This chapter has 60 questions.
Scroll down to see and select individual questions or narrow the list using the checkboxes below.

Select 0 questions at random and keep in order

- ☐ *Multiple Choice Questions* - (51)
- ☐ *Fill In The Blank Questions* - (9)
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- ☐ Accessibility: Keyboard Navigation - (49)
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- ☐ Topic: Collisions at an Angle - (2)
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1. When a baseball bat hits the ball, the impulse delivered to the ball is increased by
   - → ○ "follow through" on the swing, which increases contact time.
   - ○ rapidly stopping the bat after impact.
   - ○ letting the bat recoil upon impact.
   - ○ The impulse cannot be changed.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Topic: Momentum and Impulse
Type: Conceptual

Multiple Choice Question
MC When a baseball bat hits the ball, the impul...

2. One form of the proper metric unit for momentum is
   - ○ Joule.
   - ○ Kg·m.
   - ○ $Kg \cdot m/s^2$.
   - → ○ N·sec.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Topic: Momentum and Impulse
Type: Conceptual
Type: Definition

Multiple Choice Question
MC One form of the proper metric unit for momen...

3. Suppose you are out on a frozen lake, where there is no friction. Which of the following would start you moving towards the shore?
   - ○ Shouting at someone on the shore.
   - → ○ Removing a shoe and throwing it away from the shore.
   - ○ Removing a shoe and throwing it towards the shore.
   - ○ None of these would work.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Topic: Conservation of Momentum
Type: Conceptual

Multiple Choice Question
MC Suppose you are out on a frozen lake, where ...

4. A gun is made of a super-low-weight but strong material. The bullet for the gun is more massive than the gun itself. For such a gun
   - ○ recoil problems would be lessened.
   - → ○ the gun, if unsupported, would have a recoil velocity higher than the bullet velocity.
   - ○ conservation of momentum is not satisfied.
   - ○ the bullet would go faster with less powder.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Topic: Recoil
Type: Conceptual

Multiple Choice Question
MC A gun is made of a super-low-weight ...

5. The purpose of an air bag in an auto is to
   - → ○ decrease the force applied to you during a collision.
   - ○ reduce the impulse on you during a collision.
   - ○ make your momentum change occur over a shorter time during a collision.
   - ○ reduce your speed just before a collision.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Topic: Momentum and Impulse
Type: Conceptual

Multiple Choice Question
MC The purpose of an air bag in an auto is to

Select

6. A bowling ball, moving to the east at a speed of 1.4 m/s, collides head-on with a stationary beach ball of the same diameter but less than one twentieth the mass. After the collision, the beach ball moves with a speed of 1.6 m/s. Which of the following is then true?

→ ○ The bowling ball has a velocity of slightly under 1.4 m/s, to the east.
○ The beach ball has more momentum than the bowling ball.
○ The bowling ball recoils to the west with nearly the same speed as before the collision.
○ The bowling ball and the beach ball have the same momentum after the collision.

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question — Topic: Elastic and Inelastic Collisions
MC A bowling ball, moving to the east at a spee... — Type: Conceptual

7. Which of the following mathematical expressions should be used to calculate the momentum of an auto?
○ weight × speed
○ mass × acceleration
○ weight × force
→ ○ mass × velocity

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Topic: Momentum and Impulse
Multiple Choice Question — Type: Conceptual
MC Which of the following mathematical express... — Type: Definition

8. The momentum of a truck is increased by a factor of 2; its weight does not change. Thus,
○ its acceleration is doubled.
→ ○ its speed doubled.
○ its speed increased by a factor of 4.
○ its kinetic energy doubled.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Topic: Momentum and Impulse
Multiple Choice Question — Type: Conceptual
MC The momentum of a truck is increased by a fa... — Type: Definition

9. A quantity which is conserved in the collision of a car and a truck is
○ kinetic energy.
○ nervous energy.
○ momentum of the car.
○ momentum of the truck.
→ ○ total momentum.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Conservation of Momentum
MC A quantity which is conserved in the collisi... — Type: Conceptual

