EXAM 1 Review

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Which aspect of the scientific worldview does this course primarily promote?
a. an *analytical* worldview.
b. a *mechanical* worldview.
c. a *quantitative* worldview.
d. a *conceptual* worldview.

____ 2. Which of the following is not a valid criterion for the acceptance of a physical law or theory?
a. agreement with past data
b. based on scientific principles
c. ability to predict future results
d. prestige of the scientist proposing it

____ 3. In physics a world view is
a. the visual stimuli that allow the physicist to experience the microscopic world.
b. the idea that the Sun is at the center of the Solar System.
c. a shared set of ideas that represents the current explanations of how the material world operates.
d. the unchanging rules used to predict the behavior of physical systems.

____ 4. Bode's law giving the sizes of the orbits of the planets is no longer considered to be a physical law because it
a. did not agree with the data known at the time it was proposed.
b. did not make any predictions that could be tested.
c. was actually proposed by Titus of Wittenburg.
d. was not based on physical principles.

____ 5. Besides the United States, which of the following major countries has not adopted the metric system of units?
a. No other
b. Great Britain
c. Australia
d. Russia

____ 6. How many millimeters are there in one kilometer?
a. 10
b. 100
c. 1000
d. 1,000,000

____ 7. A meter is about the same length as
a. a mile.
b. a foot.
c. a yard.
d. an inch.

____ 8. Approximately how long is an average car?
a. 1 meter
b. 5 meters
c. 10 meters

d. 20 meters

____ 9. A kilometer is roughly the same distance as
a. one-tenth of a mile.
b. one-half of a mile.
c. one mile.
d. 10 miles.

____ 10. The length of a typical maple bar donut is about
a. 15 mm.
b. 15 cm.
c. 1.5 m.
d. 0.15 km.

____ 11. The height of an average adult human being is roughly
a. 1 meter.
b. 2 meters.
c. 5 meters.
d. 10 meters.

____ 12. Which of the following is equal to 86,400 seconds?
a. 8.64×10^3 seconds
b. 8.64×10^4 seconds
c. 8.64×10^5 seconds
d. 8.64×10^6 seconds

____ 13. The diameter of a typical atom is approximately 0.000 000 000 1 meter. This can also be written as
a. 1×10^{-9} meter.
b. 1×10^{-10} meter.
c. 1×10^{-11} meter.
d. 1×10^{10} meter.

____ 14. What is the product of 4×10^4 and 2×10^8?
a. 8×10^4
b. 8×10^8
c. 8×10^{12}
d. 8×10^{32}

____ 15. When you calculate the speed (in meters per second) in an experiment, your calculator display reads 12.666667. If you are asked to record your result to three significant figures, you should write
a. 12.6 m/s.
b. 12.7 m/s.
c. 12.666 m/s.
d. 12.667 m/s.

____ 16. How many significant figures are there in the measurement 0.000 234 m^2 ?
a. 3
b. 4
c. 5
d. 6

____ 17. Which of the following expressions gives the number of seconds in one week?

a. $\left(\frac{7\text{ days}}{1\text{ week}}\right)\left(\frac{24\text{ h}}{1\text{ day}}\right)\left(\frac{3600\text{ s}}{1\text{ h}}\right)$

b. $\left(\frac{7\text{ days}}{1\text{ week}}\right)\left(\frac{1\text{ day}}{24\text{ h}}\right)\left(\frac{1\text{ h}}{3600\text{ s}}\right)$

c. $\left(\frac{1\text{ week}}{7\text{ days}}\right)\left(\frac{24\text{ h}}{1\text{ day}}\right)\left(\frac{3600\text{ s}}{1\text{ h}}\right)$

d. $\left(\frac{1\text{ week}}{7\text{ days}}\right)\left(\frac{1\text{ day}}{24\text{ h}}\right)\left(\frac{1\text{ h}}{3600\text{ s}}\right)$

____ 18. A certain piece of fabric sells in Canada for $4.75 CD per meter. Given that 1 meter = 1.09 yards and $1.00 US= $0.65 CD, what is the price of the fabric in US dollars per yard?

a. $\left(\frac{\$4.75\text{ CD}}{1\text{ m}}\right)\left[\frac{\$1.00\text{ US}}{\$0.65\text{ CD}}\right]\left[\frac{1.09\text{ yard}}{1\text{ m}}\right]$

b. $\left(\frac{\$4.75\text{ CD}}{1\text{ m}}\right)\left[\frac{\$0.65\text{ CD}}{\$1.00\text{ US}}\right]\left[\frac{1\text{ m}}{1.09\text{ yard}}\right]$

c. $\left(\frac{\$4.75\text{ CD}}{1\text{ m}}\right)\left[\frac{\$1.00\text{ US}}{\$0.65\text{ CD}}\right]\left[\frac{1\text{ m}}{1.09\text{ yard}}\right]$

d. $\left(\frac{\$4.75\text{ CD}}{1\text{ m}}\right)\left[\frac{\$0.65\text{ CD}}{\$1.00\text{ US}}\right]\left[\frac{1.09\text{ yard}}{1\text{ m}}\right]$

