

Physics
Keller
Midterm exam review

The midterm exam will be seventy questions selected from the following. The questions will be changed slightly, but will remain essentially the same.

1) A truck is moving at constant velocity. Inside the storage compartment, a rock is dropped from the midpoint of the ceiling and strikes the floor below. The rock hits the floor

- A) exactly below the midpoint of the ceiling.
- B) ahead of the midpoint of the ceiling.
- C) behind the midpoint of the ceiling.
- D) More information is needed to solve this problem.
- E) none of these

2) When a rocket ship accelerating in outer space runs out of fuel, it

- A) accelerates for a short time, then slows down to a constant velocity.
- B) accelerates for a short time, slows down, and eventually stops.
- C) no longer accelerates.

3) A horse gallops a distance of 10 kilometers in a time of 30 minutes. Its average speed is

- A) 15 km/h.
- B) 20 km/h.
- C) 30 km/h.
- D) 40 km/h.

4) A car maintains a constant velocity of 100 km/hr for 10 seconds. During this interval its acceleration is

- A) zero.
- B) 10 km/hr.
- C) 110 km/hr.
- D) 1000 km/hr.

5) While an object near the Earth's surface is in free fall, its

- A) velocity increases.
- B) acceleration increases.
- C) mass increases.
- D) mass decreases.

6) A hockey puck is set in motion across a frozen pond. If ice friction and air resistance are neglected, the force required to keep the puck sliding at constant velocity is

- A) zero.
- B) equal to its weight.
- C) equal to its weight divided by its mass.
- D) equal to the product of its mass times its weight.

- 7) An object at rest near the surface of a distant planet starts to fall freely. If the acceleration there is twice that of the Earth, its speed one second later would be
- A) 10 m/s.
 - B) 20 m/s.
 - C) 30 m/s.
 - D) 40 m/s.
- 8) If an object falling freely were somehow equipped with an odometer to measure the distance it travels, then the amount of distance it travels each succeeding second would be
- A) constant.
 - B) less and less each second.
 - C) greater than the second before.
 - D) doubled.
- 9) If a freely falling object were somehow equipped with a speedometer, its speed reading would increase each second by about
- A) 5 m/s.
 - B) 10 m/s.
 - C) 15 m/s.
 - D) a variable amount.
 - E) depends on its initial speed
- 10) Twelve seconds after starting from rest, an object falling freely will have a speed of
- A) 10 m/s.
 - B) 50 m/s.
 - C) 100 m/s.
 - D) more than 100 m/s.
- 11) If an object moves with constant acceleration, its velocity must
- A) be constant also.
 - B) change by the same amount each second.
 - C) change by varying amounts depending on its speed.
 - D) always decrease.
- 12) If a car increases its velocity from zero to 60 km/h in 10 seconds, its acceleration is
- A) 3 km/h/s.
 - B) 6 km/h/s.
 - C) 10 km/h/s.
 - D) 60 km/h/s.
 - E) 600 km/h/s.
- 13) If a rocket initially at rest accelerates at a rate of 50 m/s^2 for one minute, its speed will be
- A) 50 m/s.
 - B) 500 m/s.
 - C) 3000 m/s.
 - D) 3600 m/s.

14) An apple falls from a tree and hits the ground 5 meters below. It hits the ground with a speed of about

- A) 5 m/s.
- B) 10 m/s.
- C) 15 m/s.
- D) 20 m/s.
- E) not enough information given to estimate

15) It takes 6 seconds for a stone to fall to the bottom of a mine shaft. How deep is the shaft?

- A) about 60 m
- B) about 120 m
- C) about 180 m
- D) more than 200 m

16) In each second of fall, the distance a freely falling object will fall is

- A) about 5 m.
- B) about 10 m.
- C) the same, but not 5 m or 10 m.
- D) increasing.
- E) none of these

17) A car accelerates at 2 meters/s/s. Assuming the car starts from rest, how far will it travel in 10 s?