10. A ping-pong ball is dropped vertically onto a stationary bowling ball resting on the floor. Which of the balls experiences the greater force as a result of the collision?
○ The bowling ball.
○ The ping-pong ball.
→ ○ Neither, both experience forces of the same size.
○ It's impossible to tell from this data.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Elastic and Inelastic Collisions
MC A ping-pong ball is dropped vertically, onto... — Type: Conceptual

11. A tennis ball bounces off a brick wall. Which of the following is true?
→ ○ The total momentum of the ball, wall, and Earth is conserved in this process.
○ The momentum of the ball is conserved in this process.
○ If the collision is elastic, then the ball's velocity does not change in this process.
○ None of these is true.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Conservation of Momentum
MC A tennis ball bounces off a brick wall. Whic... — Type: Conceptual

12. Object A moving due east collides with object B moving due west. After the collision, A is moving 20° north of due east. What must be true of B after the collision?
○ B must be moving 20° south of due east.

Select

○ B must be moving 20° south of due west.
→ ○ At least part of B's velocity must be toward the south.
○ At least part of B's velocity must be toward the west.
○ None of these is true.

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Collisions at an Angle
MC Object A moving due east collides with objec...
Type: Conceptual

13. Force F, acting for time T and over a distance D, gives impulse I. To get the same impulse using half the force, it would be necessary for the force to act

○ over a distance 2D.
○ over a distance 4D.
○ over half the distance D.
→ ○ for a time 2T.
○ for half the time T.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Momentum and Impulse
MC Force F, acting for time T and over a distan...
Type: Conceptual

14. An 80-kg football player travels to the right at 8 m/s and a 120-kg player on the opposite team travels to the left at 4.0 m/s. The total momentum is

○ 240 kg m/s to the left.
→ ○ 160 kg m/s to the right.
○ zero.
○ 160 kg m/s to the left.
○ 1120 kg m/s to the right.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Conservation of Momentum
MC An 80-kg football player travels to the left...
Type: Numerical

15. Two people sit face to face on nice skateboards that are free to roll without friction. They push each other with a force of 40 N and move apart. Person X, whose mass (including the skateboard) is 50 kg, moves to the left at 3 m/s. Person Z, whose mass (including the skateboard) is 60 kg,

→ ○ moves to the right at 2.5 m/s.
○ moves to the right at 1 m/s.
○ moves to the right at 4 m/s.
○ moves to the right at 10 m/s.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Conservation of Momentum
MC Two people sit face to face on nice skateboa...
Type: Numerical

16. In attempting to pull a 1500-kg car out of a ditch, Arnold exerts a force of 300 N for three seconds, Bob exerts a force of 500 N for two seconds, and Cecil exerts a force of 200 N for four seconds. Who provided the greatest impulse?

○ Arnold
→ ○ Bob
○ Cecil

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Momentum and Impulse
MC In attempting to pull a 1500-kg car out of a...
Type: Numerical

17. A 30-kg child runs at 3.0 m/s and jumps onto a shopping cart and holds on for dear life. The cart has a mass of 20 kg. Assuming the child rides on the cart after the collision, the speed of the child and shopping cart just after the child jumps on is

○ zero.
→ ○ 2.0 m/s.
○ 2.5 m/s.
○ 3.0 m/s.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Conservation of Momentum
MC A 25-kg child runs at 4.0 m/s and jumps onto...
Type: Numerical

Select 18. In a head-on automobile collision, a person's momentum could be reduced from 2000 kg m/s to zero in just 0.1 s. If this occurs, the average force exerted to stop the person is

→ ○ 20,000 N.
○ 2,000 N.
○ 200 N.
○ This can't be answered without knowing the person's mass.

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Elastic and Inelastic Collisions
MC In a head-on automobile collision, a person'... — Type: Numerical

19. A child runs at 3.0 m/s and jumps onto a sled, initially at rest. If the child's mass is 36 kg, and if the child and sled slide off together at 2.0 m/s after the collision, the sled's mass is

○ 12 kg.
→ ○ 18 kg.
○ 36 kg.
Select ○ 48 kg.

