Physics 200 Mid-Term Review – January 2022
Multiple Choice

112 Multiple Choice Questions of which 25 will be on the Mid-Term

Part 1: Motion in 1 Dimension (16 questions)

Question 7:

aa. A car slows down from +32 m/s to +8 m/s in 4 s. The average acceleration is ______ m/s/s.

a. 24 b. -24 c. 96 d. -96
e. 6 ab. -6 ac. 64 ad. -64

Question 8:

aa. An object with an acceleration of 10 m/s^2 will ____.

a. move 10 m in 1 second
b. have a velocity of 10 m/s after 1 s
c. have a velocity of 100 m/s after 10 s
d. change its velocity by 10 m/s in 1 s

Question 9:

aa. The slope of the line on a velocity-time graph represents the _____.

a. the speed
b. the direction
c. how fast one moves
d. the acceleration

Question 10:

aa. If an object has zero acceleration, then it MUST _____.

a. be at rest
b. be moving
c. be changing its velocity
d. have a constant velocity

Question 14:

aa. A downward falling parachutist pulls the chord and rapidly slows down. The velocity direction is _____ and the acceleration direction is _____.

a. up, up b. down, down c. up, down d. down, up

Question 33:

aa. A <u>constant</u> acceleration means that the ____.

a. velocity is zero
b. acceleration is zero
c. the velocity is changing
d. velocity is changing by the same amount each second

Question 34:

aa. A stone is dropped from rest into a 45-meter deep well. It hits the water after approximately 3.0 seconds. The rock's acceleration has a magnitude of approximately ____ m/s/s.

a. 5.0 b. 10.0 c. 15.0 d. none of these

Question 35:

aa. A car starts from rest and accelerates uniformly for a distance of 160 m over an 8.0-second time interval. The car's acceleration is _____.

a. 0.05 m/s b. 0.05 m/s/s c. 5 m/s/s d. 20 m/s e. 20 m/s/s

Question 43:

aa. A car with a leftward velocity and a rightward acceleration is _____.

a. moving to the right and speeding up
b. moving to the right and slowing down
c. moving to the left and speeding up
d. moving to the left and slowing down

Question 60:

aa. A car that is moving at a constant velocity of 20 m/s, east for 10 seconds has an acceleration of _____ m/s/s.

a. 0 b. 2 c. 20 d. 200
e. none of these

Question 61:

aa. A free-falling object is an object _____. Select the most complete answer.

a. that is falling
b. upon which gravity is the only force
c. that is floating through the air like a feather
d. upon which the force of air resistance is equal to the force of gravity

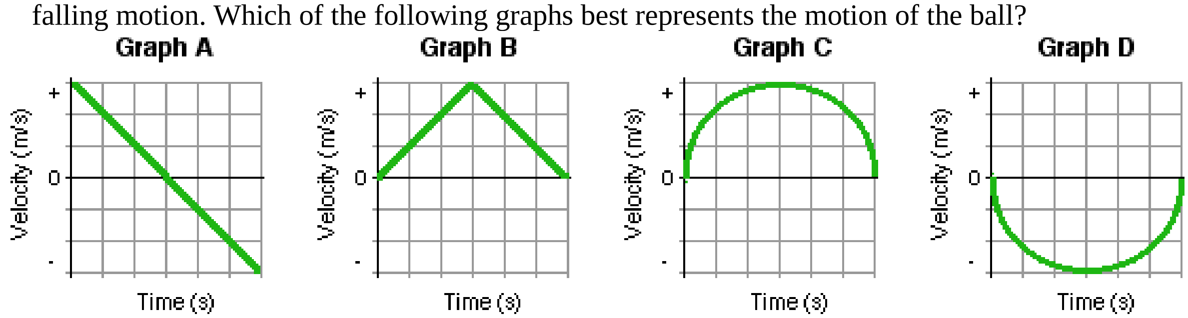
Question 62:

aa. Which of the following statements are true of all free-falling objects? Select all that apply.

a. The acceleration of the object is 0 m/s/s.
b. The velocity of the object is a constant value.
c. Gravity is the only force acting upon the object.
d. The acceleration value is increasing as it falls through the air.
e. The mass of the object does not affect the rate at which it free-falls.

Question 63:

aa. A ball is thrown into the air. The ball rises upward, reaches a peak and falls back downward before being caught at the same height from which it is thrown. Its motion can be approximated as a free falling motion. Which of the following graphs best represents the motion of the ball?



a. Graph A b. Graph B c. Graph C d. Graph D

Question 64:

aa. Suppose that a ball is thrown straight upward and that air resistance has no appreciable effect upon its motion. As the ball rises towards its peak, its velocity vector is directed ____ and its acceleration vector is directed ____. Which two words fill in these two blanks in their respective order?

a. upward, upward b. upward, downward
c. downward, upward d. downward, downward

Question 65:

aa. Suppose that a ball is thrown straight upward and that air resistance has no appreciable effect upon its motion. As the ball falls from its peak back to the ground, its velocity vector is directed ____ and its acceleration vector is directed ____. Which two words fill in these two blanks in their respective order?

a. upward, upward b. upward, downward
c. downward, upward d. downward, downward

Question 66:

aa. Suppose that a ball is thrown straight upward and that air resistance has no appreciable effect upon its motion. At the instant in time that the ball is at the peak of its trajectory, the _____.

a. velocity is 0.0 m/s and the acceleration is 0.0 m/s/s.
b. velocity is approximately -10 m/s and the acceleration is 0.0 m/s/s.
c. velocity is 0.0 m/s and the acceleration is approximately -10 m/s/s.
d. velocity is 0.0 m/s and the acceleration value cannot be predicted.
e. velocity cannot be predicted and the acceleration is approximately -10 m/s/s.
ab. velocity is approximately -10 m/s and the acceleration is approximately -10 m/s/s.
ac. velocity is approximately -10 m/s and the acceleration value cannot be predicted.
ad. velocity cannot be predicted and the acceleration is 0.0 m/s/s.