____ 19. On average, Americans eat 28 pounds of bananas per year. On average, how many pounds of bananas are eaten each day in the U.S.?

a. $\left(\frac{28\text{ lb}}{\text{person}\cdot\text{y}}\right)\left[\frac{1}{350\text{ million people}}\right]\left[\frac{365\text{ days}}{1\text{ y}}\right]$

b. $\left(\frac{28\text{ lb}}{\text{person}\cdot\text{y}}\right)\left[\frac{1}{350\text{ million people}}\right]\left[\frac{1\text{ y}}{365\text{ days}}\right]$

c. $\left(\frac{28\text{ lb}}{\text{person}\cdot\text{y}}\right)\left(350\text{ million people}\right)\left[\frac{365\text{ days}}{1\text{ y}}\right]$

d. $\left(\frac{28\text{ lb}}{\text{person}\cdot\text{y}}\right)\left(350\text{ million people}\right)\left[\frac{1\text{ y}}{365\text{ days}}\right]$

____ 20. A speed of 90 km/hr is equal to ____ m/s.

a. 25
b. 90
c. 150
d. 324

____ 21. A speed of 36 m/s is equal to ____ km/hr.

a. 6
b. 10
c. 60
d. 130

____ 22. A speed of 3 m/s is approximately equal to ____ km/hr.

a. 0.2
b. 0.8
c. 11
d. 50

____ 23. If there are 8 furlongs in one mile, how many furlongs does a horse run in a 4-mile race?
a. 2
b. 4
c. 8
d. 32

____ 24. If there are 8 furlongs in one mile, how fast in miles per hour can a horse run if it can complete a 12-furlong race in 2 minutes?
a. 15 mph
b. 30 mph
c. 45 mph
d. 60 mph

____ 25. One meter is about the same length as 3.25 feet. A child has height *h* measured in meters. To find the height of the child in feet, you should
a. multiply 3.25*h
b. divide 3.25/*h*
c. divide *h*/3.25
d. none of these

____ 26. A brand new baby has a mass of about
a. 100 grams
b. 500 grams
c. 1000 grams
d. 5000 grams

____ 27. While her big brother isn't looking, a baby sister drops his piggy bank from a second story window. About how long does it take to hit the ground?
a. 1 second
b. 10 seconds
c. 50 seconds
d. 100 seconds

____ 28. Suppose 9 pumpkin pies can fit on a small square table cloth 1 meter on a side. How many pies will fit on a second table cloth 2 meters on a side?
a. about 20
b. about 50
c. about 80
d. more than 100

____ 29. A large state, like Montana, might have an area of about 150,000 square miles. A small state, like Massachusetts, might have an area of about 50,000 square miles. By how many orders of magnitude is the large state larger than the small state?
a. zero
b. one
c. two
d. three

____ 30. About how many orders of magnitude is the distance from New York to Los Angeles greater than your own height?
a. three
b. six
c. nine
d. twelve

____ 31. An object moves uniformly along a straight-line path, covering *N* meters in *T* seconds. A student calculates the ratio *T/N*, obtaining the numerical value 3.2. This value, 3.2, can be interpreted as
a. the number of meters the object travels during each second
b. the number of seconds the object requires to travel 1 meter
c. the number of meters the object travels in *T* seconds

d. the number of seconds the object requires to travel *N* meters
e. this number has no physical interpretation; it is essentially meaningless

____ 32. A runner in the Boston marathon covered the first 20 miles in a time of 4 hours. How fast was he running when he passed the 15 mile marker?
a. 5 mph
b. 10 mph
c. 20 mph
d. We don't know.

____ 33. A Honda Civic travels from milepost 405 to milepost 455 between 1:00 and 2:00 pm. A Subaru Legacy travels from milepost 200 to milepost 240 during the same time. Which car was traveling faster at 1:30 pm?
a. Honda
b. Subaru
c. They were traveling at the same speed.
d. There is not enough information to be able to say.

____ 34. Car A travels from milepost 343 to milepost 349 in 5 minutes. Car B travels from milepost 493 to milepost 499 in 5 minutes. Which car has the greater average speed?
a. Car A
b. Car B
c. Their average speeds are the same.
d. There is not enough information to be able to say.

____ 35. A yellow car takes 10 minutes to go from milepost 101 to milepost 109. A red car takes 10 minutes to go from milepost 11 to milepost 21. Which car has the higher average speed?
a. the yellow one
b. the red one
c. Their average speeds are the same.
d. Not enough information is given to be able to say.

