Preview Assessment Lec 02 Quiz

Name: Lec 02 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **16 points** Save

A projectile is launched from a cliff at a 42 degree angle above the horizontal. It eventually reaches the ground below. This question is exclusively about the projectile while it is in free fall. It is in free fall from the instant after it leaves the launcher until the instant before it hits the ground. Where, along the trajectory of the projectile, is the kinetic energy of the projectile at its minimum value?

- Nowhere.
- At the point where it leaves the launcher.
- At the highest point of its motion.
- At the lowest point in its motion, its location immediately prior to hitting the ground.

Question 2 **16 points** Save

A projectile is launched from a cliff at a 42 degree angle above the horizontal. It eventually reaches the ground below. This question is exclusively about the projectile while it is in free fall. It is in free fall from the instant after it leaves the launcher until the instant before it hits the ground. Where, along the trajectory of the projectile, is the kinetic energy of the projectile zero?

- Nowhere.
- At the point where it leaves the launcher.
- At the highest point of its motion.
- At the lowest point in its motion, its location immediately prior to hitting the ground.

Question 3 **16 points** Save

A projectile is launched from a cliff at a 42 degree angle above the horizontal. It eventually reaches the ground below. This question is exclusively about the projectile while it is in free fall. It is in free fall from the instant after it leaves the launcher until the instant before it hits the ground. Where, along the trajectory of the projectile, is the potential energy of the projectile at its maximum value?

- Nowhere.
- At the point where it leaves the launcher.
- At the highest point in its trajectory.
- At the lowest point in its motion, its location immediately prior to hitting the ground.

Question 4 **16 points** Save

A projectile is launched from a cliff at a 42 degree angle above the horizontal. It eventually reaches the ground below. This question is exclusively about the projectile while it is in free fall. It is in free fall from the instant after it leaves the launcher until the instant before it hits the ground. Where, along the trajectory of the projectile, is the kinetic energy of the projectile at its maximum value?

- Nowhere.
- At the point where it leaves the launcher.
- At the highest point of its motion.
- At the lowest point in its motion, its location immediately prior to hitting the ground.

Question 5 **16 points** Save

Consider a pendulum consisting of a metal ball on the end of a slender string. A person pulls the ball to one side, keeping the string taught. The ball moves along an arc, increasing its height above the ground as it is moved to one side. Consider the reference level for potential energy of the ball to be the ball's lowest possible level. The ball is released from rest. At it's release point it has 15 joules of potential energy. The ball swings back and forth. Ignore air resistance and friction. What is the kinetic energy of the ball when it is at its lowest position?

- 0 joules
- 5 joules
- 15 joules
- No other answer provided is correct.

Question 6 **20 points** Save

A 1 kg object hangs from the end of a very long string of negligible mass. A person pulls the object to one side, keeping the string taut, to the point where the mass is 1 meter higher than its hanging position. Considering the hanging position to be the zero of gravitational potential energy, the object has 9.8 joules of potential energy in this raised position. The person releases the object from rest, at its raised position. The object begins swinging back and forth. Neglect air resistance as you match answer items to the question items below. Each answer item may be used more than once.

- Where, in the motion of the object, is its potential energy a maximum?
- Where in the motion of the object is its potential energy a minimum?
- Where, in the motion of the object, is its kinetic energy a maximum?
- Where in the motion of the object is its kinetic energy a minimum?
- Where in the motion of the object is the total mechanical energy of the object a maximum?

A. It has the same value everywhere so it has its maximum value everywhere.
B. It has the same value everywhere so it has its minimum value everywhere.
C. At the very bottom of its motion.
D. At the top of its motion. That is, at the release point and at the highest point of its swing away from the release point.
E. Somewhere in between (but not at) the bottommost point of its motion and either of the topmost points of its motion.

Save Submit

Preview Assessment Lec 03 Quiz

Name: Lec 03 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

In the expression $\frac{1}{2}kx^2$ for the potential energy stored in the spring, what does the x represent?

- The length of the spring.
- The amount by which the spring is stretched or compressed.
- Both of the other answers are correct.

Question 2 **20 points** Save

Match the units to the physical quantity that is measured in those units.

- kg	A. time
- J	B. velocity
- m	C. energy
- m/s	D. mass
- s	E. distance

Question 3 **20 points** Save

A block of mass m, on a flat horizontal frictionless surface, is pushed up against the end of a horizontal spring, the other end of which is connected to a wall, so that it compresses the spring by an amount x. The force constant of the spring is k. Consider the mass of the spring to be negligible. The block is released, and the spring pushes the block away from the wall. What is the kinetic energy of the block after it loses contact with the spring? (Hint: From the wording of the question you are supposed to know that m, k, and x are to be considered known quantities, and, that your answer should have only known quantities in it.)

- 0 mgh
- $\frac{1}{2}mv^2$
- $\frac{1}{2}kx^2$
- kx^2
- $\frac{1}{2}kx^2$-mgh
- No other answer provided is correct.

Question 4 **20 points** Save

Which has more rotational kinetic energy, an object with a rotational inertia of 4 kg·m^2 and an angular velocity of 8 rad/s, or, an object with a rotational inertia of 8 kg·m^2 and an angular velocity of 4 rad/s?

- An object with a rotational inertia of 4 kg·m^2 and an angular velocity of 8 rad/s.
- An object with a rotational inertia of 8 kg·m^2 and an angular velocity of 4 rad/s.
- Neither. They both have the same amount of kinetic energy.

Question 5 **20 points** Save

A disk lies horizontally on a massless, frictionless, rotational motion support such that the disk is spinning freely about a vertical axis through the center of the disk and perpendicular to the face of the disk. A second disk, identical to the first disk is held in place a negligible height (immeasurably close but not touching) above the first disk. The second disk is aligned so perfectly with the first disk that the axis of rotation of the first disk also passes through the center of the second disk. The person holding the second disk drops it onto the first disk and the two disks spin as one. Is mechanical energy conserved in this process?

- Yes
- No

Save Submit

Preview Assessment Lec 04 Quiz

Name: Lec 04 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

Consider a bowling ball and a Ping Pong ball, each moving along a straight line path at constant velocity. Which has the greater magnitude of momentum?

- Neither, they both have the same momentum.
- The bowling ball has the greater momentum.
- The Ping Pong ball has the greater momentum.
- Insufficient information is given to determine a definite answer.

Question 2 **20 points** Save

Consider two cars, both moving eastward along a straight road. Car 1 is in front of car 2. Car 1 has a mass of 1200 kg and a speed of 24 m/s. Car 2 has a mass of 1100 kg and a speed of 32 m/s. Consider eastward to be the positive direction. Car 2 collides with car 1. The two cars stick together and move off as one object. No external eastward/westward forces act on either car. What is the total momentum of the combination object, consisting of the two cars stuck together, after the collision?

- Zero
- 6400 kg·m/s
- 28,800 kg·m/s
- 35,200 kg·m/s
- 64,000 kg·m/s
- 128,800 kg·m/s
- No other answer provided is correct.

Question 3 **20 points** Save

Consider two cars, both moving eastward along a straight road. Car 1 is in front of car 2. Car 1 has a mass of 1200 kg and a speed of 24 m/s. Car 2 has a mass of 1100 kg and a speed of 32 m/s. Consider eastward to be the positive direction. Car 2 collides with car 1. The two cars stick together and move off as one object. No external eastward/westward forces act on either car. What is the mass of the combination object consisting of the two cars stuck together?

- 100 kg
- 1100 kg
- 1200 kg
- No other answer provided is correct.

Question 4 **20 points** Save

Consider two cars, both moving eastward along a straight road. Car 1 is in front of car 2. Car 1 has a mass of 1200 kg and a speed of 24 m/s. Car 2 has a mass of 1100 kg and a speed of 32 m/s. Consider eastward to be the positive direction. Car 2 collides with car 1. The two cars stick together and move off as one object. No external eastward/westward forces act on either car. What is the total momentum of the system of cars prior to the collision?

- Zero
- 6400 kg·m/s
- 28,800 kg·m/s
- 35,200 kg·m/s
- 64,000 kg·m/s
- 128,800 kg·m/s
- No other answer provided is correct.

Question 5 **20 points** Save

Consider two cars, both moving eastward along a straight road. Car 1 is in front of car 2. Car 1 has a mass of 1200 kg and a speed of 24 m/s. Car 2 has a mass of 1100 kg and a speed of 32 m/s. Consider eastward to be the positive direction. Car 2 collides with car 1. The two cars stick together and move off as one object. No external eastward/westward forces act on either car. What is the velocity of the combination object, consisting of the two cars stuck together, after the collision?

- Zero
- 24 m/s
- 28 m/s
- 32 m/s
- 56 m/s
- 2300 m/s
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 05 Quiz

Name: Lec 05 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

Some people are on a playground merry-go-round which is spinning freely. Consider the merry-go-round-plus-people to be the "object" whose rotational motion is under consideration. All at once, the people move to the center of the merry-go-round. What happens to the mass of the merry-go-round-plus-people?

- It stays the same.
- It increases.
- It decreases.
- Not enough information is given to determine a definite answer.

Question 2 **20 points** Save

Some people are on a playground merry-go-round which is spinning freely. Consider the MERRY-GO-ROUND to be the "object" whose rotational motion is under consideration. All at once, the people move to the center of the merry-go-round. What happens to the angular momentum of the MERRY-GO-ROUND?

- It stays the same.
- It increases.
- It decreases.
- Not enough information is given to determine a definite answer.

Question 3 **20 points** Save

Some people are on a playground merry-go-round which is spinning freely. Consider the merry-go-round-plus-people to be the "object" whose rotational motion is under consideration. All at once, the people move to the center of the merry-go-round. What happens to the angular momentum of the merry-go-round-plus-people?

- It stays the same.
- It increases.
- It decreases.
- Not enough information is given to determine a definite answer.

Question 4 **20 points** Save

Some people are on a playground merry-go-round which is spinning freely. Consider the merry-go-round-plus-people to be the "object" whose rotational motion is under consideration. All at once, the people move to the center of the merry-go-round. What happens to the angular velocity of the merry-go-round-plus-people?

- It stays the same.

It increases.

- It decreases.
- Not enough information is given to determine a definite answer.

Question 5 **20 points** Save

Some people are on a playground merry-go-round which is spinning freely. Consider the merry-go-round-plus-people to be the "object" whose rotational motion is under consideration. All at once, the people move to the center of the merry-go-round. What happens to the rotational inertia of the merry-go-round-plus-people?

- It stays the same.
- It increases.
- It decreases.
- Not enough information is given to determine a definite answer

Save Submit

Preview Assessment Lec 06 Quiz

Name: Lec 06 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

Consider an object undergoing linear motion. Define the forward direction to be the positive direction. In which case or cases is the acceleration of the object negative? (Indicate all the correct answers.)

- [ ] The object is going forward and speeding up.
- [ ] The object is going forward and slowing down.
- [ ] The object is going backward and speeding up.
- [ ] The object is going backward and slowing down.
- [ ] No other answer provided is correct.

Question 2 **20 points** Save

A person walks along a straight line path. The person's position x is measured with respect to a start line. During a particular time interval, the person is observed to go from x = 2 meters to x = 6 meters and from there to x = 3 meters. What is the displacement of the person in the time interval in question?

- ◯ 2 meters
- ◯ 7 meters
- ◯ 4 meters
- ◯ No other answer provided is correct.

Question 3 **20 points** Save

A person walks along a straight line path. The person's position x is measured with respect to a start line. During a particular time interval, the person is observed to go from x = 2 meters to x = 6 meters and from there to x = 3 meters. What is the person's total distance traveled in the time interval in question?

- ◯ 1 meter
- ◯ 7 meters
- ◯ 4 meters
- ◯ No other answer provided is correct.

Question 4 **20 points** Save

What is the acceleration of an object that is constrained to move along a straight line path? (Choose the one best answer.)

- ◯ How fast and which way the velocity of an object is going.

  How fast the speed of an object is changing.

- How fast and which way the object is going.
- The rate of change and the direction of change of the object's velocity.
- No other answer provided is correct.

Question 5 **20 points** Save

What is the difference, if any, between speed and velocity? (Choose the one best answer.)

- There is no difference. They both characterize how fast something is going.
- Speed is how fast something is going, whereas velocity is how fast the speed is changing.
- Velocity characterizes both how fast and which way something is going, whereas speed just characterizes how fast it is going.
- The speed of a car is just its speedometer reading whereas velocity is just which way the car is heading.
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 07 Quiz

Name: Lec 07 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

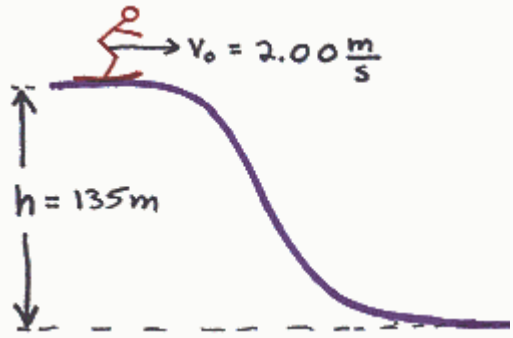
Question Completion Status:

Question 1 **50 points** Save

Would it be correct to apply one or more of the constant acceleration equations in solving the following problem?

At the top of a hill of height 135 meters, a skier already has a forward velocity of 2.00 m/s. The skier continues forward, down the hill depicted below. How fast is the skier going at the bottom of the hill? Consider the snow to be frictionless and assume the skier does not use ski poles on the way down. Ignore wind and air resistance.

Note that you are not supposed to solve the problem. You are just supposed to answer the question as to whether or not it would be correct to apply one or more of the constant acceleration equations in solving the problem.



- Yes
- No

Question 2 **50 points** Save

Do the constant acceleration equations apply in the case of the following problem?

A car is initially at rest. The motor is running. Starting at time 0 the driver releases the brake and slowly begins depressing the gas pedal farther and farther as time goes by, until, after 5.0 seconds, the gas pedal is pressed all the way down to the floor. Assume that the driver keeps the car headed and going in a straight line path for the entire 5.0 seconds. Assume that the acceleration increases steadily during the five-second time interval in question such that, at the five-second mark, the acceleration is 6.0 mph per second. How far does the car travel during the first 5.0 seconds of its motion?

Note that you are not supposed to solve the problem. You are just supposed to indicate whether or not the constant acceleration equations apply to the problem.

- Yes
- No

Save Submit

Preview Assessment Lec 08 Quiz

Name: Lec 08 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

In solving a "Collision Type II" problem, it is important to:

- use the correct mass for each of the objects.
- apply the conservation of momentum but not the conservation of energy.
- apply both the conservation of momentum and the conservation of energy.
- Use the same start line and the same positive direction in establishing the value of, or an expression for, the position of each object.

Question 2 **20 points** Save

In the type II collision, what is the one physical quantity that always has the same value for both objects involved in the so-called collision?

- position
- time
- velocity
- acceleration
- No other answer provided is correct.

Question 3 **20 points** Save

The "Collision Type I" problem was studied as part of the lecture on the Conservation of Momentum. It involved one object crashing into another one. The "Collision Type II" problem...

- also involves one object crashing into another, but, the two objects bounce off of each other with no loss of mechanical energy.
- does not necessarily involve an actual crash, rather, it involves two objects, each traveling along a straight line path. The so-called "collision" occurs when the two objects have one and the same position.
- also involves one object crashing into another, but, the two objects stick together.
- No other answer provided is correct.

Question 4 **20 points** Save

Assume one chooses to use the subscript 1 for each variable used to characterize one of the objects involved in a type II collision and the subscript 2 for each variable used to characterize the other object. What then is the equation corresponding to the fact that the two objects experience a "type II collision?"

- $x_1 = x_2$
- $m_1v_1 = m_2v_2$

- ◯ $(1/2)m_1v_1^2 = (1/2)m_2v_2^2$
- ◯ No other answer provided is correct.

Question 5 **20 points** Save

We have defined the *Collision Type II equation* to be $x_1 = x_2$ where x_1 is the position of object 1 and x_2 is the position of object 2. In order for this equation to apply in the case of the following problem which of the following combinations of starting position (x=0) and positive direction would be appropriate? Indicate all that are correct.

> Car 1 is traveling along a straight line. Car 2 is traveling along another straight line, parallel to, and rather close to (so close that the cars will be only a few centimeters apart when they are side-by-side) the line along which car 1 is traveling. At time zero the cars are 782 m apart. At time zero, car 1 is moving toward car 2 with a speed of 15 m/s relative to the road and an acceleration of 2.5 m/s^2 relative to the road. At time zero car 2 is moving toward car 1 with a speed of 28 m/s relative to the road and an acceleration of 2.9 m/s^2 relative to the road. How far must car 2 travel in order to be side-by-side with car 1?

Note that you are not supposed to solve the problem. Just indicate which of the following would be an appropriate combination of start line (x=0) and positive direction. Indicate the answer, or all the answers, that are correct.

- ☐ Define x to be 0 at the initial position of car 1 and the positive direction to be the direction of motion of car 1.
- ☐ Define x to be 0 at the initial position of car 1 and the positive direction to be the direction of motion of car 2.
- ☐ Define x to be 0 at the initial position of car 2 and the positive direction to be the direction of motion of car 1.
- ☐ Define x to be 0 at the initial position of car 2 and the positive direction to be the direction of motion of car 2.

Save Submit

Preview Assessment Lec 09 Quiz

Name: Lec 09 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

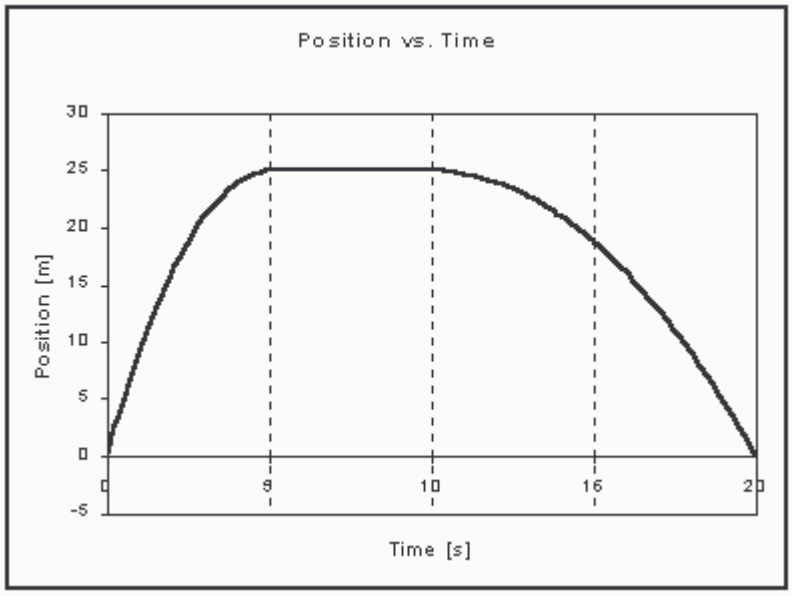
For each graph characteristic, indicate the corresponding physical quantity used to characterize linear motion involving constant acceleration, or, if none of the physical quantities, applies, indicate "none".