Part 2: Vectors and Projectiles (22 questions)

Question 1:

aa. The difference between a vector and a scalar quantity is that a vector ___.
  a. does not have any units
  b. does not have a magnitude
  c. is generally of the same magnitude or larger
  d. has a magnitude AND a direction
  e. can be graphed; scalars can't

Question 6:

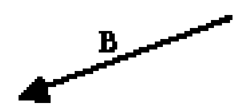
aa. A student adds A + B + C and obtains the resultant. If another students adds the same three vectors in a different order (say C + B + A), the resultant would ____.
  a. the same magnitude but a different direction
  b. a different magnitude and a different direction
  c. the same direction but a different magnitude
  d. the same magnitude and the same direction

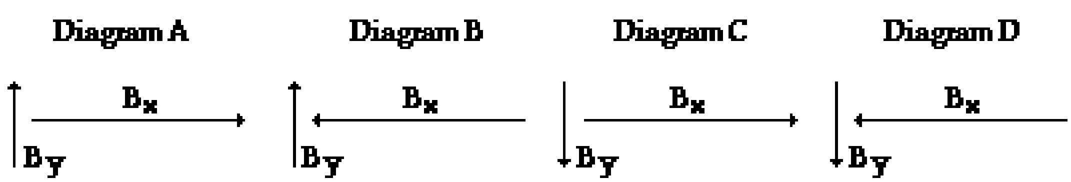
Question 11:

aa. The projection of a vector along the axis of a rectangular coordinate system is known as a(n) _________.
  a. projector b. scalar c. resultant d. component

Question 13:

aa. Consider the diagram of vector **B** at the right. Which one of the following combinations would result in the projection of this vector onto the usual x- and y-axis?





  a. Diagram A b. Diagram B c. Diagram C d. Diagram D
  e. ... nonsense! None of these combinations represent a projection of vector **B**.

Question 17:

aa. A water balloon is launched with a speed of 40 m/s at an angle of 60° to the horizontal. The $\mathbf{v_x}$ and $\mathbf{v_y}$ components are ____ m/s and ____ m/s respectively.
  a. -38.0, -12.2 b. 20.0, 34.6 c. 46.0, 38.6 d. none of these

Question 19:

aa. A springboard diver jumps with a velocity of 12 m/s at an angle of 80° to the horizontal. The $\mathbf{v_x}$ and $\mathbf{v_y}$ components are ____ m/s and ____ m/s respectively.
  a. 2.1, 11.8 b. 78.3, 16.6 c. -1.3, -11.9 d. none of these

Question 20:

aa. A football is kicked at an angle to the ground and is moving upwards and rightwards towards the peak of its trajectory. The acceleration of the football as it is approaching its peak is directed ____.

a. upward and rightward
b. downward and rightward
c. downward and leftward
d. upward and leftward
e. downward only
ab. upward only

Question 21:

aa. A projectile is launched at an angle of 25° above the horizontal with an initial velocity (v_o) of 32.5 m/s. The magnitude of the vertical velocity (v_y) upon returning to its original height (2.80 seconds after launch) is ____ m/s.

a. 5.02
b. 9.29
c. 9.8
d. 13.7
e. 32.5
ab. 60.0

Question 22:

aa. A projectile is set in motion in a horizontal direction with an initial horizontal velocity of 17.2 m/s from the edge of a 62.1-meter high cliff. The projectile lands upon the ground 3.56 seconds later. The horizontal distance at which it would land from the edge of the cliff (a vertical uprising) is ____ meters.

a. 17.
b. 34.
c. 61.2
d. 62.1
e. 123.3

Question 23:

aa. A football is kicked at an angle to the ground and has since reached its peak and is now moving downwards and rightwards. The acceleration of the football as it is falls from its peak is directed ____.

a. upward and rightward
b. downward and rightward
c. downward and leftward
d. upward and leftward
e. downward only
ab. upward only

Question 24:

aa. A tennis ball is hit horizontally from a height of 1-meter above the ground. After being hit, it moves as a projectile. The magnitude of the horizontal velocity of the tennis ball while in flight will ____.

a. decrease
b. remain constant
c. increase at a constant rate
d. increase at first and then remain constant
e. increase at first, remain constant, then decrease as it approaches the ground

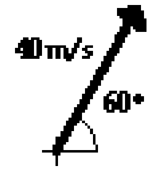
Question 25:

aa. A tennis ball is hit horizontally from a height of 1-meter above the ground. After being hit, it moves as a projectile. The magnitude of the vertical velocity of the ball while in flight will _____.

a. decrease
b. remain constant
c. increase at a constant rate
d. increase at first and then remain constant
e. increase at first, remain constant, then decrease as it approaches the ground

Question 29:

aa. The diagram at the right shows the initial velocity and direction of a projectile. The horizontal and vertical components of this velocity are ____ m/s, respectively.