- A) 2 m
- B) 10 m
- C) 40 m
- D) 100 m
- E) 200 m

18) A ball tossed vertically upward rises, reaches its highest point, and then falls back to its starting point. During this time the acceleration of the ball is always

- A) in the direction of motion.
- B) opposite its velocity.
- C) directed upward.
- D) directed downward.

19) An object covers a distance of 8 meters in the first second of travel, another 8 meters during the next second, and 8 meters again during the third second. Its acceleration in meters per second per second is approximately

- A) 0.
- B) 5.
- C) 8.
- D) 24.

20) At one instant an object in free fall is moving downward at 50 meters per second. One second later its speed should be about

- A) 25 m/s.
- B) 50 m/s.
- C) 55 m/s.
- D) 60 m/s.
- E) 100 m/s.

21) At one instant a heavy object in air is moving upward at 50 meters per second. One second later its speed is approximately

- A) 40 m/s.
- B) 50 m/s.
- C) 55 m/s.
- D) 60 m/s.

22) Disregarding air resistance, objects fall with constant

- A) velocity.
- B) speed.
- C) acceleration.
- D) distances each successive second.

23) One half second after starting from rest, a freely falling object will have a speed of about

- A) 20 m/s.
- B) 10 m/s.
- C) 5 m/s.
- D) 2.5 m/s.
- E) none of these

24) An apple falls from a tree and hits the ground 5 meters below. It hits the ground with a speed of about

- A) 5 m/s.
- B) 10 m/s.
- C) 15 m/s.
- D) 20 m/s.
- E) not enough information given to estimate

25) It takes 6 seconds for a stone to fall to the bottom of a mine shaft. How deep is the shaft?

- A) about 60 m
- B) about 120 m
- C) about 180 m
- D) more than 200 m

26) If you drop an object, it will accelerate downward at a rate of 10 meters per second per second. If you instead throw it downwards, its acceleration (in the absence of air resistance) will be

- A) less than 10 meters per second per second.
- B) 10 meters per second per second.
- C) greater than 10 meters per second per second.

- 27) In each second of fall, the distance a freely falling object will fall is
- A) about 5 m.
 - B) about 10 m.
 - C) the same, but not 5 m or 10 m.
 - D) increasing.
 - E) none of these
- 28) If a projectile is fired straight up at a speed of 10 m/s, the time it takes to reach the top of its path is about
- A) 1 second.
 - B) 2 seconds.
 - C) 10 seconds.
 - D) not enough information to estimate
- 29) A car accelerates at 2 meters per second per second. Assuming the car starts from rest, how much time does it need to accelerate to a speed of 30 m/s?
- A) 2 seconds
 - B) 15 seconds
 - C) 30 seconds
 - D) 60 seconds
 - E) none of these
- 30) A car accelerates from rest for 5 seconds until it reaches a speed of 20 m/s. What is the car's acceleration in meters per second per second?
- A) 1
 - B) 2
 - C) 3
 - D) 4
 - E) 5
- 31) Ten seconds after starting from rest, a car is moving at 40 m/s. What is the car's acceleration in meters per second per second?
- A) 0.25
 - B) 2.8
 - C) 4.0
 - D) 10
 - E) 40
- 32) When a rock thrown straight upwards gets to the exact top of its path, its
- A) velocity is zero and its acceleration is zero.
 - B) velocity is zero and its acceleration is about 10 meters per second per second.
 - C) velocity is about 10 m/s and its acceleration is zero.
 - D) velocity is about 10 m/s and its acceleration is about 10 meters per second per second.
 - E) none of these

