**Momentum and Collisions**

**Questions from a Conceptual Course**

**Category 1: Momentum, Impulse and Momentum Change**

**Question 1:**

aa. Momentum is \_\_\_\_\_.

a. the speed that an object has

b. the rate at which an object changes its motion

c. the product of the mass and velocity of an object

d. the product of the mass and acceleration of an object

**Question 2:**

aa. An object that has momentum **MUST** be \_\_\_\_\_.

a. at rest b. located on Earth

c. moving d. changing its speed

**Question 3:**

aa. Which one of the following can NOT be true of an object that has momentum?

a. The object is moving.

b. The object is stationary.

c. The object is accelerating.

d. The object is moving through space.

e. The object is acted upon by a friction force.

**Question 4:**

aa. An object that has momentum can NOT also be \_\_\_\_\_.

a. at rest

b. slowing down

c. in free fall motion

d. moving along a curved path

**Question 5:**

aa. The amount of momentum an object possesses depends upon two quantities. What are the two quantities? Select two answers.

a. The mass of the object.

b. The speed of the object.

c. The weight of the object.

d. The acceleration of the object.

e. The direction that the object is moving.

**Question 6:**

aa. What two quantities affect the amount of momentum an object possesses? Select two answers.

a. The mass of the object and its rate of acceleration.

b. The mass of the object and the acceleration of gravity.

c. The weight of the object and the impulse that it experiences.

d. The mass of the object and the speed with which it is moving.

e. The direction that the object is moving and how fast it is moving.

**Question 7:**

aa. Which one of the following objects has the greatest amount of momentum?

a. A turtle that slowly makes its way across the road.

b. The car that is parked along the side of the road.

c. The stop sign that warns cars to stop when they reach the end of the road.

**Question 8:**

aa. Which one of the following objects has the greatest amount of momentum?

a. The large tree growing in the back yard.

b. The bird that is at rest on the nest on a branch in the tree.

c. The caterpillar that is slowly making its way along another branch in the tree.

**Question 9:**

aa. Which one of the following objects has the greatest amount of momentum?

a. A desk in the physics classroom.

b. A test setting on top of the desk in the physics classroom.

c. A pencil that is slowly rolling across the desk towards the edge.

**Question 10:**

aa. An object that is speeding up would have \_\_\_\_\_.

a. zero momentum b. a positive momentum

c. a constant momentum d. a decreasing momentum

e. an increasing momentum

**Question 11:**

aa. If an object has momentum, then one can be sure that the object is \_\_\_\_\_\_. List all that apply in alphabetical order with no commas or spaces between letters.

a. moving b. moving fast

c. speeding up d. slowing down

e. encountering a net force

**Question 12:**

aa. An object that has momentum can best be described as \_\_\_\_.

a. moving fast

b. changing its velocity

c. having its mass in motion

d. encountering a net force

e. resisting changes in its state of motion

**Question 13:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 5-kg object moving at 2 m/s.

**Object B**: a 2-kg object moving at 5 m/s.

Which one of the following statements describing the two objects is true?

a. **Object A** has more momentum than **Object B**.

b. **Object B** has more momentum than **Object A**.

c. **Object A** and **Object B** have the same amount of momentum.

**Question 14:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 4-kg object moving at 2 m/s.

**Object B**: a 2-kg object moving at 3 m/s.

Which one of the following statements describing the two objects is true?

a. **Object A** has more momentum than **Object B**.

b. **Object B** has more momentum than **Object A**.

c. **Object A** and **Object B** have the same amount of momentum.

**Question 15:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 3-kg object moving at 4 m/s.

**Object B**: a 2-kg object moving at 5 m/s.

Which one of the following statements describing the two objects is true?

a. **Object A** has more momentum than **Object B**.

b. **Object B** has more momentum than **Object A**.

c. **Object A** and **Object B** have the same amount of momentum.

**Question 16:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 5-kg object moving at 4 m/s.

**Object B**: a 6-kg object moving at 3 m/s.

Which one of the following statements describing the two objects is true?

a. **Object A** has more momentum than **Object B**.

b. **Object B** has more momentum than **Object A**.

c. **Object A** and **Object B** have the same amount of momentum.

**Question 17:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 4-kg object moving at 4 m/s.

**Object B**: a 2-kg object moving at 2 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 18:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 2-kg object moving at 2 m/s.

**Object B**: a 4-kg object moving at 4 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 19:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 2-kg object moving at 2 m/s.

**Object B**: a 4-kg object moving at 1 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 20:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 2-kg object moving at 4 m/s.

**Object B**: a 4-kg object moving at 2 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 21:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 2-kg object moving at 3 m/s.

**Object B**: a 4-kg object moving at 6 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 22:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 6-kg object moving at 2 m/s.

**Object B**: a 2-kg object moving at 3 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 23:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 6-kg object moving at 1 m/s.

**Object B**: a 2-kg object moving at 6 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 24:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 6-kg object moving at 1 m/s.

**Object B**: a 4-kg object moving at 3 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 25:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 3-kg object moving at 4 m/s.

**Object B**: a 6-kg object moving at 2 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 26:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 3-kg object moving at 4 m/s.

**Object B**: a 6-kg object moving at 4 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 27:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 3-kg object moving at 12 m/s.

**Object B**: a 6-kg object moving at 3 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 28:**

aa. Consider the description given to **Object A** and **Object B** below:

**Object A**: a 6-kg object moving at 3 m/s.

**Object B**: a 3-kg object moving at 12 m/s.

Based on this description, **Object A** has \_\_\_\_\_ momentum compared to **Object B**.

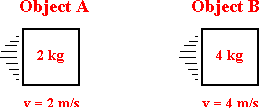
a. the same amount of b. twice as much

c. four times as much d. one-half as much

e. one-fourth as much

**Question 29:**

aa. Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has \_\_\_\_ momentum.

 a. two times the

b. four times the

c. six times the

d. eight times the

e. the same

ab. one-half the

ac. one-fourth the

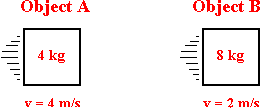
ad. one-sixth the

ae. one-eighth the

**Question 30:**

aa. Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has \_\_\_\_ momentum.

a. two times the

 b. four times the

c. six times the

d. eight times the

e. the same

ab. one-half the

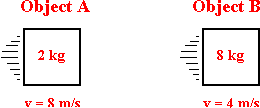
ac. one-fourth the

ad. one-sixth the

ae. one-eighth the

**Question 31:**

aa. Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has \_\_\_\_ momentum.

 a. two times the

b. four times the

c. six times the

d. eight times the

e. the same

ab. one-half the

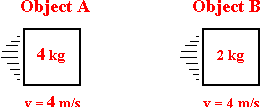
ac. one-fourth the

ad. one-sixth the

ae. one-eighth the

**Question 32:**

aa. Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has \_\_\_\_ momentum.

 a. two times the

b. four times the

c. six times the

d. eight times the

e. the same

ab. one-half the

ac. one-fourth the

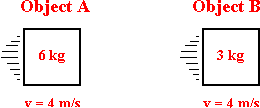
ad. one-sixth the

ae. one-eighth the

**Question 33:**

aa. Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has \_\_\_\_ momentum.

a. two times the

 b. four times the

c. six times the

d. eight times the

e. the same

ab. one-half the

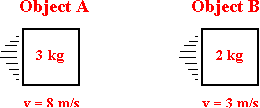
ac. one-fourth the

ad. one-sixth the

ae. one-eighth the

**Question 34:**

aa. Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has \_\_\_\_ momentum.

 a. two times the

b. four times the

c. six times the

d. eight times the

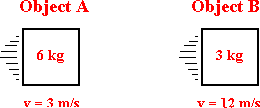
e. the same

ab. one-half the

ac. one-fourth the

ad. one-sixth the

ae. one-eighth the



**Question 35:**

aa. Consider the mass and velocity values of Objects A and B below. Compared to Object B, Object A has \_\_\_\_ momentum.

a. two times the

b. four times the

c. six times the

d. eight times the

e. the same

ab. one-half the

ac. one-fourth the

ad. one-sixth the

ae. one-eighth the

**Question 36:**

aa. Which one of the following is a unit of momentum?

a. m/s b. kg/s

c. kg • m/s d. kg • m/s2

**Question 37:**

aa. Which one of the following is a unit of momentum?

a. mi/hr b. N/s

c. N • m/s d. kg • cm/s

**Question 38:**

aa. Momentum is a vector quantity. What does being a vector indicate about momentum?

a. The quantity has a magnitude or value associated with it.

b. The quantity is calculated by determining the rate of change.

c. The quantity has both a magnitude and a direction associated with it.

d. The quantity depends upon where the object is located - on Earth, the moon or … .

**Question 39:**

aa. Momentum is a vector quantity. What does the direction of the momentum vector depend upon?

a. The direction the object is moving.

b. The direction that the object is accelerating.

c. The direction of the net force that acts upon the object.

d. The direction of the momentum is always in the direction of gravity - down.