a. -38.0, -12.2 b. 20.0, 34.6 c. 46.0, 38.6
d. none of these

Question 30:

aa. A projectile is launched at an angle of 25° above the horizontal with an initial velocity (v_o) of 32.5 m/s. It reaches the peak of its trajectory in 1.40 seconds. Its horizontal velocity (v_x) at the peak of its trajectory is ____ m/s.

a. 0.0 b. 3.0 c. 13.7 d. 29.5
e. 32.5 ab. 41.3

Questions 36-37:

Consider the following river boat problem. The questions are based on the following scenario:

A motorboat heads due west across a river which flows south. The river water moves with respect to the shore with a velocity of 3.50 m/s, south. The boat moves with respect to the water with a velocity of 2.50 m/s, west.

aa. The velocity (magnitude) of the boat with respect to the shore is _____ m/s.

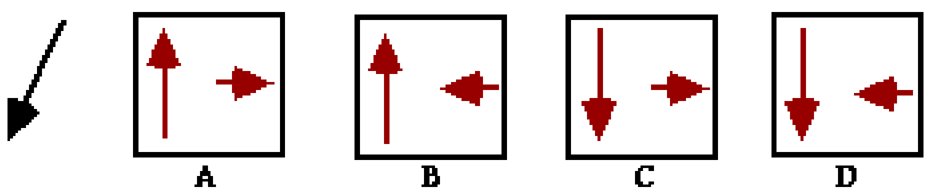
a. 1.00 b. 2.45 c. 4.30 d. 6.00

aa. The direction of the boat with respect to the shore is _____.

a. southwest b. 225 degrees
c. 54.5 degrees S of W d. 54.5 degrees W of S

Question 58:

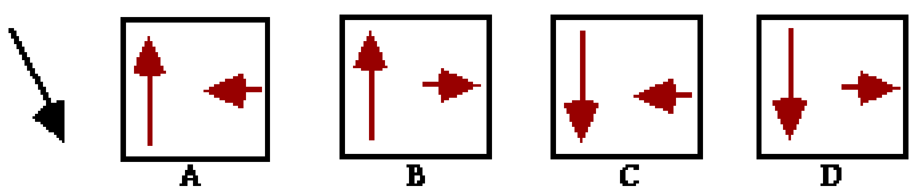
aa. Consider the vector below.



Its x- and y- components are best represented in diagram ____. (Enter a letter.)

Question 59:

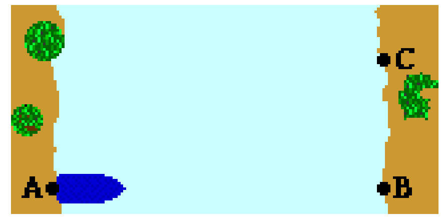
aa. Consider the vector below.



Its x- and y- components are best represented by ____.(Enter a letter.)

Question 64:

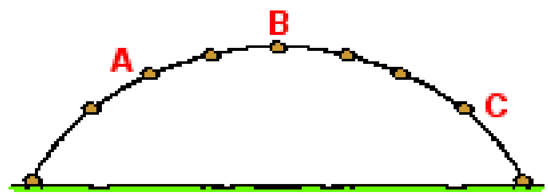
aa. A boat begins at point A and heads straight across a river. Because of the 2 m/s river current, the boat lands on the opposite shore at point C. If the river current was 3 m/s, then the boat would land on the opposite shore at ___. (Assume that the boat speed relative to the water does not change.)



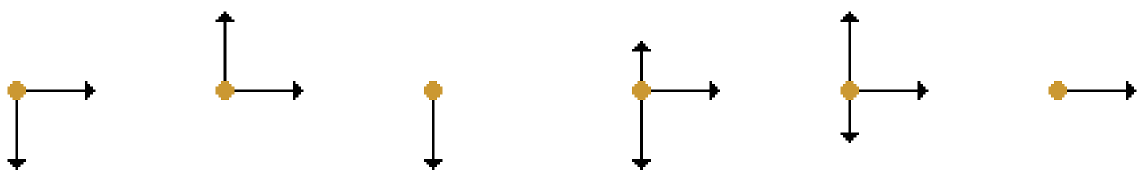
a. a location north of C
b. the same location of C
c. a location south of C
d. Nonsense! Impossible to answer without knowledge of the time to cross the river.

Questions 68-70:

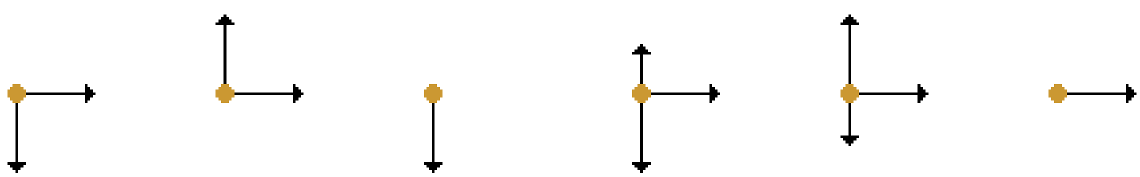
A football is kicked off a tee. It is traveling through the air along a trajectory as shown at the right. There are three locations marked on the diagram. **Location A** is a location prior to the ball reaching the peak of the trajectory. **Location B** is the location when the ball is exactly at the peak of its trajectory. **Location C** is a location after the ball has reached the peak of its trajectory. Use the diagram to answer the following three questions. Consider air resistance to be negligible.