- The slope of the position versus time curve.
- The curvature of the position versus time curve.
- The slope of the velocity versus time curve.
- The curvature of the velocity versus time curve.
- The slope of the acceleration versus time curve.

A. Time
B. Position
C. Velocity
D. Acceleration
E. Trajectory
F. None

Question 2 **15 points** Save

A start line (x = 0) and a positive x-direction are established for a straight road. Observations are made on the motion of a car on that road. The observer has a stopwatch in hand. The time in the graph below represents the stopwatch reading. The stopwatch was started at time 0. Based on the graph below, for each time interval specified, indicate the appropriate description of the motion of the car during the time interval.



- zero to five seconds
- five seconds to ten seconds
- ten seconds to twenty seconds

A. Beginning at rest the car remains at rest throughout the time interval.
B. Beginning at rest the car speeds up steadily in the forward direction.

C. Beginning at rest the car speeds up steadily in the backward direction.

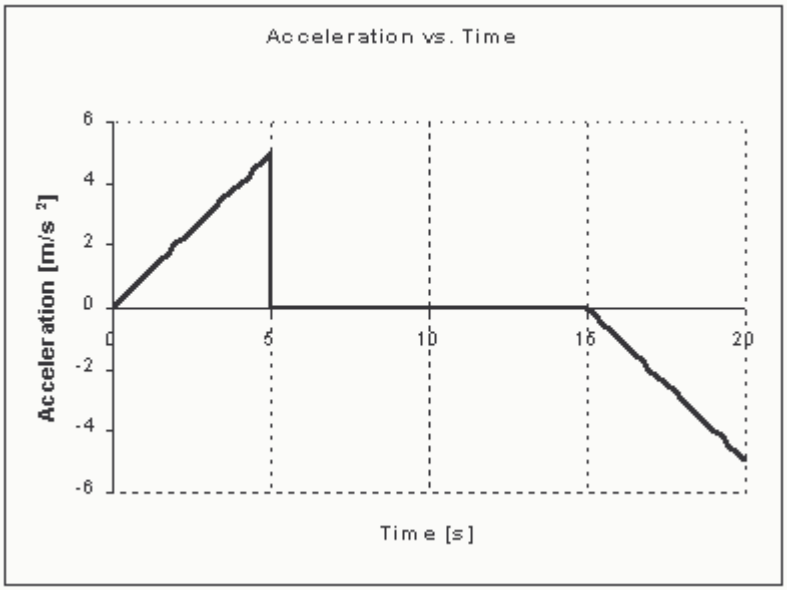
D. At the start of the time interval the car is already moving forward. It continues to move forward at a constant velocity.

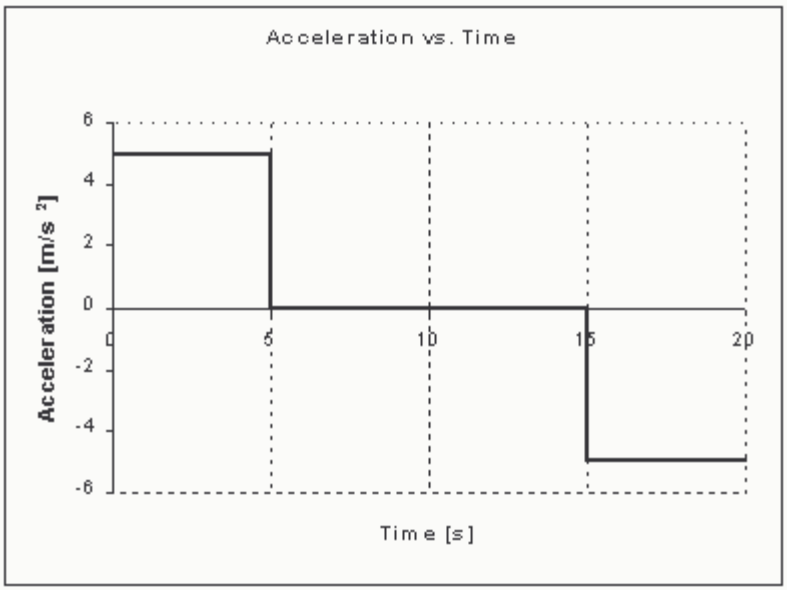
E. At the start of the time interval the car is already moving forward. It continues to move forward at a steadily increasing speed.

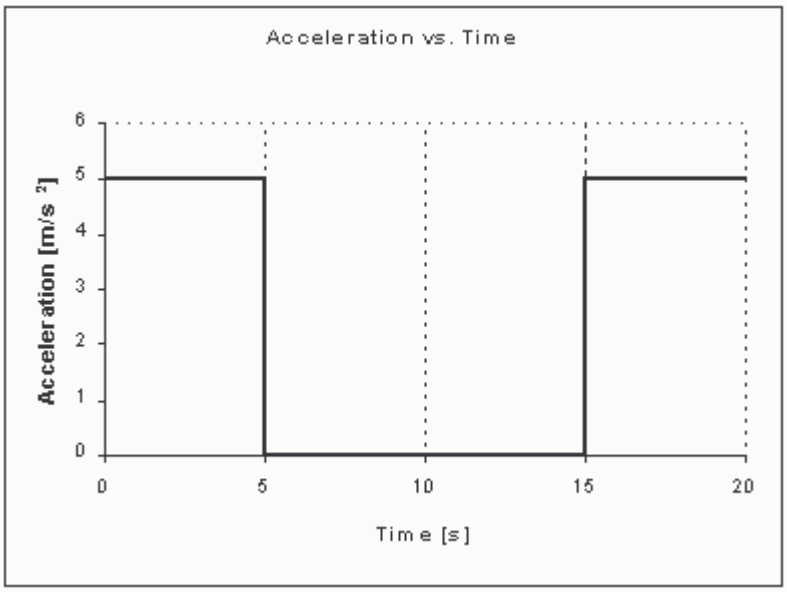
F. At the start of the time interval the car is already moving forward. It continues to move forward but is steadily slowing down.

Question 3 **20 points** Save

A car moves on a straight line path, starting from rest at time 0. It undergoes a constant acceleration of 5 m/s^2 for 5 seconds. Then the car experiences no acceleration for 10 seconds at which point it begins to accelerate steadily at –5 m/s^2 and continues to do for the final 5 seconds of motion under study. Which graph of acceleration vs. time correctly characterizes the motion of the car?



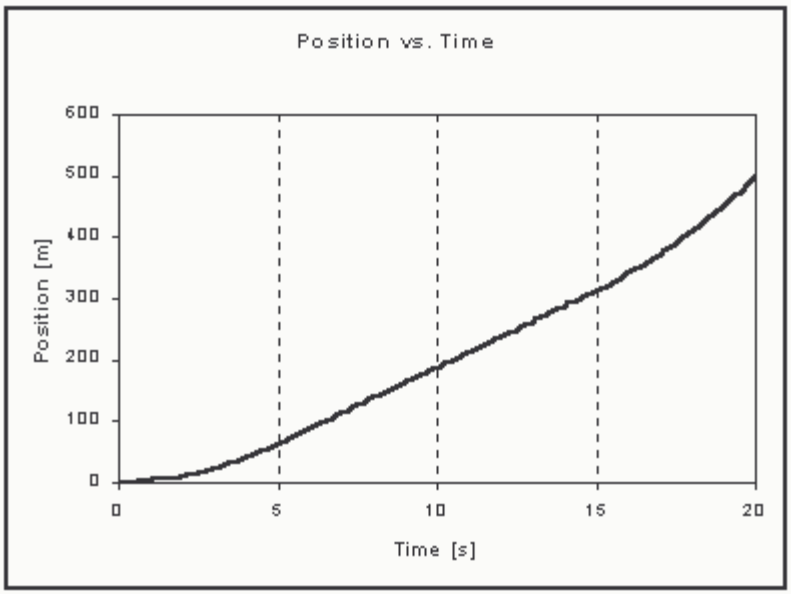


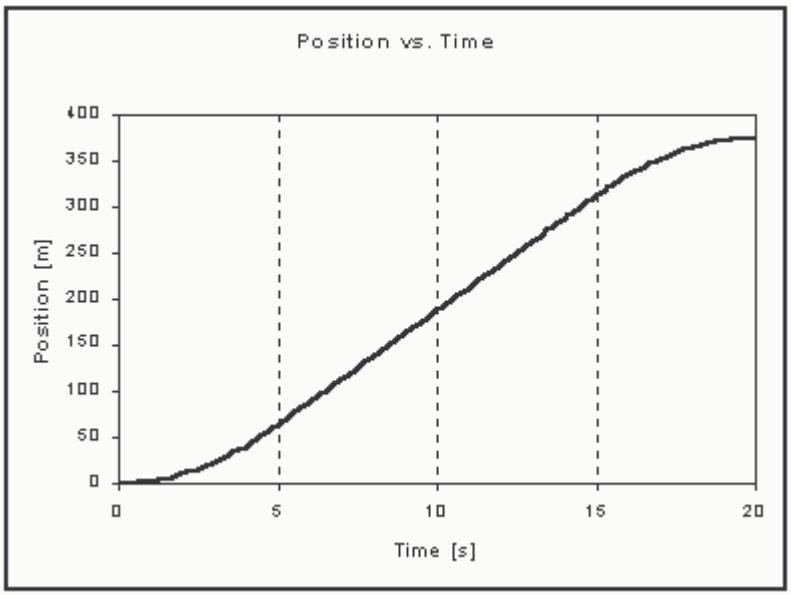


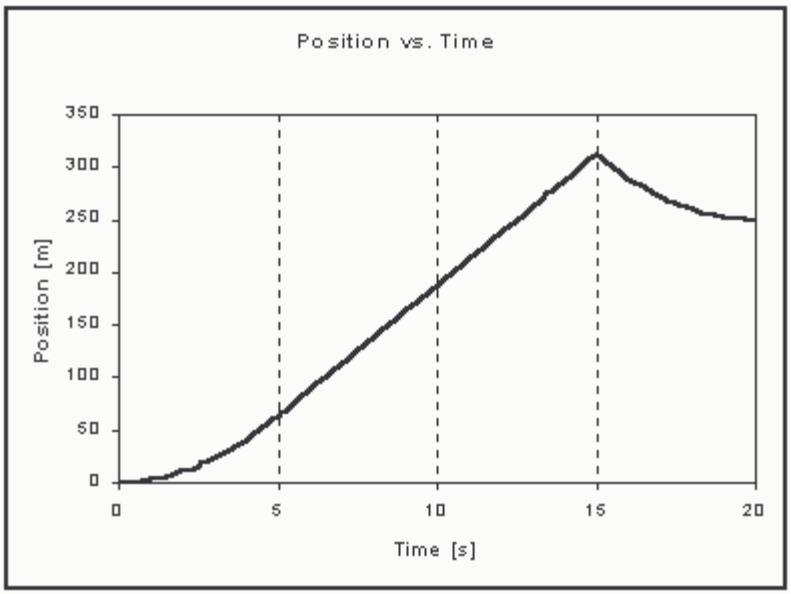
No other answer provided is correct.

Question 4 **15 points** Save

A car moves on a straight line path, starting from rest, at $x = 0$, at time 0. It undergoes a constant acceleration of 5 m/s^2 for 5 seconds. Then the car experiences no acceleration for 10 seconds at which point it begins to accelerate steadily at –5 m/s^2 and continues to do for the final 5 seconds of motion under study. Which graph of position vs. time correctly characterizes the motion of the car?


Position vs. Time
Position [m]
600
500
400
300
200
100
0
0
5
10
15
20
Time [s]

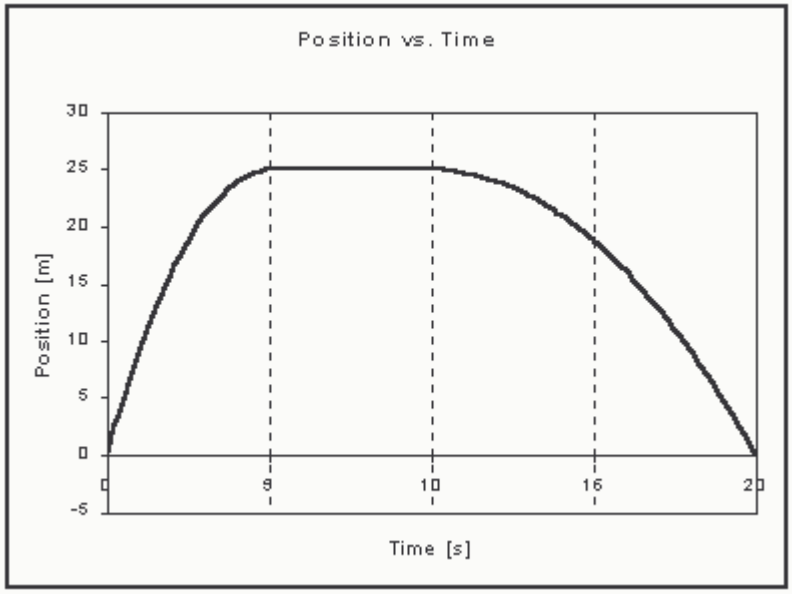

Position vs. Time
Position [m]
400
350
300
250
200
150
100
50
0
0
5
10
15
20
Time [s]



No other answer provided is correct.

Question 5 **15 points** Save

A start line (x=0) and a positive x-direction are established for a straight road. Observations are made on the motion of a car on that road. The observer has a stopwatch in hand. The time in the graph below represents the stopwatch reading. The stopwatch was started at time 0. Based on the graph below, characterize the initial (time zero) position and velocity of the car.



The car is at rest at the start line.

The car is at rest at a position ahead of the start line.

The car is at rest at a position behind the start line.

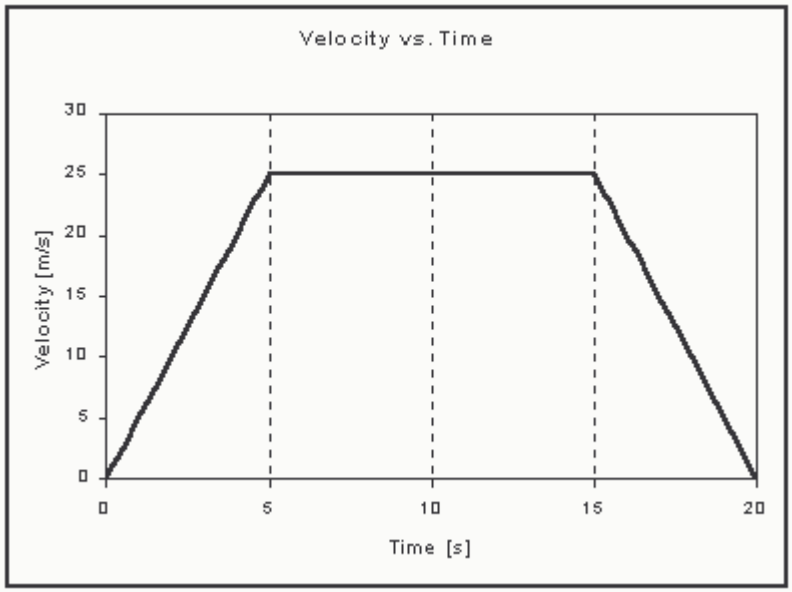
The car is at the start line but it already has an appreciable forward speed. The observer must have started the stopwatch when the car was already moving, just as it crossed the start line.

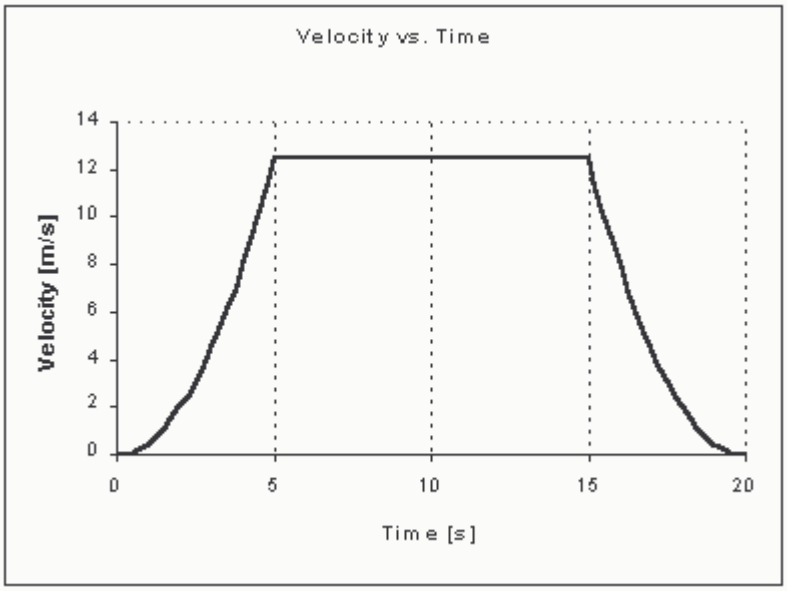
The car is ahead of the start line and is moving forward at an appreciable speed.