____ 36. In Aesop's fable of the tortoise and the hare, the "faster" hare loses the race to the slow and steady tortoise. During the race, which animal has the greater average speed?
a. the tortoise
b. the hare
c. Both have the same average speed.
d. There is not enough information to say.

____ 37. Pat and Chris both travel from Los Angeles to New York along the same route. Pat rides a bicycle while Chris drives a fancy sports car. Unfortunately, Chris's car breaks down in Phoenix for over a week, causing the two to arrive in New York at exactly the same time. Which statement is true?
a. Pat and Chris had the same average speed.
b. Chris had the higher average speed.
c. Pat had the higher average speed.

____ 38. How many hours are required to make a 4400-km trip across the United States if you average 80 km/h?
a. 45 h
b. 50 h
c. 55 h
d. 60 h

____ 39. The instantaneous speed of an object is defined to be the
a. distance it travels divided by the time it takes.

b. distance it travels multiplied by the time it takes.
c. average speed determined over an infinitesimally small time interval.
d. value of the average speed at the midpoint of the time interval.

____ 40. Which of the following could be a velocity?
a. 5 meters west
b. 5 meters per second
c. 5 meters per second west
d. 5 meters per second per second

____ 41. The average acceleration of an object is defined to be the
a. distance it travels divided by the time it takes.
b. change in its velocity divided by the time it takes.
c. change in its speed divided by the time it takes.
d. average of the accelerations during the two halves of the trip.

____ 42. An object is accelerating
a. only when its speed changes.
b. only when its direction changes.
c. when its speed or direction changes.

____ 43. An object moves along a straight-line path, steadily increasing its speed by a total of *W* miles per hour in *S* seconds. A student calculates the ratio *W/S*, obtaining the numerical value 2.1. This value, 2.1, can be interpreted as
a. the number of mph that the speed increases during each second
b. the number of seconds required for the speed to increase by 1 mph
c. the number of mph that the speed increases in *S* seconds
d. the number of seconds required for the speed to increase by *W* mph
e. this number has no physical intepretation; it is essentially meaningless

____ 44. An object moves along a straight-line path, steadily increasing its speed by a total of *V* miles per hour in *T* seconds. A student calculates the ratio *V/T*, obtaining the numerical value 1.8. This value, 1.8, can be interpreted as
a. the number of mph that the speed increases during each second
b. the number of seconds required for the speed to increase by 1 mph
c. the number of mph that the speed increases in *T* seconds
d. the number of seconds required for the speed to increase by *V* mph
e. this number has no physical intepretation; it is essentially meaningless

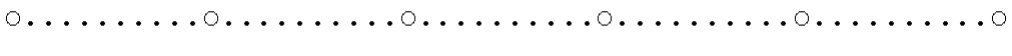
____ 45. Which of the following could be considered to be an "accelerator" in an automobile?
a. brake pedal
b. gas pedal
c. steering wheel
d. All of these can cause the car to accelerate.

____ 46. In the strobe diagram below the ball is moving from left to right. Which statement best describes the motion? The ball is

a. moving with a constant speed.
b. speeding up.
c. slowing down.

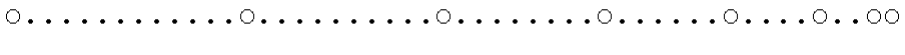
d. not accelerating.

____ 47. Which statement best describes the motion of the ball shown in the strobe diagram below? (Assume the ball moves from left to right.) The ball is



a. moving with constant speed.
b. speeding up.
c. accelerating.
d. slowing down.

____ 48. Which statement best describes the motion of the ball shown in the strobe diagram below? (Assume the ball moves from left to right.) The ball is



a. moving with constant speed.
b. speeding up.
c. accelerating.
d. stopped

____ 49. When we say that light objects and heavy objects fall at the same rate, what assumption are we making?
a. They have the same shape.
b. They are falling in a vacuum.
c. They are made of the same material.
d. They have the same size.

____ 50. A ping-pong ball and a golf ball have approximately the same size but very different masses. Which hits the ground first if you drop them simultaneously while standing on the Moon?
a. the ping-pong ball
b. the golf ball
c. They hit simultaneously.
d. We are not able to predict the results.

____ 51. A sheet of paper and a book fell at different rates in the classroom until the paper was wadded up into a ball. We then claimed that if the air resistance could be neglected, all objects would fall at
a. different constant speeds depending on the type of material.
b. the same constant speed regardless of the type of material.
c. the same constant speed regardless of how much they weigh.
d. the same constant acceleration.

____ 52. A student decides to test Aristotle's and Galileo's ideas about free-fall by simultaneously dropping a 20-lb. ball and a 1-lb. ball from the top of a grain elevator. The two balls have the same size and shape. What actually happens? (Do not neglect air resistance!).
a. The 20-lb. ball hits first.
b. The 1-lb. ball hits first.
c. They hit simultaneously.
d. We are not able to predict the results.