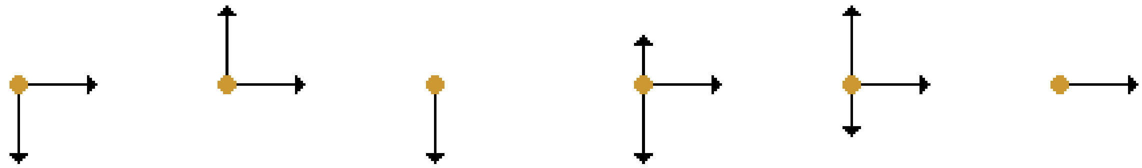
aa. Which of the diagrams below are proper representations of the forces that act upon the football at location A? Circle the proper diagram.



aa. Which of the diagrams below are proper representations of the forces that act upon the football at location B? Circle the proper diagram.



aa. Which of the diagrams below are proper representations of the forces that act upon the football at location C? Circle the proper diagram.



Part 3: Forces (35 questions)

Question 2:

aa. Forces, when unbalanced, always cause objects to _______.

a. maintain their speed
b. change direction
c. slow down
d. maintain their velocity
e. accelerate

Question 7:

aa. Suppose that an astronaut throws a rock in outer space at a location far from significant influences of gravity and air resistance. One would expect that the rock would ____.

a. eventually stop since all objects ultimately "lose their steam"
b. continue in motion with the same speed and direction
c. eventually stop as its inertia slowly becomes used up
d. either of the above -- depending on whether the astronaut continues to push it

Question 8:

aa. If you were in a spaceship and fired a missile into deep space (assumed frictionless), the amount of force needed to keep the missile in motion would be ____.

a. more than the force with which it was fired
b. equal to the force with which it was fired
c. equal to the weight of the missile
d. less than the force with which it was fired
e. zero, since no force is necessary to keep an object moving

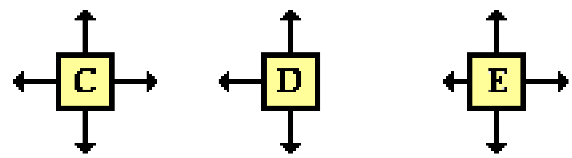
Question 9:

aa. An object moving at a constant velocity MUST _____.

a. be experiencing a balance of forces
b. not have a force of friction acting on it
c. eventually stop due to the force of gravity
d. not have any forces exerted upon it
e. not have a force of gravity acting on it
ab. have a net force acting on it
ac. none of these

Question 10:

aa. The diagrams below depict the individual forces acting upon an object.



Each arrow represents a force and the length of the arrow represents the size of the force. Based on this information, which objects could be moving to the right at a constant speed? Select all that apply.

Question 15:

aa. If an object is at equilibrium, then which of the following MUST be true? Select all that apply.

a. The forces are balanced.
b. The acceleration is 0 m/s/s.
c. The net force is 0 N.
d. The velocity is changing.
e. The object is at rest.

Question 19:

aa. A 10-kg object is moving to the right at a constant velocity of 4 m/s. Which one of the following horizontal forces is required to maintain this state of motion?

a. 0.4 N
b. 40 N
c. 2.5 N
d. 0 N

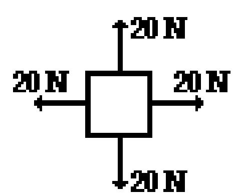
Question 23:

aa. In a physics demonstration, Noah Formula stands on a skateboard and holds a spring scale (for measuring forces). Anna Litical holds the other end of the spring scale and pulls in order to accelerate Noah along the floor. If the system is considered to be the combination of Noah and the skateboard, then the forces that act upon the system are ____. Choose all that apply.

a. The force of the spring scale on Noah.
b. The force of Noah on the skateboard.
c. The force of the skateboard on Noah.
d. The force of the floor on the skateboard.
e. The force of Earth's gravity on Noah and the skateboard.

Question 45:

aa. The diagram below shows an object with a variety of forces acting upon it; the magnitudes of the forces are labeled.

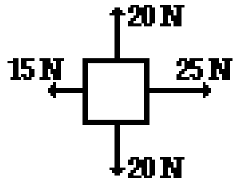


The magnitude of the net force on this object is ___ N.

a. 0
b. 20
c. 40
d. 80
e. impossible to tell

Question 46:

aa. The diagram below shows an object with a variety of forces acting upon it; the magnitudes of the forces are labeled.

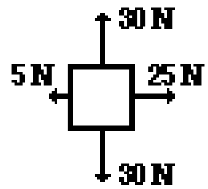


The magnitude of the net force on this object is ___ N.

a. 0 b. 1 c. 2 d. 25
e. 40 ab. 80

Question 47:

aa. The diagram below shows an object with a variety of forces acting upon it; the magnitudes of the forces are labeled.



The magnitude of the net force on this object is ___ N.

a. 5 b. 20 c. 30 d. 6 e. 90

Question 50:

aa. The force of gravity that acts upon an object is referred to as the _____ of the object.

a. kilograms b. pressure c. weight d. inertia e. mass

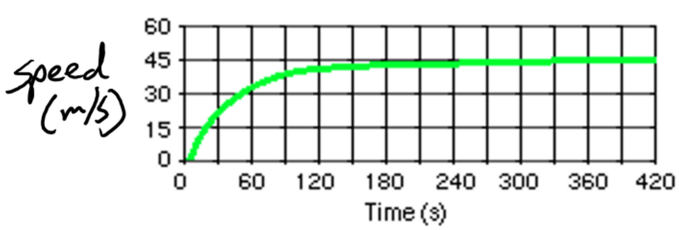
Question 53:

aa. A downward moving object accelerates upward. The total upward force on the object is ______.

a. equal to the object's weight
b. less than the object's weight
c. greater than the object's weight

Questions 55-57:

The speed-time plot below represents the motion of a falling skydiver.



