

Selected Response

Benchmark: MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. [Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with HCl.] [Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.]

DOK Level: 2

Jenya is taking a cooking class. She mixes equal amounts of table sugar and water and heats the mixture on a stove. She places a thermometer in the mixture to record its temperature. At first, Jenya’s mixture becomes a clear, thick liquid as its temperature increases and its volume decreases. Then, it turns into a black solid and starts to give off a different odor. Jenya thinks that the mixture underwent a chemical reaction.

Which statement best supports Jenya’s conclusion?

- a) The mixture decreased in volume.
- b) The mixture produced a different odor.**
- c) The mixture gained energy as it was heated.
- d) The mixture changed from a liquid to a solid.

Rationale:

a	Incorrect. A change in volume may indicate a physical change. The production of a different odor best indicates that a chemical reaction occurred.
b	Correct.
c	Incorrect. A change in temperature due to heating indicates a physical change. The production of a different odor best indicates that a chemical reaction occurred.
d	Incorrect. A change in state of matter is a physical change and may or may not indicate that a chemical reaction took place. The production of a different odor best indicates that a chemical reaction occurred.

Extended Constructed Response

Benchmark: MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. [Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.] [Assessment Boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.]

DOK level: 3

Zeke wants to test how mass affects the forces that move a toy car down a ramp. He has the following materials:

- a 3.0 m × 0.5 m board
- a meter stick
- a stopwatch
- 10 sturdy blocks
- 5 different-sized toy cars
- sandpaper
- slick wrapping paper
- tape
- a bowl of pennies

Zeke is not sure which of his materials will be needed for the investigation.

What experiment can Zeke set up that will help him answer his question? Describe why certain materials will be used and why others will not.

Response Area:

Scoring Rubric and Exemplar

Rubric:

4	4 points: A score of four indicates that the student has demonstrated a thorough understanding of the scientific concepts and/or procedures embodied in the task. The student has completed the task correctly, used scientifically sound procedures, and provided clear and complete explanations and interpretations. The response may contain minor flaws that do not detract from a demonstration of a thorough understanding.
3	3 points: A score of three indicates that the student has demonstrated an understanding of the scientific concepts and/or procedures embodied in the task. The student's response to the task is essentially correct, but the scientific procedures, explanations, and/or interpretations provided are not thorough. The response may contain minor flaws that reflect inattentiveness or indicate some misunderstanding of the underlying scientific concepts and/or procedures.
2	2 points: A score of two indicates that the student has demonstrated only a partial understanding of the scientific concepts and/or procedures embodied in the task. Although the student may have arrived at an acceptable conclusion or provided an adequate interpretation of the task, the student's work lacks an essential understanding of the underlying scientific concepts and/or procedures. The response may contain errors related to misunderstanding important aspects of the task, misuse of scientific procedures/processes, or faulty interpretations of results.
1	1 point: A score of one indicates that the student has demonstrated a very limited understanding of the scientific concepts and/or procedures embodied in the task. The student's response is incomplete and exhibits many flaws. Although the student's response has addressed some of the conditions of the task, the student has reached an inadequate conclusion and/or provided reasoning that is faulty or incomplete. The response exhibits many flaws or may be incomplete.
0	0 points: A score of zero indicates that the student has not provided a response or has provided a response that does not demonstrate an understanding of the scientific concepts and/or procedures embodied in the task. The student's explanation may be uninterpretable, lack sufficient information to determine the student's understanding, or contain clear misunderstandings of the underlying scientific concepts.

Exemplar:

4	Zeke can stack the blocks and lean the board on them to make a ramp. He can choose one car to use for the experiment. He should not use all of the cars, because they may have different masses and he does not have a balance or scale. He should put a piece of tape around the car and let it roll down the ramp, repeating this several times. He will use the meter stick to measure the distance of the ramp and a stopwatch to determine how long it takes the car to travel this distance. Once he has this data, he can tape different numbers of pennies onto the car to vary its mass and record the time required for the car to travel the distance of the ramp, several times for each mass. Then, he can analyze the results to determine how mass affects motion. Zeke will not use the sandpaper or slick wrapping paper, because he does not wish to test the effects of friction.
3	Zeke can stack a few of the blocks and lean the board on them to make a ramp. He can choose one car to use for the experiment. He will use the stopwatch to time the car's motion and the meter stick to measure the distance it travels. Once he has this data, he can tape different numbers of pennies onto the car to give it different masses. After he has recorded the time and distance traveled by each car mass, he can determine how the mass of the car determined its motion. Zeke will not use the sandpaper or slick wrapping paper.
2	Zeke can stack a few of the blocks and lean the board on them to make a ramp. He will roll the cars down the ramp for the experiment. He will use the stopwatch to time each car's motion and the meter stick to measure the distance it travels. Once he has this data, he can tape different numbers of pennies onto the car to give the car different masses.
1	Zeke can stack a few of the blocks and lean the board on them to make a ramp. He will roll the cars down the ramp for the experiment.

No 0-point exemplar is required.

Short Response:

Benchmark: MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. [Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.]

DOK level: 1

Annette is building a plant cell model and labeling its parts. She knows that a plant cell has many parts and each has a different job. Some parts tell the cell what to do and when. Other parts help make food and energy for the cell. Annette uses plastic wrap poked with many tiny holes to model the part of a cell that determines which substances are able to enter and leave the cell.

What part of the cell is Annette modeling with the plastic wrap?

Correct Answer: cell membrane (also acceptable: cellular membrane, plasma membrane)

Rationales

Correct Answer	The cell membrane is semi-permeable, allowing only certain substances in and out of the cell.
Incorrect Answer	The cell wall of a plant cell is often confused with the cell membrane because it also lies outside of the cell. However, it provides support to the plant cell without regulating the substances that enter and leave.