**Question 40:**

aa. Momentum is a vector quantity. What affects the direction of the momentum of an object?

a. The direction that the object is moving.

b. The direction of the net force that acts upon the object.

c. The direction the object is moving and whether it is slowing down or speeding up.

**Question 41:**

aa. An object is moving to the right at a constant speed. What is the direction of the momentum vector?

a. The momentum vector is directed leftward.

b. The momentum vector is directed rightward.

c. Nonsense! Momentum is not a vector. It does not have a direction.

d. Nonsense! An object moving with a constant speed does not have a momentum.

**Question 42:**

aa. An object is moving to the left at a constant speed. What is the direction of the momentum vector?

a. The momentum vector is directed leftward.

b. The momentum vector is directed rightward.

c. Nonsense! Momentum is not a vector. It does not have a direction.

d. Nonsense! An object moving with a constant speed does not have a momentum.

**Question 43:**

aa. An object is moving to the right and slowing down. What is the direction of the momentum vector?

a. The momentum vector is directed leftward.

b. The momentum vector is directed rightward.

c. Nonsense! Momentum is not a vector. It does not have a direction.

d. Nonsense! An object that is changing speed does not have a momentum.

**Question 44:**

aa. An object is moving to the left and slowing down. What is the direction of the momentum vector?

a. The momentum vector is directed leftward.

b. The momentum vector is directed rightward.

c. Nonsense! Momentum is not a vector. It does not have a direction.

d. Nonsense! An object that is changing speed does not have a momentum.

**Question 45:**

aa. An object is moving to the right and speeding up. What is the direction of the momentum vector?

a. The momentum vector is directed leftward.

b. The momentum vector is directed rightward.

c. Nonsense! Momentum is not a vector. It does not have a direction.

d. Nonsense! An object that is changing speed does not have a momentum.

**Question 46:**

aa. An object is moving to the left and speeding up. What is the direction of the momentum vector?

a. The momentum vector is directed leftward.

b. The momentum vector is directed rightward.

c. Nonsense! Momentum is not a vector. It does not have a direction.

d. Nonsense! An object that is changing speed does not have a momentum.

**Question 47:**

aa. Which one of the following statements describes the quantity *impulse*?

a. An impulse is the force that acts upon an object.

b. An impulse is a force that causes an object to rotate.

c. An impulse is a force multiplied by the distance it is exerted from a pivot point.

d. An impulse is a force multiplied by the time that the force is acting on the object.

**Question 48:**

aa. During a collision, an object experiences an impulse. How can this impulse be calculated?

a. Impulse is calculated by multiplying force by time.

b. Impulse is calculated by multiplying mass times velocity.

c. Impulse is calculated by dividing velocity change by time.

d. Impulse is calculated by multiplying mass times acceleration.

**Question 49:**

aa. An object that undergoes a collision will always experience an impulse. This impulse is \_\_\_\_.

a. a force divided by a mass that causes a change in velocity

b. a force multiplied by a distance that causes a change in energy

c. a force multiplied by a time that causes a change in momentum

d. a mass multiplied by a change in velocity that causes a net force

**Question 50:**

aa. What quantity causes a momentum change and is equal to the amount of momentum change?

a. The acceleration of gravity.

b. The acceleration of the object.

c. The net force that acts upon the object.

d. The impulse encountered by the object.

**Question 51:**

aa. An object experiences an impulse during a collision. What does this impulse equal?

a. The impulse is equal to the object's energy change.

b. The impulse is equal to the object's velocity change.

c. The impulse is equal to the net force upon the object.

d. The impulse is equal to the object's momentum change.

**Question 52:**

aa. An impulse occurs when a \_\_\_\_ is acting upon an object for a given amount of \_\_\_\_ in order to cause a change in \_\_\_\_. Pick the three words that fill in the blanks in their respective order.

a. energy, force, time

b. force, time, energy

c. force, time, momentum

d. force, acceleration, mass

e. force, distance, momentum

**Question 53:**

aa. **TRUE** or **FALSE**:

In a collision, the impulse encountered by an object is equal to its momentum.

a. True b. False

**Question 54:**

aa. **TRUE** or **FALSE**:

In a collision, the impulse encountered by an object is equal to its momentum.

a. True b. False

**Question 55:**

aa. **TRUE** or **FALSE**:

In a collision, the impulse encountered by an object is equal to its momentum change.

a. True b. False

**Question 56:**

aa. **TRUE** or **FALSE**:

In a collision, the impulse encountered by an object is equal to its momentum change.

a. True b. False

**Question 57:**

aa. A 2.0-kg object moving at 5.0 m/s experiences a 30-Newton resistive force over a duration of 0.10 seconds. What is the impulse experienced by the object?

a. 0.30 N•s b. 3.0 N•s

c. 10.0 kg•m/s d. 15.0 kg•m/s2

e. … nonsense! None of these are equal to the impulse.

**Question 58:**

aa. A 5.0-kg object moving at 2.0 m/s experiences a 20-Newton resistive force over a duration of 0.20 seconds. What is the impulse experienced by the object?

a. 0.40 N•s b. 2.0 kg•m/s2

c. 4.0 N•s d. 10.0 kg•m/s

e. … nonsense! None of these are equal to the impulse.

**Question 59:**

aa. A 4.0-kg object moving at 3.0 m/s experiences a 16.0-Newton resistive force over a duration of 0.20 seconds. What is the impulse experienced by the object?

a. 2.7 N•s b. 3.2 N•s

c. 4.0 kg•m/s2 d. 12.0 kg•m/s

e. … nonsense! None of these are equal to the impulse.

**Question 60:**

aa. A 6.0-kg object moving at 2.0 m/s experiences a 18.0-Newton resistive force over a duration of 0.1 seconds. What is the impulse experienced by the object?

a. 0.15 N•s b. 1.8 N•s

c. 3.0 kg•m/s2 d. 12.0 kg•m/s

e. … nonsense! None of these are equal to the impulse.

**Question 61:**

aa. A 4.0-kg object experiences a force of 8.0 N for a time of 0.20 seconds. What is the impulse experienced by the object?

a. 0.4 N•s b. 1.6 N•s

c. 2.5 N•s d. 4.8 N•s

e. … nonsense! None of these are equal to the impulse.

**Question 62:**

aa. A 2.0-kg object experiences a force of 10.0 N for a time of 0.20 seconds. What is the impulse experienced by the object?

a. 1.0 N•s b. 2.0 N•s

c. 5.0 N•s d. 10.0 N•s

e. … nonsense! None of these are equal to the impulse.

**Question 63:**

aa. A 5.0-kg object experiences a force of 10.0 N for a time of 0.10 seconds. What is the impulse experienced by the object?

a. 0.2 N•s b. 1.0 N•s

c. 2.0 N•s d. 5.0 N•s

e. … nonsense! None of these are equal to the impulse.

**Question 64:**

aa. A 2.0-kg object experiences a force of 12.0 N for a time of 0.30 seconds. What is the impulse experienced by the object?

a. 0.5 N•s b. 2.0 N•s

c. 4.0 N•s d. 6.0 N•s

e. … nonsense! None of these are equal to the impulse.

**Question 65:**

aa. A 4.0-kg object experiences a force of 8.0 N for a time of 0.20 seconds. What is the momentum change experienced by the object?

a. 0.4 kg•m/s b. 1.6 kg•m/s

c. 2.5 kg•m/s d. 4.8 kg•m/s

e. … nonsense! None of these are equal to the impulse.

**Question 66:**

aa. A 2.0-kg object experiences a force of 10.0 N for a time of 0.20 seconds. What is the momentum change experienced by the object?

a. 1.0 kg•m/s b. 2.0 kg•m/s

c. 5.0 kg•m/s d. 10.0 kg•m/s

e. … nonsense! None of these are equal to the impulse.

**Question 67:**

aa. A 5.0-kg object experiences a force of 10.0 N for a time of 0.10 seconds. What is the momentum change experienced by the object?

a. 0.2 kg•m/s b. 1.0 kg•m/s

c. 2.0 kg•m/s d. 5.0 kg•m/s

e. … nonsense! None of these are equal to the impulse.

**Question 68:**

aa. A 2.0-kg object experiences a force of 12.0 N for a time of 0.30 seconds. What is the momentum change experienced by the object?

a. 0.5 kg•m/s b. 2.0 kg•m/s

c. 4.0 kg•m/s d. 6.0 kg•m/s

e. … nonsense! None of these are equal to the impulse.