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question — Topic: Elastic and Inelastic Collisions
MC A child runs at 4.0 m/s and jumps onto a sle... — Type: Numerical

20. A fire fighting vehicle of mass 12,000 kg is at rest but free to roll with no resistance. If you push it forward with a force of 500 N, the momentum at the end of 10 s of pushing will be

→ ○ 5000 kg m/s.
○ 20,000 kg N/s.
○ 0.416 m/s.
Select ○ zero.

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question — Topic: Conservation of Momentum
MC A fire fighting vehicle of mass 12,000 kg is... — Type: Numerical

21. The average force required to accelerate a 0.20-kg ball from rest to 30 m/s in 0.002 s is

○ 75,000 N.
○ 15,000 N.
→ ○ 3,000 N.
Select ○ 0.003 N.

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Momentum and Impulse
MC The average force required to accelerate a 0... — Type: Numerical

22. A friend drops a package to you from a window 16 feet above where you first catch it. It drops an additional 3 feet as you bring it to a stop with a constant force. In order to calculate the force required, you need

○ the time it takes for you to stop the package.
→ ○ the mass of the package.
Select ○ no additional information.

Accessibility: Keyboard Navigation
Difficulty: Hard
Gradable: automatic
Multiple Choice Question — Topic: Conservation of Momentum
MC A friend drops a package to you from a windo... — Type: Conceptual

23. The principle that total momentum does not change during a brief collision is a result of

○ the definition of the kilogram.
○ the definition of the newton.
○ Newton's first law and Newton's second law.
○ Newton's first law and Newton's third law.
Select → ○ Newton's second law and Newton's third law.

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Topic: Conservation of Momentum
Multiple Choice Question — Type: Conceptual
MC The principle that total momentum does not c... — Type: Definition

Select 24.

A box is moved 10 m across a smooth floor by a force F making a downward angle with the floor, so that there is effectively a 4 N force acting parallel to the floor in the direction of motion and a 3 N force acting perpendicular to the floor. The force F acts for 20 seconds. The impulse delivered to the box by the floor during this process has magnitude

- ○ 100 Ns.
- ○ 80 Ns.
- ○ 60 Ns.
- ○ zero.
- → ○ Can't tell without knowing the weight of the box.

Accessibility: Keyboard Navigation
Difficulty: Hard
Gradable: automatic
Multiple Choice Question — Topic: Momentum and Impulse
MC A box is moved 10 m across a smooth floor by... — Type: Conceptual

25. A box is pushed eastward across a rough horizontal floor by a force acting parallel to the floor. A force providing an impulse directed westward on the body is

- ○ gravity.
- ○ the applied force.
- → ○ friction.
- ○ normal reaction force of floor upward on body.
- ○ a fictitious force.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Momentum and Impulse
MC A box is pushed eastward across a rough hori... — Type: Conceptual

26. A box is pushed across a rough horizontal floor by a force acting parallel to the floor in the direction of motion. A force providing no impulse during the motion is

- ○ gravity.
- ○ friction.
- ○ the applied force.
- → ○ none of these.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question — Topic: Momentum and Impulse
MC A box is pushed across a rough horizontal fl... — Type: Conceptual

27. A 3 kg block, initially moving due east at 6 m/s, is acted upon by an impulse having magnitude 6 Ns and direction due west. The final velocity of the block is

- ○ 8 m/s east.
- → ○ 4 m/s east.
- ○ 4 m/s west.
- ○ 8 m/s west.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Momentum and Impulse
MC A 2 kg block, initially moving due east at 6... — Type: Numerical

28. Moving at a constant speed, an elevator lifts a 1000 N package 10 meters in 3 seconds. During this time, the impulse delivered to the package by the elevator floor is

- ○ 10,000 Ns up.
- → ○ 3,000 Ns up.
- ○ 10,000 Nm up.
- ○ zero.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question — Topic: Momentum and Impulse
MC Moving at a constant speed, an elevator lift... — Type: Numerical

