Battle Creek Area Mathematics and Science Center Summative Assessment - End of Unit Exam

Attached is the Summative Assessment for the Battle Creek Area Mathematics and Science Center Science Unit, *Changes in Motion*. This assessment includes a number of multiple-choice questions, one constructed response question, and several items from the unit's Student Journal. Summative assessment of targeted concepts and skills provides feedback to the individual student and the teacher on conceptual understanding, demonstration of achievement of selected content, and determination of readiness for refinement and application of new knowledge and skills. The inclusion of the Student Journal items provides the opportunity to determine the level of understanding and ability of key knowledge and skills targeted in this unit. The Student Journal items evaluate individual student learning and the effectiveness of instruction. Rubrics are included in the Summative Assessment to ensure consistent scoring of the items. All components of this assessment provide multiple opportunities to assess student understanding of each science content expectation addressed in the unit.

The BCAMSC Summative Assessments are in draft form and may change based on student performance and teacher feedback. The BCAMSC Outreach Staff will use data collected from participating districts to make adjustments for the following school year.

If you have any questions or suggestions regarding the Summative Assessment, please direct your calls to Nancy Karre at (269) 965-9584 or email: nancy@bcamsc.org.

Name: _____

Date: _____

A S S E S S M E N T

Changes in Motion

1. Roger and Mike were observing and measuring the motion of toy jumping frogs. How did Roger and Mike know that the jumping frogs had moved?
    a. They moved very quickly.
    b. The jumping frogs changed position.
    c. The jumping frogs flipped over.
    d. The jumping frogs looked smaller when they were farther away.

2. What force was needed to start the frogs moving?
    a. gravity
    b. friction
    c. push
    d. work

3. Roger and Mike wanted to record the motion of the jumping frogs. Choose the list of words for Roger and Mike to use to describe the motion of the frogs.
    a. fast, slow, up, down, straight, curve, right, left
    b. wild, springing, flipping, soaring, flying
    c. fastest, slowest, soaring, flying, jumping
    d. friction, gravity, push, pull, force

4. Mrs. Clark's class was investigating the force needed to move a block of wood over different surfaces. They tested the smooth surface of the wood block, sandpaper, waxed paper, and rubber bands. Choose the question for the class investigation.
    a. Which block will move the fastest?
    b. Do rubber bands affect the movement of the block more than sandpaper?
    c. Which surface will require the most force to move the block?
    d. Does sandpaper cause more friction than rubber bands?

5. Mrs. Clark's class collected the following data:

Surface	Wood	Sandpaper	Waxed Paper	Rubber Band
Trial 1	16 washers	9 washers	15 washers	38 washers
Trial 2	15 washers	7 washers	15 washers	38 washers
Trial 3	16 washers	8 washers	16 washers	37 washers

What conclusion can Mrs. Clark's students draw based on their data?

a. The block requires the same amount of force to move with all four surfaces.
b. The block with the rubber bands attached never moved.
c. The block with the sandpaper required the least amount of force to move.
d. Friction always hinders motion.

6. Friction is a force caused by:

a. rough surfaces.
b. smooth surfaces.
c. the heating and cooling of two objects.
d. surfaces rubbing against one another.

7. When performing an investigation, it is BEST to do it:

a. only one time.
b. only two times.
c. at least 950 times.
d. at least three times.

8. When a car moves around a corner it:

a. speeds up.
b. stops.
c. changes direction.
d. loses gravity.

9. Josh and Tyrone were investigating the force to move a marble on the gymnasium floor. They measured the distance the marble traveled after Josh pushed the marbles for three trials and then after Tyrone pushed the marbles after three trials. They collected the following data:

	Trial 1 Distance Traveled	Trial 2 Distance Traveled	Trial 3 Distance Traveled
Josh	6 meters	7 meters	6 meters
Tyrone	4 meters	5 meters	5 meters

Josh and Tyrone discovered that the marble traveled a greater distance when Josh pushed it across the floor. Choose the answer that describes why the marble traveled at a greater distance when Josh pushed it.

a. Josh was pushing the marble in a different direction.

b. Josh applied a greater push on the marble than Tyrone.

c. Tyrone had more friction and gravity acting on the marble than Josh.

d. Tyrone needs a lighter marble to travel the same distance as Josh.