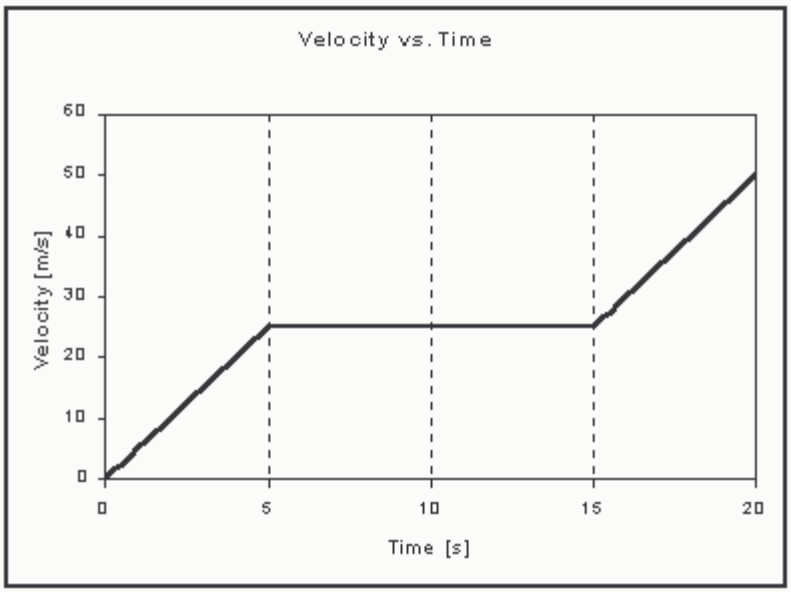
The car is behind the start line and is moving forward at an appreciable speed.

Question 6 **15 points** Save

A car moves on a straight line path, starting from rest at time 0. It undergoes a constant acceleration of 5 m/s^2 for 5 seconds. Then the car experiences no acceleration for 10 seconds at which point it begins to accelerate steadily at –5 m/s^2 which it continues to do for the final 5 seconds of motion under study. Which graph of velocity vs. time correctly characterizes the motion of the car?







- No other answer provided is correct.

Save Submit

Preview Assessment Lec 10 Quiz

Name: Lec 10 Quiz

Instructions:

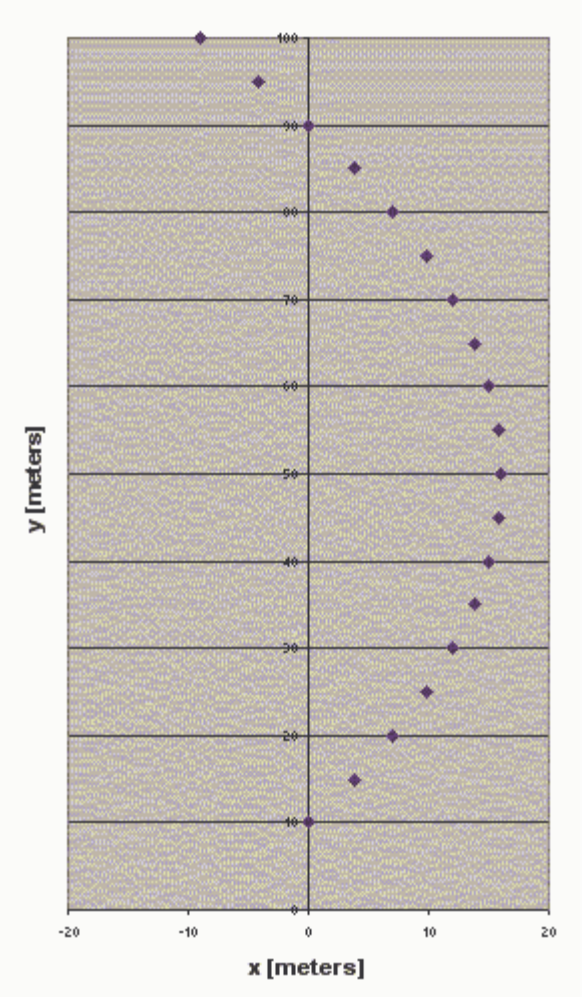
Multiple Attempts: This Test allows multiple attempts.

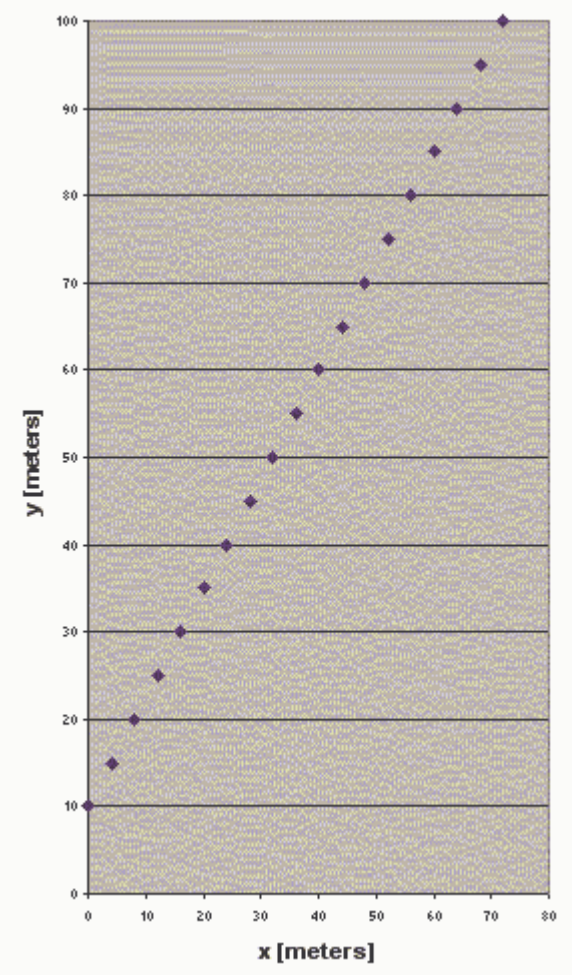
Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **100 points** Save

The positions of a particle moving on a frictionless horizontal surface are specified by means of a Cartesian coordinate system. At time 0, the particle is at (0, 10.0 m) and has a velocity of 12.8 m/s at 128.66°. The particle has a constant acceleration of 2.00 m/s^2 at 0.0°. Which of the following diagrams best characterizes the trajectory of the particle?




y [meters]
x [meters]
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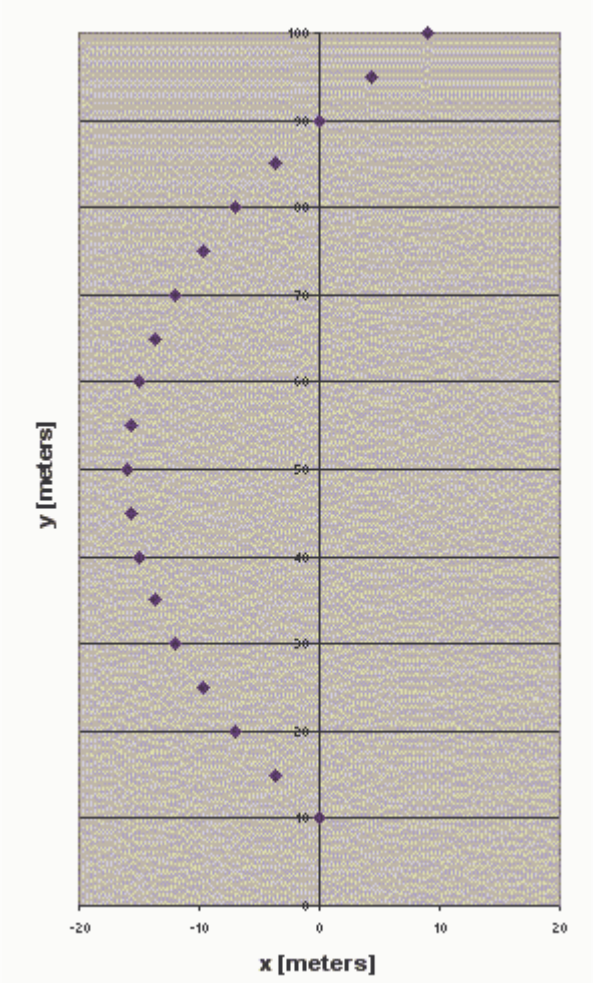
20
30
40
50
60
70
80
90
100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x [meters]
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-10
0
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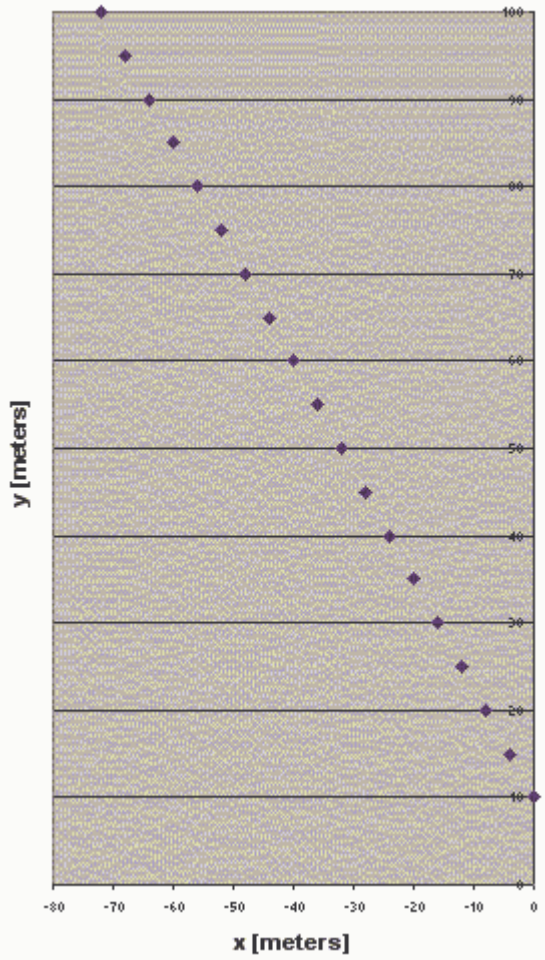
y [meters]
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90
80
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20
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0
-80
-70
-60
-50
-40
-30
-20
-10
0
x [meters]

Save Submit

Preview Assessment Lec 11 Quiz

Name: Lec 11 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

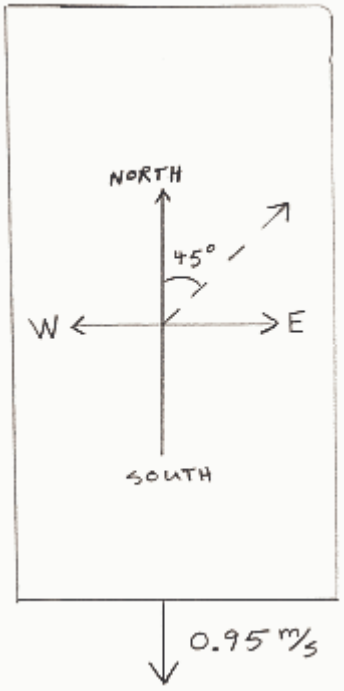
Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

A marble is rolling northeast at .65 m/s with respect to the railroad car it is in. The railroad car is going due south at .95 m/s. In what direction, is the marble going relative to the ground?

The figure below is included to clarify what is meant by "northeast relative to the railroad car." It depicts a railroad flatcar moving southward. The compass directions are painted on the railroad car, as is a dotted line with an arrowhead. The marble stays on the dotted line as it rolls on the railroad car toward the arrowhead.



- Northeast
- South
- In a northeasterly direction.
- In a southeasterly direction
- No other answer provided is correct.

Question 2 **20 points** Save

A person has a throwing speed of 30 m/s. That is, every time she throws something it travels at 30 m/s relative to whatever she is standing on. Suppose she is standing on a bus which is moving due north at 35 m/s and throws a ball, with her normal throwing speed, directly toward the rear of the bus. How fast and in what direction would the ball be moving horizontally relative to the street (prior to the ball hitting anything)?

- 5 m/s northward
- 5 m/s southward
- 65 m/s northward
- 65 m/s southward
- No other answer provided is correct.

Question 3 **20 points** Save

A person in a car which is going due east at a steady 35 m/s points a rifle, whose muzzle velocity is 200 m/s due south, and pulls the trigger. Ignore air resistance. Assume the bullet hits nothing for the first 0.5 seconds of its travel and the car keeps traveling east at 35 m/s.
0.25 seconds after the bullet is fired:

- The car is farther east than the bullet is.
- The bullet is farther east than the car is.
- Neither the bullet nor the car is farther east than the other.
- No other answer provided is correct.

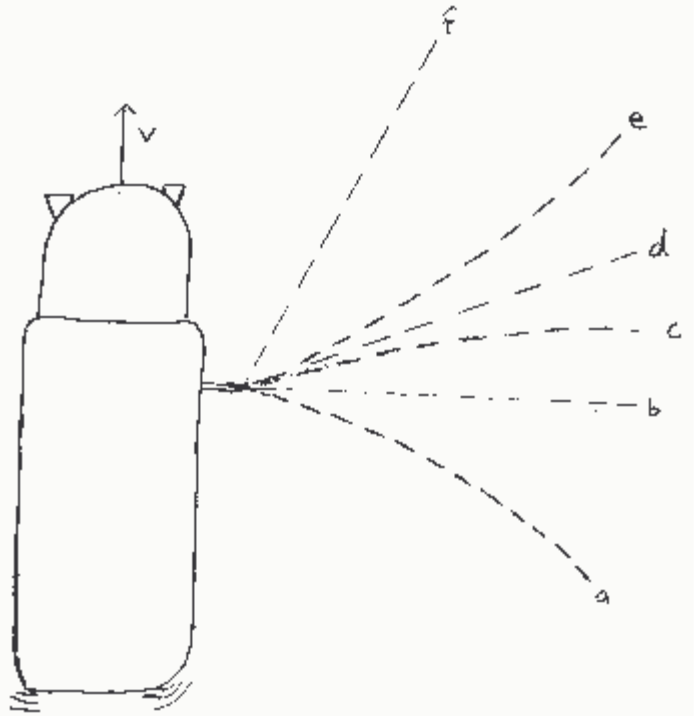
Question 4 **20 points** Save

A person is operating a motorboat such that it is heading due east and if it were on still water it would be going due east at 12 mph. But it is not on still water. It is on a river. The boat has just left the west bank of the river which flows due north at 5 mph. In what direction is the boat actually going?

- The boat is going due east.
- The boat is going due north.
- The boat is going northeast.
- The boat is going in a direction which is between north and northeast.
- No other answer provided is correct.

Question 5 **20 points** Save

Below is a bird's eye view of a bus traveling due north at 50 mph at the instant a pellet gun, pointed due east, is fired. The muzzle velocity of the gun is 25 mph. (The muzzle velocity is the speed of the pellet relative to the gun, in the direction in which the gun is pointing.) Which of the trajectories depicted in the diagram will the pellet follow relative to the road? Ignore air resistance.



- a)
- b)
- c)
- d)
- e)
- f)

Save Submit

Preview Assessment Lec 12 Quiz

Name: Lec 12 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **50 points** Save

A rock is released from rest from point P, a point near the surface of the earth, but high enough above the surface of the earth that it takes more than 4 seconds for the rock to hit the ground. 2 seconds after the release of the first rock a second rock is thrown straight downward from point P with an initial speed of 10.0 m/s. Which of the following most correctly describes what happens after the release of the second rock but prior to any rock/rock or rock/ground collision?

- The second rock continually gains on the first rock thus decreasing the separation of the rocks.
- The separation of the two rocks remains constant.
- The first rock continually gains on the second rock thus increasing the separation of the rocks.

Question 2 **50 points** Save

A rock is thrown straight up. Neglecting air resistance, how does the speed of the rock when it reaches its release point on the way down compare with the speed it had upon release.

- The speed of the rock at the release point on the way down is greater than the speed of the rock upon release.
- The speed of the rock at the release point on the way down is the same as the speed of the rock upon release.
- The speed of the rock at the release point on the way down is less than the speed of the rock upon release.

Save Submit

Preview Assessment Lec 13 Quiz

Name: Lec 13 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **12 points** Save

A rock is thrown up into the air at an angle of 75° ab ove the horizontal. Neglect air resistance. The questions pertain only to the free-fall portion of the rock's flight. What is the direction of the acceleration of the rock: (Beside each question item select one answer item. Any answer item may be used more than once.)

- on the way up?
- at the top of its flight?
- on the way down?

A. upward
B. downward
C. forward
D. backward
E. upward and forward
F. downward and forward
G. upward and backward
H. downward and backward

Question 2 **12 points** Save

A rock is thrown with a velocity of 5.0 m/s at 35° above the horizontal. Ignore air resistance an d consider only the free-fall portion of the rock's flight. What is the x-component of the rock's velocity:

- at the instant after release?
- at the top of its flight?
- on the way down, at the instant it achieves the elevation from which it was released?

A. 0 m/s
B. 2.9 m/s
C. –2.9 m/s
D. 4.1 m/s
E. –4.1 m/s
F. 9.8 m/s
G. –9.8 m/s
H. none of the given values

Question 3 **12 points** Save

A rock is thrown with a velocity of 5.0 m/s at 35° above the horizontal. Ignore air resistance an d consider only the free-fall portion of the rock's flight. Consider the forward direction to be the x-direction and upward to be the y-direction. What is the y-component of the rock's velocity:

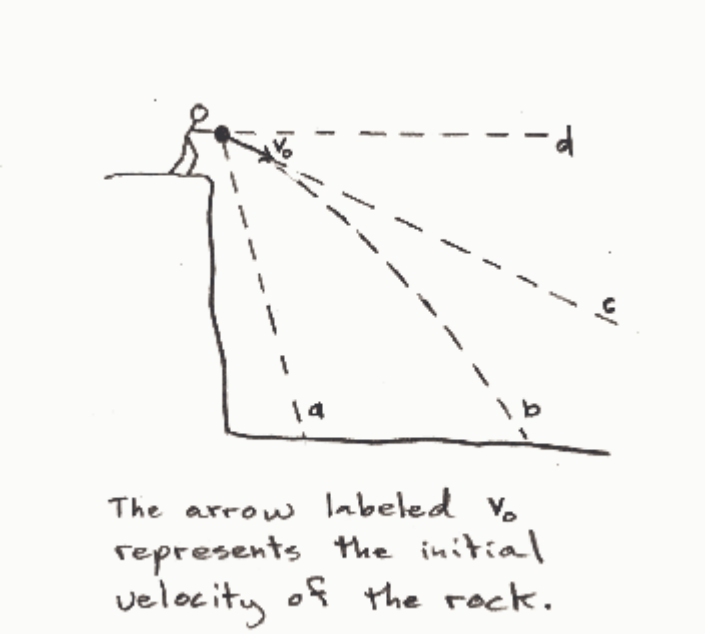
- at the instant after release?
- at the top of its flight?
- on the way down, at the instant it achieves the elevation from which it was released?