**Question 69:**

aa. A football player is running down the field. He has 240 kg•m/s of northward momentum. He experiences a southward impulse of 80 N•s. What is the final momentum - magnitude and direction - of the player?

a. 160 kg•m/s, northward b. 160 kg•m/s, southward

c. 320 kg•m/s, northward d. 320 kg•m/s, southward

**Question 70:**

aa. A football player is running down the field. He has 280 kg•m/s of northward momentum. He experiences a southward impulse of 120 N•s. What is the final momentum - magnitude and direction - of the player?

a. 160 kg•m/s, northward b. 160 kg•m/s, southward

c. 400 kg•m/s, northward d. 400 kg•m/s, southward

**Question 71:**

aa. A football player is running down the field. He has 160 kg•m/s of northward momentum. He experiences a southward impulse of 220 N•s. What is the final momentum - magnitude and direction - of the player?

a. 60 kg•m/s, northward b. 60 kg•m/s, southward

c. 380 kg•m/s, northward d. 380 kg•m/s, southward

**Question 72:**

aa. A football player is running down the field. He has 120 kg•m/s of northward momentum. He experiences a southward impulse of 200 N•s. What is the final momentum - magnitude and direction - of the player?

a. 80 kg•m/s, northward b. 80 kg•m/s, southward

c. 320 kg•m/s, northward d. 320 kg•m/s, southward

**Question 73:**

aa. A 50.0-kg object has an eastward momentum of 350 kg•m/s. The object encounters an eastward impulse of 100 N•s. What is the magnitude of the final momentum of the object?

a. 7.0 kg•m/s b. 9.0 kg•m/s

c. 250 kg•m/s d. 450 kg•m/s

e. 500 kg•m/s

**Question 74:**

aa. A 50.0-kg object has an eastward momentum of 350 kg•m/s. The object encounters a westward impulse of 100 N•s. What is the magnitude of the final momentum of the object?

a. 5.0 kg•m/s b. 7.0 kg•m/s

c. 250 kg•m/s d. 400 kg•m/s

e. 450 kg•m/s

**Question 75:**

aa. A 40.0-kg object has an eastward momentum of 360 kg•m/s. The object encounters a westward impulse of 120 N•s. What is the magnitude of the final momentum of the object?

a. 6.0 kg•m/s b. 9.0 kg•m/s

c. 240 kg•m/s d. 280 kg•m/s

e. 480 kg•m/s

**Question 76:**

aa. A 40.0-kg object has an eastward momentum of 360 kg•m/s. The object encounters an eastward impulse of 120 N•s. What is the magnitude of the final momentum of the object?

a. 9.0 kg•m/s b. 12 kg•m/s

c. 240 kg•m/s d. 480 kg•m/s

e. 520 kg•m/s

**Question 77:**

aa. A 20.0-kg object has an eastward momentum of 120 kg•m/s. The object encounters an eastward impulse of 40 N•s. What is the magnitude of the final momentum of the object?

a. 6.0 kg•m/s b. 8.0 kg•m/s

c. 80 kg•m/s d. 160 kg•m/s

e. 180 kg•m/s

**Question 78:**

aa. A 20.0-kg object has an eastward momentum of 120 kg•m/s. The object encounters a westward impulse of 40 N•s. What is the magnitude of the final momentum of the object?

a. 4.0 kg•m/s b. 6.0 kg•m/s

c. 80 kg•m/s d. 100 kg•m/s

e. 160 kg•m/s

**Question 79:**

aa. A 20.0-kg object has an eastward momentum of 160 kg•m/s. The object encounters an eastward impulse of 60 N•s. What is the magnitude of the final momentum of the object?

a. 8.0 kg•m/s b. 11 kg•m/s

c. 100 kg•m/s d. 220 kg•m/s

e. 240 kg•m/s

**Question 80:**

aa. A 20.0-kg object has an eastward momentum of 160 kg•m/s. The object encounters a westward impulse of 60 N•s. What is the magnitude of the final momentum of the object?

a. 5.0 kg•m/s b. 8.0 kg•m/s

c. 100 kg•m/s d. 120 kg•m/s

e. 220 kg•m/s

**Question 81:**

aa. A 40.0-kg object has an eastward momentum of 360 kg•m/s. The object encounters an eastward impulse of 120 N•s. What is the magnitude of the final velocity of the object?

a. 3.0 m/s b. 6.0 m/s

c. 9.0 m/s d. 12.0 m/s

**Question 82:**

aa. A 40.0-kg object has an eastward momentum of 360 kg•m/s. The object encounters a westward impulse of 120 N•s. What is the magnitude of the final velocity of the object?

a. 3.0 m/s b. 6.0 m/s

c. 9.0 m/s d. 12.0 m/s

**Question 83:**

aa. A 50.0-kg object has an eastward momentum of 350 kg•m/s. The object encounters an eastward impulse of 100 N•s. What is the magnitude of the final velocity of the object?

a. 2.0 m/s b. 5.0 m/s

c. 7.0 m/s d. 9.0 m/s

**Question 84:**

aa. A 50.0-kg object has an eastward momentum of 350 kg•m/s. The object encounters a westward impulse of 100 N•s. What is the magnitude of the final velocity of the object?

a. 2.0 m/s b. 5.0 m/s

c. 7.0 m/s d. 9.0 m/s

**Question 85:**

aa. A 20.0-kg object has an eastward momentum of 120 kg•m/s. The object encounters an eastward impulse of 40 N•s. What is the magnitude of the final momentum of the object?

a. 2.0 m/s b. 4.0 m/s

c. 6.0 m/s d. 8.0 m/s

**Question 86:**

aa. A 20.0-kg object has an eastward momentum of 120 kg•m/s. The object encounters a westward impulse of 40 N•s. What is the magnitude of the final momentum of the object?

a. 2.0 m/s b. 4.0 m/s

c. 6.0 m/s d. 8.0 m/s

**Question 87:**

aa. A 20.0-kg object has an eastward momentum of 160 kg•m/s. The object encounters an eastward impulse of 60 N•s. What is the magnitude of the final velocity of the object?

a. 3.0 m/s b. 5.0 m/s

c. 8.0 m/s d. 11.0 m/s

**Question 88:**

aa. A 20.0-kg object has an eastward momentum of 160 kg•m/s. The object encounters a westward impulse of 60 N•s. What is the magnitude of the final velocity of the object?

a. 3.0 m/s b. 5.0 m/s

c. 8.0 m/s d. 11.0 m/s

**Question 89:**

aa. A 2.0-kg ball is thrown towards a wall with a speed of 6.0 m/s. The ball hits the wall and rebounds backwards with a speed of 4.0 m/s. What is the momentum change experienced by the ball?

a. 2.0 kg•m/s b. 4.0 kg•m/s

c. 10.0 kg•m/s d. 20.0 kg•m/s

**Question 90:**

aa. A 2.0-kg ball is thrown towards a wall with a speed of 6.0 m/s. The ball hits the wall and rebounds backwards with a speed of 4.0 m/s. What is the magnitude of the impulse experienced by the ball?

a. 2.0 N•s b. 4.0 N•s

c. 10.0 N•s d. 20.0 N•s

**Question 91:**

aa. A 2.0-kg ball is thrown towards a wall with a speed of 8.0 m/s. The ball hits the wall and rebounds backwards with a speed of 6.0 m/s. What is the momentum change experienced by the ball?

a. 2.0 kg•m/s b. 4.0 kg•m/s

c. 14.0 kg•m/s d. 28.0 kg•m/s

**Question 92:**

aa. A 2.0-kg ball is thrown towards a wall with a speed of 8.0 m/s. The ball hits the wall and rebounds backwards with a speed of 6.0 m/s. What is the magnitude of the impulse experienced by the ball?

a. 2.0 N•s b. 4.0 N•s

c. 14.0 N•s d. 28.0 N•s

**Question 93:**

aa. A 4.0-kg ball is thrown towards a wall with a speed of 6.0 m/s. The ball hits the wall and rebounds backwards with a speed of 2.0 m/s. What is the momentum change experienced by the ball?

a. 4.0 kg•m/s b. 8.0 kg•m/s

c. 16.0 kg•m/s d. 40.0 kg•m/s

**Question 94:**

aa. A 4.0-kg ball is thrown towards a wall with a speed of 6.0 m/s. The ball hits the wall and rebounds backwards with a speed of 2.0 m/s. What is the magnitude of the impulse experienced by the ball?

a. 4.0 N•s b. 8.0 N•s

c. 16.0 N•s d. 32.0 N•s

**Question 95:**

aa. A 5.0-kg ball is thrown towards a wall with a speed of 6.0 m/s. The ball hits the wall and rebounds backwards with a speed of 2.0 m/s. What is the momentum change experienced by the ball?

a. 4.0 kg•m/s b. 8.0 kg•m/s

c. 20.0 kg•m/s d. 40.0 kg•m/s

**Question 96:**

aa. A 5.0-kg ball is thrown towards a wall with a speed of 6.0 m/s. The ball hits the wall and rebounds backwards with a speed of 2.0 m/s. What is the magnitude of the impulse experienced by the ball?

a. 4.0 N•s b. 8.0 N•s

c. 20.0 N•s d. 40.0 N•s

**Question 97:**

aa. An 80-kg running back moving north at 4.0 m/s experiences a southward impulse of 200 N•s. What is the magnitude of the final momentum of the running back?

a. 120 kg•m/s b. 320 kg•m/s

c. 400 kg•m/s d. 520 kg•m/s

**Question 98:**

aa. An 80-kg running back moving north at 4.0 m/s experiences a southward impulse of 400 N•s. What is the magnitude of the final momentum of the running back?

a. 20 kg•m/s b. 80 kg•m/s

c. 180 kg•m/s d. 320 kg•m/s

e. 720 kg•m/s

**Question 99:**

aa. A 60-kg running back moving north at 4.0 m/s experiences a southward impulse of 200 N•s. What is the magnitude of the final momentum of the running back?