____ 53. A ping-pong ball and a golf ball have approximately the same size but very different masses. Which hits the ground first if you drop them simultaneously from a tall building? Do not ignore the effects of the air.
a. the ping-pong ball

b. the golf ball
c. They hit simultaneously.
d. We are not able to predict the results.

____ 54. If we do *not* neglect air resistance, during which, if any, of the first 5 s of free fall does a ball's speed change the most?
a. first second
b. third second
c. fifth second
d. The speed changes the same amount each second.

____ 55. If we ignore air resistance, the acceleration of an object that is falling downward is constant. How do you suppose the acceleration would change if we do *not* ignore air resistance?
a. The acceleration increases.
b. The acceleration does not change.
c. The acceleration decreases.

____ 56. A ball is thrown straight up into the air. If we do not ignore air resistance, the acceleration of the ball as it is traveling upward is
a. 9.8 m/s^2.
b. greater than 9.8 m/s^2.
c. less than 9.8 m/s^2.
d. zero.

____ 57. A ball is dropped in air. If we do not ignore air resistance, the acceleration of the ball is
a. 9.8 m/s^2.
b. greater than 9.8 m/s^2.
c. less than 9.8 m/s^2.
d. zero.

____ 58. If the mass of an object in free fall is doubled, its acceleration
a. doubles.
b. increases by a factor of four.
c. stays the same.
d. is cut in half.

____ 59. The motion of a block sliding down a frictionless ramp can be described as motion with
a. a constant speed.
b. a constant acceleration greater than 10 m/s/s.
c. a constant acceleration less than 10 m/s/s.
d. a constant speed that depends on the steepness of the ramp.

____ 60. The motion of a ball or cylinder rolling down a ramp is one with
a. constant speed.
b. increasing acceleration.
c. constant acceleration.
d. decreasing acceleration.

____ 61. You are bouncing on a trampoline while holding a bowling ball. As your feet leave the trampoline, you let go of the bowling ball. When you reach your maximum height, the bowling ball is
a. above you.
b. beside you.
c. below you.

____ 62. Suppose that you look out a tenth-floor window and see a ball falling at 5 m/s. How fast will this ball be falling 1 s later?
a. 5 m/s
b. 10 m/s
c. 15 m/s
d. 20 m/s

____ 63. Suppose that you look out a tenth-floor window and see a ball falling at 5 m/s. How fast will this ball be falling 2 s later?
a. 5 m/s
b. 15 m/s
c. 25 m/s
d. 35 m/s

____ 64. An object is dropped off a cliff. How far will the object fall during the next 4 s?
a. 20 m
b. 45 m
c. 80 m
d. 125 m

____ 65. You decide to launch a ball vertically so that a friend located 45 m above you can catch it. What is the minimum launch speed you can use?
a. 4.5 m/s
b. 20 m/s
c. 30 m/s
d. 45 m/s

____ 66. A ball is thrown vertically upward and you know that its speed is 20 m/s as it leaves the thrower's hand. What is the speed of the ball 1 s later?
a. 30 m/s
b. 20 m/s
c. 10 m/s
d. zero

____ 67. A rock is thrown vertically upward with a speed of 15 m/s. What are its speed and direction 2 s later?
a. 10 m/s upward
b. 5 m/s upward
c. zero
d. 5 m/s downward

____ 68. A golf ball is thrown vertically upward with a speed of 30 m/s. How long does it take to get to the top of its path?
a. 1 s
b. 2 s
c. 3 s
d. 4 s

____ 69. You throw a ball straight up at 30 m/s. How many seconds elapse before it is traveling downward at 10 m/s?
a. 2 s
b. 3 s
c. 4 s
d. 5 s

____ 70. If we use plus and minus signs to indicate the directions of velocity and acceleration, in which of the following situations does the object speed up?
a. positive velocity and negative acceleration
b. negative velocity and positive acceleration
c. positive velocity and zero acceleration
d. negative velocity and negative acceleration

____ 71. A car traveling westward at 20 m/s turns around and travels eastward at 5 m/s. What is the change in velocity of the car?
a. 15 m/s west
b. 25 m/s
c. 25 m/s west
d. 25 m/s east

____ 72. A car traveling westward at 20 m/s turns around and travels eastward at 15 m/s. If this takes place in 5 s, what is the average acceleration of the car?
a. 1 m/s^2 west
b. 7 m/s^2
c. 7 m/s^2 west
d. 7 m/s^2 east

____ 73. A car initially traveling westward at 20 m/s has a constant acceleration of 1 m/s^2 westward. How far does the car travel in the first 10 s?
a. 200 m
b. 210 m
c. 250 m
d. 300 m