- 33) A bullet is dropped from the top of the Empire State Building while another bullet is fired downward from the same location. Neglecting air resistance, the acceleration of
- A) the fired bullet is greater.
 - B) the dropped bullet is greater.
 - C) each bullet is 9.8 meters per second per second.
- 34) A pot falls from a ledge and hits the ground 45 m below. The speed with which it hits the ground is
- A) about 30 m/s.
 - B) about 60 m/s.
 - C) about 120 m/s.
 - D) more than 120 m/s.
- 35) Compared to a 1-kg block of solid iron, a 2-kg block of solid iron has twice as much
- A) inertia.
 - B) mass.
 - C) volume.
 - D) all of these
 - E) none of these
- 36) Your weight is
- A) equal to your mass.
 - B) the gravitational attraction force between you and the Earth.
 - C) a property of mechanical equilibrium.
 - D) all of these
- 37) Compared to the mass of a certain object on Earth, the mass of the same object on the moon is
- A) one sixth as much.
 - B) the same.
 - C) six times as much.
 - D) zero.
- 38) A rock weighs 30 N on Earth. A second rock weighs 30 N on the moon. Which of the two rocks has the greater mass?
- A) the one on Earth
 - B) the one on the moon
 - C) They have the same mass.
 - D) not enough information to say
- 39) A 10-kg brick and a 1-kg book are dropped in a vacuum. The force of gravity on the 10-kg brick is
- A) the same as the force on the 1-kg book.
 - B) 10 times as much.
 - C) one-tenth as much.
 - D) zero.

40) An object is propelled along a straight-line path by a force. If the net force were doubled, the object's acceleration would be

- A) half as much.
- B) the same.
- C) twice as much.
- D) four times as much.
- E) none of these

41) An object is propelled along a straight-line path in space by a force. If the mass of the object somehow becomes twice as much, its acceleration

- A) quadruples.
- B) doubles.
- C) stays the same.
- D) halves.
- E) none of these

42) An object is pulled northward by a force of 10 N and at the same time another force of 15 N pulls it southward. The magnitude of the resultant force on the object is

- A) 0 N.
- B) 5 N.
- C) 25 N.
- D) 150 N.

43) The force of friction on a sliding object is 10 newtons. The applied force needed to maintain a constant velocity is

- A) more than 10 N.
- B) less than 10 N.
- C) 10 N.

44) A 10-N falling object encounters 4 N of air resistance. The net force on the object is

- A) 0 N.
- B) 4 N.
- C) 6 N.
- D) 10 N.
- E) none of these

45) A 10-N falling object encounters 10 N of air resistance. The net force on the object is

- A) 0 N.
- B) 4 N.
- C) 6 N.
- D) 10 N.
- E) none of these

- 46) An apple weighs 1 N. When held at rest above your head, the net force on the apple is
A) 0 N.
B) 0.1 N.
C) 1 N.
D) 9.8 N.
E) none of these
- 47) An apple at rest weighs 1 N. The net force on the apple when it is in free fall is
A) 0 N.
B) 0.1 N.
C) 1 N.
D) 9.8 N.
E) none of these
- 48) Your car is coasting on level ground at 60 km/h and you apply the brakes until the car slows to 40 km/h. If you suddenly release the brakes now, the car tends to
A) momentarily regain its higher initial speed.
B) continue moving at 40 km/h.
C) decrease in speed if no other forces act.
- 49) A heavy block at rest is suspended by a vertical rope. When the block is accelerated upward by the rope, the rope tension
A) increases.
B) decreases.
C) remains the same.
- 50) A 1-kg mass at the Earth's surface weighs
A) 1 N.
B) 4.9 N.
C) 9.8 N.
D) 10.8 N.
E) none of these
- 51) A car has a mass of 1000 kg and accelerates at 2 meters per second per second. What is the magnitude of the net force exerted on the car?
A) 500 N
B) 1000 N
C) 1500 N
D) 2000 N
E) none of these
- 52) A tow truck exerts a force of 3000 N on a car, accelerating it at 2 meters per second per second. What is the mass of the car?
A) 500 kg
B) 1000 kg
C) 1500 kg
D) 3000 kg
E) none of these

53) A girl pulls on a 10-kg wagon with a constant horizontal force of 30 N. If there are no other horizontal forces, what is the wagon's acceleration in meters per second per second?

- A) 0.3
- B) 3.0
- C) 10
- D) 30
- E) 300

54) A force of 1 N accelerates a mass of 1 kg at the rate of 1 m/s^2 . The acceleration of a mass of 2 kg acted upon by a net force of 2 N is

- A) half as much.
- B) twice as much.
- C) the same.
- D) none of these

55) A bag of groceries has a mass of 10 kilograms and a weight of

- A) about 1 N.
- B) about 10 N.
- C) about 100 N.
- D) about 1000 N.
- E) more than 1000 N.