29. Collisions between which pairs of objects is likely to be most nearly elastic?

Select

- ○ A steel ball and a cotton ball
- → ○ Two steel balls
- ○ A steel ball and a baseball
- ○ Two baseballs

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Momentum and Impulse
MC Which of these collisions is likely to be mo... — Type: Numerical

Topic: Elastic and Inelastic Collisions
Type: Conceptual
Type: Definition

30. If the speed of a car is tripled, the impulse required to stop the car changes by a factor of
- ○ 9.
- → ○ 3.
- ○ 1.
- ○ 1/3.
- ○ 1/9.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Momentum and Impulse
MC If the speed of a car is tripled, the impuls...
Type: Conceptual

31. A painter of mass 80 kg climbs 3.0 m up a ladder. The painter has gained momentum in the amount of
- ○ 240 J.
- ○ 784 J.
- ○ 2352 J.
- → ○ Can't say without knowing his velocity change (if any)

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Momentum and Impulse
MC A painter of mass 80 kg climbs 3.0 m up a la...
Type: Conceptual

32. During a collision, which of these is an indication that the total kinetic energy has changed?
- ○ Heat is generated.
- ○ Deformation occurs.
- ○ Sound is produced.
- → ○ Heat is generated, deformation occurs, and sound is produced.
- ○ None of these is correct.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Elastic and Inelastic Collisions
MC During a collision, which of these is an ind...
Type: Conceptual

33. During a collision, which of these is an indication that the total momentum has changed?
- ○ Heat is generated.
- ○ Deformation occurs.
- ○ Sound is produced.
- ○ Heat is generated, deformation occurs, and sound is produced.
- → ○ None of these is correct.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Conservation of Momentum
MC During a collision, which of these is an ind...
Type: Conceptual

34. Suppose a ball is dropped from shoulder height, falls, makes a perfectly elastic collision with the floor, and rebounds to shoulder height. Compare the magnitudes of the impulses delivered to the ball by gravity and by the floor during this entire motion.
- ○ The impulse delivered by the floor is half as large as the impulse delivered by gravity.
- ○ The impulse delivered by the floor is twice as large as the impulse delivered by gravity.
- → ○ The two impulses have the same magnitude.
- ○ The floor delivers an upward impulse, but gravity does not deliver a total impulse.

Select

Accessibility: Keyboard Navigation
Difficulty: Hard
Gradable: automatic
Multiple Choice Question
Topic: Momentum and Impulse
MC Suppose a ball is dropped from shoulder heig...
Type: Conceptual

35. Although Newton's second law, F = ma, is valid for collisions, it is difficult to use it generally in this form for collisions because
- ○ the acceleration is too small.
- ○ the force F is not constant.
- ○ the acceleration occurs during a time interval too short to measure easily.
- ○ the acceleration is too small and the force F is not constant.
- → ○ the force F is not constant and the acceleration occurs during a time interval too short to measure easily.

Select

Multiple Choice Question
Mc Although Newton's second law...

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Topic: Elastic and Inelastic Collisions
Type: Conceptual

36. Suppose two boys are trapped on the ice atop a frozen pond, and that the ice is completely frictionless. The boys are initially at rest, but they do have a baseball. They begin to play catch with the ball. Which of these is true?

- ○ The boys only move while the ball is in the air.
- ○ They will be stuck on the ice until rescued.
- → ○ The more times they throw and catch the ball, the faster they will get to shore.
- ○ If after a few throws the ball is not caught and rolls away, the boys will be stuck on the ice.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Topic: Recoil
Type: Conceptual

Multiple Choice Question
MC Suppose two boys are trapped on the ice atop...

37. A bullet of mass 0.010 kg and speed of 200 m/s is brought to rest in a wooden block after penetrating a distance of 0.10 m. This process takes 0.02 second. The magnitude of the impulse delivered to the bullet by the block during this time is

- ○ zero.
- ○ 0.98 N.
- ○ 1.0 Ns.
- → ○ 2.0 Ns.
- ○ 4.0 Ns.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Topic: Momentum and Impulse
Type: Numerical

Multiple Choice Question
MC A bullet of mass 0.010 kg and speed of 100 m...