a. 40 kg•m/s b. 110 kg•m/s

c. 240 kg•m/s d. 300 kg•m/s

e. 440 kg•m/s

**Question 100:**

aa. A 60-kg running back moving north at 4.0 m/s experiences a southward impulse of 300 N•s. What is the magnitude of the final momentum of the running back?

a. 60 kg•m/s b. 200 kg•m/s

c. 240 kg•m/s d. 540 kg•m/s

**Question 101:**

aa. A 75-kg running back moving north at 2.0 m/s experiences a southward impulse of 50 N•s. What is the magnitude of the final momentum of the running back?

a. 50 kg•m/s b. 100 kg•m/s

c. 150 kg•m/s d. 200 kg•m/s

**Question 102:**

aa. A 75-kg running back moving north at 2.0 m/s experiences a southward impulse of 250 N•s. What is the magnitude of the final momentum of the running back?

a. 8.0 kg•m/s b. 100 kg•m/s

c. 150 kg•m/s d. 200 kg•m/s

e. 400 kg•m/s

**Question 103:**

aa. A 90-kg fullback moving north at 2.0 m/s experiences a southward impulse of 100 N•s. What is the magnitude of the final momentum of the fullback?

a. 20 kg•m/s b. 40 kg•m/s

c. 80 kg•m/s d. 180 kg•m/s

e. 280 kg•m/s

**Question 104:**

aa. A 90-kg fullback moving north at 2.0 m/s experiences a southward impulse of 200 N•s. What is the magnitude of the final momentum of the fullback?

a. 10 kg•m/s b. 20 kg•m/s

c. 180 kg•m/s d. 190 kg•m/s

e. 380 kg•m/s

**Question 105:**

aa. A 100-kg fullback moving north at 4.0 m/s experiences a southward impulse of 200 N•s. What is the magnitude of the final momentum of the fullback?

a. 50 kg•m/s b. 150 kg•m/s

c. 200 kg•m/s d. 400 kg•m/s

e. 600 kg•m/s

**Question 106:**

aa. A 100-kg fullback moving north at 3.0 m/s experiences a southward impulse of 400 N•s. What is the magnitude of the final momentum of the fullback?

a. 12 kg•m/s b. 100 kg•m/s

c. 120 kg•m/s d. 300 kg•m/s

e. 700 kg•m/s

**Question 107:**

aa. A 60-kg gymnast is moving with a speed of 12.0 m/s when she lands on the ground during an event. If she bends her knees upon contact with the ground, then she will increase the time of collision by a factor of 20 - compared to if she keeps her knees stiff. What affect does this have upon the force and the impulse that she experiences? Select two answers.

a. Bending her knees will make the force twenty times greater.

b. Bending her knees will make the force twenty times smaller.

c. Bending her knees will make the impulse twenty times greater.

d. Bending her knees will make the impulse twenty times smaller.

e. Bending her knees will have no affect upon the impulse she experiences.

**Question 108:**

aa. An 80-kg student collides with a padded wall in the gymnasium while moving at 6.0 m/s. Because he collided with a padded wall instead of a concrete wall, the time of collision was increased by a factor of 10. What affect does this increase in collision time have upon the force and the impulse that he experiences? Select two answers.

a. Colliding with the padded wall will make the force 10 times greater.

b. Colliding with the padded wall will make the force 10 times smaller.

c. Colliding with the padded wall will make the impulse 10 times greater.

d. Colliding with the padded wall will make the impulse 10 times smaller.

e. Colliding with the padded wall will have no affect upon the impulse he experiences.

**Question 109:**

aa. When a catching a baseball bare-handed, a person will draw their hand backwards in the direction of the ball's motion. The act of drawing the hand backwards is much safer than catching the ball with stiff arms. What affect does this have upon the collision of the ball and the hand?

a. It causes the ball's change in momentum to be less.

b. It causes the impulse experienced by the hand to be less.

c. It causes the time of the collision to be greater and the force to be less.

d. It causes the time of the collision to be less and the force to be greater.

e. It causes the impulse, momentum change, force and time to all be less.

**Question 110:**

aa. Cars are equipped with crumple zones. In a front-end collision, these crumple zones are designed to intentionally fold up and crumple during the short duration of the collision. Without a crumple zone and car would tend to rebound backwards during a collision. Why does placing a crumple zone in a car contribute to the safety of the occupants?

a. Crumple zones insure that the velocity change is greater during the collision.

b. Crumple zones cause the collision time to be smaller and the force to be greater.

c. Crumple zones reduce the amount of momentum change and impulse of the occupants.

**Question 111:**

aa. Cars are equipped with air bags to prevent occupants from colliding with a dashboard or windshield. A 50-kg person moving at 20 m/s will be considerably safer if their momentum is stopped by an air bag instead of by a dashboard or windshield. Why does an air bag contribute to the safety of the person?

a. It causes the momentum change and the collision force to be less.

b. It causes the collision time to be greater and the collision force to be less.

c. It causes the momentum change and impulse experienced by the person to be less.

**Question 112:**

aa. A 60-kg object is moving at 20 m/s when a force brings the object to rest in 0.050 seconds. Suppose that the same object moving at the same speed was brought to rest in a time that was ten times longer. Stopping the object in this longer time would result in \_\_\_.

a. ten times the force but the same impulse and momentum change

b. one-tenth the force but the same impulse and momentum change

c. the same force but one-tenth the impulse and one-tenth the momentum change

d. ten times the force, ten times the impulse and ten times the momentum change

e. one-tenth the force, one-tenth the impulse and one-tenth the momentum change

**Question 113:**

aa. A moderate force will break an egg. If an egg is dropped on the hard floor, it usually breaks. Yet if it lands on soft ground with the same speed, it will often survive the impact without breaking. A collision with soft ground protects the egg by increasing the \_\_\_\_ and decreasing the \_\_\_\_. Pick the two words that fill in the blanks in order.

a. impulse, time b. impulse, force

c. force, time d. time, force

e. momentum change, impulse

**Question 114:**

aa. Air bags are used in cars to protect occupants in high-speed collisions. Air bags protect the occupants by increasing the \_\_\_\_\_ and decreasing the \_\_\_\_\_. Pick the two words that fill in the blanks in order.

a. impulse, time b. impulse, force

c. force, time d. time, force

e. momentum change, impulse

**Question 115:**

aa. Foam padding is often placed on walls in gymnasiums behind basketball hoops in order to protect players in possible collisions with the walls. The foam padding protects players by increasing the \_\_\_\_\_ and decreasing the \_\_\_\_\_. Pick the two words that fill in the blanks in order.

a. impulse, time b. impulse, force

c. force, time d. time, force

e. momentum change, impulse

**Question 116:**

aa. A sad and a happy ball (same mass) are dropped from a height of 1 meter. The sad ball collides with the ground and stops with very little bounce. The happy ball collides with the ground and bounces off with a significant enough speed to reach a height of 0.8 meters. How does the velocity change, momentum change and impulse of the sad ball compare to that of the happy ball?

a. Each ball has the same velocity change, momentum change and impulse.

b. The sad ball has the greater velocity change, momentum change and impulse.

c. The happy ball has the greater velocity change, momentum change and impulse.

d. The happy ball has the greater velocity change and momentum change; the impulses are the same.

e. The happy ball has the greater velocity change; the momentum change and the impulses are the same.

**Question 117:**

aa. Two balls of the same mass are thrown towards a wall and collide with it moving with a speed of 5 m/s. Ball A hits the wall and rebounds with a speed of 4 m/s. Ball B hits the wall and stops. How does the velocity change, momentum change and impulse of Ball A compare to that of the Ball B?

a. Each ball has the same velocity change, momentum change and impulse.

b. Ball A has the greater velocity change, momentum change and impulse.

c. Ball B has the greater velocity change, momentum change and impulse.

d. Ball A has the greater velocity change and momentum change; the impulses are the same.

e. Ball A has the greater velocity change; the momentum change and the impulses are the same.

**Category 2: Explosions, Collisions, and Momentum Conservation**

**Question 118:**

aa. Consider a collision between a more massive object and a less massive object. Which one of the following statements is CORRECT?

a. The momentum change of the two objects is equal in magnitude.

b. The less massive object experiences a greater momentum change.

c. The more massive object experiences a greater momentum change.

**Question 119:**

aa. A moving object collides with a stationary object. Which one of the following statements is CORRECT?

a. The moving object experiences a greater momentum change.

b. The stationary object experiences a greater momentum change.

c. The momentum change of the two objects is equal in magnitude.