A. 0 m/s
B. 2.9 m/s
C. –2.9 m/s
D. 4.1 m/s

E. –4.1 m/s
F. 9.8 m/s
G. –9.8 m/s
H. none of the given values

Question 4 **9 points** Save

A rock is thrown from a cliff. The initial velocity of the rock is 15 m/s at an angle of 30° below the horizontal. Which trajectory will the rock follow? Ignore air resistance.



- a
- b
- c
- d
- No other answer provided is correct.

Question 5 **9 points** Save

A rock is thrown up into the air with an initial velocity of 7 m/s at an angle of 65° above the horizontal. The rock is released from a point that is 1.5 m above the ground which is flat and level. At the exact same instant that the rock is released, another rock is released from rest from the same height, 1.5 m, from which the first rock was released. Which rock, if either, hits the ground first?

- They both hit at the same time.
- The thrown rock hits first.
- The dropped rock hits first.
- Not enough information is given to determine a definite answer.

Question 6 **9 points** Save

A projectile is launched horizontally from a height of 12 meters above ground level at a speed of 22 m/s. What is the x-component of the initial velocity?

- 0 m/s
- 22 m/s
- 15.6 m/s
- –15.6 m/s
- No other answer provided is correct.

Question 7 **9 points** Save

A projectile is launched horizontally from a height of 12 meters above ground level at a speed of 22 m/s. What is the y-component of the initial velocity?

- 0 m/s
- 22 m/s
- 15.6 m/s
- –15.6 m/s
- No other answer provided is correct.

Question 8 **9 points** Save

A projectile is launched horizontally from a height of 12 meters above ground level at a speed of 22 m/s. How long does it travel before hitting the ground?

- 1.6 seconds
- 2.4 seconds
- 3.2 seconds
- 4.0 seconds
- No other answer provided is correct.

Question 9 **9 points** Save

A projectile is launched horizontally from a height of 12 meters above ground level at a speed of 22 m/s. How far forward does it go before hitting the ground?

- 12 meters
- 23 meters
- 34 meters
- 43 meters
- No other answer provided is correct.

Question 10 **10 points** Save

A projectile is launched horizontally from a height of 12 meters above ground level at a speed of 22 m/s. How fast is it going just before it hits the ground?

- 15 m/s
- 22 m/s
- 27 m/s
- 32 m/s

-
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 14 Quiz

Name: Lec 14 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **10 points** Save

A karate expert hits a thick board with her hand. The board breaks. Why does the board break while the karate expert's hand does not?

- The karate expert hits the board, not the other way round. The karate expert does feel the board but because she is the agent of the actual force, the force on the board is much greater than the force on her hand, the board breaks while her hand remains intact.
- The board absorbs the energy from the hand and gives way so it cannot exert an equal and opposite force on the hand.
- The force exerted on the hand by the board is just as great as the force exerted on the board by the hand. That magnitude of force is sufficient to break the board but it is not sufficient to break the hand. At the orientation of each at impact, the hand can withstand, without breaking, a greater force than the board can.
- No other answer provided is correct.

Question 2 **10 points** Save

Consider a cart pulled by a horse. How can the horse ever get the cart moving if, no matter how hard the horse pulls forward on the cart, the cart pulls backward just as hard on the horse.

- The force of the cart pulling backward on the horse is not a force on the cart so it does not affect the motion of the cart. The force of the horse on the cart is what causes the cart to accelerate forward.
- The two forces cancel each other out so the horse can never cause the cart to accelerate. The horse can only pull the cart at constant velocity.
- The reaction force of the force of the horse on the cart is a force exerted by the road on the horse, not by the cart on the horse.
- The cart does not exert a force on the horse because the cart is an inanimate object. There is nothing to cancel the force of the horse on the cart.
- No other answer provided is correct.

Question 3 **10 points** Save

In the case of a horse pulling a cart, if the cart is pulling backward on the horse just as hard as the horse pulls forward on the cart, how can the horse ever get going?

- The premise is wrong. The cart does not pull on the horse.
- The ground pushes the horse forward with a force that is greater than the force with which the cart pulls backward on the horse. Hence there is a net forward force on the horse.
- The force of the cart on the horse is just a reaction force to the force of the horse on the cart. It does not affect the motion of the horse.
- The cart pulls backward on the horse but not as hard as the horse pulls forward on the cart.
- No other answer provided is correct.

Question 4 **10 points** Save

What's the difference between mass and weight?

- There is no difference. They represent two different terms for the same thing.
- Mass pertains to solids only, whereas, weight pertains to all phases of matter.
- Weight is a characteristic of an object, whereas mass is a characteristic of the motion of an object.
- Mass is a measure of an object's inertia, whereas weight is a measure of how hard the earth is pulling on an object.
- No other answer provided is correct.

Question 5 **10 points** Save

A huge truck going 20 mph collides head-on with a small car also going 20 mph. The car is badly smashed and pushed backward whereas the truck is less damaged and continues forward. How does the force with which the truck pushes on the car compare with the force with which the car pushes on the truck during the collision?

- The car pushes harder on the truck. One can tell that this is the case because the car distorts itself in pushing on the truck more than the truck distorts itself pushing on the car.
- The truck pushes harder on the car. We know this because the car is pushed backward.
- The car pushes just as hard on the truck as the truck pushes on the car in accordance with Newton's third law. The car experiences a greater acceleration than the truck does because it has less mass.
- No other answer provided is correct.

Question 6 **10 points** Save

Any object near the surface of the earth experiences a force known as the weight of said object. Name the agent of the weight force.

- Inertia
- Mass
- The air.
- The ground.
- Gravity
- The earth.
- No other answer provided is correct.

Question 7 **10 points** Save

Consider a car accelerating in the forward direction. What exerts the force on the car that causes the car to experience the forward acceleration.

- The engine.
- The air.
- Gravity.
- No other answer provided is correct.

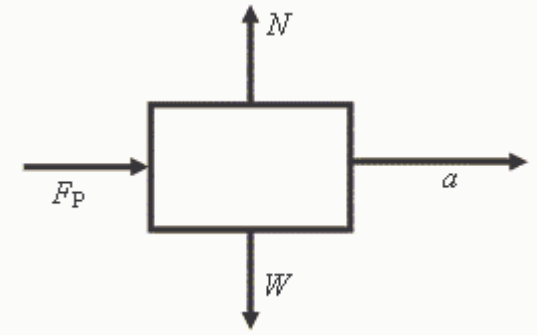
Question 8 **10 points** Save

Once an arrow is shot into the air, what exerts the force that makes the arrow keep on going downrange? (Downrange is the horizontal direction away from the bow in which the arrow is going. The arrow also has some vertical motion.)

- m·a.
- The air squeezing on the back of the arrow exerts the forward force necessary to keep the arrow moving forward.
- Nothing. The natural tendency of the arrow is to keep on moving forward at a constant velocity. The earth does exert a gravitational force on the arrow in the downward direction which does affect the arrow's vertical motion, but this is not what keeps it going downrange.
- The string of the bow from which the arrow was shot.
- Inertia.
- The earth.
- No other answer provided is correct.

Question 9 **10 points** Save

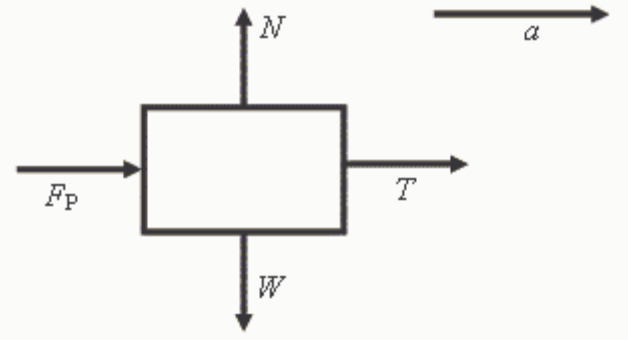
Judging from the free body diagram alone; given that F_P is the force exerted on the block by a person, N is the normal force exerted on the block by the floor, W is the weight of the block, and a is the acceleration of the block; what is wrong with the following free body diagram?



- The arrow representing the force of the person is pointing the wrong way.
- The arrow representing the force of the person is drawn with the head of the arrow touching the block. The arrow must be moved to the other side of the block and drawn so that the tail of the arrow is touching the block, not the head.
- The force arrows are touching the object.
- The acceleration arrow is touching the object.

Question 10 **10 points** Save

Which one of the equations below does not follow from the following free body diagram of a block of mass m?



- $F_P + T = ma$
- $N - W = 0$

- $N - W = ma$
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 15 Quiz

Name: Lec 15 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **24 points** Save

A block is released from rest on a flat frictionless board which is tilted so that it slants down to the right. To help yourself with this question, draw a free body diagram for the block. Beside each direction given below, indicate the number of forces acting on the block in that direction.

- Up the ramp.
- Down the ramp.
- Perpendicular to and into the ramp.
- Perpendicular to and out of the ramp.
- Straight up.
- Straight down.
- Horizontal and to the right.
- Horizontal and to the left.

A. 0
B. 1
C. 2
D. 3

Question 2 **20 points** Save

A person pushes horizontally on a crate in the forward direction. The crate is on a rough surface. The crate accelerates forward without tipping. Draw the free body diagram for the crate and then indicate the number of forces on your diagram in each of the directions specified below. (You may use any answer item more than once. You do not have to use all the answer items.)

- Number of forces in the upward direction.
- Number of forces in the downward direction.
- Number of forces in the forward direction.
- Number of forces in the backward direction.

A. 0
B. 1
C. 2
D. 3

Question 3 **16 points** Save

A block is sliding up a ramp in the straight-up-the-ramp direction which is also the up-and-to-the-right direction. The surface of the ramp is flat but not horizontal and not smooth. The block is in contact with nothing but the ramp. What is the direction of the acceleration of the block? (Choose the one best answer.)

- In no direction. The acceleration is zero. Since there is no acceleration, there is no direction of acceleration.
- Up the ramp.
- Down the ramp.
- Perpendicular to and into the ramp.

- Perpendicular to and out of the ramp.
- Straight up.
- Straight down.
- To the right.
- To the left.
- The information given is insufficient to determine a definite answer.

Question 4 **24 points** Save

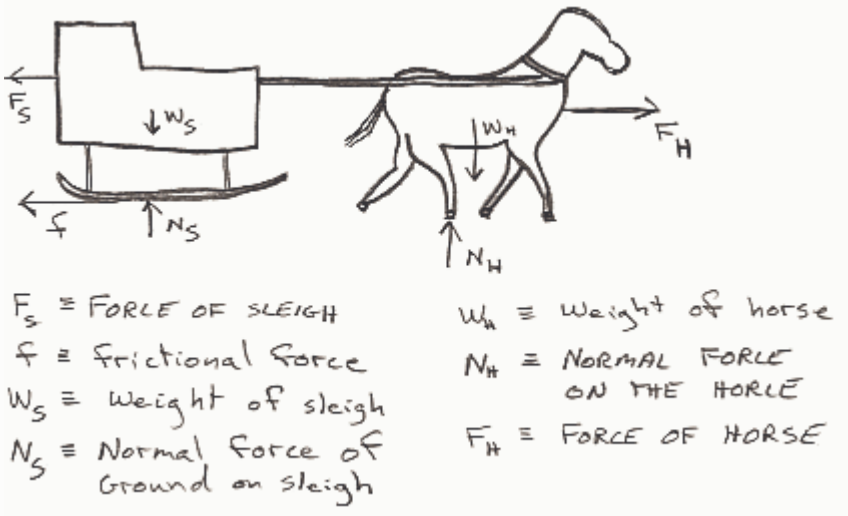
A block is sliding up a ramp in the straight-up-the-ramp direction which is also the up-and-to-the-right direction. The surface of the ramp is flat but not horizontal and not smooth. The block is in contact with nothing but the ramp. Draw a free body diagram of the block. Beside each direction specified below, indicate the number of forces acting on the block in that direction.

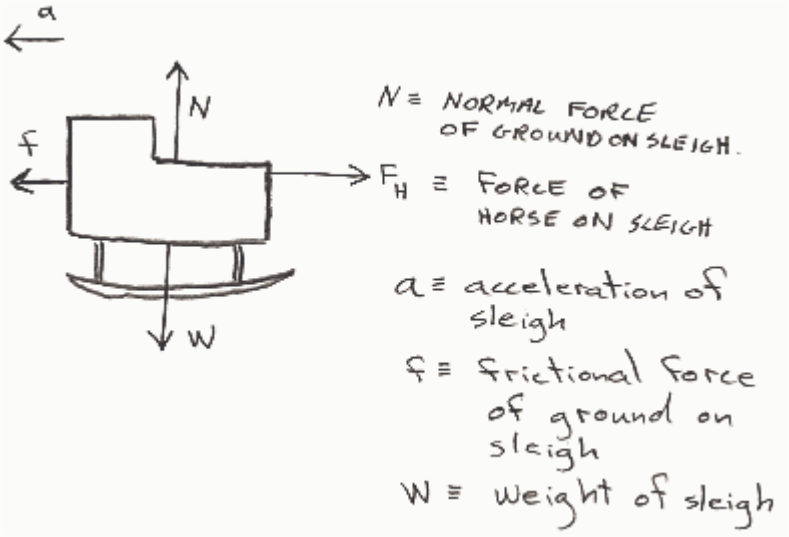
- Parallel to the surface of the ramp, up the ramp.
- Parallel to the surface of the ramp, down the ramp.
- Perpendicular to and into the ramp.
- Perpendicular to and out of the ramp.
- Straight up.
- Straight down.
- Horizontal and to the right.
- Horizontal and to the left.

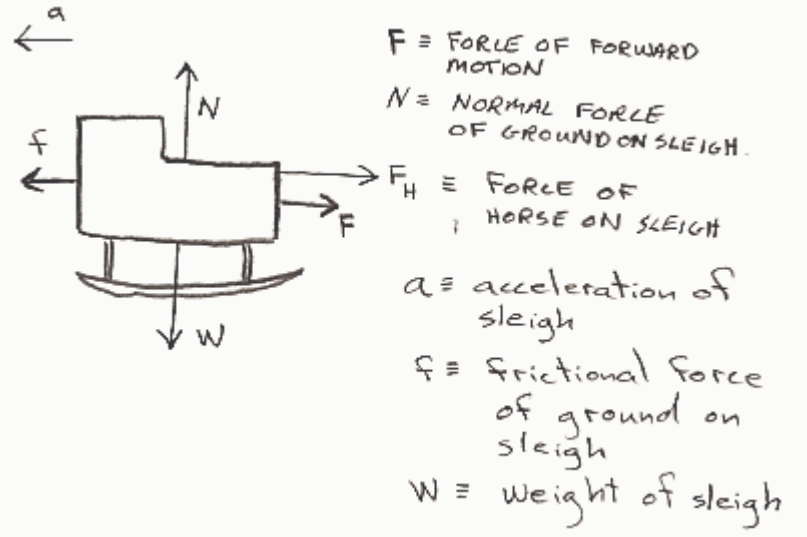
A. 0
B. 1
C. 2
D. 3

Question 5 **16 points** Save

A horse is pulling a sleigh over flat level, snow-covered terrain when the sleigh hits a bare patch of ground causing the sleigh to be slowing down even though the horse is pulling directly forward on the sleigh. Which one of the following represents a correct, complete free body diagram for the sleigh under the given circumstances? (Consider the harness to be part of the horse.)







No other answer provided is correct.

Save Submit

Preview Assessment Lec 16 Quiz

Name: Lec 16 Quiz

Instructions:

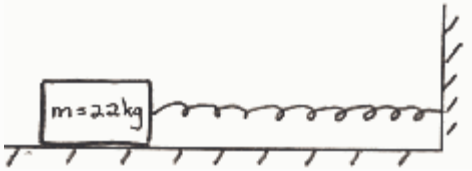
Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

Below is depicted a block on a frictionless surface. It is attached by a spring to a wall. The unstretched length of the spring is 1.00 m. The spring is stretched so that its length as depicted in the diagram is 1.20 m. Because of the spring, the block is accelerating rightward at 2.3 m/s^2. What is the force constant (also known as the spring constant) for the spring?



- .44 N/m
- 3.9 N/m
- 88 N/m
- 250 N/m
- No other answer provided is correct.

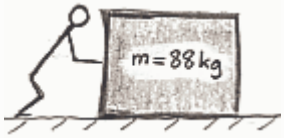
Question 2 **20 points** Save

Depicted below is a block of mass 1.5 kg on a frictionless incline. The surface of the incline makes an angle of 12° with the horizontal. What is the magnitude of the acceleration of the block?

- 0 m/s^2
- 1.2 m/s^2
- 2.0 m/s^2
- 9.8 m/s^2
- No other answer provided is correct.

Question 3 **20 points** Save

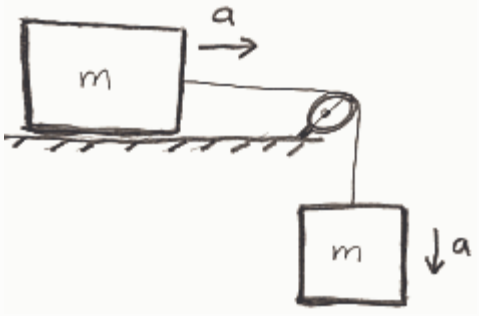
The diagram below depicts a person pushing horizontally on a crate on a horizontal surface which is not frictionless. The person is exerting a force of 320 N on the crate and the crate is accelerating forward at 1.0 m/s^2. Find the coefficient of kinetic friction governing the crate/floor interface.



- 0
- .27
- .45
- .68
- No other answer provided is correct.