Use this graph to answer the following questions.

aa. What is the terminal speed value of this skydiver?

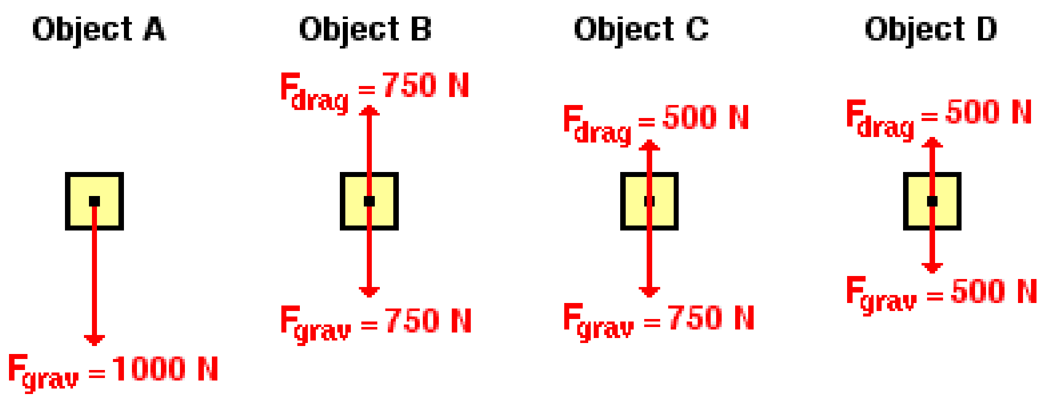
a. 30 m/s b. 45 m/s c. 60 m/s d. 150 s e. 180 s

aa. What is happening to the speed of the skydiver during the first two minutes (120 seconds)?
a. decreasing b. increasing c. remains the same

aa. What is happening to the acceleration of the skydiver during the first two minutes (120 seconds)?
a. decreasing b. increasing c. remains the same

Question 66:

aa. Which of the following free-body diagrams would be characteristic of an object that has reached terminal velocity?



a. Diagram A b. Diagram B c. Diagram C d. Diagram D

Question 67:

aa. A large truck rear-ends a less massive car at a stop sign. The force of the car on the truck is _____ the force of the truck on the car; the resulting acceleration of the car is ____ the acceleration of the truck. Which two words fill in the two blanks in the respective order?

a. less than, greater than
b. equal to, less than
c. greater than, less than
d. less than, equal to
e. greater than, greater than
ab. greater than, equal to
ac. equal to, greater than
ad. less than, less than
ae. equal to, equal to

Question 69:

aa. Joel and Marissa are on skates on an icy pond. They are facing each other with their hands touching. They then push away from each other with their hands. The force of Joel pushing upon Marissa is equal to _____.
a. the force of air resistance (air drag) upon Joel
b. the force of Marissa pushing upon Joel
c. the force of the floor pushing upon Marissa
d. the force of the floor pushing upon Joel
e. Nonsense! None of these conclusions can be made.

Question 75:

aa. In its final effort to reach a terminal velocity, a misbehaving bug collides with the windshield of a fast-moving bus. The force of the bus on the bug is _____ the force of the bug on the bus; the resulting acceleration of the bug is ____ the acceleration of the bus.

a. equal to, less than
b. equal to, equal to
c. less than, less than
d. less than, equal to
e. greater than, greater than
ab. less than, greater than
ac. equal to, greater than
ad. greater than, equal to
ae. greater than, less than

Question 76:

aa. An object experiences a **tension force** whenever it is _____.

a. acted upon by a drag force
b. being pulled upon by a string or a rope
c. under stress
d. being pressed firmly against a surface

Question 77:

aa. An object experiences a **normal force** whenever it is _____.

a. at rest
b. not in free fall
c. acted upon by a drag force
d. acted upon by the force of gravity
e. in contact with and pressed against the surface of another object

Question 84:

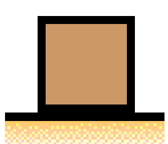
aa. The direction of the normal force is _______.

a. always directed straight up
b. always perpendicular to the plane of contact with the surface
c. usually but not always perpendicular to the plane of contact with the surface

Questions 85-87:

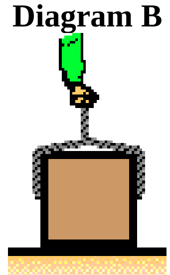
Consider the three diagrams below of a box at rest on a table. Use the diagram to answer the next three questions.

Diagram A



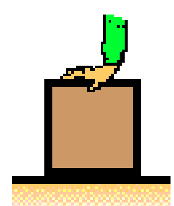
The box sits at rest on the table.

Diagram B



There is an upward pull upon the box.

