InterActions Unit 3 Cycle 1 Sample Quiz

Use your Scientists' Consensus Ideas sheets for assistance.

1. A wagon is being pulled in a straight line. The forces exerted on the wagon are balanced. The wagon

    a. speeds up.

    b. slows down.

    c. moves with a constant speed.

    When the forces exerted on an object are balanced, the object does not change its motion. To answer this question you need to understand how balanced forces affect motion.

2. A wagon is being pulled in a straight line. The forces exerted on the wagon are unbalanced in the direction opposite to its motion. The wagon

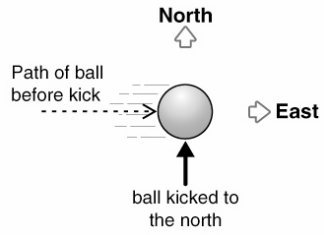
    a. speeds up.

    b. slows down.

    c. moves with a constant speed.

    When the forces exerted on an object are unbalanced and in the direction opposite to its motion, the object slows down. To answer this question you need to understand how unbalanced forces affect motion.

3. A ball is rolling to the east. It is given a quick kick to the north. After the kick the ball



    a. keeps rolling to the east.

    b. rolls only to the north

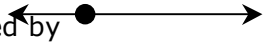
    c. keeps rolling but changes its direction.

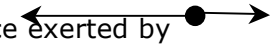
    d. there is not enough information to say how the ball moves.

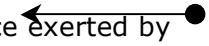
    When a force is exerted on an object in a direction different from its path it changes the object's direction of motion. To answer this question you need to know that a force exerted on an object can change an object's direction of motion.

4. Kevin pushes a large box across the floor. He pushes the box with a constant force and the box moves with a constant speed. Which force diagram best describes the situation.

a. force exerted by Kevin on box  force exerted by floor on box

b. force exerted by Kevin on box  force exerted by floor on box

c. force exerted by Kevin on box  force exerted by floor on box

d. force exerted by Kevin on box 

Since the box is moving with a constant speed, the forces acting on the box must be balanced. To answer this question you need to know how force affects motion and how to draw a force diagram.

5. You push a box on a smooth, smooth ice rink. Imagine the ice is frictionless. While you push

a. force is transferred to the box.

b. energy is transferred to the box.

c. force and energy are transferred to the box.

d. neither force nor energy are transferred to the box.

Force cannot be transferred. To answer this question you need to know that energy is transferred during interactions not force.

6. You push a box on a smooth, smooth ice rink. Imagine the ice is frictionless. Which statement is true

   a. The box speeds up.

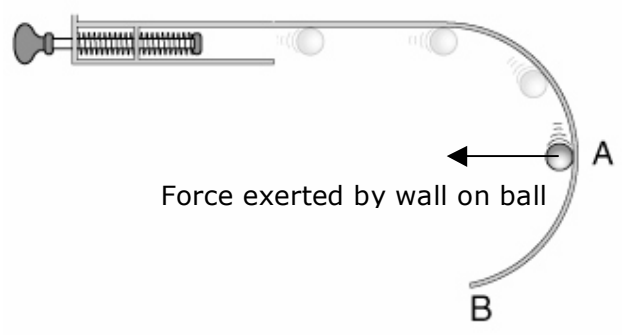
   b. The box moves at a constant speed.

   c. The box slows down.

   d. There is not enough information to say.

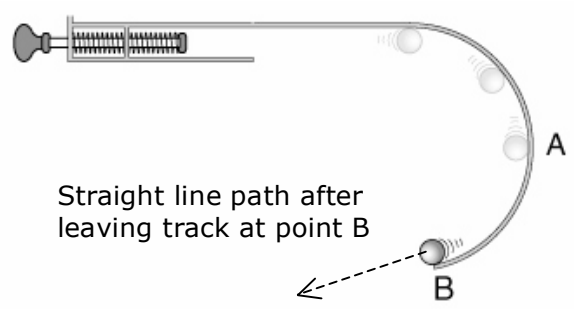
   Since there is no friction, the only force exerted on the box is from the push. This unbalanced force exerted on the box causes the box to speed up. To answer this question you need to know how motion and forces are related and what is transferred during an interaction.

7. Michael launches a marble in his marble launcher. The launcher pushes the marble to the circular wall. The marble is in contact with the wall while moving. Draw and label the force(s) exerted on the marble when it reaches point A. Don't forget to label your force arrows.



