Name:_____ Class: _____ Date: ___/___/___

Momentum Quiz Review Introductory Physics (670)

1. What unit is momentum measured with?

2. Decide if the objects below have momentum or not. Write "yes" if the underlined object has momentum and "no" if the object does not.
   a. A wagon filled with toys being pulled along the sidewalk.

   b. A plate piled high with food at rest on the table.

   c. A dump truck at rest at a stoplight.

   d. A fly moving through the air.

3. Which has more momentum: a baseball moving at 5 m/s or a baseball moving at 10 m/s?

4. Which has more momentum: a golf ball moving at 2 m/s or a bowling ball moving at 2 m/s?

5. Which has more momentum: a toy truck moving at 3 m/s or a real truck which is at rest?

6. Quantities where direction matters are called vectors. If momentum = mass • velocity and velocity is speed and direction (velocity is a vector), is momentum a vector?

Standard(s): 2.5 TA: _____ Independence Level: _____%

Assistance, coaching, prompting: _____

#7 - #14: Circle the term in parentheses that best completes each statement.

7. All (stationary / moving) objects have momentum.

8. When momentum is transferred from one object to another, the total amount of momentum in the system (is / is not) conserved.

9. Momentum is calculated by multiplying (mass / weight) times velocity.

10. If two baseballs with the same mass are thrown at different velocities, the ball with a greater velocity has a (smaller / greater) momentum.

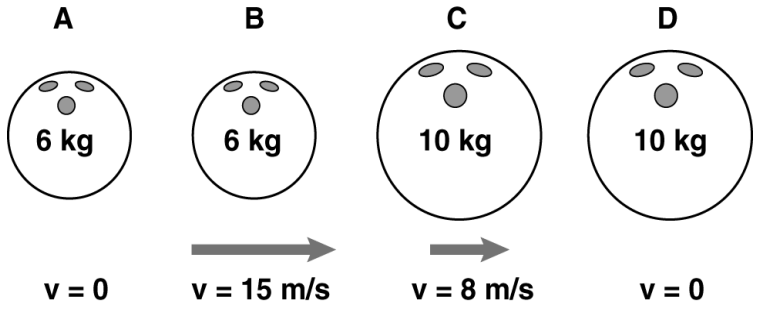
11. When a bowling ball hits a pin and knocks it down, (mass / momentum) is transferred from the ball to the pin.

12. A 6-kg puppy running at 5 m/s has a momentum of (11 k-m/s / 30 kg-m/s).

13. When a truck driver slows down in a construction zone, the truck's momentum will (increase / decrease).

14. If a car and a truck are traveling at the same speed, the (car / truck) has less momentum.

#15 - #18: Use the diagram to answer these questions.



15. What is the momentum of each ball?

    a. Ball A: p = m v = (6) (0) = _____ kg•m/s

    b. Ball B: p = m v = (6) (15) = _____ kg•m/s

    c. Ball C: p = m v = (10) (8) = _____ kg•m/s

    d. Ball D: p = m v = (10) (0) = _____ kg•m/s

16. Which ball has the greatest momentum? (A B C D) (circle your choice)

17. Of the balls that have momentum, which ball has the smallest momentum? (A B C D) (circle your choice)

18. Which balls <u>do not</u> have momentum? (A B C D) (circle your choices)

19. CALCULATE: Use the MCAS formula sheet to solve the following. Show ALL work.

How much momentum does a 5 kg ball moving at 2 m/s have?

20. CALCULATE: Use the MCAS formula sheet to solve the following. Show ALL work.

How much momentum does a 2000 kg car moving at 15 m/s have?

21. MCAS QUESTION:

A student is standing on a skateboard that is not moving. The total mass of the student and the skateboard is 50 kilograms. The student throws a ball with a mass of 2 kilograms forward at 5 m/s.

Assuming the skateboard wheels are frictionless, how will the student and the skateboard move?

a. forward at 0.4 m/s
b. forward at 5 m/s
c. backward at 0.2 m/s
d. backward at 5 m/s

22. If you stop an object, are you changing its momentum?

23. If you want an object to be stopped safely (smaller force), should you stop it **quickly** or **slowly**?

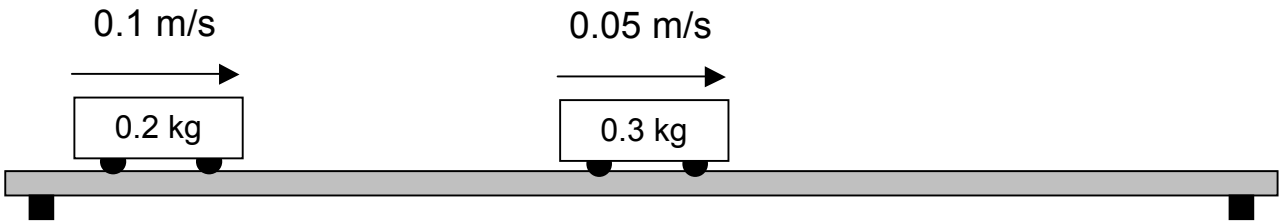
24. Why are you safer in a car crash if an air bag stops you rather than the windshield? Use complete sentences.