Diagram C



There is a downward push upon the box.

aa. In Diagram A, the normal force exerted by the table upon the box is _____.

a. greater than the weight of the box
b. equal to the weight of the box
c. less than the weight of the box

aa. In Diagram B, the normal force exerted by the table upon the box is _____.
a. greater than the weight of the box
b. equal to the weight of the box
c. less than the weight of the box

aa. In Diagram C, the normal force exerted by the table upon the box is _____.
a. greater than the weight of the box
b. equal to the weight of the box
c. less than the weight of the box

Question 96:
aa. The force of static friction tends to be ______ the force of kinetic friction.
a. greater than b. smaller than c. the same as

Question 97:
aa. The symbol μ stands for the _____.
a. normal force b. force of friction c. coefficient of friction

Question 98:
aa. The units on μ are _____.
a. Newton b. kg c. m/s/s
d. ... nonsense! There are no units on μ.

Question 99:
aa. A 30-N force is applied to a 4-kg object to move it with a constant velocity of 2 m/s across a level surface. The coefficient of friction between the object and the surface is approximately ____. (Use the approximation: **g** ~ 10 m/s/s.)
a. 0.20 b. 0.50 c. 0.55 d. 0.75
e. 2.0 ab. 3.0 ac. 7.5 ad. 20
ae. 22 bc. 30

Question 102:
aa. A book is moving across the table and gradually decelerates to a stop. During this time, there is a ____ friction force acting upon the book.
a. kinetic b. static

Question 103:
aa. A 500-N box is at rest on the floor. Dennis Elbo makes several attempts to move the box, pushing against the box with varying amounts of horizontal force. Yet the box never does move. In this situation, the amount of static friction force experienced by the box ____. Select all that apply.
a. is 500 N
b. is equal to the force with which Dennis exerts on the box
c. has an upper limit and Dennis has not yet exceeded the upper limit
d. is always the coefficient of friction multiplied by the normal force value

Question 104:

aa. The amount of friction force experienced by an object as it moves across a floor depends primarily upon ____. Select all that apply.

a. the speed of the moving object
b. the surface area of the moving object
c. the normal force which acts upon the object
d. the materials that the object and the floor are made of

Question 105:

aa. A 147-Newton horizontal force is exerted upon a 3.1-kg box to move it across a level surface at a constant velocity of 1.4 m/s. The force of friction encountered by the box is ____ Newton.

a. 105 b. 4.84 c. 6.77 d. 47
e. 147 ab. 4.3 ac. 0.21

Question 106:

aa. A 30-N force is applied to a 4-kg object to move it with a constant velocity of 2 m/s across a level surface. The coefficient of kinetic friction between the object and the surface is approximately ____.

a. 0.20 b. 0.50 c. 0.38 d. 0.77
e. 2.0 ab. 3.1 ac. 7.3 ad. 7.5
ae. 20 bc. 27 BD. 30

<u>Part 4: Energy (39 questions)</u>

Question 6:

aa. Power is defined as the _______ is done.

a. angle at which work b. amount of work which
c. direction at which work d. the rate at which work

Question 7:

aa. If the unit of mass is the lump, and the unit of distance is the jump, and the unit of time is the thump, then the unit of power is the _____.

a. $\text{lump}\cdot\text{jump}\cdot\text{thump}^2$ b. lump·jump/thump
c. $\text{lump}\cdot\text{jump}/\text{thump}^2$ d. $\text{lump}\cdot\text{jump}^2\cdot\text{thump}^3$
e. $\text{lump}\cdot\text{jump}^2/\text{thump}^3$

Questions 8-9:

Two physics students, Will N. Andable and Ben Pumpiniron, are in the weightlifting room. Will lifts the 100-pound barbell over his head 10 times in one minute; Ben lifts the 100-pound barbell over his head 10 times in 10 seconds.

aa. Which student does the most work?

a. Will b. Ben c. Both the same

aa. Which student delivers the most power?

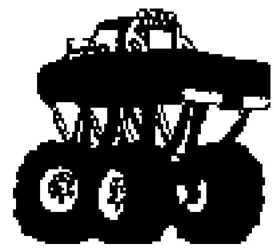
a. Will b. Ben c. Both the same

Question 10:

aa, Mr. Stapleton's car, with a 60.0-horsepower engine is able to accelerate from 0 to 60 mi/hr in 24 seconds (when it's running well). He dreams of purchasing an all-terrain 4-wheeler with a 240.0-horsepower engine. How many seconds would it take Mr. Stapleton's dream car to accelerate from 0 to 60 mi/hr?

a. 1.5 s b. 3 s c. 6 s

d. 48 s e. 96 s ab. none of these



Questions 12-18:

Read the following descriptions and identify the situation as an example of **positive work** being done, **negative work** being done, or **no work** being done.

aa. A teacher pushes against a wall for a couple of hours and becomes exhausted.

This is an example of _________ work being done.

a. positive b. negative c. no

aa. A boy exerts a force on a wagon to pull it along the sidewalk.

This is an example of _________ work being done.

a. positive b. negative c. no

aa. A softball player slows down while sliding across the infield dirt during a slide into third base.

This is an example of _________ work being done.

a. positive b. negative c. no

aa. An upward force is applied to a pile of snow to lift it up off the driveway.

This is an example of _________ work being done.

a. positive b. negative c. no

aa. A driver slams on the brakes and her high speed car skids to a stop as the light turns red.

This is an example of _________ work being done.

a. positive b. negative c. no

aa. A hockey player makes a sudden slap of the puck to accelerate it to a high speed.

This is an example of _________ work being done.
a. positive b. negative c. no

aa. While hanging a picture in their dorm room, Denise holds the picture against the wall for several moments while Jodi inspects its appearance and position.