____ 74. A car initially traveling westward at 20 m/s has a constant acceleration of 1 m/s^2 eastward. How far does the car travel in the first 10 s?
a. 150 m
b. 190 m
c. 200 m
d. 250 m

____ 75. A small metal ball is given a quick shove and coasts up an inclined track. During this motion, the acceleration vector of the ball
a. points up the incline
b. points down the incline
c. points vertically upward
d. points vertically downward

____ 76. A small metal ball is released from rest and rolls down an inclined track. During this motion, the velocity vector of the ball
a. points up the incline
b. points down the incline
c. points vertically upward
d. points vertically downward

____ 77. A small metal ball is released from rest and rolls down an inclined track. During this motion, the acceleration vector of the ball
a. points up the incline
b. points down the incline
c. points vertically upward
d. points vertically downward

____ 78. A "paddle ball" toy consists of a small rubber ball attached by an elastic band to a wooden paddle. A child gives the ball a downward whack with the paddle such that the ball moves downward while stretching out the elastic band, turns around, and comes back up. The acceleration and velocity of the ball are in the same direction
a. during the downward segment of the motion.
b. during the upward segment of the motion.
c. during both the downward and upward segments of the motion.
d. during neither the upward nor the downward segment of the motion.

____ 79. You are driving on the freeway and note that your speedometer reads a constant 60 mph. You see a blue sportscar in front of you and realize that you are "gaining" on it. Which of the following conclusions can definitely be made?
a. The sportscar is moving with increasing speed.
b. The sportscar is moving with a speed greater than 60 mph.
c. The sportscar is moving with decreasing speed.
d. The sportscar is moving with a speed less than 60 mph.
e. More than one of these is correct.
f. None of these is correct.

____ 80. While conducting a physics experiment, a student drops a bouncy ball from the window of her high rise dormitory. If the ball travels the first half of the distance in 1 second, how long will it take to travel the second half of the distance? (Ignore air resistance.)
a. less than 1 second
b. 1 second
c. more than 1 second

____ 81. A compressed air potato gun, built as a project for a physics class, launches a potato directly upward at a speed of 20 m/s. Neglecting air resistance, how long will the potato be in the air?
a. 1 second
b. 2 seconds
c. 3 seconds
d. 4 seconds
e. more than 4 seconds

____ 82. The property of an object at rest to remain at rest is known as
a. inertness.
b. inertia.
c. resistance.
d. sluggishness.

____ 83. If there is no net force acting on an object, its motion will be one with ____ acceleration.
a. zero
b. a constant, non-zero
c. an increasing
d. a decreasing

____ 84. If an object moves in a straight line with a constant speed, we can conclude that
a. the object has inertia.
b. there are no forces acting on the object.
c. there must be at least two forces acting on the object.
d. there is no unbalanced force acting on the object.

____ 85. If an object moves with a constant velocity, we can conclude that
a. it is moving toward its natural place.
b. there are no forces acting on it.
c. there is no unbalanced (net) force acting on it.

d. it has a very large inertia.

____ 86. What is the net force on an 900-kg airplane flying with a constant velocity of 180 km/hour north?
a. zero
b. 180 N
c. 900 N
d. 162,000 N

____ 87. A block is given a quick tap and allowed to slide across a horizontal frictional surface. The subsequent motion will be one with
a. decreasing speed.
b. increasing speed.
c. a constant speed.
d. a constant, non-zero acceleration.

____ 88. A small block sits on a horizontal table. In one experiment, a student pushes with a horizontal force of 5 N, but the block does not move. In a second experiment, the student pushes with a horizontal force of 8 N, but the block still does not move. The magnitude of the friction force exerted on the block is
a. greater in the first experiment
b. greater in the second experiment
c. the same in the two experiments

____ 89. A rectangular block sits on a horizontal table. In one experiment, a student pushes with a horizontal force of 5 N, but the block does not move. In a second experiment, the student tilts the block up so that it is resting on its narrow end, and once again pushes with a horizontal force of 5 N. The block still does not move. The magnitude of the friction force exerted on the block is
a. greater in the first experiment
b. greater in the second experiment
c. the same in the two experiments

____ 90. There are three forces acting on an object: 6 N to the left, 5 N to the right, and 3 N to the left. What is the net force acting on the object?
a. 4 N
b. 4 N left
c. 4 N right
d. 6 N left

____ 91. A woman pulls on one end of a rope, the other end of which is attached to a large box. The large box, however, does not move. The free-body diagram for the box should include
a. a force by the rope
b. a force by the woman
c. both a force by the rope and a force by the woman
d. neither a force by the rope nor a force by the woman