56) The mass of a pet turtle that weighs 10 N is

- A) about 1 kg.
- B) about 10 kg.
- C) about 100 kg.
- D) about 1000 kg.
- E) none of these

57) The force required to maintain an object at a constant velocity in free space is equal to

- A) zero.
- B) the mass of the object.
- C) the weight of the object.
- D) the force required to stop it.
- E) none of these

58) Neglecting friction, a large block of ice and a small block of ice start sliding down an incline together. The heavier block will get to the bottom

- A) before the light block.
- B) after the light block.
- C) at the same time as the light block.

59) A push on a 1-kg brick accelerates it. Neglecting friction, to equally accelerate a 10-kg brick, one would have to push with

- A) just as much force.
- B) 10 times as much force.
- C) 100 times as much force.
- D) one-tenth the amount of force.
- E) none of these

60) A 10-N block and a 1-N block lie on a horizontal frictionless table. To provide them with equal horizontal acceleration, we would have to push with

- A) equal forces on each block.
- B) 10 times as much force on the heavier block.
- C) 10 squared or 100 times as much force on the heavier block.
- D) 1/10 as much force on the heavier block.

61) A rock is thrown vertically into the air. At the top of its path, the magnitude of its acceleration in meters per second per second is

- A) zero.
- B) 10.
- C) between 0 and 10.
- D) greater than 10.

62) A block is dragged without acceleration in a straight-line path across a level surface by a force of 6 N. What is the force of friction between the block and the surface?

- A) less than 6 N
- B) more than 6 N
- C) 6 N
- D) need more information to say

63) Suppose a particle is being accelerated through space by a 10-N force. Suddenly the particle encounters a second force of 10 N in the opposite direction from the first force. The particle with both forces acting on it

- A) is brought to a rapid halt.
- B) decelerates gradually to a halt.
- C) continues at the speed it had when it encountered the second force.
- D) theoretically tends to accelerate toward the speed of light.
- E) none of these

64) A 1-kg rock that weighs 9.8 N is thrown straight upward at 20 m/s. Neglecting air resistance, the net force that acts on it when it is half way to the top of its path is

- A) less than 9.8 N.
- B) 9.8 N.
- C) more than 9.8 N.

65) A 1-kg ball is thrown at 10 m/s straight upward. Neglecting air resistance, the net force that acts on the stone when it is halfway to the top of its path is about

- A) 1/2 N.
- B) 1 N.
- C) 5 N.
- D) 7.5 N.
- E) 10 N.

66) A skydiver of mass 100 kg experiences air resistance of 500 N, and an acceleration of

- A) about 0.2 g.
- B) about 0.3 g.
- C) about 0.4 g.
- D) about 0.5 g.
- E) more than 0.5 g.

67) An object released from rest on another planet requires one second to fall a distance of 6 meters. What is the acceleration in meters per second per second due to gravity on this planet?

- A) 3
- B) 6
- C) 12
- D) 15
- E) none of these

68) A 10-kilogram block with an initial velocity of 10 m/s slides 10 meters across a horizontal surface and comes to rest. It takes the block 2 seconds to stop. The stopping force acting on the block is about

- A) 5 N.
- B) 10 N.
- C) 25 N.
- D) 50 N.
- E) none of these

69) A 10-kilogram block is pushed across a horizontal surface with a horizontal force of 20 N against a friction force of 10 N. The acceleration of the block in meters per second per second is

- A) 1.
- B) 2.
- C) 5.
- D) 10.
- E) none of these

70) A 1000-kg automobile enters a freeway on-ramp at 20 m/s and accelerates uniformly up to 40 m/s in a time of 10 seconds. How far does the automobile travel during that time?