**Question 120:**

aa. A golf ball is at rest on a tee when a high speed and more massive golf club collides with it. Assume that this collision between club and ball occurs in an isolated system. During the collision, the golf ball encounters \_\_\_\_ momentum change.

a. a greater

b. a smaller

c. the same

**Question 121:**

aa. An unfortunate bug experiences a collision with a high-speed bus. During the collision, the bug encounters \_\_\_\_ momentum change.

a. a greater

b. a smaller

c. the same

**Question 122:**

aa. In a physics lab, two carts undergo a collision on a low-friction track. Cart A has twice the mass and twice the speed of Cart B. It is assumed that the two carts collide in an isolated system. During the collision, the Cart B encounters \_\_\_\_ momentum change.

a. a greater

b. a smaller

c. the same

**Question 123:**

aa. A tennis ball is loaded into a more massive home-made cannon. The reactor chamber is filled with fuel, lit and an explosion occurs. During the explosion, the tennis ball encounters \_\_\_\_ momentum change.

a. a greater

b. a smaller

c. the same

**Question 124:**

aa. The law of conservation of momentum applies to any collision between two objects that occurs in an isolated system. Assuming that the collision between Object A and Object B occurs in an isolated system, which of the following statements are consistent with this law?

a. Object A will not have its momentum altered during a collision.

b. Object A's momentum before the collision is the same as it is after the collision.

c. Object A will have the same momentum as Object B both before and after the collision.

d. The change in Object A's momentum will be equal and opposite to the change in Object B's momentum.

e. ... nonsense! None of these statements are consistent with momentum conservation.

**Question 125:**

aa. The law of conservation of momentum applies to any collision between two objects that occurs in an isolated system. Assuming that the collision between Object A and Object B occurs in an isolated system, which of the following statements are consistent with this law?

a. Object A will not have its momentum altered during a collision.

b. Object A's momentum before the collision is the same as it is after the collision.

c. Object A will have the same momentum as Object B both before and after the collision.

d. The total momentum of Objects A and B will be the same before and after the collision.

e. ... nonsense! None of these statements are consistent with momentum conservation.

**Question 126:**

aa. Two Silly Putty balls of equal mass are moving in opposite directions at equal speeds. The balls collide head on and immediately stop. Which one of the following statements is true about the collision?

a. Both objects conserve their own individual momentum.

b. Momentum is not conserved by the system of two Silly Putty balls.

c. The system starts with some total momentum and ends with no total momentum.

d. ... nonsense! None of these statements are true.

**Question 127:**

aa. In a physics lab, two carts (a red cart and a blue cart) are at rest on a low-friction track. A spring-like plunger connects them. The springs are compressed and then suddenly released, exerting explosion-like forces on each of the two carts. The red cart has one-half the mass as the blue cart. Which one of the statements is true about this *explosion*?

a. The momentum change of the two carts is the same.

b. The momentum change of the blue cart is two times greater than the red cart.

c. The momentum change of the red cart is two times greater than the blue cart.

**Question 128:**

aa. In a physics lab, two carts (a red cart and a blue cart) are at rest on a low-friction track. A spring-like plunger connects them. The springs are compressed and then suddenly released, exerting explosion-like forces on each of the two carts. The red cart has one-third the mass as the blue cart. Which one of the statements is true about this *explosion*?

a. The momentum change of the two carts is the same.

b. The momentum change of the blue cart is three times greater than the red cart.

c. The momentum change of the red cart is three times greater than the blue cart.

**Question 129:**

aa. Two ice dancers are at rest on the ice, facing each other with their hands together. They push off on each other in order to set each other in motion. The subsequent momentum change (magnitude only) of the two skaters will be \_\_\_\_.

a. the same for each skater

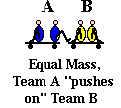
b. greatest for the skater with the most mass

c. greatest for the skater with the least mass

d. greatest for the skater who pushes with the greatest force

e. greatest for the skater who is pushed upon with the greatest force

**Question 130:**

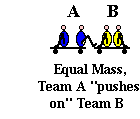
aa. In a physics demonstration, two *teams* of equal-mass students are placed on each of two identical carts. A student on Cart A pushes upon Cart B. Which of the following statements describes the resulting motion of the two carts?

a. Cart A will remain stationary; cart B will be propelled rightward.

b. Cart A will move backwards slightly; cart B will be propelled rightward with a considerably greater momentum.

c. Cart A and Cart B will move away from each other with the same speed.

**Question 131:**

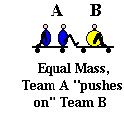
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a. Cart A will remain stationary; cart B will be propelled rightward.

b. Cart A will move backwards slightly; cart B will be propelled rightward with a considerably greater speed.

c. Cart A and Cart B will move away from each other with the same speed.

**Question 132:**

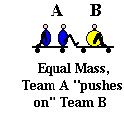
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a. Cart A will remain stationary; cart B will be propelled rightward.

b. Cart A will move backwards slightly; cart B will be propelled rightward with a considerably greater momentum.

c. Cart A and Cart B will move away from each other with the same speed.

**Question 133:**

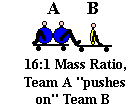
aa. In a physics demonstration, two *teams* of equal-mass students are placed on each of two identical carts. A student on Cart A pushes upon Cart B. Which of the following statements describes the resulting motion of the two carts?

a. Cart A will remain stationary; cart B will be propelled rightward.

b. Cart A will move backwards slightly; cart B will be propelled rightward with a considerably greater speed.

c. Cart A and Cart B will move away from each other with the same speed.

**Question 134:**

aa. In a physics demonstration, students are placed on separate carts. Cart A is 16 times more massive than Cart B. A student on Cart A pushes upon Cart B. Which of the following statements describes the resulting motion of the two carts?

a. Cart A will remain stationary; cart B will be propelled rightward.

b. Cart A will move backwards slightly; cart B will be propelled rightward with a considerably greater momentum.

c. Cart A and Cart B will move away from each other with the same momentum.

**Question 135:**

aa. Two carts with masses of 0.5 kg and 1.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, forcing the carts away from one another in an *explosion*. How does the force acting upon the 0.5-kg cart compare to the force that acts upon the 1.0-kg cart?

a. Both carts experience the same force.

b. The force on the 0.5-kg cart is twice the strength as the force on the 1.0-kg cart.

c. The force on the 0.5-kg cart is one-half the strength as the force on the 1.0-kg cart.

**Question 136:**

aa. Two carts with masses of 0.5 kg and 2.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, forcing the carts away from one another in an *explosion*. How does the force acting upon the 0.5-kg cart compare to the force that acts upon the 2.0-kg cart?

a. Both carts experience the same force.

b. The force on the 0.5-kg cart is four times the strength as the force on the 2.0-kg cart.

c. The force on the 0.5-kg cart is one-fourth the strength as the force on the 2.0-kg cart.

**Question 137:**

aa. Two carts with masses of 0.5 kg and 1.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, forcing the carts away from one another in an *explosion*. How does the impulse experienced by the 0.5-kg cart compare to the impulse experienced by the 1.0-kg cart?

a. Both carts experience the same impulse.

b. The impulse on the 0.5-kg cart is twice the strength as the impulse on the 1.0-kg cart.

c. The impulse on the 0.5-kg cart is one-half the strength as the impulse on the 1.0-kg cart.

**Question 138:**

aa. Two carts with masses of 0.5 kg and 1.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, forcing the carts away from one another in an *explosion*. How does the impulse experienced by the 0.5-kg cart compare to the impulse experienced by the 2.0-kg cart?

a. Both carts experience the same impulse.

b. The impulse on the 0.5-kg cart is four times the strength as the impulse on the 2.0-kg cart.

c. The impulse on the 0.5-kg cart is one-fourth the strength as the impulse on the 2.0-kg cart.

**Question 139:**

aa. Two carts with masses of 0.5 kg and 1.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, forcing the carts away from one another in an *explosion*. How does the momentum change (∆p) experienced by the 0.5-kg cart compare to the momentum change (∆p) experienced by the 1.0-kg cart?

a. Both carts experience the same impulse.

b. The ∆p of the 0.5-kg cart is twice the ∆p of the 1.0-kg cart.

c. The ∆p of the 0.5-kg cart is one-half the ∆p of the 1.0-kg cart.

**Question 140:**

aa. Two carts with masses of 0.5 kg and 1.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, forcing the carts away from one another in an *explosion*. How does the momentum change (∆p) experienced by the 0.5-kg cart compare to the momentum change (∆p) experienced by the 2.0-kg cart?

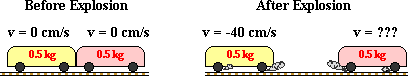
a. Both carts experience the same ∆p.

b. The ∆p of the 0.5-kg cart is four times the ∆p of the 2.0-kg cart.

c. The ∆p of the 0.5-kg cart is one-fourth the ∆p of the 2.0-kg cart.

**Question 141:**

aa. Two carts with a mass of 0.5-kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, propelling the carts away from one another in an *explosion*.



The cart on the left begins moving with a speed of 40 cm/s. With what speed will the cart on the right begin moving?

a. 20 cm/s

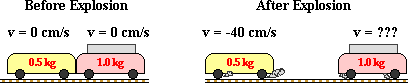
b. 40 cm/s

c. 80 cm/s

d. … nonsense! It is impossible to predict with so little information.

**Question 142:**

aa. Two carts with masses of 0.5 kg and 1.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, propelling the carts away from one another in an *explosion*.