This is an example of _________ work being done.
a. positive b. negative c. no

Questions 24-25:
aa. There is a difference between work and kinetic energy. Work is ______ the system …
a. a property of
b. negative for
c. positive for
d. something which is done to
e. a quantitative description of
ab. a qualitative description of

aa. … and kinetic energy is _____ the system.
a. a property of
b. negative for
c. positive for
d. something which is done to
e. a quantitative description of
ab. a qualitative description of

Question 26:
aa. An 80-kg baseball player slides into third base. He experiences 60 N of friction force over a distance of 1.2 m. The amount of work done by friction is _____ Joule.
a. 16 b. -72 c. 72 d. 400
e. -400 ab. 960 ac. -960

Question 27:
aa. For a constant force in the direction of motion, work is calculated as _____.
a. weight•speed
b. distance•speed
c. force•acceleration
d. force•displacement
e. weight•displacement

Question 28:
aa. Dennis Elbough pushes on a 53.5-kg box with a forward force of 300 N to move it 17.0 m across the floor. The work done by Dennis on the box is _____ J.
a. 0.330 b. 5.61 c. 17.65 d. 95.3 e. 5100

Question 29:
aa. The energy possessed by an object as a result of its motion is referred to as _____.
a. thermal b. kinetic c. potential d. kinematic
e. mechanical ab. motionary

Question 30:
aa. A boy is pulling a wagon along the sidewalk. It has a kinetic energy of 20 J. The boy then applies a forward force of 15 N for 3 m. The new kinetic energy of the wagon is _____ J.

a. 25 b. 35 c. 45 d. 60
e. 65 ab. 75 ac. 80

Question 31:

aa. The kinetic energy of an object depends upon the _______ of the object. Select all that apply.

a. speed b. mass c. height
d. dimensions e. acceleration

Question 32:

aa. An object has a kinetic energy of 36.0 J. If the object's speed is tripled, then its new kinetic energy will be ____ J.

a. 4.00 b. 6.00 c. 12.00 d. 24.00
e. 54.0 ab. 108.0 ac. 216.0 ad. 324.0

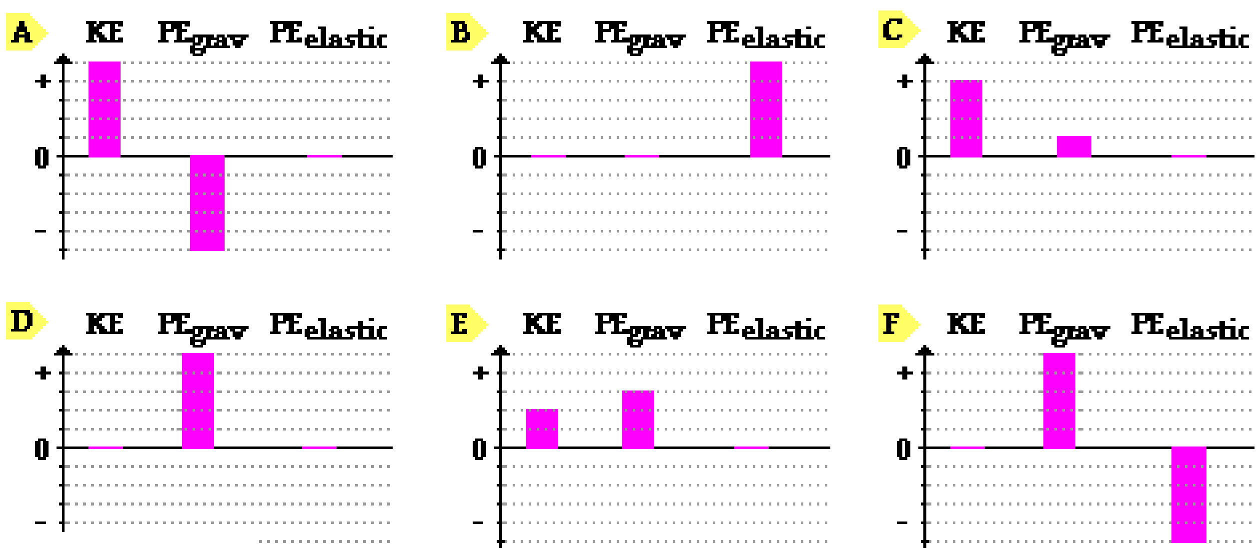
Question 33:

aa. An object has a kinetic energy of 36.0 J. An object with three times the mass moving at the same speed will have a kinetic energy of ____ J.

a. 4.00 b. 6.00 c. 12.00 d. 24.00
e. 54.0 ab. 108.0 ac. 216.0 ad. 324.0

Questions 42-45:

A boy is jumping up and down on a trampoline in repeating fashion. Consider the following four positions of the boy during a particular cycle of his up and down motion. For each position, identify the energy bar chart which best represents the form of energy possessed by the boy. The reference level for zero gravitational potential energy is the height of the body when he is at the lowest position in his path. Of course, two letters will not be used.