____ 92. During a physics experiment, a fan is used to apply a push to a cart on a horizontal track. A student would like the net force on the cart to be 12 N to the right. The student knows that the friction force on the cart by the track will be 3 N to the left. The fan should exert a force of
a. 15 N to the right
b. 15 N to the left
c. 9 N to the right
d. 9 N to the left
e. None of these

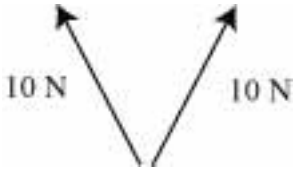
____ 93. What are the size and direction of the force that is the sum of a force of 3 N acting south and a force of 6 N acting north?

a. 2 N north
b. 3 N north
c. 6 N north
d. 9 N north

____ 94. What is the net force acting on an object which is under the influence of a 5 N force acting north and a 5 N force acting west?
a. 5 N northwest
b. 7 N northwest
c. 10 N northwest
d. zero

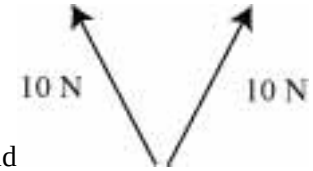
____ 95. What is the magnitude of the net force acting on an object which is under the influence of a 3 N force acting south and a 4 N force acting east?
a. 3 N
b. 4 N
c. 5 N
d. 7 N

____ 96. Two 10 N forces act on a particle as shown. The magnitude of the net force exerted on the particle is:



a. less than 10 N
b. 10 N
c. between 10 N and 20 N
d. 20 N
e. more than 20 N

____ 97. Two 10 N forces act on a particle as shown. If the direction of one of these two forces was reversed 180 degrees, the magnitude of the net force exerted on the particle would



a. become larger.
b. become smaller.
c. remain the same.

____ 98. A subway train is moving with constant velocity along a level section of track. The net force on the first subway car is ____ the net force on the last subway car.
a. equal to
b. much greater than
c. slightly greater than
d. less than

____ 99. You are analyzing a problem in which two forces act on an object. A 200-N force pulls to the right and a 40-N force pulls to the left. The net force acting on the object is
a. 40 N to the left.
b. 160 N to the right.

c. 200 N to the right.
d. 240 N to the right.

____ 100. Two skydivers of identical weight are in freefall at terminal speed. The first skydiver has a baggy suit and descends at a speed of 150 mph. The second skydiver has a skintight suit and descends at a speed of 200 mph. The magnitude of the force of air resistance on the second skydiver is
a. greater than that on the first skydiver.
b. less than that on the first skydiver.
c. equal to that on the first skydiver.
d. there is not enough information to deteremine this

____ 101. If the net force on an object is directed due west, which way does the acceleration point?
a. due west
b. due east
c. west only if the velocity is west
d. It could be in any westerly direction.

____ 102. If a hot air balloon is descending with decreasing speed, the net force exerted on it must be:
a. downward
b. upward
c. zero

____ 103. What kind of motion does a constant, non-zero net force produce on an object of constant mass?
a. constant speed
b. constant acceleration
c. increasing acceleration
d. decreasing acceleration

____ 104. If a body is acted on by a force of 10 N and doesn't accelerate, we have to assume
a. nothing. That's what should happen.
b. its inertia is too large.
c. that the net force acting on the body is zero.
d. that the law of inertia only holds for large forces.

____ 105. If a body is acted on by a force of 10 N and moves in a straight line with constant speed, we have to assume
a. nothing. That's what should happen.
b. that its inertia is too large for it to speed up.
c. that the net force acting on the body is zero.
d. that the surface the object sits on must have very low friction.

____ 106. You push on a large crate with a horizontal force of 25 N and it moves with constant speed across a concrete floor. If you were to push the same crate on the same floor with a force of 50 N, the crate would
a. move with a constant speed twice as great as before.
b. move with the same constant speed as before.
c. move with increasing speed.
d. the mass of the crate must be known in order to answer.

____ 107. You are applying a 400-N force to a freezer full of chocolate chip ice cream in an attempt to move it across the basement. It will not budge. The weight of the freezer (including the ice cream) is 1000 N. The friction force exerted by the floor on the freezer is
a. 400 N.
b. greater than 400 N but less than 1000 N.
c. 1000 N.

d. greater than 1000 N.

____ 108. When the same net force is applied to two blocks, the yellow one has a larger acceleration than the blue one. Which of the following is correct?
a. The yellow block has a larger mass.
b. The blue block has a larger mass.
c. They have the same mass.