- A) 100 m
- B) 200 m
- C) 300 m
- D) 400 m
- E) none of these

71) A 2000-kg car experiences a braking force of 10,000 N and skids to a stop in 6 seconds. The speed of the car just before the brakes were applied was

- A) 1.2 m/s.
- B) 15 m/s.
- C) 30 m/s.
- D) 45 m/s.
- E) none of these

72) An astronaut on another planet drops a 1-kg rock from rest and finds that it falls a vertical distance of 2.5 meters in one second. On this planet, the rock has a weight of

- A) 1 N.
- B) 2 N.
- C) 3 N.
- D) 4 N.
- E) 5 N.

73) The human body can, under certain conditions, withstand an acceleration of 10 g. What net force would produce this acceleration of a 50-kg person?

- A) about 500 N
- B) about 2500 N
- C) about 5000 N
- D) about 25,000 N
- E) none of these

74) A skydiver, who weighs 500 N, reaches terminal velocity of 90 km/h. The air resistance on the diver is then

- A) 90 N.
- B) 250 N.
- C) 410 N.
- D) 500 N.
- E) none of these

75) An astronaut on another planet drops a 1-kg rock from rest. The astronaut notices that the rock falls 2 meters straight down in one second. On this planet, how much does the rock weigh?

- A) 1 N
- B) 4 N
- C) 4.9 N
- D) 5 N

76) An archer shoots an arrow. Consider the action force to be the bowstring against the arrow. The reaction to this force is the

- A) combined weight of the arrow and bowstring.
- B) air resistance against the bow.
- C) friction of the ground against the archer's feet.
- D) grip of the archer's hand on the bow.
- E) arrow's push against the bowstring.

77) A player catches a ball. Consider the action force to be the impact of the ball against the player's glove. The reaction to this force is the

- A) player's grip on the glove.
- B) force the glove exerts on the ball.
- C) friction of the ground against the player's shoes.
- D) muscular effort in the player's arms.
- E) none of these

78) A player hits a ball with a bat. The action force is the impact of the bat against the ball. The reaction to this force is the

- A) air resistance on the ball.
- B) weight of the ball.
- C) force that the ball exerts on the bat.
- D) grip of the player's hand against the ball.
- E) weight of the bat.

79) A baseball player bats a ball with a force of 1000 N. The reaction force that the ball exerts against the bat is

- A) less than 1000 N.
- B) more than 1000 N.
- C) 1000 N.
- D) impossible to determine.

80) As a ball falls, the action force is the pull of Earth on the ball. The reaction force is the

- A) air resistance acting against the ball.
- B) acceleration of the ball.
- C) pull of the ball's mass on the Earth.
- D) none of these

81) A person is attracted toward the center of Earth by a 500-N gravitational force. The Earth is attracted toward the person with a force of

- A) zero.
- B) 250 N.
- C) 500 N.
- D) 1000 N.

82) A karate chop delivers a blow of 3000 N to a board that breaks. The force that acts on the hand during this event is

- A) zero.
- B) 1500 N.
- C) 3000 N.
- D) 6000 N.

83) The attraction of a person's body toward Earth is called weight. The reaction to this force is

- A) the person's body pushing against Earth's surface.
- B) the Earth's surface pushing against the person's body.
- C) the person's body pulling on the Earth.
- D) none of these

84) A car traveling at 100 km/hr strikes an unfortunate bug and splatters it. The force of impact is

- A) greater on the bug.
- B) greater on the car.
- C) the same for both.

85) A vehicle that weighs 4000 N on the surface of the Earth is travelling in outer space at a speed of 200 m/s. The smallest constant force that must be applied to stop it in 20 seconds is

- A) 20 N.
- B) 40 N.
- C) 400 N.
- D) 4000 N.
- E) more than 4000 N.

86) A vehicle that weighs 400 N on the surface of the Earth is traveling in outer space at a speed of 400 m/s. It can be stopped by applying a constant force of 20 N for

- A) 2 seconds.
- B) 4 seconds.
- C) 80 seconds.
- D) 400 seconds.
- E) 800 seconds.

87) A freight train rolls along a track with considerable momentum. If it rolls at the same speed but has twice as much mass, its momentum is

- A) zero.
- B) doubled.
- C) quadrupled.
- D) unchanged.

88) A 4 kg ball has a momentum of 12 kg m/s. What is the ball's speed?