The cart on the left begins moving with a speed of 40 cm/s. With what speed will the cart on the right begin moving?

a. 20 cm/s

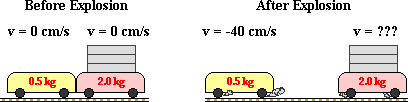
b. 40 cm/s

c. 80 cm/s

d. … nonsense! It is impossible to predict with so little information.

**Question 143:**

aa. Two carts with masses of 0.5 kg and 2.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, propelling the carts away from one another in an *explosion*.



The cart on the left begins moving with a speed of 40 cm/s. With what speed will the cart on the right begin moving?

a. 10 cm/s

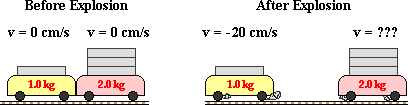
b. 40 cm/s

c. 160 cm/s

d. … nonsense! It is impossible to predict with so little information.

**Question 144:**

aa. Two carts with masses of 0.5 kg and 2.0 kg are positioned next to one another on a low-friction track. A spring-loaded plunger is released, propelling the carts away from one another in an *explosion*.



The cart on the left begins moving with a speed of 40 cm/s. With what speed will the cart on the right begin moving?

a. 5 cm/s

b. 20 cm/s

c. 80 cm/s

d. … nonsense! It is impossible to predict with so little information.

**Question 145:**

aa. In a physics demonstration, two carts of unequal mass collide while moving in the same direction along a track. Which one of the following statements is true about the collision?

a. The more massive object acquires the greatest momentum change.

b. The less massive object acquires the greatest momentum change.

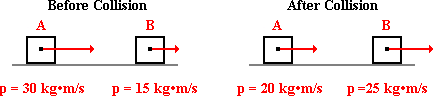
c. The force is greatest on the least massive object.

d. The force is greatest on the more massive object.

e. Each object experiences the same impulse.

**Question 146:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = -10 kg•m/s After collision: ptotal = =10 kg•m/s

b. Before collision: ptotal = 15 kg•m/s After collision: ptotal = 5 kg•m/s

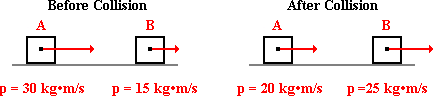
c. Before collision: ptotal = 10 kg•m/s After collision: ptotal = 10 kg•m/s

d. Before collision: ptotal = 45 kg•m/s After collision: ptotal = 45 kg•m/s

e. Before collision: ptotal = 50 kg•m/s After collision: ptotal = 40 kg•m/s

**Question 147:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

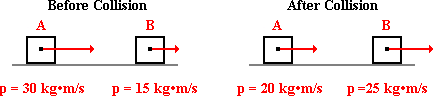
a. 0 kg•m/s b. +5 kg•m/s

c. -10 kg•m/s d . +10 kg•m/s

e. +45 kg•m/s

**Question 148:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

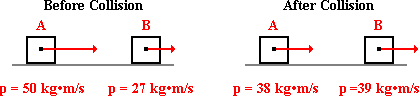
a. 0 kg•m/s b. +5 kg•m/s

c. -10 kg•m/s d . +10 kg•m/s

e. +45 kg•m/s

**Question 149:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = -11 kg•m/s After collision: ptotal = +11 kg•m/s

b. Before collision: ptotal = +11 kg•m/s After collision: ptotal = -11 kg•m/s

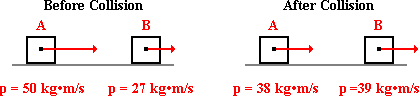
c. Before collision: ptotal = -23 kg•m/s After collision: ptotal = +1 kg•m/s

d. Before collision: ptotal = +23 kg•m/s After collision: ptotal = -1 kg•m/s

e. Before collision: ptotal = 77 kg•m/s After collision: ptotal = 77 kg•m/s

**Question 150:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

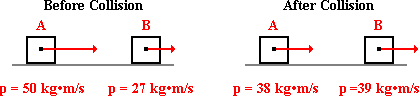
a. 0 kg•m/s b. -23 kg•m/s

c. -12 kg•m/s d . +12 kg•m/s

e. +77 kg•m/s

**Question 151:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrows.



What is the momentum change of object **B**?

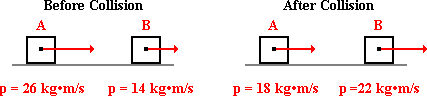
a. 0 kg•m/s b. +23 kg•m/s

c. -12 kg•m/s d . +12 kg•m/s

e. +77 kg•m/s

**Question 152:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = -8 kg•m/s After collision: ptotal = +8 kg•m/s

b. Before collision: ptotal = +8 kg•m/s After collision: ptotal = -8 kg•m/s

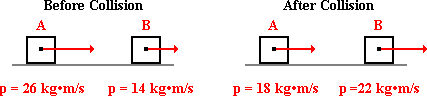
c. Before collision: ptotal = -12 kg•m/s After collision: ptotal = +4 kg•m/s

d. Before collision: ptotal = +12 kg•m/s After collision: ptotal = -4 kg•m/s

e. Before collision: ptotal = 40 kg•m/s After collision: ptotal = 40 kg•m/s

**Question 153:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

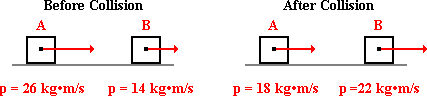
a. 0 kg•m/s b. +8 kg•m/s

c. -8 kg•m/s d . -12 kg•m/s

e. +40 kg•m/s

**Question 154:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

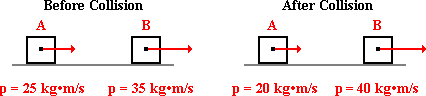
a. 0 kg•m/s b. +8 kg•m/s

c. -8 kg•m/s d . +12 kg•m/s

e. +40 kg•m/s

**Question 155:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = -5 kg•m/s After collision: ptotal = +5 kg•m/s

b. Before collision: ptotal = +5 kg•m/s After collision: ptotal = -5 kg•m/s

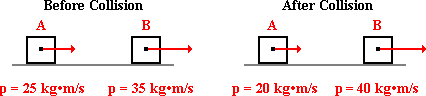
c. Before collision: ptotal = +10 kg•m/s After collision: ptotal = -10 kg•m/s

d. Before collision: ptotal = -10 kg•m/s After collision: ptotal = +10 kg•m/s

e. Before collision: ptotal = +60 kg•m/s After collision: ptotal = +60 kg•m/s

**Question 156:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

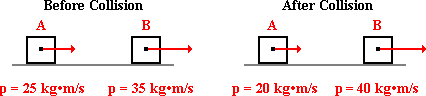
a. 0 kg•m/s b. +5 kg•m/s

c. -5 kg•m/s d . +10 kg•m/s

e. +60 kg•m/s

**Question 157:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

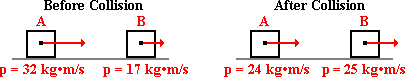
a. 0 kg•m/s b. +5 kg•m/s

c. -5 kg•m/s d . -10 kg•m/s

e. +60 kg•m/s

**Question 158:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = +1 kg•m/s After collision: ptotal = -1 kg•m/s

b. Before collision: ptotal = -1 kg•m/s After collision: ptotal = +1 kg•m/s

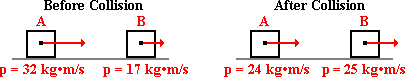
c. Before collision: ptotal = -15 kg•m/s After collision: ptotal = +15 kg•m/s

d. Before collision: ptotal = +15 kg•m/s After collision: ptotal = -15 kg•m/s

e. Before collision: ptotal = +49 kg•m/s After collision: ptotal = +49 kg•m/s

**Question 159:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

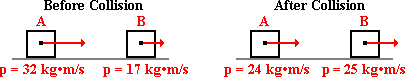
a. 0 kg•m/s b. +8 kg•m/s

c. -8 kg•m/s d . -15 kg•m/s

e. +49 kg•m/s

**Question 160:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

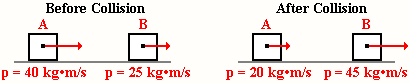
a. 0 kg•m/s b. +8 kg•m/s

c. -8 kg•m/s d . +15 kg•m/s

e. +49 kg•m/s

**Question 161:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = -20 kg•m/s After collision: ptotal = +20 kg•m/s

b. Before collision: ptotal = +20 kg•m/s After collision: ptotal = -20 kg•m/s

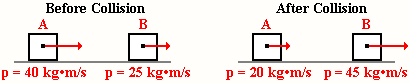
c. Before collision: ptotal = -15 kg•m/s After collision: ptotal = +15 kg•m/s