38. A bullet is fired into a wall and comes to rest. Considering only the bullet as the system we can say that

- ○ the total kinetic energy is conserved.
- ○ the momentum is conserved.
- → ○ neither total kinetic energy nor momentum is conserved.
- ○ both total kinetic energy and momentum are conserved.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Topic: Elastic and Inelastic Collisions
Type: Conceptual

Multiple Choice Question
MC A bullet is fired into a wall and comes to r...

39. If a force acts on an object, the impulse will be

- ○ zero if the force is applied perpendicular to the momentum object.
- ○ zero if the force is in the opposite direction of the velocity of the object.
- ○ zero if the speed of the object does not change.
- → ○ nonzero in all situations.

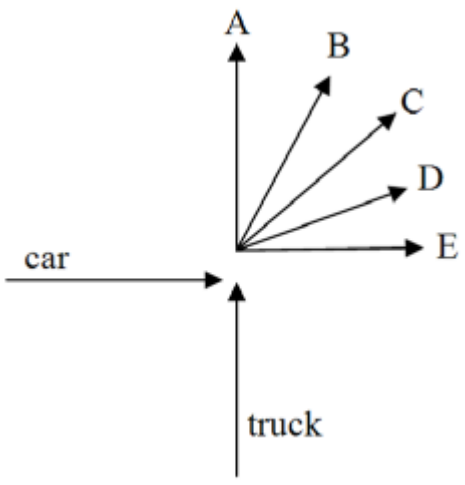
Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Topic: Momentum and Impulse
Type: Conceptual

Multiple Choice Question
MC If a force acts on an object, the impulse wi...

Select

40. A car moving east collides with a truck moving north. The vehicles have the same speed but the truck has twice the mass of the car. If the vehicles stick together after the collision, what is the path followed by the vehicles after the collision?



- ○ A
- → ○ B
- ○ C
- ○ D
- ○ E

Difficulty: Easy
Gradable: automatic
Topic: Collisions at an Angle
Multiple Choice Question
Type: Conceptual
MC A car moving east collides with a truck movi...
Type: Graphical

41. A racquetball is dropped from a height of one meter. It bounces off the floor and rises to a height of 0.8 m. The collision with the floor was
    - ○ an elastic collision.
    - → ○ a partially inelastic collision.
    - ○ a perfectly inelastic collision.
    - ○ impossible to tell without knowing the mass of the ball.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Elastic and Inelastic Collisions
MC A racquetball is dropped from a height of on...
Type: Conceptual

42. A toy car and a toy truck at rest have a compressed spring in between them. The truck has more mass than the car. The spring is released and the two cars move in opposite directions. Which of the following is true?
    - → ○ The magnitude of the truck's momentum is the same as the car's.
    - ○ The magnitude of the truck's momentum is larger than the car's.
    - ○ The magnitude of the truck's momentum is smaller than the car's.
    - ○ It is not possible to tell which has more momentum without knowing the speeds.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Conservation of Momentum
MC A toy car and a toy truck at rest have a com...
Type: Conceptual

43. Consider a system containing three objects that move with different velocities. The objects can interact with each other through forces. In this system
    - ○ the total kinetic energy of the objects will not change unless an outside force is applied.
    - ○ the objects can only collide if an outside force is applied.
    - ○ any collisions between the objects must be elastic.
    - → ○ the total momentum of the objects cannot change unless an outside force acts on the system.