____ 109. When a net force of 2 newtons is applied to a block, a student measures the acceleration of the block to have magnitude a_o. If 5 newtons of net force were applied to the same block, the magnitude of its acceleration would be
a. a_o
b. greater than a_o but less than $2a_o$
c. $2a_o$
d. greater than $2a_o$ but less than $5a_o$
e. greater than $5a_o$

____ 110. What net force is required to accelerate 20 kg at 5 m/s^2.
a. 100 N
b. 25 N
c. 15 N
d. 4 N

____ 111. What acceleration is produced by a force of 30 N acting on a mass of 10 kg?
a. 3 m/s^2
b. 10 m/s^2
c. 30 m/s^2
d. 300 m/s^2

____ 112. What net force is needed to accelerate a 60-kg ice skater at 2 m/s^2?
a. zero
b. 30 N
c. 60 N
d. 120 N

____ 113. What acceleration is produced by a force of 100 N acting on a mass of 10 kg if its velocity is 20 m/s and the frictional force is 30 N?
a. 10 m/s^2
b. 9 m/s^2
c. 8 m/s^2
d. 7 m/s^2

____ 114. When the same net force is applied to object A and object B, object A has an acceleration three times that of object B. Which of the following is correct?
a. Object A has three times the mass of object B.
b. Object A has one-third the mass of object B.
c. Object A has a different, less streamlined shape than object B.
d. Object A has more friction than object B.

____ 115. The strength of gravity on the Moon is only 1/6th that on Earth. If an astronaut has a mass of 90 kg on earth, what would her mass be on the Moon?
a. 540 kg
b. 90 kg

c. 15 kg
d. 6 kg

____ 116. Which of the following is not a vector quantity?
a. force
b. acceleration
c. weight
d. mass

____ 117. The strength of gravity on the Moon is only 1/6th that on Earth. If an astronaut has a mass of 90 kg on Earth, what would her weight be on the Moon?
a. 900 N
b. 150 N
c. 90 N
d. 15 N

____ 118. The strength of gravity on Mars is only 40% of that on Earth. If a child has a mass of 40 kg on Earth, what would the child's weight be on Mars?
a. 16 N
b. 40 N
c. 160 N
d. 400 N

____ 119. A ball with a weight of 20 N is thrown vertically upward. What are the size and direction of the force on the ball just as it reaches the top of its path?
a. zero
b. 10 N upward
c. 10 N downward
d. 20 N downward

____ 120. A ball falling from a great height will reach terminal speed when its ____ goes to zero.
a. inertia
b. net force
c. weight
d. speed

____ 121. When a snowflake falls, it quickly reaches a terminal velocity. This happens because
a. the mass of the snowflake is too small for gravity to have any effect.
b. there is no net force acting on the snowflake.
c. the snowflake has no weight.
d. the mass of the snowflake is smaller than its weight.

____ 122. A parachutist reaches terminal speed when
a. her weight goes to zero.
b. the force of air resistance equals her weight.
c. the force of air resistance exceeds her weight.
d. the force of air resistance equals her mass.

____ 123. Two steel balls have the same size and shape, but one is hollow. They are dropped in air and their terminal speeds are measured. Which of the following statements is correct?
a. The hollow ball has a smaller terminal speed because it requires a smaller air resistance to cancel the gravitational force on it.
b. The hollow ball has a larger terminal speed because it requires a smaller air resistance to

cancel the gravitational force on it.
c. The terminal speeds are the same because the acceleration of gravity doesn't depend on mass.
d. The terminal speeds are the same and equal to 10 m/s.

____ 124. A professor decides to simulate the effects of air resistance by simultaneously dropping two balls in a long column of water. The two balls have the same size but have masses of 1 kg and 2 kg. What happens?
a. The 1-kg ball hits the bottom first.
b. The 2-kg ball hits the bottom first.
c. They hit the bottom at the same time.

____ 125. A 40-kg crate is being pushed across a horizontal floor. If the coefficient of sliding friction is 0.3, what is the frictional force acting on the crate?
a. 12 N
b. 40 N
c. 120 N
d. 400 N

____ 126. A crate has a mass of 24 kg. What applied force is required to produce an acceleration of 3 m/s^2 if the frictional force is known to be 90 N?
a. 72 N
b. 90 N
c. 162 N
d. 240 N

____ 127. A 40-kg crate is being pushed across a horizontal floor by a horizontal force of 240 N. If the coefficient of sliding friction is 0.5, what is the acceleration of the crate?
a. zero
b. 1 m/s^2
c. 3 m/s^2
d. 6 m/s^2

____ 128. You apply a 75-N force to pull a child's wagon across the floor at a constant speed of 0.5 m/s. If you increase your pull to 80 N, the wagon will
a. continue to move at 0.5 m/s.
b. speed up briefly and then move at a faster constant speed.
c. move with a continuously increasing speed.