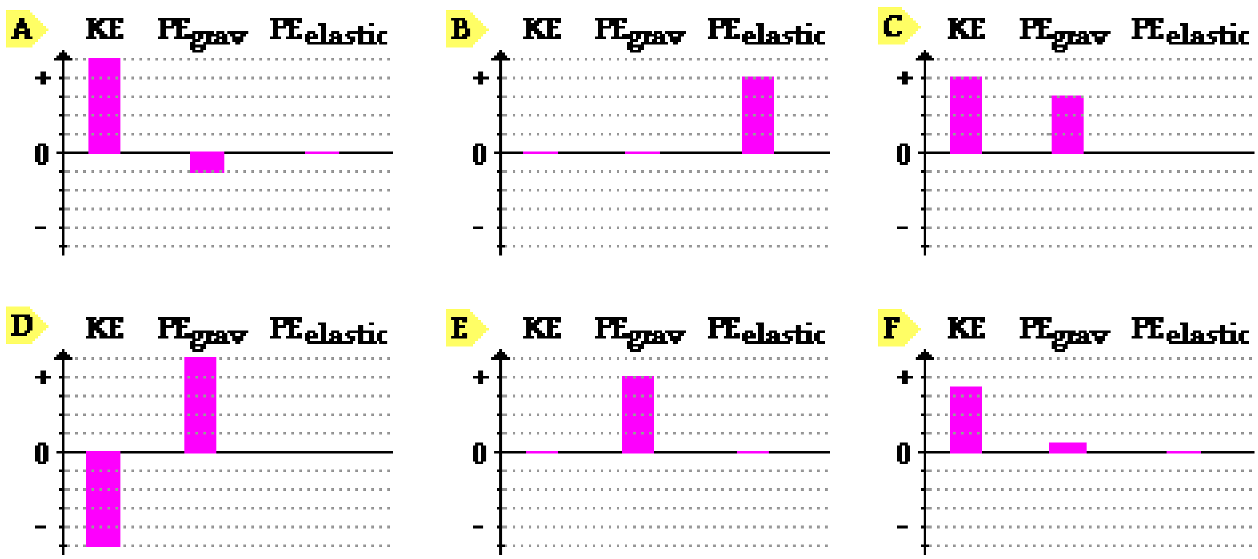
aa. The boy is at the highest point of his path (the peak height). This position would be consistent with bar chart_______.

aa. The boy is at the midway point of his upward path. This position would be consistent with bar chart _______.

aa. The boy has just touched the trampoline surface but has not yet pushed it downwards below its normal resting position. This position would be consistent with bar chart _______.

aa. The boy is at the lowest point in the cycle, having compressed the springs of the trampoline the maximum amount below their normal resting position. This position would be consistent with bar chart _______.

Question 46-49:
A child receives a spring-loaded toy dart gun. The dart is prepared to fire by compressing the dart against the springs. When the trigger is pulled, the elastic potential energy of the springs push the rubber dart out of the gun. Suppose the child uses the dart gun to shoot a dart straight up into the air. The dart is loaded into the gun (position **A**) at the child's waist level. The dart is launched upward at high speed (position **B** is when the dart has just left the gun). The dart continues upward to its peak (position **C**) and then falls back to the ground (position **D** is the position of the dart when it is a mere pico-meter above the ground). Match the various positions of the flight of the dart to the corresponding energy bar chart. The reference level for zero gravitational potential energy is the height of the dart at position A.



aa. Position **A** corresponds to bar chart _____.

aa. Position **B** corresponds to bar chart _____.

aa. Position **C** corresponds to bar chart _____.

aa. Position **D** corresponds to bar chart _____.

Question 65:

aa. Consider the types of forces present in the following physical situation:

> A parachutist is falling downward, encountering a large amount of air resistance.

In this situation, the total mechanical energy of the parachutist ____.
a. will definitely change
b. will remain constant
c. will probably change, but might not if it is skidding to a stop while moving uphill
d. ... nonsense! None of these predictions are possible without actual energy values.

Question 66:
aa. Consider the types of forces present in the following physical situation:

> A roller coaster car is coasting down the first drop of the track. Assume that resistance forces have no effect on the car's motion.

In this situation, the total mechanical energy of the car ____.
a. will definitely change
b. will remain constant
c. will probably change, but might not if it is skidding to a stop while moving uphill
d. ... nonsense! None of these predictions are possible without actual energy values.

Question 67:
aa. There are various forms of energy that are of major interests to scientists of biology, chemistry, and physics. The form of energy that is associated with kinetic and potential energy is known as _______ energy.

a. work	b. physical	c. chemical	d. thermal
e. isolated	ab. mechanical	ac. conservation of	

Question 68:
aa. An 80-kg baseball player slides into third base. He experiences 60 N of friction force over a distance of 1.2 m. The amount of work done by friction is _____ Joule.

a. 16	b. 72	c. -72	d. -400
e. 400	ab. 960	ac. -960	

Questions 85-89:
For the following descriptions of a motion, identify whether the object being described encounters a change in kinetic energy, a change in potential energy, a change in both types of energy or in neither type of energy.

aa. A 2.5-kg cart is pulled from the floor to the top of a box along an inclined plane at a constant speed.
a. Change in KE b. Change in PE
c. both A and B d. neither A nor B

aa. A cart starts from rest on top of an inclined plane and rolls down to the floor.
a. Change in KE b. Change in PE
c. both A and B d. neither A nor B

aa. A small Hot Wheels car moving along the floor hits a computer diskette box and skids to a stop.

a. Change in KE
b. Change in PE
c. both A and B
d. neither A nor B

aa. A raindrop completes the last 100 feet of its fall at a terminal velocity.

a. Change in KE
b. Change in PE
c. both A and B
d. neither A nor B

aa. A roller coaster car descends the first hill of the Shockwave roller coaster.

a. Change in KE
b. Change in PE
c. both A and B
d. neither A nor B