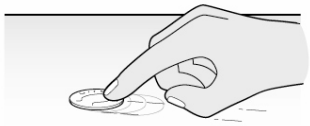
   A continuous sideways force pointing inward causes circular motion. To answer this test question you need to know how a sideways force exerted on an object affects its motion.

8. Draw the path the marble takes when it reaches the end of the wall at point B.



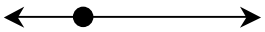
When the marble reaches the end of the wall, there is no longer a force exerted by the wall on it to change the marble's direction, so it moves in a straight line. To answer this question you need to know that motion is not affected when there is no force exerted on the object.

9. There is a quarter on a table. Allison quickly pushes the quarter. The quarter speeds up while Allison is pushing it.



Below is an analysis and explanation of why the quarter sped up while Allison pushed it. Read the analysis and explanation and then evaluate it.

Analysis: There is an applied interaction between the quarter and Allison, and a friction interaction between the quarter and the table.



force exerted by Allison on quarter — force exerted by table on quarter

Explanation: There is an applied force exerted by Allison on the quarter and a friction force exerted by the table on the quarter. The applied force by Allison on the quarter is greater than the friction force from the table on the quarter. Since the forces on the quarter are not balanced in the direction of motion, the quarter speeds up in the direction of the unbalanced force, in other words the direction that Allison pushes it.

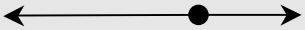
Evaluate the analysis and explanation of why the quarter starts to speed up. If the analysis and/or explanation are poor, make them good.

I. Are the interacting objects and their interaction types are correctly identified? If not, correct it.

II. Does the force diagram correctly show the forces exerted on the object? If not, correct it.

III. Does the written explanation includes all the appropriate scientific ideas; none of the important ones are missing? If not, correct it.

Criteria numbers 1 and 3 are satisfied, however criteria 2 is not. The force diagram should be:

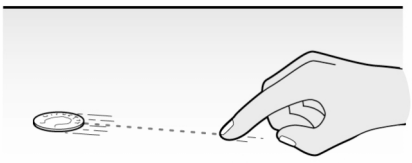


force exerted by Allison on quarter

force exerted by table on quarter

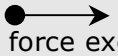
To answer this question you need to know how to apply the ideas you learned about force to evaluate an analysis and explanation of a situation.

10. Allison pushed a quarter. It slid across the table top toward Robert. The quarter slowed down and eventually stopped very close to Robert.



Explain why the quarter slowed down as it moved toward Robert.

There is a friction interaction between the table and the quarter.



force exerted by table on quarter

Explanation: There is a force exerted on the quarter by the table due to the friction interaction. This force on the quarter is unbalanced and acting opposite to its direction of motion, so the quarter slows down.

To answer this question you need to know how to apply the ideas you learned about force to explain a situation.

11. Two identical low friction cars are filled with different amounts of wood. Car A has a much greater mass than car B. Both cars are given the same initial push. Which car slows down faster?

    a. Car B slows down faster because it has less mass.

    b. Car B slows down faster because it has more mass.

    c. Car B slows down at the same rate as Car A since they were given the same initial push.

    d. Car A slows down faster because it has more mass.

    e. Car A slows down faster because it has less mass.

    If a force of the same strength is exerted on two objects, the object with the smaller mass will slow down more quickly. To answer this question you need to know the change in motion depends on the mass of the object.

12. Imagine two identical low friction cars. One car has a larger constant force exerted on it than the other. Which car speeds up more quickly?

    a. Car A speeds up more quickly because it has a smaller force exerted on it.

    b. Car A speeds up more quickly because it has a larger force exerted on it.

    c. Car A and B speed up at the same rate because they both the same mass.

    d. Car B speeds up more quickly because it has a smaller force exerted on it.

    e. Car B speeds up more quickly because it has a larger force exerted on it.

    The larger the force exerted on an object, the more quickly it will speed up or slow down. To answer this question you need to know how change in motion depends on the strength of the force.

13. A simple machine can

a. change the direction of a force and the size of the force

b. change the direction of a force but not its size

c. change the size of a force but not its direction

d. cannot change anything about a force

To answer this test question you need to know that simple machines can change the direction and size of a force.