- A) 3 m/s
- B) 4 m/s
- C) 12 m/s
- D) 48 m/s
- E) none of these

89) A ball is moving at 3 m/s and has a momentum of 48 kg m/s. What is the ball's mass?

- A) 4 kg
- B) 12 kg
- C) 16 kg
- D) 144 kg
- E) none of these

90) A rifle of mass 2 kg is suspended by strings. The rifle fires a bullet of mass 0.01 kg at a speed of 200 m/s. The recoil velocity of the rifle is about

- A) 0.001 m/s.
- B) 0.01 m/s.
- C) 0.1 m/s.
- D) 1 m/s.
- E) none of these

91) A 1-kg chunk of putty moving at 1 m/s collides with and sticks to a 5-kg bowling ball that is initially at rest on a frictionless surface. The speed of the putty thereafter is

- A) 1/4 m/s.
- B) 1/5 m/s.
- C) 1/6 m/s.
- D) impossible to solve with the information given.

92) Consider massive gliders that slide friction-free along a horizontal air track. Glider A has a mass of 1 kg, a speed of 1 m/s, and collides with Glider B that has a mass of 5 kg and is at rest. If they stick upon collision, their speed after collision will be

- A) 1/4 m/s.
- B) 1/5 m/s.
- C) 1/6 m/s.
- D) 1 m/s.
- E) none of these

93) A 5000-kg freight car runs into a 10,000-kg freight car at rest. They couple upon collision and move with a speed of 2 m/s. What was the initial speed of the 5000-kg car?

- A) 4 m/s
- B) 5 m/s
- C) 6 m/s
- D) 8 m/s
- E) none of these

94) If you push an object twice as far while applying the same force, you do

- A) twice as much work.
- B) four times as much work.
- C) the same amount of work.
- D) half as much work.

95) If you push an object a given distance, while applying twice the force, you do

- A) twice as much work.
- B) four times as much work.
- C) the same amount of work.
- D) half as much work.

96) If you find that twice as much work is needed to perform a task but it takes twice as much time, the amount of power required is

- A) twice as much.
- B) four times as much.
- C) sixteen times as much.
- D) unchanged.

97) Do 100 J of work in 50 s and your power output is

- A) $\frac{1}{2}$ W
- B) 2 W.
- C) 4 W.
- D) 50 W.
- E) 5,000 W.

98) An object lifted 10 meters gains 200 J of potential energy. If the same object is lifted 20 meters, its potential energy gain is

- A) half as much.
- B) the same.
- C) twice as much.
- D) four times as much.
- E) more than four times as much.

99) A 1000-kg car and a 2000-kg car are hoisted the same distance. Raising the more massive car requires

- A) less work.
- B) as much work.
- C) twice as much work.
- D) four times as much work.
- E) more than four times as much work.

100) Both a 50-kg sack is lifted 2 meters from the ground and a 25-kg sack is lifted 4 meters in the same time. The power expended in raising the 50-kg sack is

- A) twice as much.
- B) half as much.
- C) the same.
- D) impossible to predict without further information

101) A 2-kg mass is held 4 m above the ground. What is the approximate potential energy of the mass with respect to the ground?

- A) 6 J
- B) 8 J
- C) 32 J
- D) 80 J
- E) none of these

102) A 2 kg mass has 40 J of potential energy with respect to the ground. Approximately how high is it above the ground?

- A) 1 m
- B) 2 m
- C) 3 m
- D) 4 m
- E) none of these

103) Using 1000 J of work, a toy elevator is raised from the ground floor to the second floor in 20 seconds. The power needed to do this job was

- A) 20 W.
- B) 50 W.
- C) 100 W.
- D) 1000 W.
- E) 20,000 W.

104) A car moves 4 times as fast as another identical car. Compared to the slower car, the faster car has

- A) 4 times the KE.
- B) 8 times the KE.
- C) 12 times the KE.
- D) 16 times the KE.

105) Which has greater kinetic energy, a car traveling at 30 km/hr or a car of half the mass traveling at 60 km/hr?

