AmplifyScience

Metabolism

Lesson 2.5: Critical Juncture Assessment

Answer Key and Scoring Guide

Overview of Assessment Design and Approach to Scoring

The Critical Juncture (CJ) Assessment is designed to reveal students' current levels of understanding of the unit's core content and identify the student's level on the unit Progress Build. Assessment results indicate students' progress from the beginning of the unit and are used to group students for differentiated instruction in the next lesson. As with the Pre-Unit Assessment, the CJ includes content beyond what a student is expected to have mastered. Therefore, the CJ is not intended to be used for summative purposes. Further, it is not intended to be scored as an overall "percent correct." Instead, each assessment item is aligned to a particular level of the Progress Build: there are 4 items focusing on each level, and the assessment is designed such that answering at least 3 of the 4 items correctly represents full, explanatory understanding of the level. At this point in the unit, students are expected to have reached Level 2 of the unit's Progress Build. However, there are many reasons that this may not be the case (from differences in background knowledge to class absences), so the Critical Juncture Assessment is intended to identify the Progress Build Level at which each student understands the content by this point in the unit and help you determine the instruction that will best support students to advance their understanding.

Progress Build (PB)

Progress Build Level 1 (L1): Cells in the body need molecules from outside to function.

The body can function when the cells of the body are getting and using molecules that come from outside the body—from the food we eat and the air we breathe. Oxygen, glucose, and amino acids are molecules the cells need that come from outside the body.

Progress Build Level 2 (L2): Systems in the body work together to take in, break down, and deliver needed molecules to the cells.

The body can function when the cells of the body are getting and using molecules that come from outside the body—from the food we eat and the air we breathe. Oxygen, glucose, and amino acids are molecules the cells need that come from outside the body. The digestive system breaks down starch and protein molecules from food into glucose and amino acids, and then the circulatory system transports these molecules to the cells. Also, the respiratory system takes in oxygen molecules from the air, and the circulatory system transports those molecules unchanged to the cells because oxygen molecules are already small enough to fit into cells.

Progress Build Level 3 (L3): Cells can use these molecules to release energy for the body to function.

The body can function when the cells of the body are getting and using molecules that come from outside the body—from the food we eat and the air we breathe. Oxygen, glucose, and amino acids are molecules the cells need that come from outside the body. The digestive system breaks down starch and protein molecules from food into glucose and amino acids, and then the circulatory system transports these molecules to the cells. Also, the respiratory system takes in oxygen molecules from the air, and the circulatory system transports those molecules unchanged to the cells because oxygen molecules are already small enough to fit into cells. When glucose and oxygen molecules are both in a cell, they undergo a chemical reaction, called cellular respiration, that releases energy. Cells use the energy released in cellular respiration to function, which allows the whole body to function.

Guidance for Hand-Scoring and Interpreting Student Critical Juncture Assessments

For teachers who are hand-scoring Critical Juncture Assessments, we recommend the following approach, which represents a simplified version of our auto-scoring algorithm and will lead to the same score our digitally automated system would provide in the most common cases.

The Item-PB Mapping table is provided to identify which items are aligned to which Level of the PB. We suggest beginning with a review of items at Level 1 of the PB, and then moving to Levels 2 and 3 in turn.

Table 1: Item-PB Mapping

Question No.	Correct Answer	Progress Build Level
1	c	L1
2	a	L2
3	c	L3
4	d	L1
5	c	L2
6	d	L3
7	c	L1
8	b	L2
9	d	L3
10	a	L1
11	a	L2
12	b	L3

In most situations, because there are 4 items at each level, a "¾ rule" at each PB level will generally indicate a student's level of understanding: correctly answering 3 (or 4) items at a Level indicates understanding at that level. Less than ¾ indicates struggle with the content introduced in that level. This method is summarized in the Scoring Guide table. We also recommend reviewing students' written responses to the assessment's open-ended questions to provide more insight into students' developing understanding of unit content.

Table 2: Scoring Guide: Interpreting Student Scores on Critical Juncture Multiple-Choice Assessments

Note: Numbers in the first three columns represent the number of correctly answered items in that Level; Column 4 (Overall PB Level) represents the level of understanding demonstrated by a student's performance on the assessment.

For the differentiated instruction that follows this assessment, students answering fewer than 3 correct at Level 1 may engage in a personalized learning experience that supports the first level of the progress build.

L1 Questions	L2 Questions	L3 Questions	Overall PB Level	Interpretation
3-4	3-4	3-4	Lv3	Student has demonstrated explanatory understanding through Level 3 of the Progress Build
3-4	3-4	0-2	Lv2	Student has demonstrated explanatory understanding through Level 2 of the Progress Build and may need support with ideas at Levels 3
3-4	0-2	0-2	Lv1	Student has demonstrated explanatory understanding through Level 1 of the Progress Build and may need support with ideas at Levels 2 and 3

Science Content Rubrics for Critical Juncture Assessment

The rubrics that follow are designed to guide scoring of student responses to each of the two writing prompts associated with the Critical Juncture Assessment.