Question 4 **20 points** Save

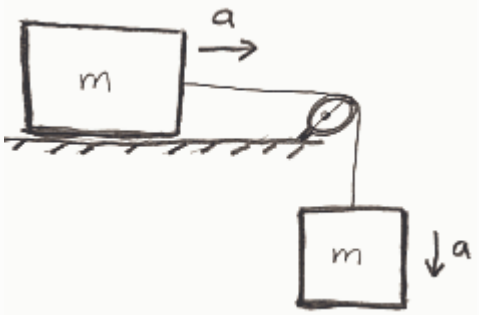
The diagram below depicts two objects connected by a taut cord. One of the objects is sliding rightward on a frictionless surface while the other is descending. Consider the cord to be massless and the pulley to be massless and frictionless. What is the direction of the force exerted on the descending mass by the cord?



- upward
- downward
- leftward
- rightward
- There is no force exerted on the descending object by the cord.
- No other answer provided is correct.

Question 5 **20 points** Save

The diagram below depicts two objects connected by a taut cord. One of the objects is sliding rightward on a frictionless surface while the other is descending. Consider the cord to be massless and the pulley to be massless and frictionless. How does the magnitude of the tension in the cord compare with the weight of the descending object?



- The tension in the cord is equal to the weight of the block.
- The tension in the cord is less than the weight of the block.
- The tension in the cord is greater than the weight of the block.
- The information given is insufficient to determine a definite answer.

- No other answer provided is correct.

Save Submit

Preview Assessment Lec 17 Quiz

Name: Lec 17 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

Point objects 1, 2, and 3 are all equidistant from each other. Objects 1 and 2 have one and the same mass. The mass of object 3 is twice that of object 1. How does the force exerted upon object 1 by object 2 compare with the force exerted upon object 1 by object 3.

- The force of object 2 on object 1 is the same as the force of object 3 on object 1.
- The force of object 2 on object 1 is one forth the force of object 3 on object 1.
- The force of object 2 on object 1 is four times the force of object 3 on object 1.
- Insufficient information is given. The answer depends on which object is in the middle.
- No other answer provided is correct.

Question 2 **20 points** Save

If any two objects that have mass exert an attractive gravitational force on each other, why is it possible for me to put two books on a desk without having them slide toward each other.

- The gravitational force is only present if one of the objects is of mass comparable to that of the moon.
- For two books, because of the small mass of each, the gravitational force is so small compared to the frictional force that the desk can exert on each book, that the effect of the force is unnoticeable.
- The gravitational force is only present in vacuum. The earth pulls on the moon, for instance, because there is no air in much of the space between them.
- Because of the tiny separation between the centers of the books, as compared to the separation between either of the books and the center of the earth, the force that one book exerts on the other is vanishingly small.
- No other answer provided is correct.

Question 3 **20 points** Save

If the sun is pulling the earth directly toward the center of the sun, why hasn't the earth crashed into the sun?

- The earth's momentum keeps it from falling into the sun.
- The gravitational force of the sun on the earth is what provides the centripetal force on the earth necessary to keep it moving in a circle.
- The sun actually exerts a sideways force on the earth which keeps it going around the sun in an elliptical path which is pretty close to being circular.
- No other answer provided is correct.

Question 4 **20 points** Save

If you decrease the separation of two objects by one third, what happens to the gravitational force of attraction that each exerts upon the other?

- It becomes 9/4 what it was.
- It becomes 1/3 what it was.
- It becomes 1/9 what it was.
- It becomes 3 times what it was.
- It becomes 9 times what it was.
- No other answer provided is correct.

Question 5 **20 points** Save

What happens to the gravitational force that one object exerts on another if you triple the separation of the two objects?

- The force becomes 1/9 times less than what it was.
- The force becomes 1/3 of what it was.
- The force becomes 1/9 of what it was.
- the force becomes 3 times what it was.
- The force becomes 9 times greater than what it was.
- The force becomes 9 times what it was.
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 18 Quiz

Name: Lec 18 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

Consider a person in the passenger seat of a car that is in the process of making a left turn at a constant speed. The passenger feels as if she is being pressed against the door of the car. Why?

- A person's inertia, that natural tendency to move in a straight line path, feels, to a person in a car going around on a part of a circular path, like a force directed away from the center of the circle. This is what she feels.
- The force experienced by the person is just the reaction force to the force exerted by the street on the wheels of the car.
- The force pushing her toward the door is centripetal force experienced by the person because she is in circular motion.
- No other answer provided is correct.

Question 2 **20 points** Save

For an object in uniform circular motion the acceleration is directed:

- toward the center of the circle on which the object is moving.
- directly away from the center of the circle.
- tangent to the circle.
- No other answer provided is correct.

Question 3 **20 points** Save

Recall that the adjective "uniform" in uniform circular motion implies that the speed of the object that is moving in a circle is constant. Which of the following statements about the acceleration of an object undergoing uniform circular motion is most correct?

- The acceleration of the object is zero.
- The magnitude of the acceleration is constant.
- The magnitude of the acceleration varies continuously.
- No other answer provided is correct.

Question 4 **20 points** Save

Consider a car going around a circular track at constant speed. What exerts the force on the car that causes the acceleration that the car is experiencing?

- The car experiences no acceleration so nothing is exerting such a force.
- The force in question is the weight of the car and it is exerted on the car by the earth.
- The engine exerts the force which causes the acceleration the car is experiencing.

- No other answer provided is correct.

Question 5 **20 points** Save

Consider two people on a merry-go-round which has a constant spin rate. Harry is sitting on the merry-go-round 1 meter from the center. Jane is sitting on the merry-go-round 2 meters from the center. Which, if either has the greater speed.

- They both have the same speed.
- Harry is going faster.
- Jane is going faster.
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 19 Quiz

Name: Lec 19 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **13 points** Save

How many radians are there in a circle?

- π
- 2π
- 360
- 1
- No other answer provided is correct.

Question 2 **13 points** Save

What is angular acceleration?

- How fast and which way an object is spinning.
- How fast and which way a point on a spinning object is moving.
- How fast and which way the spin rate of an object is changing.
- How fast and which way the speed and direction of motion of a point on a spinning object is changing.
- No other answer provided is correct.

Question 3 **13 points** Save

What is angular velocity?

- How fast and which way an object is spinning.
- How fast and which way a point on a spinning object is moving.
- How fast and which way the spin rate of an object is changing.
- How fast and which way the speed and/or direction of motion of a point on a spinning object is changing.
- No other answer provided is correct.

Question 4 **13 points** Save

What symbol is used to represent angular acceleration?

- lower-case omega
- upper-case omega
- lower-case alpha

- upper-case alpha
- No other answer provided is correct.

Question 5 **12 points** Save

What symbol is used to represent angular velocity?

- v-sub-a
- upper-case omega
- lower-case omega
- upper-case alpha
- lower-case alpha
- No other answer provided is correct.

Question 6 **12 points** Save

A person is pedaling her bicycle along a straight path such that both wheels (each of which has a diameter of .820 meters and is rolling without slipping) have an angular acceleration of 2.40 radians per second. What is the acceleration of the bike?

- 0
- .171 m/s^2
- .342 m/s^2
- .984 m/s^2
- 1.97 m/s^2
- 2.93 m/s^2
- 5.85 m/s^2

Question 7 **12 points** Save

A solid cylinder of radius 0.25 m is mounted on a thin horizontal rod through the center of the cylinder and perpendicular to the base of the cylinder. The cylinder is free to rotate, without friction, on the rod. A person holds the cylinder in a fixed position while taping one end of a piece of string to the wall of the cylinder and then wrapping the string several turns around the circumference of the cylinder. The thickness of the string is negligible. The person ties an object onto the other end of the string and lets that object hang there at rest. Finally, the person lets go of the cylinder. The string unwinds from the cylinder as the object drops with an acceleration of 6.0 m/s^2. What is the angular acceleration of the cylinder?

- 0
- 0.042 rad/s^2
- 4.0 rad/s^2
- 16 rad/s^2
- No other answer provided is correct.

Question 8 **12 points** Save

A disk of radius 1.20 m is rotating about its axis of symmetry with an angular velocity of 5.0 rad/s. What is the speed of a point, on the disk, that is 0.40 m from the rim?

- 0

-
- .24 m/s
- 4.2 m/s
- 6.0 m/s
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 20 Quiz

Name: Lec 20 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **10 points** Save

What is meant by the expression "Moment Arm". (Indicate all the answers that are correct.)

- [ ] It's a synonym for the expression "rotational inertia".
- [ ] It's what you multiply the magnitude of the force by to get the magnitude of the torque.
- [ ] It's the distance from the axis of rotation to the line of action of the force measured along an imaginary line which is perpendicular to the line of action of the force.
- [ ] It's the product of the rotational inertia and the angular velocity of an object.
- [ ] No other answer provided is correct.

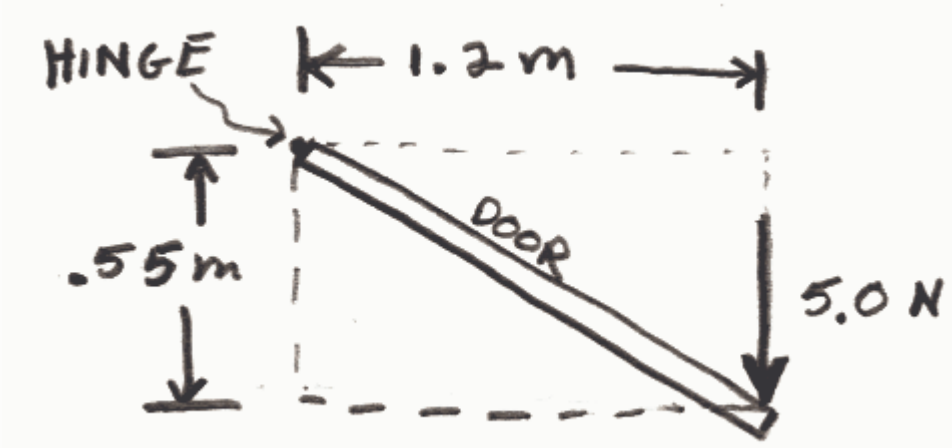
Question 2 **10 points** Save

An object is constrained to rotate on a fixed axis. A force is exerted on the object. The resulting non-zero torque on the object, with respect to the axis of rotation, does not depend on:

- ( ) the position of the point of application of the force.
- ( ) the direction of the force.
- ( ) the magnitude of the force.
- ( ) the moment of inertia of the object.
- ( ) No other answer provided is correct.

Question 3 **10 points** Save

Below is depicted a door. With respect to the door hinge, what is the moment arm for the 5.0 N force?



- 6.0 N·m
- .12 m
- .55 m
- 1.32 m
- No other answer provided is correct.

Question 4 **10 points** Save

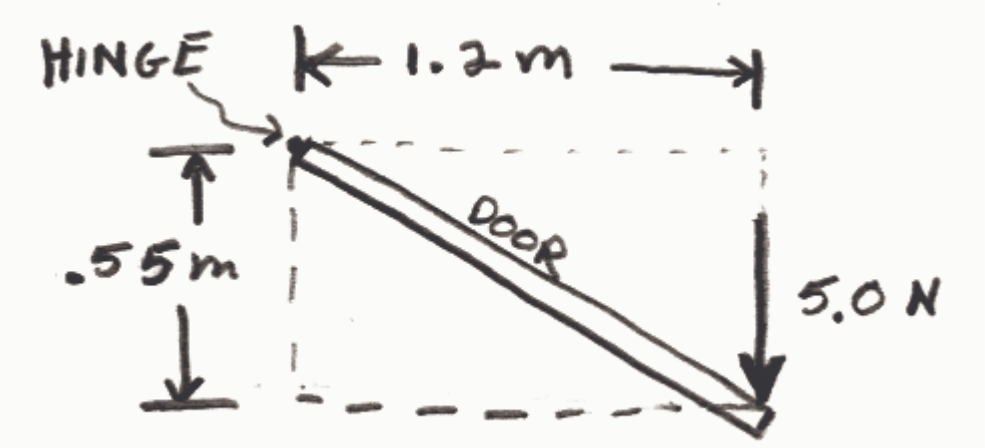
Consider a car wheel that is one of the wheels that is not connected to a drive shaft, such as a rear wheel on a front-wheel-drive car. Assume the wheel to be ideal (that is, there is no frictional torque exerted by the axle on the wheel, and, the normal force is directed through the axis of rotation). Suppose that the wheel is on a car that has a forward velocity and a forward acceleration. Further suppose that the wheel is rolling without slipping. Now because the wheel is attached to the car, and the car is accelerating forward, the wheel itself (its center of mass), must be accelerating in the forward direction.

Now consider the wheel from the viewpoint of a person who sees the wheel traveling to her right. From that viewpoint, for the wheel to be rolling without slipping it must be rotating clockwise on the axle of the car. Furthermore, since the car is accelerating forward, the angular velocity must be increasing in order for the wheel to continue rolling without slipping. For that to be the case there must be a clockwise torque on the wheel. The torque associated with the frictional force exerted on the bottom of the wheel by the road can only be clockwise if the frictional force is in the backward direction. But if we consider the motion of the wheel itself (as opposed to looking at the car as a whole), how could the wheel be accelerating forward if the frictional force is in the backward direction?

- The frictional force is actually in the forward direction.
- The component of the normal force exerted on the wheel by the road in the forward direction exceeds the frictional force.
- The force of the road on the driven wheels is in the forward direction.
- The force of the axle on the wheel has a component in the forward direction which exceeds the frictional force.
- The weight of the wheel is greater than the frictional force exerted on the wheel by the road.

Question 5 **10 points** Save

Consider the door depicted below. Someone is pushing on the door with a force of 5.0 Newtons. With respect to the door hinge, what is the torque on the door?



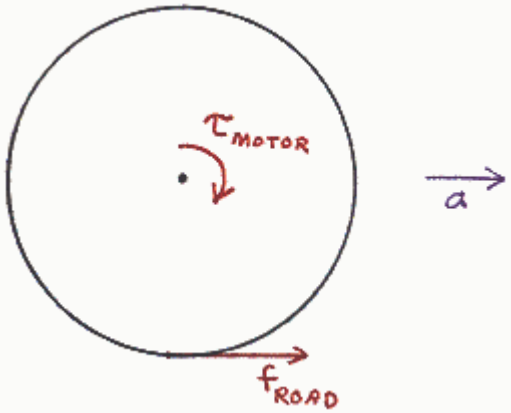
- 6.6 N·m
- 6.0 N·m
- 1.32 m

- 2.75 N·m
- 6.6 N
- No other answer provided is correct.

Question 6 **10 points** Save

Depicted below is a wheel of a car. The driver is stepping on the gas causing the motor to apply a torque to the transmission which applies a torque to the drive shaft which applies a torque to the axle which applies a torque to the wheel. In principle, the motor is applying a torque to the wheel. This would tend to cause the wheel to spin faster but it is in contact with the road and the wheel is not slipping on the road. The impending sliding motion of the bottom-most point on the wheel is backward (leftward in the diagram). The static frictional force is in the direction opposite the impending motion of that point in contact road, so the static frictional force f_{ROAD} is forward (rightward in the diagram). It is this force which causes the forward acceleration that occurs when one depresses the gas pedal with the motor running, the brakes off and the car in a forward gear.

Assuming the wheel is rolling without slipping, if the car is accelerating forward, the clockwise spin rate of the wheel must be increasing. But, in exerting the frictional force f_{ROAD} where and in the direction it does exert the frictional force, the road is also exerting a counterclockwise torque (of magnitude $r \cdot f_{ROAD}$ where r is the radius of the wheel) on the wheel. This would tend to cause the clockwise spin rate of the wheel to be decreasing. How can the clockwise spin rate of the wheel actually be increasing when the road exerts a counterclockwise torque on the wheel?



- The counterclockwise torque exerted on the wheel by the road is negative. A negative clockwise torque is actually a clockwise torque.
- The torque exerted by the motor (via the drive components) on the wheel is greater than the torque exerted by the road on the wheel.
- The frictional force is indicated in the diagram to be in the opposite direction to that of the actual frictional force exerted on the wheel by the road when the car is accelerating forward.
- From the reader's viewpoint of the diagram above, if the car is moving forward (rightward in the diagram) the wheel must be spinning counterclockwise. For the car to be moving forward and accelerating forward such that the wheel rolls without slipping, the counterclockwise spin rate of the wheel must be increasing.

Question 7 **10 points** Save

What does torque cause?

- Angular Position
- Angular Velocity
- Angular Acceleration
- No other answer provided is correct.

Question 8 **10 points** Save

A net torque of 0.012 N·m is applied to the blade of an electric mixer. The moment of inertia of the mixer is 0.00025

$kg \cdot m^2$. What is the magnitude of the angular acceleration of the blade?

- 0.000 003 0 rad/s^2
- 0.021 rad/s^2
- 48 rad/s^2
- No other answer provided is correct.

Question 9 **10 points** Save

The moment of inertia of an object plays a role in *Newton's Second Law for Rotational Motion* that is analogous to the role played by _____ in *Newton's Second Law*.

- position
- speed
- velocity
- moment of inertia
- time
- displacement
- force
- acceleration
- No other answer provided is correct.

Question 10 **10 points** Save

To determine the moment of inertia of a wheel, a net torque of 15 $N \cdot m$ is applied to the wheel and the resulting angular acceleration of the wheel is measured. The angular acceleration is measured to be 5.6 rad/s^2. What is the value of the moment of inertia of the wheel?

- 0.37 $kg \cdot m^2$
- 2.7 $kg \cdot m^2$
- 84 $kg \cdot m^2$
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 21 Quiz

Name: Lec 21 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

Conceptually, the magnitude of the cross product of two vectors is:

- a measure of the degree to which the two vectors are parallel to each other.
- a measure of the degree to which the two vectors are perpendicular to each other.
- the length of the hypotenuse of the right triangle whose sides are the two vectors placed tail to tail and whose hypotenuse is a line from the head of one of the vectors to the head of the other.
- the magnitude of the vector difference of the two vectors.
- the torque exerted on one vector by the other.
- The cross product results in a vector that is a mathematical entity and therefore has no conceptual interpretation.

Question 2 **20 points** Save

Indicate the answer that is equivalent to:

$\hat{\jmath}\times\hat{\imath},\ \hat{\jmath}\times\hat{\jmath},\ \hat{\jmath}\times\hat{k}$

- $\hat{k},\ 0,\ -\hat{\imath}$
- $0,\ 1,\ 0$
- $-\hat{k},\ 0,\ \hat{\imath}$
- $0,\ \hat{\jmath},\ 0$
- $\hat{k},\ \hat{\jmath},\ \hat{\imath}$
- None of the above.