- A) the 30 km/hr car
- B) the 60 km/hr car
- C) Both have the same kinetic energy.
- D) More information is needed about the distance traveled.

106) Horses that move with the fastest linear speed on a merry-go-round are located

- A) near the center.
- B) near the outside.
- C) anywhere, because they all move at the same speed.

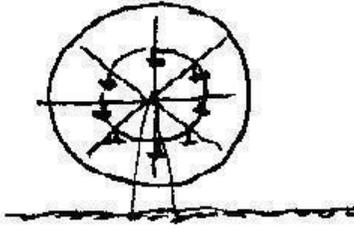
107) Which moves faster in m/s on a merry-go-round: a horse on the inside or a horse on the outside near the outer rail?

- A) inside horse
- B) outside horse
- C) Both move at the same speed in m/s.

108) On a balanced seesaw, a boy three times as heavy as his partner sits

- A) $\frac{1}{3}$ the distance from the fulcrum.
- B) less than $\frac{1}{3}$ the distance from the fulcrum.
- C) more than $\frac{1}{3}$ the distance from the fulcrum

Figure 8-E



109) A carnival has a Ferris wheel where the seats are located halfway between the center and outside rim. If you were at the outside rim, your angular speed while riding on this Ferris wheel would be

- A) less and your tangential speed more.
- B) more and your tangential speed less.
- C) the same and your tangential speed less.

110) Two people are balanced on a seesaw. If one person leans toward the center of the seesaw, that person's end of the seesaw will

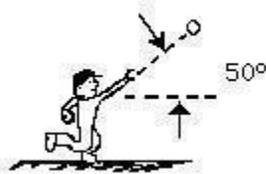
- A) rise.
- B) fall.
- C) stay at the same level.
- D) rise and then fall.
- E) fall and then rise.

111) A car travels in a circle with constant speed. The net force on the car is

- A) directed forward, in the direction of travel.
- B) directed toward the center of the curve.
- C) zero because the car is not accelerating.
- D) none of these

112) Suppose you're on a Ferris wheel at a carnival, seated 10 m from the Ferris wheel's axis. If you make a complete rotation each minute, your linear speed is

- A) 10 m/min.
- B) 31.4 m/min.
- C) 62.8 m/min.
- D) 100 m/min.
- E) Not enough information is given.



113) A rock is thrown upward at 50 degrees with respect to the horizontal. As it rises, neglecting air drag, its vertical component of velocity

- A) increases.
- B) remains unchanged.
- C) decreases.

114) A rock is thrown upward at 50 degrees with respect to the horizontal. As it rises, neglecting air drag, its horizontal component of velocity

- A) increases.
- B) remains unchanged.
- C) decreases.

115) A stone is thrown horizontally from the top of a cliff. One second after it has left your hand, its vertical distance below the top of the cliff is

- A) 5 m.
- B) 10 m.
- C) 15 m.

116) Roll a bowling ball off the edge of a table. As it falls, its horizontal component of velocity

- A) decreases.
- B) remains constant.
- C) increases.

117) A bullet fired horizontally over level ground hits the ground in 0.5 second. If it had been fired with twice the speed in the same direction, it would have hit the ground in

- A) less than 0.5 s.
- B) more than 0.5 s.
- C) 0.5 s.

118) A gun with a muzzle velocity of 100 m/s is fired horizontally from a tower. Neglecting air resistance, how far downrange will the bullet be 1 second later?

- A) 50 m
- B) 98
- C) 100
- D) 490
- E) none of these

119) A ball player wishes to determine pitching speed by throwing a ball horizontally from an elevation of 5 m above the ground. The player sees the ball land 20 m down range. What is the player's pitching speed?

- A) about 5 m/s
- B) about 10 m/s
- C) about 20 m/s
- D) about 25 m/s
- E) none of these

120) An airplane flies at 40 m/s at an altitude of 50 meters. The pilot drops a heavy package which falls to the ground. Where, approximately, does the package land relative to the plane's new position?

- A) beneath the plane
- B) 400 m behind the plane
- C) 500 m behind the plane
- D) more than 500 m behind the plane
- E) none of these