Independent | 5 min | Pacing: Screens 11–12

Show What You Know

Purpose: Students demonstrate their understanding by using floats and anchors to represent adding and subtracting positive and negative numbers.

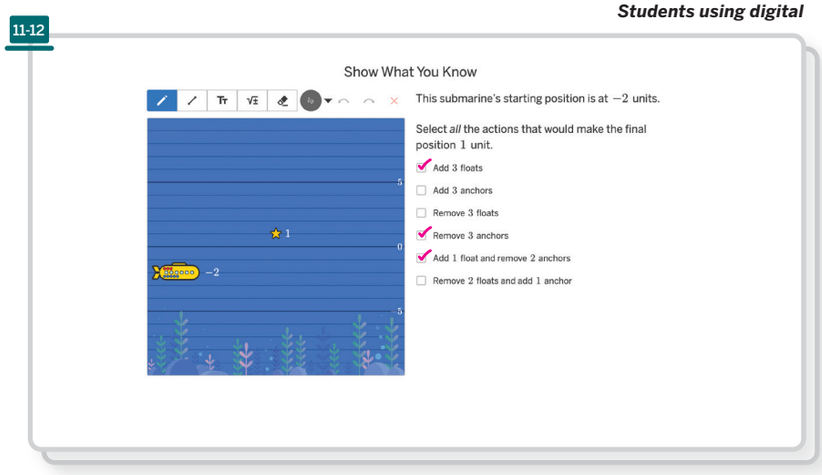


Students using print

11-12 Today's Goals

1. **Goal:** Use a visual model to represent adding and subtracting positive and negative numbers.
2. **Goal:** Use a visual model to represent that pairs of numbers can be combined to make 0.
3. **Language Goal:** Identify different ways to represent the same change (e.g., removing 2 floats or adding 2 anchors). **(Writing, Speaking, and Listening)**

Students using digital



D Differentiation Use after Lesson 01

Here are options for responding to student work on the Show What You Know and throughout the lesson.

Support

Provide targeted intervention.

If student work shows **partial understanding** of adding and subtracting positive and negative numbers:

You may choose not to intervene now. Students will have more opportunities to develop their understanding of these concepts in Lesson 2 and throughout the unit.

Strengthen

Reinforce students' understanding.

If student work shows **conceptual understanding** with minor errors, consider:

- Revisiting the **Repeated Challenges** in Activity 3.
- Assigning the **Lesson Practice**.

Stretch

Challenge students and extend their learning.

If students would enjoy an **additional challenge**, consider:

- Assigning the **Sub-Unit 1 Extensions**.

Support, *Strengthen*, and *Stretch* learning by assigning these digital resources that adjust to each student's current level of skill and understanding.

- **Boost Personalized Learning**
- **Fluency Practice**
- **Math Adventures**

Professional Learning

Reflect on students' use of the submarine model throughout the lesson. How did this model support students with communicating their ideas or participating in the lesson? What support might students need to apply the concepts from this model effectively in the future?

Lesson Practice

Independent

Students continue developing their conceptual understanding, fluency, and application of topics from this lesson and previous lessons/units (spiral review). Invite students to refer to the **Lesson Summary** to support them with this practice and their learning throughout the year.

Lesson 1 **Practice**

Students using digital

Students using print

10 Synthesis

Describe a set of actions that would allow this submarine to collect the star at 5 units.

Try to come up with something none of your classmates will.

Responses vary.

- Add 5 floats
- Add 1 float and remove 4 anchors
- Add 3 floats and remove 2 anchors
- Add 6 floats and add 1 anchor

Lesson Practice 7.5.01

Lesson Summary

Using models, such as floats and anchors on a vertical number line, can be useful when representing addition and subtraction of positive and negative numbers.

For example, imagine a submarine whose position is at -6 units. The submarine will move from its position as 3 floats are added and 2 anchors are removed.

- 3 floats being added represents moving up 3 units or adding 3.
- 2 anchors being removed represents moving up 2 units because -(-2) = 2.

The submarine's new position would be $-6 + 3 + 2 = -1$ units.

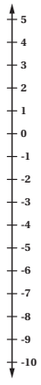
To move the submarine to 0 units from -1 units, 1 float can be added. -1 and 1 are an opposite pair, which means they sum to 0.



Lesson Practice
7.5.01

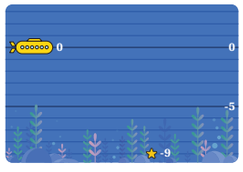
Name: _____ Date: _____ Period: _____

Problems 1–5: One moment in December, it was -8°C in Harbin, China, and -2°C in Beijing, China. Use the number line if it helps with your thinking.



1. Which city was colder?
   Harbin
2. At the same moment, it was 7 degrees warmer in Shanghai than it was in Beijing. What was the temperature in Shanghai?
   5°C
3. How many degrees warmer was it in Shanghai than in Harbin?
   13 degrees
4. Later in the day, Beijing got 5 degrees colder. What was Beijing's new temperature?
   -7°C
5. Later in the day, Harbin's temperature was 1°C. By how much did Harbin's temperature change? Explain your thinking.
   9 degrees. *Explanations vary.* The distance from -8 to 1 on a number line is 9 units.

Problems 6–7: This submarine has 0 floats and 0 anchors. The submarine can hold up to 10 floats and 10 anchors.



6. List *all* the combinations of floats and anchors that could collect the star at -9 units.
   - 9 anchors
   - 10 anchors and 1 float
7. How do you know there are no other combinations?
   Responses vary. It takes 9 anchors to get down to -9. Every other anchor needs to be balanced with a float. Since the submarine only has space for 10 anchors, you can only add 1 float.

Lesson Practice
7.5.01

Name: _____ Date: _____ Period: _____

Spiral Review

8. Fill in each blank using the symbols >, <, or =.

3	>	-3
12	<	24
-12	>	-24
7	<	7.2
-7	>	-7.2

Problems 9–11: A color of green paint is made by mixing 2 cups of yellow paint with 3.5 cups of blue paint.

9. Complete the table to show amounts of yellow and blue paint that will make the same color of green but in a smaller amount.
   Responses vary. Sample shown in table.

Yellow Paint (cups)	Blue Paint (cups)
1	1.75

10. Complete the table to show amounts of yellow and blue paint that will make the same color of green but in a larger amount.
    Responses vary. Sample shown in table.

Yellow Paint (cups)	Blue Paint (cups)
4	7

11. Will a mixture that is 3 cups of yellow and 4.5 cups of blue be more blue, more yellow, or the same color of green as the original mixture? Explain your thinking.
    More yellow. *Explanations vary.* For a mixture with 3 cups of yellow paint, 5.25 cups of blue paint are needed to get the same color of green as the original mixture. 4.5 cups of blue paint is less than 5.25 cups, which would make the green look more yellow.

Reflection

1. Put a question mark next to a response you'd like to compare with a classmate's.
2. Use this space to ask a question or share something you're proud of.

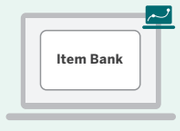
Lesson Practice Item Analysis

	Problem(s)	DOK
On-Lesson		
Fluency	1–5	2
	6–7	3
Spiral Review		
	8	1
	9–10	2
Test Practice	11	2

Need More Practice?



Additional Practice



Item Bank