10. Tiffany and Stuart were investigating the distance two marbles traveled that had different weight. They used one large shooter marble and one small playing marble. They discovered that it was more difficult to move the larger shooter marble than the smaller playing marble. Choose the explanation for their findings.

a. The forces applied to the marbles were gravity, friction, and a push.

b. A greater force is needed to move the marble with greater weight.

c. The amount of force to move the marbles is equal.

d. The larger the force, the greater the change in motion.

11. To measure the speed that the large marble and small marble traveled, Tiffany and Stuart need to know the:

a. amount of force applied to the marbles.

b. amount of gravity and friction applied to the marbles.

c. distance the marble traveled and the amount of time it took.

d. the length of the gym floor and the weight of the marbles.

12. Mrs. Smith placed a tennis ball on the desktop and it did not move. Why is the tennis ball not moving?

    a. The force of gravity is pulling down on the ball and the table is pushing up on the ball with equal force.

    b. The force of friction is equal to the force of gravity, so the ball stays in the same position on the desk.

    c. The force of gravity disappears when objects are placed on surfaces and the ground.

    d. The force of gravity is not great enough to overcome the force of friction holding the ball to the table.

13. Erica and Joan ran a race. They ran 20 meters. Erica crossed the finish line in 22 seconds and Joan crossed the finish line in 24 seconds. Erica won the race because:

    a. she started earlier than Joan.

    b. she sped up at the end of the race.

    c. she ran 20 meters in less time than Joan.

    d. she ran a shorter distance than Joan.

14. Sally and Kristin were testing the flight of paper airplanes as they tossed them across the school gym. The airplanes flew across the gym and then came to rest on the floor. What force made the paper airplanes land on the floor?

    a. gravity

    b. friction

    c. air pressure

    d. volume

15. In science class, Sally and Kristin watched a video about astronauts tossing a paper airplane in space. They discovered that the airplane moved differently in an environment where there is little gravity. What will happen to a paper airplane when it is tossed in a spacecraft? The airplane will:

    a. stay in one spot and not move.

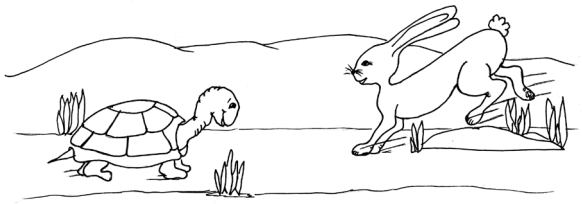
    b. drop straight to the floor of the spacecraft because there is no air.

    c. keep going in the direction it was tossed until a force stops it.

    d. spin around continuously until a force stops it.

16. Write what you think will happen to the paper airplane when it hits a wall in a spacecraft.

17. Look at the picture of the turtle and the hare. Write about the motion of each animal. Include at least one motion word, one speed word, and one direction word in your writing. Compare the motion of the turtle and the hare.



Changes in Motion (cont.)
Answer Key

18. Draw and write about a time when you used a pulling force to change the way something was moving. How did you know it changed?

19. Draw and write about a time when you used a pushing force to change the way something was moving. How did you know it changed?

Scoring Rubric

Changes in Motion(Total Possible Points - 24)

Question #1: Roger and Mike were observing and measuring the motion of toy jumping frogs. How did Roger and Mike know that the jumping frogs had moved? (P.FM.03.36)

Answer: b (1 point)

Question #2: What force was needed to start the frogs moving? (P.FM.03.35)

Answer: c (1 point)

Question #3: Roger and Mike wanted to record the motion of the jumping frogs. Choose the BEST list of motion words for Roger and Mike to use to describe the motion of the frogs. (P.FM.03.41)

Answer: a (1 point)

Question #4: Mrs. Clark's class was investigating the force needed to move a block of wood over different surfaces. They tested the smooth surface of the wood block, sandpaper, waxed paper, and rubber bands. Choose the BEST question for the class investigation. (S.IP.03.12)