Select

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Conservation of Momentum
MC Consider a system containing three objects t...
Type: Conceptual

44. If a single force acts on a moving object
    - ○ the momentum of the object will change only if the force is in the same direction as the velocity of the object.
    - → ○ the momentum of the object must change.
    - ○ the momentum of the object can only change magnitude, not direction.
    - ○ the momentum of the object can only change direction, not magnitude.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Conservation of Momentum
MC If a single force acts on a moving object
Type: Conceptual

45. Two astronauts of equal mass are holding on to each other and moving at a speed of 30 m/s. They push off of each other and one of the astronauts moves in the same direction as the two were initially moving but at 60 m/s. The velocity of the second astronaut is
    - ○ 60 m/s backward.
    - ○ 30 m/s backward.
    - → ○ zero.
    - ○ 30 m/s forward.
    - ○ 60 m/s forward.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Conservation of Momentum
MC Two astronauts of equal mass are holding on ...
Type: Numerical

46. If you were standing on a cart that was at rest and free to roll (ignore friction) and someone threw a 10 kg ball at you, you would
    - ○ not move if you caught the ball because you are more massive than the ball.
    - ○ roll backward faster if you caught the ball.
    - → ○ roll backward faster if the ball bounced off of you elastically.
    - ○ roll backward faster if you caught the ball higher above the ground.

Select

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Elastic and Inelastic Collisions
MC If you were standing on a cart that was at r...
Type: Conceptual

47. An oil tanker heading due west, straight into a strong wind, reaches a speed of 5 m/s and then shuts down its engines to drift. The forward-facing flat surfaces of the tanker catch a total of 60,000 N of force from the wind. This wind force is pointing backwards, to the east. The tanker's mass is 100,000 metric tons, which is 100 million kg. If the wind blows at the same strength for 5 minutes, then how much has the wind changed the tanker's speed?

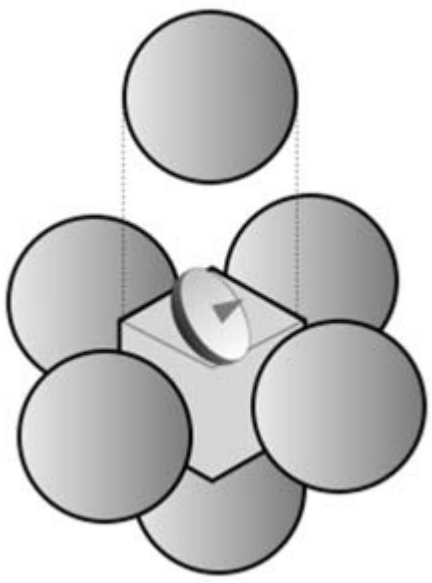
Select

- ○ 1.2 m/s
- ○ 1.08 m/s
- ○ 0.018 m/s
- → ○ 0.18 m/s

Accessibility: Keyboard Navigation
Difficulty: Hard
Gradable: automatic
Multiple Choice Question
Topic: Momentum and Impulse
MC An oil tanker heading due west, straight int...
Type: Numerical

48. A robot spacecraft is sent to Mars to explore the Martian polar ice cap. Designers can surround it with a set of inflatable balloons that pop out like automobile air bags as soon as the spacecraft's re-entry parachute opens up.

Select



When the spacecraft lands, it will be able to roll for a few meters across the surface of Mars. The pop out balloons have an advantage to the spacecraft, because

- ○ they cancel out the normal force of the surface of Mars.
- ○ they decrease the kinetic energy.
- → ○ they increase the time of impact and lessen the stopping force.
- ○ the impulse that stops the spacecraft for landing is less with these balloons.

Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Momentum and Impulse
MC A robot spacecraft is sent to Mars to explor...
Type: Conceptual

49. A rocket obeys the principles of recoil. However, it is much more difficult to apply Newton's second law to a rocket because

Select

- ○ Newton's three laws do not apply in outer space.
- ○ there is actually sideways momentum, because a rocket motor is just a well-controlled explosion.
- ○ the rocket pushes against air but the air is a fluid.
- → ○ as the rocket motor fires the total mass of the rocket changes.

Accessibility: Keyboard Navigation
Difficulty: Medium
Gradable: automatic
Multiple Choice Question
Topic: Recoil
MC A rocket obeys the principles of recoil. How...
Type: Conceptual

50. When a single boxcar in the freight yard hooks onto a stationary string of four boxcars, as in example 7.4, there is some kinetic energy lost. Which of the following could account for the missing energy?