d. Before collision: ptotal = +15 kg•m/s After collision: ptotal = -15 kg•m/s

e. Before collision: ptotal = +65 kg•m/s After collision: ptotal = +65 kg•m/s

**Question 162:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

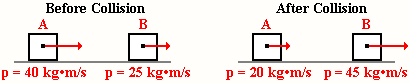
a. 0 kg•m/s b. -15 kg•m/s

c. -25 kg•m/s d . -25 kg•m/s

e. +65 kg•m/s

**Question 163:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

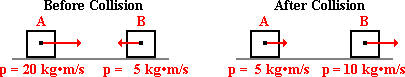
a. 0 kg•m/s b. +15 kg•m/s

c. -25 kg•m/s d . -25 kg•m/s

e. +65 kg•m/s

**Question 164:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = -20 kg•m/s After collision: ptotal = +20 kg•m/s

b. Before collision: ptotal = +20 kg•m/s After collision: ptotal = -15 kg•m/s

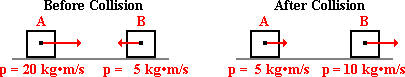
c. Before collision: ptotal = -15 kg•m/s After collision: ptotal = +15 kg•m/s

d. Before collision: ptotal = +15 kg•m/s After collision: ptotal = +15 kg•m/s

e. Before collision: ptotal = +25 kg•m/s After collision: ptotal = +15 kg•m/s

**Question 165:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

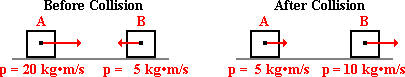
a. 0 kg•m/s b. +5 kg•m/s

c. +15 kg•m/s d . -15 kg•m/s

e. +25 kg•m/s

**Question 166:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

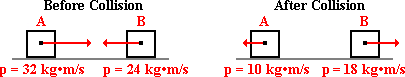
a. 0 kg•m/s b. +5 kg•m/s

c. +15 kg•m/s d . -15 kg•m/s

e. +25 kg•m/s

**Question 167:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = +8 kg•m/s After collision: ptotal = +8 kg•m/s

b. Before collision: ptotal = -8 kg•m/s After collision: ptotal = +8 kg•m/s

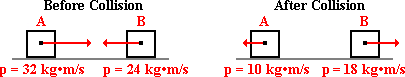
c. Before collision: ptotal = -22 kg•m/s After collision: -8 = AAA kg•m/s

d. Before collision: ptotal = -42 kg•m/s After collision: ptotal = +42 kg•m/s

e. Before collision: ptotal = +56 kg•m/s After collision: ptotal = +28 kg•m/s

**Question 168:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

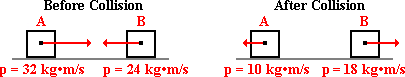
a. 0 kg•m/s b. -8 kg•m/s

c. -22 kg•m/s d . +42 kg•m/s

e. -42 kg•m/s

**Question 169:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

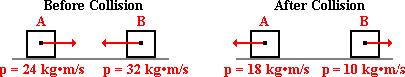
a. 0 kg•m/s b. -6 kg•m/s

c. +8 kg•m/s d . +42 kg•m/s

e. -42 kg•m/s

**Question 170:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = +8 kg•m/s After collision: ptotal = +8 kg•m/s

b. Before collision: ptotal = -8 kg•m/s After collision: ptotal = +8 kg•m/s

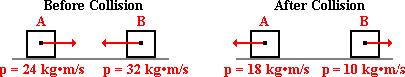
c. Before collision: ptotal = -22 kg•m/s After collision: -8 = AAA kg•m/s

d. Before collision: ptotal = -42 kg•m/s After collision: ptotal = +42 kg•m/s

e. Before collision: ptotal = +56 kg•m/s After collision: ptotal = +28 kg•m/s

**Question 171:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

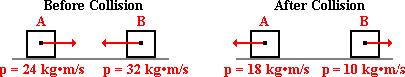
a. 0 kg•m/s b. -8 kg•m/s

c. +18 kg•m/s d . +56 kg•m/s

e. -56 kg•m/s

**Question 172:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

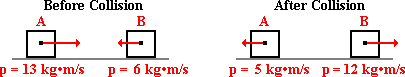
a. 0 kg•m/s b. -8 kg•m/s

c. -18 kg•m/s d . +56 kg•m/s

e. -56 kg•m/s

**Question 173:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = +7 kg•m/s After collision: ptotal = +7 kg•m/s

b. Before collision: ptotal = +19 kg•m/s After collision: ptotal = +17 kg•m/s

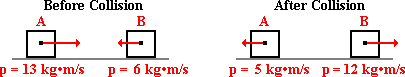
c. Before collision: ptotal = -18 kg•m/s After collision: ptotal = +6 kg•m/s

d. Before collision: ptotal = -18 kg•m/s After collision: ptotal = +18 kg•m/s

e. Before collision: ptotal = +18 kg•m/s After collision: ptotal = -18 kg•m/s

**Question 174:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

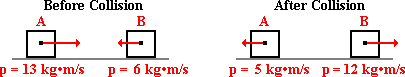
a. 0 kg•m/s b. +7 kg•m/s

c. +18 kg•m/s d . -18 kg•m/s

e. +19 kg•m/s

**Question 175:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

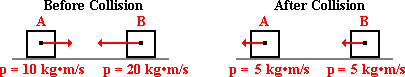
a. 0 kg•m/s b. +7 kg•m/s

c. +18 kg•m/s d . -18 kg•m/s

e. +19 kg•m/s

**Question 176:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow. What is the total momentum of the system before the collision and after the collision?



a. Before collision: ptotal = +10 kg•m/s After collision: ptotal = -10 kg•m/s

b. Before collision: ptotal = -10 kg•m/s After collision: ptotal = -10 kg•m/s

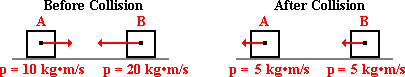
c. Before collision: ptotal = -5 kg•m/s After collision: ptotal = -15 kg•m/s

d. Before collision: ptotal = +30 kg•m/s After collision: ptotal = -10 kg•m/s

e. Before collision: ptotal = +30 kg•m/s After collision: ptotal = +30 kg•m/s

**Question 177:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **A**?

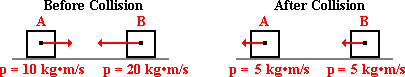
a. 0 kg•m/s b. +10 kg•m/s

c. -10 kg•m/s d . -15 kg•m/s

e. +15 kg•m/s

**Question 178:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



What is the momentum change of object **B**?

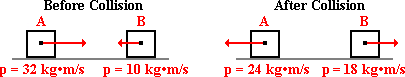
a. 0 kg•m/s b. +10 kg•m/s

c. -10 kg•m/s d . -15 kg•m/s

e. +15 kg•m/s

**Question 179:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



Which one of the following statements is true about this collision?

(NOTE: **p** = momentum)

a. The **∆p** of object A is -8 kg•m/s and the ∆p of Object B is +8 kg•m/s.

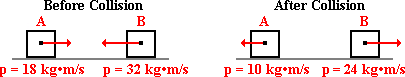
b. The **∆p** of object A is +8 kg•m/s and the ∆p of Object B is -8 kg•m/s.

c. The total **p** before the collision is 42 kg•m/s; it is the same after the collision.

d. The total **p** before the collision is +22 kg•m/s; it is -6 kg•m/s after the collision.

**Question 180:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



Which one of the following statements is true about this collision?

(NOTE: **p** = momentum)

a. The **∆p** of object A is -8 kg•m/s and the ∆p of Object B is +8 kg•m/s.

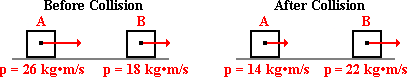
b. The **∆p** of object A is +8 kg•m/s and the ∆p of Object B is -8 kg•m/s.

c. The total **p** before the collision is 50 kg•m/s; it is the same after the collision.

d. The total **p** before the collision is -14 kg•m/s; it is +14 kg•m/s after the collision.

**Question 181:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



Which one of the following statements is true about this collision?

(NOTE: **p** = momentum)

a. The **∆p** of object A is -8 kg•m/s and the ∆p of Object B is +8 kg•m/s.

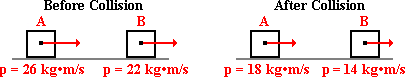
b. The **∆p** of object A is +8 kg•m/s and the ∆p of Object B is -8 kg•m/s.

c. Object A loses **p**; object B gains **p**. Thus **p** is conserved in this collision.

d. This collision is an example of momentum not being conserved by the two objects.

**Question 182:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



Which one of the following statements is true about this collision?

(NOTE: **p** = momentum)

a. The **∆p** of object A is -8 kg•m/s and the ∆p of Object B is +8 kg•m/s.

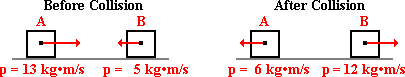
b. The **∆p** of object A is +8 kg•m/s and the ∆p of Object B is -8 kg•m/s.

c. Object A loses **p**; object B gains **p**. Thus **p** is conserved in this collision.

d. This collision is an example of momentum not being conserved by the two objects.

**Question 183:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



Which one of the following statements is true about this collision?

(NOTE: **p** = momentum)

a. The **∆p** of object A is -7 kg•m/s and the ∆p of Object B is +7 kg•m/s.

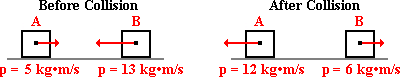
b. The **∆p** of object A is +7 kg•m/s and the ∆p of Object B is -7 kg•m/s.

c. Object A loses **p**; object B gains **p**. Thus **p** is conserved in this collision.

d. This collision is an example of momentum **NOT** being conserved by the two objects.