Answer: c (1 point)

Question #5: What conclusion can Mrs. Clark's students draw based on their data? (S.IA.03.11)

Answer: c (1 point)

Question #6: Friction is a force caused by: (P.FM.03.37)

Answer: d (1 point)

Question #7: When performing an investigation, it is BEST to do it: (S.IP.03.13, S.IA.03.15)

Answer: d (1 point)

Question #8: When a car moves around a corner it: (P.FM.03.42)

Answer: c (1 point)

Question #9: Josh and Tyrone discovered that the marble traveled a greater distance when Josh pushed it across the floor. Choose the answer that BEST describes why the marble traveled at a greater distance when Josh pushed it. (P.FM.03.37)

Answer: b (1 point)

Question #10: Tiffany and Stuart were investigating the distance two marbles traveled that had different weight...Choose the BEST explanation for their findings. (P.FM.03.37)

Answer: b (1 point)

Question #11: To measure the speed that the large marble and small marble traveled, Tiffany and Stuart need to know the: (P.FM.03.43)

Answer: c (1 point)

Question #12: Mrs. Smith placed a tennis ball on the desktop and it did not move. Why is the tennis ball not moving? (P.FM.03.38)

Answer: a (1 point)

Question #13: Erica and Joan ran a race. They ran 20 meters. Erica crossed the finish line in 22 seconds and Joan crossed the finish line in 24 seconds. Erica won the race because: (P.FM.03.43)

Answer: c (1 point)

Question #14: Sally and Kristen were testing the flight of paper airplanes as they tossed them across the school gym. The airplanes flew across the gym and then came to rest on the floor. What force made the paper airplanes land on the floor? (P.FM.03.22)

Answer: a (1 point)

Question #15: What will happen to a paper airplane when it is tossed in a spacecraft? The airplane will: (P.FM.03.22, P.FM.03.36, P.FM.03.41)

Answer: c (1 point)

Question #16: Write what you think will happen to the paper airplane when it hits a wall in a spacecraft. (P.FM.03.42)

Elements

a. The airplane will change direction when it hits a wall in a spacecraft.

b. The airplane will keep moving in a new direction.

Scoring (2 points)

2 - Response includes both elements

1 - Response includes one element

0 - No response, no elements, can't read the answer

Question #17 - Activity #2, Journal Entry: Look at the picture of the turtle and the hare. Use the words from your Describing Motion Chart to write about the motion of each animal. Include at least one motion word, one speed word, and one direction word in your writing. Compare the motion of the turtle and the hare. (P.FM.03.41)

Elements

a. Response includes a comparison of the turtle and hare using at least one speed word. (fast, slow, quick, rapid, etc.)

b. Response includes a description that includes at least one direction word. (along, over, past, right, left, north, south, east, west, etc.)

c. Response includes a comparison that includes at least one motion word. (run, walk, hop, crawl, etc.)

Scoring (3 points)

3 - Response includes all three elements

2 - Response includes two elements

1 - Response includes one element

0 - No response, no elements, can't read the answer

Question #18 - Activity #4, Journal Entry Question #1: Draw and write about a time when you used a pulling force to change the way something was moving. How did you know it changed? (P.FM.03.35)

Elements

a. Drawing includes accurate representation of a pulling force.

b. Description includes that the object changed position through one of the following: started moving, changed direction, stopped, sped up, or slowed down.

Scoring (2 point)

2 - Response includes both elements

1 - Response includes one element

0 - No response, no elements, can't read the answer

Question #19 - Activity #4, Journal Entry Question #2: Draw and write about a time when you used a pushing force to change the way something was moving. How did you know it changed? (P.FM.03.35)

Elements

a. Drawing includes accurate representation of a pushing force.

b. Description includes that the object changed position through one of the following: started moving, changed direction, stopped, sped up, or slowed down.

Scoring (2 points)

2 - Response includes both elements

1 - Response includes one element

0 - No response, no elements, can't read the answer