Written-Response Question #1: Lucille is finding it difficult to play soccer after school. Her doctor thinks that her cells might not be getting enough oxygen. When Lucille talked about it with a friend, her friend said there might be a problem with Lucille's respiratory system or circulatory system.

What do Lucille's cells need in order for her body to function properly? How might a problem with Lucille's respiratory system or circulatory system make it difficult for Lucille to play soccer?

Scoring Guide and Possible Student Responses at Each Level of the Progress Build
Level 1: Students indicate that cells need glucose and oxygen molecules from food and air in order for the body to function. Students may or may not specify that amino acids are also needed. **Possible Student Response:** Lucille's cells need glucose and oxygen in order for her body to function properly. If there is a problem with her circulatory or respiratory systems, they might not be bringing in enough oxygen from the air. It's hard to play soccer if you don't have enough oxygen in your cells.
Level 2: Students demonstrate an understanding of Level 1 AND explain that if the respiratory system is not taking in enough oxygen, or if not enough oxygen molecules are being delivered to the cells through the circulatory system, this would lead to having too little oxygen in the cells. **Possible Student Response:** Lucille's cells need glucose and oxygen in order for her body to function properly. If Lucille's respiratory system is not working properly, then there wouldn't be enough oxygen molecules passing through her respiratory system, which means there wouldn't be enough oxygen sent to her cells through her circulatory system. If Lucille's circulatory system is not working properly, then there would not be enough oxygen molecules being delivered to her cells. It's hard to play soccer if you don't have enough oxygen in your cells.
Level 3: Students demonstrate the understanding at Levels 1 and 2 AND explain that when glucose and oxygen molecules are both in a cell they undergo a chemical reaction, called cellular respiration, that releases energy. Cells use the energy released in cellular respiration to function. **Possible Student Response:** Lucille's cells need glucose and oxygen in order for her body to function properly. If Lucille's respiratory system is not working properly, then there wouldn't be enough oxygen molecules passing through her respiratory system, which means there wouldn't be enough oxygen sent to her cells through her circulatory system. If Lucille's circulatory system is not working properly, then there would not be enough oxygen molecules being delivered to her cells. It's hard for her to play soccer because if her cells aren't getting enough oxygen, then her cells can't release enough energy from the chemical reaction with glucose called cellular respiration. Therefore, she might not have enough energy to play.

Science Content Rubrics for Critical Juncture Assessment

The rubrics that follow are designed to guide scoring of student responses to each of the two writing prompts associated with the Critical Juncture Assessment.

Written-Response Question #2: Ezra eats a cheese sandwich for lunch. Cheese contains a lot of protein and bread is mostly starch. Ezra plans to play basketball later in the afternoon. Ezra is breathing normally.

What does Ezra need from the food he ate and the air he breathes so that he can play basketball? How do Ezra's body systems work together to get the molecules he needs into his cells? How do his cells use these molecules to release energy for his body to run?

Scoring Guide and Possible Student Responses at Each Level of the Progress Build
Level 1: Students indicate that cells need glucose and oxygen molecules from food and air in order for the body to function. Students may or may not specify that amino acids are also needed. **Possible Student Response:** Ezra's cells need oxygen from air and glucose from the starch in his food in order for him to be able to play basketball. After he breathes, and eats the food, his body will have what it needs because of the work of the respiratory system, the circulatory system, and the digestive system. His cells release energy from the molecules.
Level 2: Students demonstrate understanding of Level 1 AND specify that the digestive system breaks down starch into glucose. Glucose then moves through the circulatory system into the cells. Oxygen molecules pass through the respiratory system unchanged and are delivered to cells through the circulatory system. **Possible Student Response:** Ezra's cells need oxygen from air and glucose from the starch in his food in order for him to be able to play basketball. Oxygen molecules pass through Ezra's respiratory system and get sent through the circulatory system to his cells. The starch in his food needs to get broken down into glucose by his digestive system and then get sent to his cells through the circulatory system. His cells release energy from the molecules.
Level 3: Students demonstrate the understanding at Levels 1 and 2 AND explain that when glucose and oxygen molecules are both in a cell they undergo a chemical reaction, called cellular respiration, that releases energy. Cells use the energy released in cellular respiration to function. **Possible Student Response:** Ezra's cells need oxygen from air and glucose from the starch in his food in order for him to be able to play basketball. Oxygen molecules pass through Ezra's respiratory system and get sent through the circulatory system to his cells. The starch in his food needs to get broken down into glucose by his digestive system and then get sent to his cells through the circulatory system. His cells release energy through a chemical reaction between glucose and oxygen. When his cells release energy, he will have enough energy to play basketball.