Question 3 **15 points** Save

When calculating the sum of two vectors, the order in which one adds the vectors does not matter.

- True
- False

Question 4 **15 points** Save

When calculating the cross product of two vectors, the order in which the vectors are cross multiplied does not matter.

- True
- False

Question 5 **15 points** Save

The torque with respect to a point in space (call it point P), due to a force, is the cross product of the postion vector of the point of application of the force, relative to point P, and the force in question.

- True
- False

Question 6 **15 points** Save

The position vector of the point of application of the force, used to calculate the torque caused by that force, is a vector that extends from the point of application of the force, to the axis with respect to which the torque is being calculated.

- True
- False

Save Submit

Preview Assessment Lec 22 Quiz

Name: Lec 22 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

A 1.00 m long, thin, uniform wooden rod lies on the x axis of a Cartesian coordinate system with one end at the origin and one end at x = 1.00 m. An identical rod is positioned on the y axis with one end at the origin and one end at y = 1.00 m. The center of mass of the pair of rods is at the midpoint (call it point P with coordinates x,y) of the line segment that extends from the center of one rod to the center of the other. Now the rod on the x axis is replaced with a uniform, thin, metal rod of the same length as the wooden one but of greater mass. Again, one end of it is at the origin and the other is at x = 1.00 m. Call the position of the center of mass of the mixed pair of rods (the wooden one along the y axis and the metal one along the x axis) point P' with coordinates x', y'. How do the values of the coordinates of the center of mass of the mixed pair of rods compare with the values of the coordinates of the center of mass of the original pair of wooden rods?

- x' < x, y' < y
- x' < x, y' > y
- x' > x, y' < y
- x' > x, y' > y
- None of the other answers is correct under all the possible circumstances meeting the given conditions.

Question 2 **20 points** Save

Consider a thin rod of length 4L. Suppose you know the rod's moment of inertia I with respect to an axis perpendicular to the rod and passing through one end of the rod. Further suppose that you want to find the moment of inertia of the rod with respect to an axis perpendicular to the rod and passing through the rod at a point that is a distance L from the same end of the rod mentioned above. Would it be correct to say that the moment of inertia about the new axis is $I + mL^2$ where m is the mass of the rod?

- Yes.
- No.

Question 3 **20 points** Save

Some meter sticks, four of them to be exact, are arranged on the floor in the shape of a square. Looking down on it from a position outside the square, you identify the meter stick nearest you as the bottom of the square, the one farthest from you as the top, the one to your right as the right side of the square and the one to your left as the left side of the square. Now you remove the top and right side of the square, leaving a pair of meter sticks arranged in the shape of an L. Where is the center of mass of the L?

- At the 50 cm mark on the meter stick that was the left side of the square.
- At the 50 cm mark on the meter stick that was the bottom of the square.
- At the point where the two meter sticks meet.
- Between the point that was the center of the square and the point where the two rulers meet.
- At the point that was the center of the square.

- None of the other answers is correct.

Question 4 **20 points** Save

Consider a uniform flat metal plate cut out in an irregular shape whose dimensions are known to you. Which of the following would be a valid way of determining that axis perpendicular to the plate, with respect to which, the moment of inertia of the plate is a minimum?

- Find the center of mass. The perpendicular-to-the-plate axis in question is the one that passes through the center of mass.
- Choose any point on the plate, and find the moment of inertia I_1 of the plate with respect to the perpendicular-to-the-plate axis that passes through that point. Establish a coordinate system whose z axis is perpendicular to the plate and passes through your chosen point. Then consider an arbitrary point whose coordinates are x,y where x and y are not known. Use the parallel axis theorem to write the moment of inertia with respect to the perpendicular-to-the-plate axis that passes through x,y as and use calculus to find the minimum of I and then the values of x and y corresponding to that minimum. Those values of x and y are the coordinates of the point on the plate through which the perpendicular-to-the-plate axis in question passes.
- The moment of inertia of the plate has the same value with respect to any axis that is perpendicular to the plate.
- The axis in question cannot be determined without more information. In particular, one must know either the mass of the plate, or, the density of the material of which the plate is made.
- None of the other answers are correct.

Question 5 **20 points** Save

Consider a uniform flat metal plate in the shape of a right triangle. One leg of the triangle is horizontal, call it the base. The left leg of the triangle is vertical. The remaining leg of the triangle is, of course, the hypotenuse. Now consider a vertical line that is a perpendicular bisector of the base of the triangle. Which of the following is true about the position of the center of mass of the plate?

- The center of mass is to the left of the perpendicular bisector.
- The center of mass lies on the perpendicular bisector.
- The center of mass is to the right of the perpendicular bisector.
- None of the other answers is correct.

Save Submit

Preview Assessment Lec 23 Quiz

Name: Lec 23 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **10 points** Save

A basketball (mass .60 kg) is dropped from the top of the Empire State Building. At first it accelerates toward the pavement below at 9.8 m/s^2 but air resistance builds up as the speed of the ball increases. Air resistance never slows the ball, but it keeps it from gaining speed as rapidly as it would in the absence of air resistance. Eventually, the air resistance becomes so great that the ball stops speeding up. Neither does it slow down however. It keeps falling at a speed called the terminal velocity. As it falls at the terminal velocity, what is the magnitude of the drag force? (The drag force is the name of the air resistance force.)

- The drag force is in the upward direction but the magnitude cannot be determined without more information.
- The drag force is in the downward direction but the magnitude cannot be determined without more information.
- 5.9 N in the upward direction.
- 0 N
- No other answer provided is correct.

Question 2 **10 points** Save

A horse pulls a sleigh at constant velocity. To do so the horse maintains a constant forward force of 185 Newtons on the sleigh. Neglecting air resistance, find the frictional force exerted on the sleigh by the surface over which the sleigh is being pulled.

- The frictional force is in the backward direction (the direction opposite to the direction in which the sleigh is going) but the magnitude cannot be determined without more information.
- The frictional force is in the forward direction (the direction in which the sleigh is going) but the magnitude cannot be determined without more information.
- The frictional force is 185 N in the forward direction.
- The frictional force is 185 N in the backward direction.
- The frictional force is 0 N.
- No other answer provided is correct.

Question 3 **10 points** Save

A person is pulling a 105 kg crate straight across a cement floor at a steady speed of 1.5 m/s by means of a rope attached to the crate. The rope makes an angle of 18 degrees with the horizontal and the person is pulling on it with a force of 58 Newtons. What is the magnitude of the net force on the crate?

- 0 N
- 21 N
- 27 N
- 55 N

- No other answer provided is correct.

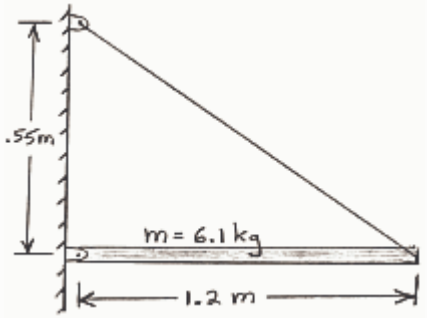
Question 4 **10 points** Save

Consider a car of mass 1100 kg traveling on a straight road at a steady 55 mph. Do not neglect air resistance. What is the net force acting on the car?

- The net force is in the backward direction (the direction opposite to the direction in which the car is going) but the magnitude cannot be determined without more information.
- The net force is in the forward direction (the direction in which the car is going) but the magnitude cannot be determined without more information.
- 60 500 N in the forward direction.
- 0 N
- No other answer provided is correct.

Question 5 **10 points** Save

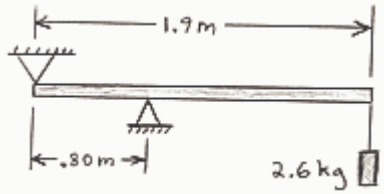
Consider the beam depicted below. It is supported by means of a pin at its left end and a rope at its right end. What is the direction of the force exerted on the beam by the rope at its right end?



- leftward
- rightward
- upward
- downward
- upward and to the right
- upward and to the left but not necessarily along the line containing the rope segment
- downward and to the right but not necessarily along the line containing the rope segment
- downward and to the left
- upward and to the left along the line containing the rope segment
- downward and to the right along the line containing the rope segment

Question 6 **10 points** Save

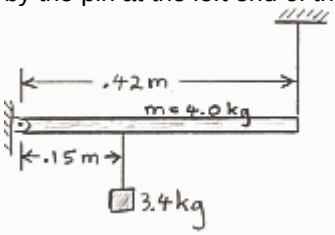
Consider the horizontal beam depicted below. It is supported by two fulcrums. A weight is suspended from the right end of the beam by means of a massless rope segment. What is the direction of the force exerted on the beam by the fulcrum that is 0.80 meters from the left end of the beam?



- leftward
- rightward
- upward
- downward
- No other answer provided is correct.

Question 7 **10 points** Save

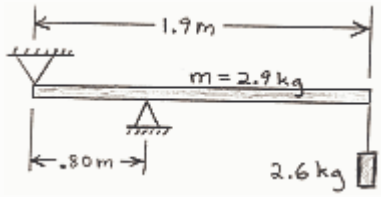
Consider the horizontal beam depicted below. It is supported by means of a pin at its left end and a vertical segment of rope at its right end. A weight is suspended from the beam. What is the direction of the force exerted on the beam by the pin at the left end of the beam?



- leftward
- rightward
- upward
- downward
- upward and to the right
- upward and to the left
- downward and to the right
- downward and to the left

Question 8 **10 points** Save

Consider the horizontal beam depicted below. It is supported by two fulcrums. A weight is suspended from the right end of the beam by means of a massless rope segment. What is the direction of the force exerted on the beam by the fulcrum at the left end of the beam?



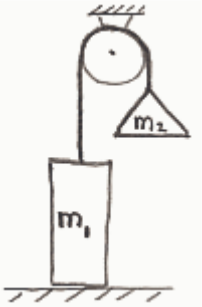
- leftward
- rightward
- upward
- downward
- No other answer provided is correct.

Question 9 **10 points** Save

Depicted below is a crate of mass m_1 = 150 kg (good to 2 significant digits) at rest on the floor. Attached to the top of

a crate is one end of a massless cord. The cord passes over a frictionless pulley. Hanging from the other end of the cord is an object of mass m_2 = 85 kg.

Find the tension in the cord.

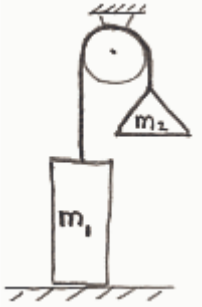


- Zero.
- 150 kg (good to 2 significant digits)
- 830 N (good to 2 significant digits)
- 1470 N (good to 3 significant digits)
- 640 N (good to 2 significant digits)
- No other answer provided is correct.

Question 10 **10 points** Save

Depicted below is a crate of mass m_1 = 150 kg (good to 2 significant digits) at rest on the floor. Attached to the top of a crate is one end of a massless cord. The cord passes over a frictionless pulley. Hanging from the other end of the cord is an object of mass m_2 = 85 kg.

What is the weight of the crate?



- Zero
- 500 N (good to 2 significant digits)
- 640 N (good to 2 significant digits)
- 840 N (good to 2 significant digits)
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 24 Quiz

Name: Lec 24 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **17 points** Save

An object is on the end of a horizontal ideal spring of spring constant k. The other end of the spring is attached to the wall. The object is on a frictionless horizontal surface. A person pulls the object directly away from the wall until the spring is stretched an amount x and releases the object from rest.

A student is asked to find the kinetic energy of the object when it first reaches that position at which the spring is neither stretched nor compressed. The student elects to use the work energy theorem which states that the work done on the object by the spring is equal to the change in kinetic energy of the object. The student reasons that the initial kinetic energy is zero. The change in kinetic energy is the final kinetic energy minus the initial kinetic energy. Because the latter is zero, the student reasons that the change in kinetic energy is the final kinetic energy. Thus the work energy theorem, for this special case boils down to the final kinetic energy being equal to the work done on the object by the spring. The student reasons that because the spring force, whose magnitude is kx, is acting in the same direction as the direction in which the object goes that the work done is just the work done is just the magnitude of the spring force times the distance that the object travels. Now, to get from the release point where the spring is stretched a distance x, to the equilibrium point where the spring is stretched a distance 0, the student reasons that the object must travel a distance x. Hence, the student reasons that the work done must be kx times x or kx^2 and therefore the kinetic energy of the object at the point in question must be kx^2. Is the student right? If not, what is wrong with the student's solution?

- The student is right.
- The student is wrong. The spring force is -kx so the work done is $-kx^2$ and therefore the kinetic energy has to be $-kx^2$.
- The student is wrong. The force only has magnitude kx at the release point. As the object moves the distance x to the equilibrium position the force gets weaker and weaker. The force kx is not the force exerted on the object as it moves over the distance x so it is wrong to calculate the work as that force times the distance x.
- The student is wrong because he or she is neglecting the work done on the spring by the object.
- The student is wrong but not a single one of the reasons given in the other answers is the correct answer.

Question 2 **17 points** Save

An object is pulled along a frictionless horizontal surface by means of a string whose tension is 2.00 newtons. The string makes an angle of 25.0°with the horizontal. Find the change in the kinetic energy of the object that occurs when it moves through a distance of .750 meters along the frictionless surface.

- 1.36 J
- 1.36 N
- 1.5 J
- 1.5 N
- No other answer provided is correct.

Question 3 **17 points** Save

An object is pulled along a horizontal surface by means of a string whose tension is 2.00 newtons. The string makes

an angle of 25.0° with the horizontal. How much work is done by the string when the object moves a distance .750 meters along the surface?

- 1.36 J
- 1.36 N
- 1.50 J
- 1.50 N
- No other answer provided is correct.

Question 4 **17 points** Save

Consider a problem in which an object is released from rest at a distance of one to two earth radii above the surface of the earth and one is asked to find the kinetic energy of the object as it enters the earth's atmosphere. One might think it pretty straight forward to solve (given values for the initial height of the object, the thickness of the atmosphere, the radius of the earth, the mass of the earth, and the mass of the object) using the work energy theorem. The initial kinetic energy is zero so the final kinetic energy is equal to the change in kinetic energy. Thus the work energy theorem, which normally states that the work done on the object is equal to the change in kinetic energy, in this case states that the work done on the object is equal to its final kinetic energy. The problem lies in the difficulty in calculating the work done on the object by the gravitational force by direct application of definition of work. Why is that such a difficulty?

- It's not. The force is mg. Just multiply that by the distance from the release point to the surface of the atmosphere.
- It is not all that difficult. One just has to find the distance that the object is from the center of the earth and plug that along with the two masses into Newton's Universal Law of Gravitation to get the force. Multiply that by the distance from the release point to the top of the atmosphere and one has the work in question.
- The problem is that the force is not directed along the path in the direction of travel and therefore, one cannot calculate the work as simply force times distance.
- The problem is that the magnitude of the force varies significantly along the path and therefore, even though the force is in the direction of motion for the whole trip, one cannot calculate the work as simply force times distance.
- No other answer provided is correct.

Question 5 **16 points** Save

Loosely speaking, work is defined as force times distance. According to the work energy theorem, the net work done on an object is equal to the change in kinetic energy. Does this mean that work is also defined as the change in kinetic energy?

- Yes.
- No.

Question 6 **16 points** Save

The mnemonic for recalling what work is, states that "Work is force times distance." Under what conditions can the mnemonic be taken so literally that one can arrive at the correct answer for the work W done on an object by a force **F** when the object (consider the object to be a point object) travels a distance d under the influence of said force simply by multiplying the magnitude of the force F by the distance d?.

- Whenever the path is straight.
- Whenever the direction of the force is constant.
- Whenever the path along which the object travels is straight, and, the force vector **F** and the displacement vector $\Delta\mathbf{x}$ (whose magnitude is d) lie along one and the same line, or, on parallel lines.
- Whenever the magnitude of the force is constant over the entire distance d traveled by the object and the force, over that same distance traveled, is at all points, tangent to the path and in the direction of motion of the

object.

- Only when the path is straight and the force is constant in both magnitude and direction and the force is in the direction of motion of the object.

Save Submit

Preview Assessment Lec 25 Quiz

Name: Lec 25 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **10 points** Save

Folks who pay for their own electricity are billed according to the number of watt·hours they used during the billing period. Watt·hours are the units for what physical quantity?

- Power
- Energy
- Time
- Impulse

Question 2 **10 points** Save

Consider a ring and a disk, each having the same mass and radius. Each is released from the same point at the top of a ramp. Each rolls, without slipping, to the bottom of the ramp and beyond. How does the forward velocity that the ring has, when it gets to the bottom of the ramp, compare with the forward velocity that the disk has, when it gets to the bottom of the ramp?

- They both have the same forward velocity at the bottom of the ramp.
- The ring has a greater forward velocity at the bottom of the ramp.
- The disk has a greater forward velocity at the bottom of the ramp.
- Insufficient information is given to establish a definite answer.
- No other answer provided is correct.

Question 3 **10 points** Save

Suppose that during the ascent of an elevator car, the power provided the elevator car by the elevator motor is 15 000 watts. How much energy would be delivered to the elevator in 10 seconds?

- 150 000 Joules
- 15 000 Joules
- 1500 Joules
- .000 667 Joules
- No other answer provided is correct.

Question 4 **10 points** Save

Consider a ring and a disk, each having the same mass and radius, and each spinning with the same angular velocity about its own axis of symmetry. Which, if either, has the greater kinetic energy?

Neither. They have one and the same value of kinetic energy.

- ( )
- ( ) The disk has the greater kinetic energy.
- ( ) The ring has the greater kinetic energy.
- ( ) Insufficient information is given to arrive at a definite answer.
- ( ) No other answer provided is correct.

Question 5 **10 points** Save

Consider a ring and a disk, each having the same mass and radius. Each is released from the same point at the top of a ramp. Each rolls, without slipping, to the bottom of the ramp and beyond. How does the kinetic energy that the ring has, when it gets to the bottom of the ramp, compare with the kinetic energy that the disk has, when it gets to the bottom of the ramp.