25. Bowling pins that are at rest do not have momentum. When a bowling ball hits the pins they will start moving, giving them momentum. If momentum is conserved where does the momentum of the moving bowling pins come from?

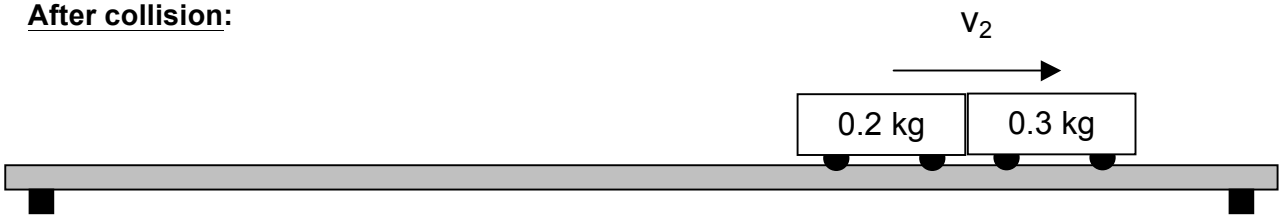
26. **(THIS IS AN OLD MCAS QUESTION)**

The illustrations below show a track with two carts before and after a collision. The mass and initial velocity of each cart are shown below.

Before collision:



After collision:



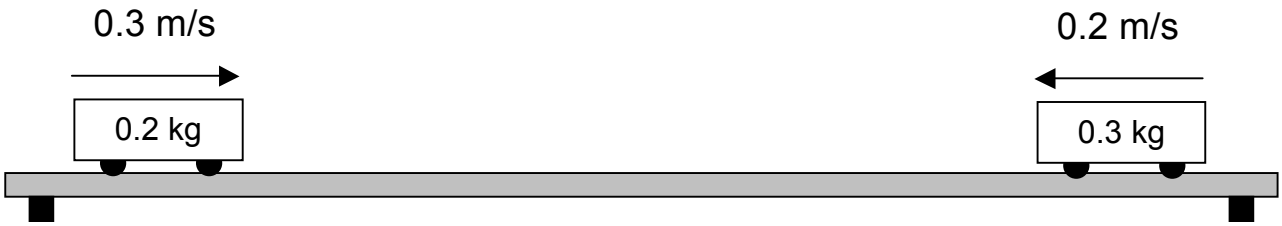
a. What is the momentum of the first cart before it collides with the second cart? Show your calculations and include units in your answer.

b. What is the momentum of the second cart before the collision? Show your calculations and include units in your answer.

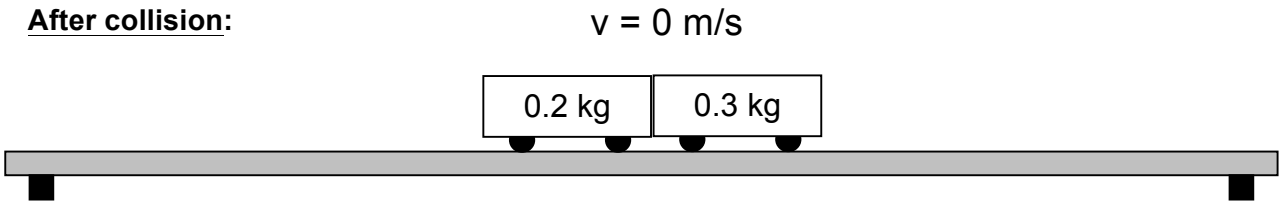
c. Describe **two** changes that could be made initially to either one or both carts that would result in an increase in momentum of the combined carts after collision.

27. The illustrations below show a track with two carts before and after a collision. The mass and initial velocity of each cart are shown below.

Before collision:



After collision:



a. What is the momentum of the first cart before it collides with the second cart? Show your calculations and include units in your answer. Remember to include direction.

b. What is the momentum of the second cart before the collision? Show your calculations and include units in your answer. Remember to include direction.

c. The final velocity of the carts after the collision is zero (the carts are at rest after the collision). What is the final momentum of the combined carts? Show your calculations and include units in your answer.