Select

- ○ Sound energy in the loud CLANG when they hook together.
- ○ Heat energy in the clamping mechanism between cars as it opens and then captures the fifth boxcar.
- → ○ Both A and B

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question
Topic: Elastic and Inelastic Collisions
MC When a single boxcar in the freight yard hoo...
Type: Conceptual

Select

51. A big defensive lineman picks up a fumbled football and begins rumbling toward the end zone. His mass is 150 kg, and his velocity is 6.0 m/s, west. A brave wide receiver, whose mass is 90 kg, must stop that lineman and he is right in the

lineman's path, so it has to be a head-on collision. How fast must the wide receiver be running if he wants to drop the lineman in his tracks and save the day?

- ○ 88 mph
- ○ 0.60 m/s
- ○ 8.3 m/s
- → ○ 10 m/s

Accessibility: Keyboard Navigation
Difficulty: Easy
Gradable: automatic
Multiple Choice Question — Topic: Elastic and Inelastic Collisions
MC A big defensive lineman picks up a fumbled f... — Type: Numerical

52. The total momentum of a system will change during a collision unless the _____ force is zero.
external

Select

Difficulty: Easy
Gradable: automatic
Topic: Conservation of Momentum
Fill-in-the-Blank Question — Type: Conceptual
FB The total momentum of a system will change d... — Type: Definition

53. If heat, sound, or deformation of solid bodies results from a collision, there will be a change in the total _____.
kinetic energy

Select

Difficulty: Easy
Gradable: automatic
Topic: Elastic and Inelastic Collisions
Fill-in-the-Blank Question — Type: Conceptual
FB If heat, sound, or deformation of solid bodi... — Type: Definition

54. A moving cue ball strikes another ball of equal mass that is initially at rest on the flat planar surface of the pool table. If the collision is elastic, the direction of the velocity of the cue ball after the collision will be _____ to the direction of the velocity of the other ball.
perpendicular

Select

Difficulty: Medium
Gradable: automatic
Topic: Elastic and Inelastic Collisions
Fill-in-the-Blank Question — Type: Conceptual
FB A moving cue ball strikes another ball of eq... — Type: Definition

55. The impulse required to bring an auto to a stop is ordinarily provided by _____ forces.
frictional

Select

Difficulty: Easy
Gradable: automatic
Fill-in-the-Blank Question — Topic: Momentum and Impulse
FB The impulse required to bring an auto to a s... — Type: Conceptual

56. If a bullet is fired into a wooden block and remains lodged in the block, the collision was _____.
inelastic

Select

Difficulty: Easy
Gradable: automatic
Topic: Elastic and Inelastic Collisions
Fill-in-the-Blank Question — Type: Conceptual
FB If a bullet is fired into a wooden block and... — Type: Definition

57. If a bullet is fired into a solid wooden block and comes out the other side, the collision was _____ inelastic.
partially

Select

Difficulty: Easy
Gradable: automatic
Topic: Elastic and Inelastic Collisions
Fill-in-the-Blank Question — Type: Conceptual
FB If a bullet is fired into a solid wooden blo... — Type: Definition

58. If the same impulse is applied to a ping-pong ball and a baseball, the change in the ping-pong ball's momentum will be _____ the baseball's.
the same as

Select

Difficulty: Easy
Gradable: automatic
Fill-in-the-Blank Question — Topic: Momentum and Impulse
FB If the same impulse is applied to a ping-pon... — Type: Conceptual

Select 59. A force acts on an object for a time. If one eighth the force had acted for twice as long, the impulse would have been _____ as much as before.
one quarter

Fill-in-the-Blank Question — Difficulty: Easy
FB If one eighth the force acts for twice as lo... — Gradable: automatic

Topic: Momentum and Impulse
Type: Conceptual

60. A 60 kg boy standing on a skateboard with frictionless wheels and negligible mass throws a 3 kg ball straight up with a speed of 4 m/s. If the boy was at rest before the throw, his speed after the throw will be _____.
zero

Select

Difficulty: Easy
Gradable: automatic
Fill-in-the-Blank Question
Topic: Recoil
FB A 60 kg boy standing on a skateboard with fr...
Type: Conceptual