- ( ) Both objects have one and the same value of kinetic energy at the bottom of the ramp.
- ( ) The disk has more kinetic energy at the bottom of the ramp.
- ( ) The ring has more kinetic energy at the bottom of the ramp.
- ( ) Insufficient information is given to arrive at a definite answer.
- ( ) No other answer provided is correct.

Question 6 **10 points** Save

What is power? (Indicate all that apply.)

- [ ] Force per unit time.
- [ ] Force times time.
- [ ] Force times distance.
- [ ] The rate at which work is done.
- [ ] The rate at which energy is being delivered.
- [ ] The rate at which energy is being used up.
- [ ] The rate at which energy is being converted from one form to another.
- [ ] Force per distance per time.

Question 7 **10 points** Save

A skater is spinning on ice. She pulls her arms and legs in so as to reduce her moment of inertia to one half its original value. How does this change her kinetic energy?

- ( ) Her kinetic energy stays the same.
- ( ) Her kinetic energy increases.
- ( ) Her kinetic energy decreases.
- ( ) Insufficient information is given to determine a definite answer.
- ( ) No other answer provided is correct.

Question 8 **10 points** Save

The Calorie is a unit of energy. Some exercise machines provide the user with a value with units of Calories/minute. That value-with-units is a measure of what physical quantity?

- mass
- energy
- power
- work

Question 9 **10 points** Save

What happens to the kinetic energy of a spinning rigid object if you make it spin twice as fast (e.g. by applying a torque to it for a certain time interval)?

- The kinetic energy becomes 4 times what it was.
- The kinetic energy becomes 2 times what it was.
- The kinetic energy becomes one half what it was.
- The kinetic energy becomes one fourth what it was.
- The kinetic energy does not change.

Question 10 **10 points** Save

A two-thousand-pound car accelerates uniformly from zero to sixty miles per hour in ten seconds. What is the average power of the car's engine during that ten-second time interval? (Note that a car whose weight is two thousand pounds has a mass of 908 kg. Also, sixty miles per hour is equivalent to 26.8 m/s.)

- 5.00 W
- 5.00 kW
- 25.4 W
- 32.6 kW

Save Submit

Preview Assessment Lec 25 Quiz

Name: Lec 25 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **10 points** Save

Folks who pay for their own electricity are billed according to the number of watt·hours they used during the billing period. Watt·hours are the units for what physical quantity?

- Power
- Energy
- Time
- Impulse

Question 2 **10 points** Save

Consider a ring and a disk, each having the same mass and radius. Each is released from the same point at the top of a ramp. Each rolls, without slipping, to the bottom of the ramp and beyond. How does the forward velocity that the ring has, when it gets to the bottom of the ramp, compare with the forward velocity that the disk has, when it gets to the bottom of the ramp?

- They both have the same forward velocity at the bottom of the ramp.
- The ring has a greater forward velocity at the bottom of the ramp.
- The disk has a greater forward velocity at the bottom of the ramp.
- Insufficient information is given to establish a definite answer.
- No other answer provided is correct.

Question 3 **10 points** Save

Suppose that during the ascent of an elevator car, the power provided the elevator car by the elevator motor is 15 000 watts. How much energy would be delivered to the elevator in 10 seconds?

- 150 000 Joules
- 15 000 Joules
- 1500 Joules
- .000 667 Joules
- No other answer provided is correct.

Question 4 **10 points** Save

Consider a ring and a disk, each having the same mass and radius, and each spinning with the same angular velocity about its own axis of symmetry. Which, if either, has the greater kinetic energy?

Neither. They have one and the same value of kinetic energy.

- ( )
- ( ) The disk has the greater kinetic energy.
- ( ) The ring has the greater kinetic energy.
- ( ) Insufficient information is given to arrive at a definite answer.
- ( ) No other answer provided is correct.

Question 5 **10 points** Save

Consider a ring and a disk, each having the same mass and radius. Each is released from the same point at the top of a ramp. Each rolls, without slipping, to the bottom of the ramp and beyond. How does the kinetic energy that the ring has, when it gets to the bottom of the ramp, compare with the kinetic energy that the disk has, when it gets to the bottom of the ramp.

- ( ) Both objects have one and the same value of kinetic energy at the bottom of the ramp.
- ( ) The disk has more kinetic energy at the bottom of the ramp.
- ( ) The ring has more kinetic energy at the bottom of the ramp.
- ( ) Insufficient information is given to arrive at a definite answer.
- ( ) No other answer provided is correct.

Question 6 **10 points** Save

What is power? (Indicate all that apply.)

- [ ] Force per unit time.
- [ ] Force times time.
- [ ] Force times distance.
- [ ] The rate at which work is done.
- [ ] The rate at which energy is being delivered.
- [ ] The rate at which energy is being used up.
- [ ] The rate at which energy is being converted from one form to another.
- [ ] Force per distance per time.

Question 7 **10 points** Save

A skater is spinning on ice. She pulls her arms and legs in so as to reduce her moment of inertia to one half its original value. How does this change her kinetic energy?

- ( ) Her kinetic energy stays the same.
- ( ) Her kinetic energy increases.
- ( ) Her kinetic energy decreases.
- ( ) Insufficient information is given to determine a definite answer.
- ( ) No other answer provided is correct.

Question 8 **10 points** Save

The Calorie is a unit of energy. Some exercise machines provide the user with a value with units of Calories/minute. That value-with-units is a measure of what physical quantity?

- mass
- energy
- power
- work

Question 9 **10 points** Save

What happens to the kinetic energy of a spinning rigid object if you make it spin twice as fast (e.g. by applying a torque to it for a certain time interval)?

- The kinetic energy becomes 4 times what it was.
- The kinetic energy becomes 2 times what it was.
- The kinetic energy becomes one half what it was.
- The kinetic energy becomes one fourth what it was.
- The kinetic energy does not change.

Question 10 **10 points** Save

A two-thousand-pound car accelerates uniformly from zero to sixty miles per hour in ten seconds. What is the average power of the car's engine during that ten-second time interval? (Note that a car whose weight is two thousand pounds has a mass of 908 kg. Also, sixty miles per hour is equivalent to 26.8 m/s.)

- 5.00 W
- 5.00 kW
- 25.4 W
- 32.6 kW

Save Submit

Preview Assessment Lec 27 Quiz

Name: Lec 27 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

On what physical characteristics of the mass-on-a-spring system does the period of oscillations of the mass depend? (Indicate all the correct answers.)

- [ ] The length of the spring.
- [ ] The force constant of the spring.
- [ ] The spring constant of the spring.
- [ ] The mass of the object.
- [ ] The gravitational force constant g.

Question 2 **20 points** Save

What happens to the frequency of oscillations if the spring is replaced with a stiffer spring?

- ( ) The frequency of oscillations increases.
- ( ) The frequency of oscillations decreases.
- ( ) The frequency of oscillations does not change.
- ( ) The period of oscillations increases.

Question 3 **20 points** Save

What happens to the frequency of oscillations of a mass on a spring if the spring is replaced with a spring having twice the force constant as compared to that of the original spring?

- ( ) It becomes half what it was.
- ( ) It becomes twice what it was.
- ( ) It becomes one fourth what it was.
- ( ) It becomes four times what it was.
- ( ) It becomes one over the square root of two times what it was.
- ( ) It becomes the square root of two times what it was.

Question 4 **20 points** Save

Suppose that for a mass m undergoing simple harmonic motion on the end of a spring with force constant k, the maximum stretch of the spring is A. What is the total energy of the system when the spring is stretched an amount ½A?

- ( ) 0

- ⅛kA^2
- ¼kA^2
- ⅜kA^2
- ½kA^2
- ¾kA^2

Question 5 **20 points** Save

Suppose that for a mass m undergoing simple harmonic motion on the end of a spring with force constant k, the maximum stretch of the spring is A. What is the kinetic energy of the system when the spring is stretched an amount ½A?

- 0
- ⅛kA^2
- ¼kA^2
- ⅜kA^2
- ½kA^2
- ¾kA^2

Save Submit

Preview Assessment Lec 28 Quiz

Name: Lec 28 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **25 points** Save

As regards the simple pendulum, what is meant by the expression "period of oscillation?"

- The time that it takes for the oscillations of the pendulum to die out.
- The rate at which the pendulum oscillates, measured in complete back and forth oscillations per second.
- The time from when the bob is at its lowest point until the next time it is at its lowest point.
- The time it takes for the pendulum to complete one entire oscillation, back and forth.
- No other answer provided is correct.

Question 2 **25 points** Save

On what physical characteristics of the simple pendulum does the period of oscillations of the pendulum depend? (Indicate every answer that is correct.)

- [ ] The length of the pendulum.
- [ ] The mass of the pendulum bob.
- [ ] The force constant of the string.
- [ ] The color of the pendulum bob.
- [ ] The gravitational force constant g.

Question 3 **25 points** Save

The bob of a simple pendulum is gently pulled to one side in such a manner that the string remains straight. The bob is released from rest at an elevation that is *h* greater than the bob's lowest possible position. The bob has mass *m*. The pendulum is at the surface of the planet earth. Subsequent to the release of the bob, what is the kinetic energy of the pendulum when the bob is at its lowest point?

- 0
- mgh
- $\frac{1}{2}mv^2$
- $\frac{1}{2}mv^2 + mgh$
- No other answer provided is correct.

Question 4 **25 points** Save

Where, in the motion of the bob of a simple pendulum, will the bob have its greatest speed?

- At the lowest point in its motion.

- At the highest point in its motion.
- Somewhere in between the lowest point in its motion and the highest point in its motion.
- No other answer provided is correct.

Save Submit

Preview Assessment Lec 29 Quiz

Name: Lec 29 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **15 points** Save

Consider a segment of a long length of string through which a wave is traveling. The wave is produced by a continuously oscillating source. Within that segment there is a certain amount of wave energy. As long as the amplitude of the oscillations remains the same, the amount of wave energy in that segment of the string always has the same value. Now suppose that the amplitude of the oscillations producing the wave is doubled so the wave amplitude in the segment of the string in question is doubled. How does the wave energy in that segment of the string compare with the original wave energy in that segment of the string?

- The new wave energy in the segment is one fourth the original wave energy.
- The new wave energy in the segment is one half the original wave energy.
- The new wave energy in the segment is twice the original wave energy.
- The new wave energy in the segment is four times the original wave energy.

Question 2 **15 points** Save

What's the difference between longitudinal waves and transverse waves?

- In the case of longitudinal waves, the particles in the medium in which the wave is traveling oscillate back and forth along the path of the wave; whereas; in the case of transverse waves, the particles oscillate back and forth (or up and down) at right angles to the path of the wave.
- In the case of longitudinal waves, the particles in the medium in which the wave is traveling oscillate back and forth (or up and down) at right angles to the path of the wave; whereas; in the case of transverse waves, the particles oscillate back and forth along the path of the wave.

Question 3 **15 points** Save

Consider sound from a point source in air. Assume that the absorption of sound energy by the air is negligible and that there are no obstacles to the sound waves. Further consider two points in the air. Point B is twice as far from the source as point A is. How does the intensity of sound at point B compare with the intensity of sound at point A?

- The intensity at B is 2 dB less than the intensity at A.
- The intensity at B is 2 dB greater than the intensity at A.
- The intensity at B is one fourth the intensity at A.
- The intensity at B is four times the intensity at A.
- The intensity at B is one half the intensity at A.
- The intensity at B is two times the intensity at A.

Question 4 **20 points** Save

Suppose that for a string undergoing traveling wave motion you were asked to sketch a graph of Displacement vs. Position and a graph of Displacement vs. Time. Further suppose that you were asked to indicate, on one or both of the graphs as applicable, the peak-to-peak amplitude of the motion. Which of the following would correspond to the

correct answer? (Indicate every correct answer.)

- [ ] The horizontal distance between peaks on the Displacement vs. Time graph.
- [ ] The horizontal distance between peaks on the Displacement vs. Position graph.
- [ ] The vertical distance between peaks on the Displacement vs. Time graph.
- [ ] The vertical distance between peaks on the Displacement vs. Position graph.
- [ ] No other answer provided is correct.

Question 5 **20 points** Save

Suppose that for a string undergoing traveling wave motion you were asked to sketch a graph of Displacement vs. Position and a graph of Displacement vs. Time. Further suppose that you were asked to indicate, on one or both of the graphs as applicable, the period of the motion. Which of the following would correspond to the correct answer? (Indicate every correct answer.)

- [ ] The horizontal distance between peaks on the displacement vs. time graph.
- [ ] The horizontal distance between peaks on the displacement vs. position graph.
- [ ] The vertical distance between peaks on the displacement vs. time graph.
- [ ] The vertical distance between peaks on the displacement vs. position graph.
- [ ] No other answer provided is correct.

Question 6 **15 points** Save

A sound source is delivering sound energy to the air, uniformly in all directions, at the rate of 25 watts. What is the intensity of the sound from that source at a distance of 18 meters from the source? (Assume the absorption of sound by the air to be negligible. Assume there are no obstacles in the path of the sound. Treat the sound source as a point source.)

- ◯ 1.39 W/m
- ◯ 0.720 m/W
- ◯ 450. Wm
- ◯ .0772 W/m^2
- ◯ 6.14 mW/m^2

Save Submit

Preview Assessment Lec 30 Quiz

Name: Lec 30 Quiz

Instructions:

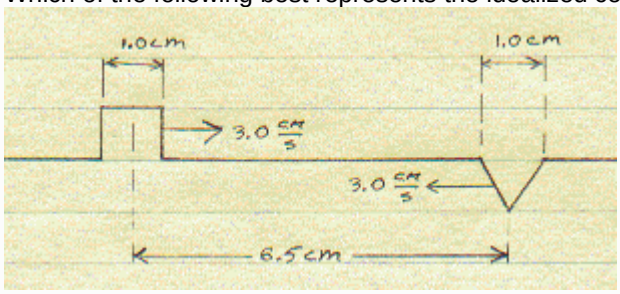
Multiple Attempts: This Test allows multiple attempts.

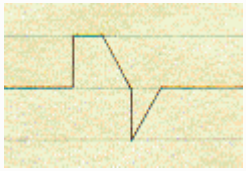
Force Completion: This Test can be saved and resumed later.

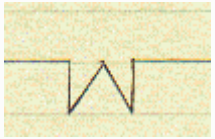
Question Completion Status:

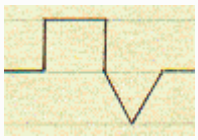
Question 1 **19 points** Save

Depicted is an idealized configuration of a string for the case in which two waves are traveling toward each other. Which of the following best represents the idealized configuration of the string, one second later?









Question 2 **19 points** Save

In the case of standing waves in a string that is fixed at both ends, what is the difference between "the fundamental" and "the first harmonic?"

- The fundamental represents the longest wavelength standing wave that can exist in the device under consideration whereas the first harmonic represents the second longest wavelength.
- The fundamental represents the shortest wavelength standing wave that can exist in the device under

consideration whereas the first harmonic represents the second shortest wavelength.

- The first harmonic represents the longest wavelength standing wave that can exist in the device under consideration whereas the fundamental represents the second longest wavelength.
- The first harmonic represents the shortest wavelength standing wave that can exist in the device under consideration whereas the fundamental represents the second shortest wavelength.
- There is no difference. They are two different names for the same thing.

Question 3 **24 points** Save

Indicate the way or ways that standing waves differ from traveling waves. (Indicate all that apply.)

- [ ] In standing waves the particles, of the medium, that take part in the wave motion just oscillate back and forth about their equilibrium positions whereas in traveling waves, the particles oscillate and travel in the direction in which the wave is traveling.
- [ ] The "speed of the wave in the medium" is a meaningful quantity for traveling waves but not for standing waves.
- [ ] Standing waves are the result of interference, traveling waves are not.
- [ ] Standing waves have nodes, traveling waves do not have nodes.
- [ ] Standing waves have both frequency and wavelength. Traveling waves have frequency but they do not have wavelength.
- [ ] Standing waves always involve wave reflection, traveling waves do not.

Question 4 **19 points** Save

The wave function below characterizes a wave moving in what direction?

$$y = (.210\text{m})\cos\left[\left(5.82\tfrac{\text{rad}}{\text{m}}\right)x + \left(94.2\tfrac{\text{rad}}{\text{s}}\right)t\right]$$

- The positive x direction.
- The negative x direction.

Question 5 **19 points** Save

For the wave characterized by the wave function below, what is the frequency of the wave?

$$y = (.210\text{m})\cos\left[\left(5.82\tfrac{\text{rad}}{\text{m}}\right)x + \left(94.2\tfrac{\text{rad}}{\text{s}}\right)t\right]$$

- 15.0 Hz
- 94.2 Hz
- 1.08 m
- 5.82 m

Save Submit

Preview Assessment Lec 31

Name: Lec 31

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

What is the wavelength of the first overtone of a 60.0 cm pipe which is closed at one end and open at the other?

- 45.0 cm
- 60.0 cm
- 120 cm
- 240. cm
- No other answer provided is correct.

Question 2 **20 points** Save

How many interior nodes (nodes not at the endpoints) does the first harmonic in a tube, in air, that is open at one end and closed at the other, have?

- 0
- 1
- 2
- 3
- No other answer provided is correct.

Question 3 **20 points** Save

How many nodes (total number of nodes) does the first overtone of a string, fixed at both ends, have?

- 0
- 1
- 2
- 3
- No other answer provided is correct.

Question 4 **20 points** Save

A violin string carries a standing wave of known frequency and wavelength. Because the string is waving in air it produces sound waves in the air. Which of the following characteristics of the wave in air is (or are) necessarily the same as the corresponding characteristic (or characteristics) of the wave in the violin string? Choose all that apply.

- [ ] frequency

- [ ] wavelength
- [ ] wave speed
- [ ] No other answer provided is correct.

Question 5 **20 points** Save

How does the frequency of the third harmonic in a pipe compare with the frequency of the third harmonic in a pipe that is twice as long as the first pipe but has the same end-cap configuration as the first pipe?