**Question 184:**

aa. The value of the before- and after-collision momentum of two colliding objects is shown in the diagram below. The direction of the momentum is indicated by the arrow.



Which one of the following statements is true about this collision?

(NOTE: **p** = momentum)

a. The **∆p** of object A is -7 kg•m/s and the ∆p of Object B is +7 kg•m/s.

b. The **∆p** of object A is +7 kg•m/s and the ∆p of Object B is -7 kg•m/s.

c. Object A loses **p**; object B gains **p**. Thus **p** is conserved in this collision.

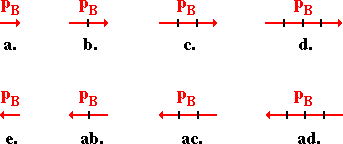
d. This collision is an example of momentum **NOT** being conserved by the two objects.

**Question 185:**

aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.

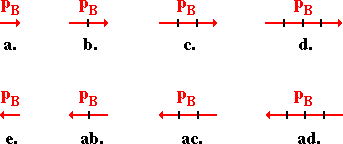


Which vector best represents the magnitude and direction of the momentum of object B after the collision?



**Question 186:**

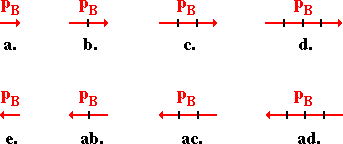
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B after the collision?

**Question 187:**

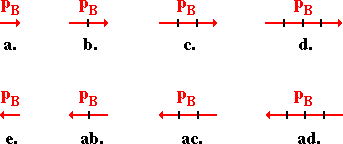
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B after the collision?

**Question 188:**

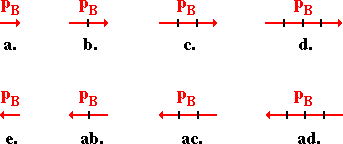
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B after the collision?

**Question 189:**

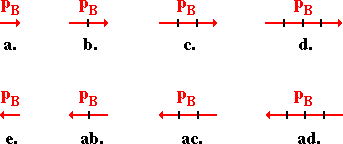
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B after the collision?

**Question 190:**

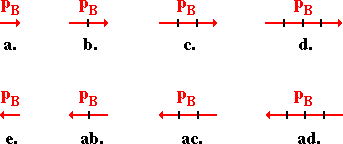
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B after the collision?

**Question 191:**

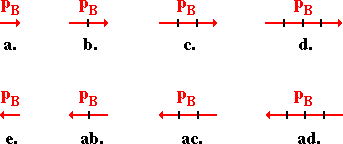
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B after the collision?

**Question 192:**

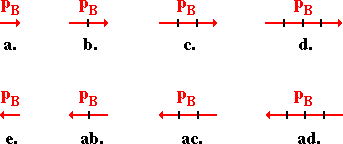
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B after the collision?

**Question 193:**

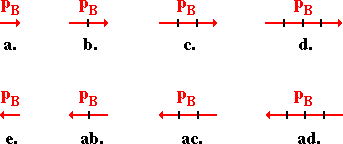
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B before the collision?

**Question 194:**

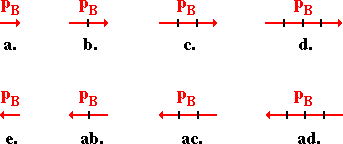
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B

**Question 195:**

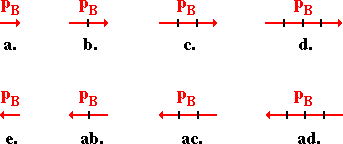
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



Which vector best represents the magnitude and direction of the momentum of object B before the collision?

**Question 196:**

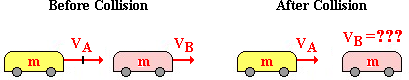
aa. Object A and object B undergo a collision in an isolated system. The vector arrows show the before- and after-collision momentum of object A and object B.



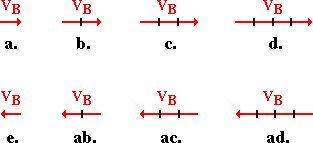
Which vector best represents the magnitude and direction of the momentum of object B before the collision?

**Question 197:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

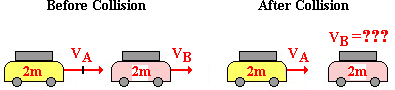


Which vector represents the after-collision velocity of cart B?

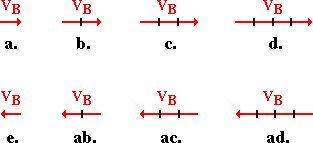


**Question 198:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

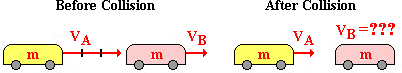


Which vector represents the after-collision velocity of cart B?

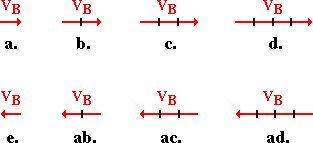


**Question 199:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

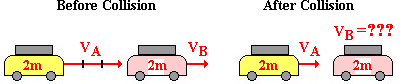


Which vector represents the after-collision velocity of cart B?

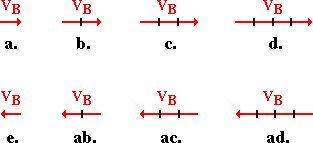


**Question 200:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

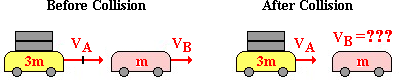


Which vector represents the after-collision velocity of cart B?

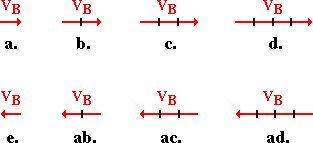


**Question 201:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

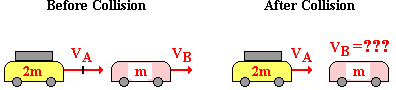


Which vector represents the after-collision velocity of cart B?

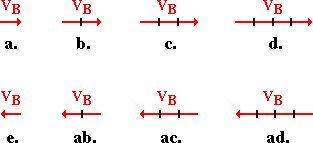


**Question 202:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

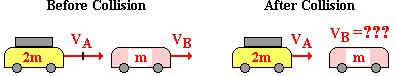


Which vector represents the after-collision velocity of cart B?

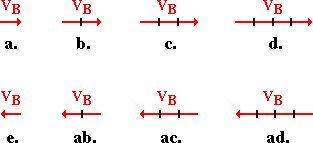


**Question 203:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

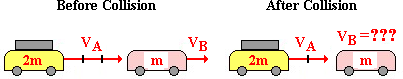


Which vector represents the after-collision velocity of cart B?

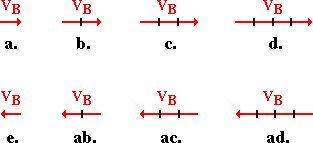


**Question 204:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.



Which vector represents the after-collision velocity of cart B?

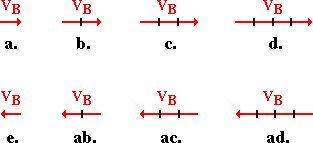


**Question 205:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

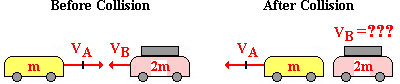


Which vector represents the after-collision velocity of cart B?

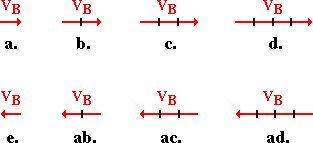


**Question 206:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.

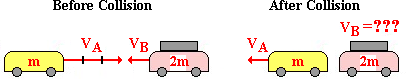


Which vector represents the after-collision velocity of cart B?

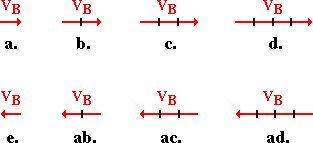


**Question 207:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.



Which vector represents the after-collision velocity of cart B?

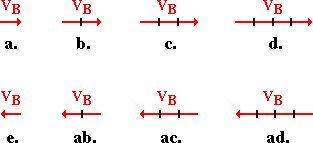


**Question 208:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.



Which vector represents the after-collision velocity of cart B?

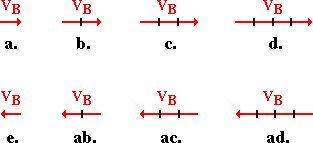


**Question 209:**

aa. In a Physics lab, two carts of varying mass collide on a low-friction track. Total system momentum is conserved. The before- and after-collision velocities of the carts are represented by vector arrows.



Which vector represents the after-collision velocity of cart B?



**Question 210:**

aa. A small fish is at rest in the water. A big fish with four times the mass is gliding along with a speed of 20 cm/s. The big fish opens its mouth and *captures* the smaller fish.



With what speed do the two fish glide through the water after the collision?

a. The same speed - 20 cm/s.

b. With a slower speed - perhaps 16 cm/s.

c. With a slower speed - perhaps 5 cm/s.

d. With a faster speed - perhaps 25 cm/s.

e. With a faster speed - perhaps 80 cm/s.