- ○ The frequency of the third harmonic in the longer pipe is one fourth the frequency of the third harmonic in the shorter pipe.
- ○ The frequency of the third harmonic in the longer pipe is one half the frequency of the third harmonic in the shorter pipe.
- ○ The frequency of the third harmonic in the longer pipe is the same as the frequency of the third harmonic in the shorter pipe.
- ○ The frequency of the third harmonic in the longer pipe is twice the frequency of the third harmonic in the shorter pipe.
- ○ The frequency of the third harmonic in the longer pipe is four times the frequency of the third harmonic in the shorter pipe.
- ○ No other answer provided is correct.

Save Submit

Preview Assessment Lec 32 Quiz

Name: Lec 32 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **20 points** Save

A sound source of 455.0 Hz and a second sound single-frequency source produce beats at 5.0 Hz. What is the frequency of the second sound source? Choose the MOST correct answer.

- 450.0 Hz
- 455.0 Hz
- 460.0 Hz
- Either 450.0 Hz or 460.0 Hz. Not enough information is provided to distinguish between these two cases.
- No other answer provided is correct.

Question 2 **20 points** Save

Consider a single-frequency sound source moving toward a person through still air. What determines the loudness of the sound heard by the person? (Choose the one BEST answer.)

- The power of the source alone.
- The distance between the source and the person alone.
- The speed of the source alone.
- Both the power of the source and the distance of the source from the person.
- Both the power of the source and the speed of the source.
- Both the distance between the source and the person, and, the speed of the source.
- The power of the source, the distance between the source and the person, and the speed of the source.

Question 3 **20 points** Save

Consider two stationary sound sources of the same power and a stationary listener. One of the sources produces sound at 264 Hz and the other at 262 Hz. What is the beat frequency? Choose the MOST correct answer.

- 2 Hz
- 263 Hz
- 266 Hz
- 526 Hz
- Either 2 Hz or 526 Hz. Insufficient information is provided to distinguish between these two answers.
- No other answer provided is correct.

Question 4 **20 points** Save

Suppose that you are on the platform at a train station as an express train approaches the station. The train does not stop at that station but for safety reasons it must slow down to 30 mph before it gets to the station. When you first hear the train, it is going at 102 mph and slowing down. The train whistle is sounding. The train whistle itself is oscillating at a fixed frequency and delivering sound to the air at a fixed power. As the train approaches the station, what do you observe about the sound you hear coming from the train whistle (besides the fact that it is getting louder)?

- The frequency is lower than the frequency of oscillations of the whistle, and it is getting lower.
- The frequency is lower than the frequency of oscillations of the whistle, and it is getting higher.
- The frequency is higher than the frequency of oscillations of the whistle, and it is getting lower.
- The frequency is higher than the frequency of oscillations of the whistle, and it is getting higher.

Question 5 **20 points** Save

Consider a single-frequency sound source moving toward a stationary person through still air. What determines the frequency of the sound heard by the person? (Choose the one BEST answer.)

- The frequency of the source alone.
- The distance between the source and the person alone.
- The speed of the source alone.
- Both the frequency of the source and the distance of the source from the person.
- Both the frequency of the source and the speed of the source.
- Both the distance between the source and the person, and, the speed of the source.
- The frequency of the source, the distance between the source and the person, and the speed of the source.

Save Submit

Preview Assessment Lec 33 Quiz

Name: Lec 33 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **10 points** Save

According to Archimedes' Principle:

- The buoyant force exerted by a fluid on an object that is either partly submerged or totally submerged in that fluid is equal in magnitude to the weight of the fluid that would be where the object is if the object wasn't there.
- The volume of an object is equal to the mass of the object divided by its density.
- No object whose density is less than the density of a fluid will float in that fluid.
- The buoyant force exerted by a fluid on an object that is either partly submerged or totally submerged in that fluid is equal in magnitude to the weight of the fluid that would be where the object is if the object wasn't there minus the weight of the object.

Question 2 **10 points** Save

Match the physical quantities with the definitions.

- pressure
- volume
- density
- mass
- area

A. That characteristic of an object or quantity of matter that indicates how hard the earth is pulling that object toward its center.
B. A characteristic of an object or quantity of matter that indicates the degree to which that object resists a change in its velocity.
C. A measure of amount of surface.
D. A characteristic of any particular kind of matter that indicates the mass-per-volume of that substance.
E. A measure of force-magnitude-per-area.
F. A characteristic of an entity indicating how much space the entity occupies in the universe.

Question 3 **10 points** Save

A bowling ball is released from rest from a position in a swimming pool where the ball is totally submerged in water. The bowling ball sinks. Why does it sink?

- The water is more dense than the ball.
- There is no buoyant force on the ball because the ball is more dense than the water.
- The downward force of the water on the ball exceeds the upward force of the water on the ball. This results in a net downward force on the ball which causes it to sink.
- The downward weight of the ball exceeds the upward buoyant force on the ball.
- The pressure at the bottom of the bowling ball is greater than the pressure at the top.

Question 4 **10 points** Save

A boat floats at rest on still water. How does the buoyant force compare, in magnitude, with the weight of the boat?

- The buoyant force is equal, in magnitude, to the weight of the boat.
- The buoyant force is greater, in magnitude, than the weight of the boat.
- The buoyant force is less than, in magnitude, than the weight of the boat.
- There is no buoyant force because the boat is not totally submerged.
- Insufficient information is provided to establish which of the other answers is the correct answers.
- No other answer provided is correct.

Question 5 **10 points** Save

A child is in a boat with a rock in it, in a backyard swimming pool. The child removes the rock from the boat and drops it into the water. It sinks to the bottom. What happens to the water level in the pool.

- It stays the same.
- It goes up.
- It goes down.
- Not enough information is provided to establish which of the other answers is correct.
- No other answer provided is correct.

Question 6 **10 points** Save

A person totally submerges a cork in water and releases it from rest. There is an upward buoyant force on the cork. What is the agent of that force? (The agent of a force on an object is the thing, the creature, or the stuff that is pushing or pulling on the object.)

- Pressure.
- Gravity.
- The water.
- The density of the water.
- No other answer provided is correct.

Question 7 **10 points** Save

How does the weight of an object in vacuum compare with the weight of the same object in water?

- They are both the same.
- The weight of the object is greater when it is in water.
- The weight of the object is less when it is in water.
- No other answer provided is correct.

Question 8 **10 points** Save

Consider a helium-filled balloon and a solid granite rock of the same size and shape. The reason that the helium-filled balloon floats in air whereas the rock sinks in water is:

- The buoyant force exerted on the balloon by the air is less than the buoyant force exerted on the rock by the water.

- The buoyant force exerted on the balloon by the air is greater than the weight of the balloon-plus-helium whereas the buoyant force exerted on the rock by the water is less than the weight of the rock.
- The gravitational force on the lighter-than-air helium is upward whereas the gravitational force on the rock is downward.
- The air pressure at the bottom of the balloon is greater than the air pressure at the top whereas the water pressure at the top of the rock is greater than the water pressure at the bottom of the rock.
- No other answer provided is correct.

Question 9 **10 points** Save

Assume that you are in a bowling alley and you see a bowling ball (of the sort that has no finger holes) and a helium-filled balloon that has the exact same size and shape as the bowling ball. On which object is the buoyant force greater?

- The bowling ball.
- The balloon.
- Neither, the magnitude of the buoyant force is not zero, but it is the same on both objects.
- There is no buoyant force on either object.

Question 10 **10 points** Save

Consider two identical basketballs. One is floating at rest in (on the surface of) fresh water and the other is floating at rest in (at the surface of) saltwater. Saltwater is more dense than fresh water. On which basketball is the buoyant force greater?

- The one in fresh water.
- The one in saltwater.
- Neither.

Save Submit

Preview Assessment Lec 34 Quiz

Name: Lec 34 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

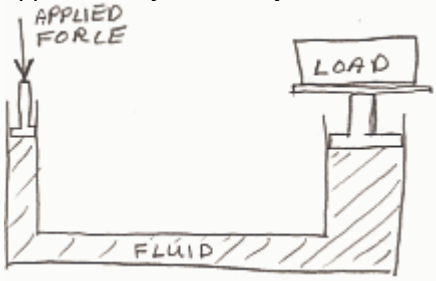
Question 1 **10 points** Save

According to Bernoulli's principle, all other things being equal, for a non-viscous incompressible fluid undergoing streamline flow:

- Fluid velocity in a pipe is greater where the diameter of the pipe is smaller.
- The pressure in a fluid is lower where the fluid is moving faster.
- The deeper the position in an incompressible fluid, the greater the density of the fluid.
- Air moves faster over an airplane wing than it does under.
- The greater the density of a fluid, the greater the buoyant force on any object submerged in the fluid.

Question 2 **10 points** Save

In the hydraulic system depicted below, the area of the face of the small piston on the left is 4.0 cm^2. The area of the face of piston on the right is 625 cm^2. The maximum force that the operator can apply to the piston on the left is his weight which is 730 newtons. With the aid of such a hydraulic system, the maximum load that the operator can lift is approximately how many times his weight?



- 114 000
- 12.5
- 240
- 114 000 N
- No other answer provided is correct.

Question 3 **10 points** Save

What is the value of the gauge pressure at the bottom of a swimming pool which is 1.7 meters deep?

- 190 Pa
- 8.8 kPa
- 1.7 kPa

- 43 MPa
- No other answer provided is correct.

Question 4 **10 points** Save

A vertical steel pipe, 22 meters in length, is closed at the bottom and filled up to the 21-meter mark with water. A person seals off the top of the pipe with a fitting that allows her to pump air into the pipe. She pumps air into the pipe, increasing the pressure of the air in the pipe by 220 000 pascals (2 dignificant figures). By how much does the pressure in the bottom of the pipe increase as a result of the pumping of air?

- 220 000 pascals (2 dignificant figures)
- .21 MPa
- 430 000 pascals (2 significant figures)
- No other answer provided is correct.

Question 5 **10 points** Save

At a submarine escape training facility, a 150-ft deep "swimming pool" consists of a tower supporting a 10-ft diameter vertical steel cylinder, 160 feet tall, sealed at the bottom and filled to the 150-foot mark with water. Compare the pressure at the bottom of this training tank with the pressure at the bottom of a 1-inch vertical pipe, 160-feet tall, sealed at the bottom and filled with water to the 150-foot mark.

- The pressure at the bottom of the 1-inch pipe is the same as the pressure at the bottom of the tank.
- The pressure at the bottom of the 1-inch pipe is greater than the pressure at the bottom of the tank.
- The pressure at the bottom of the 1-inch pipe is less than the pressure at the bottom of the tank.
- The information given is insufficient to determine a definite answer.
- No other answer provided is correct.

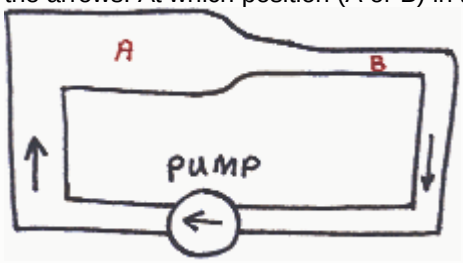
Question 6 **10 points** Save

How deep would a freshwater lake have to be so that the pressure at the bottom of the lake is 2.00 atmospheres?

- 10.3 meters
- 20.6 meters
- .000 102 meters
- .000 204 meters
- No other answer provided is correct.

Question 7 **10 points** Save

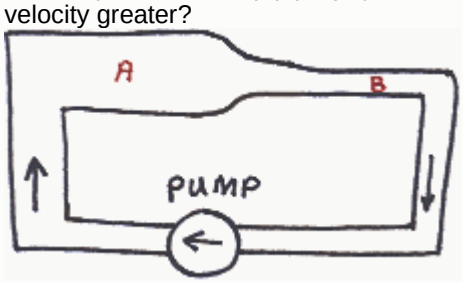
The simple closed-loop piping system depicted below is completely full of water flowing in the direction indicated by the arrows. At which position (A or B) in the pipe is the flow rate greater?



- A
- B
- Neither
- More information is needed in order to establish where the flow rate is greater.

Question 8 **10 points** Save

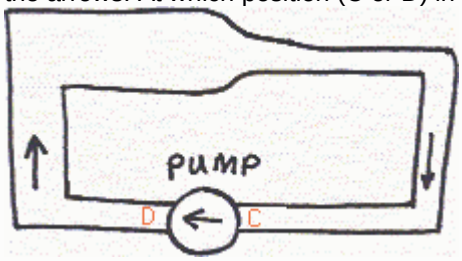
The simple closed-loop piping system depicted below is completely full of water. At which position (A or B) is the fluid velocity greater?



- A
- B
- Neither
- Not enough information is given to establish which of the other answers is correct.

Question 9 **10 points** Save

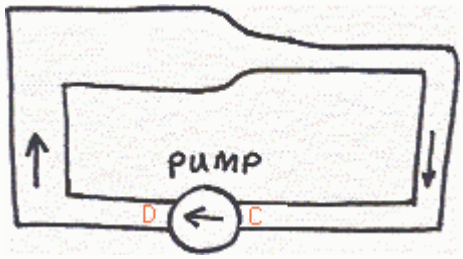
The simple closed-loop piping system depicted below is completely full of water flowing in the direction indicated by the arrows. At which position (C or D) in the pipe is the flow rate greater?



- C
- D
- Neither
- Not enough information is given to establish which of the other answers is correct.

Question 10 **10 points** Save

The simple closed-loop piping system depicted below is completely full of water flowing in the direction indicated by the arrows. At which position (C or D) in the pipe is the velocity of the water greater? (Note that the pipe diameter has one and the same value at each of the two locations.)



- C
- D
- Neither
- Not enough information is given to establish which of the other answers is correct.

Save Submit

Preview Assessment Lec 35 Quiz

Name: Lec 35 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **19 points** Save

Which of the following best characterizes heat?

- A characteristic of a material--a measure of the average kinetic energy of a molecule of that material.
- The sum total of all the energy of all the molecules making up a sample of matter (e.g. an object).
- Energy that is transferred or in the process of being transferred from one sample of matter to another because of a temperature difference between the two samples.

Question 2 **19 points** Save

Is it possible for there to be a net flow of heat into an otherwise isolated system without there being an increase in the internal energy of that system?

- Yes
- No

Question 3 **19 points** Save

What is internal energy?

- A characteristic of a material--a measure of the average kinetic energy of a molecule of that material.
- The sum total of all (except that associated with the bulk motion/position of the sample as a whole) the energy of all the molecules making up a sample of matter (e.g. an object).
- Energy that is transferred or in the process of being transferred from one sample of matter to another because of a temperature difference between the two samples.

Question 4 **24 points** Save

A clean dry hot rock at a temperature of 95℃ is placed i nto a cool container of water initially at a temperature of 5℃. The rock is completely submerged in the water. The container is thermally isolated (meaning no heat can flow into or out of the interior of the container) and has negligible heat capacity. The entire process takes place at atmospheric pressure. Which of the following is/are necessarily true? (Indicate all the correct answers.)

- [ ] After a long time, the rock and water are at 100 degrees Celsius.
- [ ] After a long time, the rock and water are at 90 degrees Celsius.
- [ ] After a long time, the rock and water are at 45 degrees Celsius.
- [ ] After a long time, the rock and water are at one and the same temperature between 5 degrees and 95 degrees but the value of that temperature cannot be determined without further information.
- [ ] All the liquid water turns into water vapor.
- [ ] Heat flows out of the rock and into the water. The net amount of heat that flows out of the rock is equal to the amount of heat that flows into the water.

Question 5 **19 points** Save

Is it possible for there to be a net flow of heat into an otherwise isolated system without there being an increase in the temperature of that system?

- Yes
- No

Save Submit

Preview Assessment Lec 36 Quiz

Name: Lec 36 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **30 points** Save

A solid chunk of a substance (sample #1) is placed in a container of the same substance (sample #2) in liquid form. Both samples of the material are initially at one and the same pressure. The container is sealed such that no heat can flow into or out of the container, but, such that the pressure inside is maintained at the initial pressure of the samples. The heat capacity of the container is negligible. Which of the following outcomes are not ruled out by the limited information given? (Assume that enough time passes for the contents of the container to come to equilibrium. Select every correct answer.)

- [ ] The temperature of sample #1 could increase.
- [ ] The temperature of sample #1 could decrease.
- [ ] The temperature of sample #1 could stay the same.
- [ ] The temperature of sample #2 could increase.
- [ ] The temperature of sample #2 could decrease.
- [ ] The temperature of sample #2 could stay the same.

Question 2 **35 points** Save

A solid chunk of a substance is placed in a container of the same substance in liquid form. Both samples of the material are initially at one and the same pressure. The container is sealed such that no heat can flow into or out of the container, but, such that the pressure inside is maintained at the initial pressure of the samples. The heat capacity of the container is negligible. Which of the following outcomes are not ruled out by the limited information given? (Assume that enough time passes for the contents of the container to come to equilibrium. Select every correct answer.)

- [ ] There could be a positive net flow of heat from the solid to the liquid with neither of the original samples experiencing a phase change. The temperature of the liquid would increase while the temperature of the solid would decrease until both the solid and the liquid were at one and the same temperature, with neither sample having undergone a phase change.
- [ ] There could be a positive net flow of heat from the liquid to the solid with neither of the original samples experiencing a phase change. The temperature of the solid would increase while the temperature of the liquid would decrease until both the solid and the liquid were at one and the same temperature.
- [ ] The liquid could remain a liquid and the solid could remain a solid with neither experiencing a change in temperature.
- [ ] All the liquid could turn to solid.
- [ ] All the solid could turn to liquid.
- [ ] Some of the liquid could turn to a solid.
- [ ] Some of the solid could turn to a liquid.

Question 3 **20 points** Save

At a manufacturing plant, molten iron is poured into a cast in the making of an iron frying pan. While the liquid iron is turning into solid iron, what happens to the temperature of the frying pan?

- It increases.
- It decreases.
- It stays the same.

Question 4 **15 points** Save

Is it possible for there to be a net positive flow of heat into a substance without the temperature of that substance increasing?

- Yes
- No

Save Submit

Preview Assessment Lec 37 Quiz

Name: Lec 37 Quiz

Instructions:

Multiple Attempts: This Test allows multiple attempts.

Force Completion: This Test can be saved and resumed later.

Question Completion Status:

Question 1 **100 points** Save

The First Law of Thermodynamics is a statement of the principle of conservation of what?

- Energy
- Momentum
- Angular Momentum
- Heat

Save Submit