____ 129. If $F_{1\text{ is}}$ the force exerted on a cart by a horse and F_2 is the force exerted on the horse by the cart, then F_1 is ____ F_2.
a. much greater than
b. slightly greater than
c. equal to
d. slightly less than

____ 130. If Earth exerts a gravitational force of 20,000 N on a satellite in synchronous orbit, what force does the satellite exert on Earth?
a. zero
b. a small fraction of 1 N
c. 5000 N
d. 20,000 N

____ 131. A ball with a weight of 40 N is falling freely toward the surface of the Moon. What force does this ball exert on the Moon?
a. zero
b. 40 N down
c. 40 N up

____ 132. Which of the following is the third-law force that accompanies the force that an apple exerts on a tree? It is the force that
a. Earth exerts on the apple.
b. the apple exerts on Earth.
c. the tree exerts on the apple.
d. the air exerts on the apple.

____ 133. A book sits at rest on a table. Which force does Newton's third law tell us is equal and opposite to the gravitational force acting on the book?
a. the normal force by the table on the book
b. the normal force by the book on the table
c. the gravitational force by the book on Earth
d. the net force on the book

____ 134. You leap from a bridge with a bungee cord tied around your ankles. As you approach the river below, the bungee cord begins to stretch and you begin to slow down. The force of the cord on your ankles to slow you is ____ the force of your ankles on the cord to stretch it.
a. less than
b. equal to
c. greater than

____ 135. You leap from a bridge with a bungee cord tied around your ankles. As you approach the river below, the bungee cord begins to stretch and you begin to slow down. The force of the cord on your ankles to slow you is ____ your weight.
a. less than
b. equal to
c. greater than

____ 136. Because the forces demanded by Newton's third law of motion are equal in magnitude and opposite in direction, how can anything ever be accelerated?
a. Newton's third law only applies when there is NO acceleration.
b. The forces in question act on different bodies.
c. Newton's second law is more important.
d. Third law forces cannot cause accelerations.

____ 137. The two forces that make up a Newton’s third law force pair
a. always appear on the same free-body diagram
b. always appear on two different free-body diagrams
c. in some cases appear on the same free-body diagram, and in other cases appear on two different free-body diagrams

____ 138. In the physics world view, a force is exerted *on* one object *by* a second object. Taken together, the two forces that make up a Newton’s third law force pair involve
a. two objects
b. three objects
c. four objects

____ 139. In a circus trick, a clown lies flat on his back with the palm of one hand directly over his face pointing upward. An elephant stands above the clown, and touches the clown's palm with its foot. The magnitude of the force exerted on the clown by the elephant is
a. greater than that exerted on the elephant by the clown
b. less than that exerted on the elephant by the clown
c. equal to that exerted on the elephant by the clown
d. equal to that exerted on the elephant by the clown as long as neither is moving; otherwise greater

____ 140. Newton's third law only applies to objects that are
a. the same mass
b. the same size
c. both at rest
d. moving with the same speed
e. none of these; Newton's third law applies to any pair of objects that exert forces on one another

____ 141. Two skaters face each other on perfectly smooth ice. One skater has twice the mass as the other. Assuming that the bigger skater pushes the smaller, which of the following statements is true?
a. The bigger skater won't move.
b. The bigger skater will move with the smaller acceleration.
c. The bigger skater will move with the larger acceleration.
d. Both skaters move with the same acceleration.

____ 142. Terry and Chris pull hand-over-hand on opposite ends of a rope while standing on a frictionless frozen pond. Terry's mass is 75 kg and Chris's mass is 50 kg. If Terry's acceleration is 2 m/s^2, what is Chris's acceleration?
a. 2 m/s^2
b. 3 m/s^2
c. 6 m/s^2
d. 10 m/s^2

____ 143. A child stands on a bathroom scale while riding in an elevator. The child's weight when the elevator is not moving is 500 N. What does the scale read when the elevator accelerates upward while traveling downward?
a. greater than 500 N
b. less than 500 N
c. equal to 500 N

____ 144. A child stands on a bathroom scale while riding in an elevator. The child's weight when the elevator is not moving is 500 N. What does the scale read when the elevator free-falls from the tenth floor?
a. greater than 500 N
b. less than 500 N
c. equal to 500 N

____ 145. A child stands on a bathroom scale while riding in an elevator. The child's weight when the elevator is not moving is 500 N. What does the scale read when the elevator is moving at a constant speed?
a. greater than 500 N
b. less than 500 N
c. equal to 500 N

____ 146. A child stands on a bathroom scale while riding in an elevator. The child's weight when the elevator is not moving is 500 N. What does the scale read as the elevator comes to a stop at the tenth floor on its upward trip?
a. greater than 500 N
b. less than 500 N

c. equal to 500 N

____ 147. A bathroom scale reads 150 lbs when a student stands on it at home. For a physics project, the student places the scale in an elevator. If the student stands on the scale and notices that it displays a reading greater than 150 lbs, the student can conclude that
a. the elevator is moving upward
b. the elevator is moving downward
c. neither of these; the elevator could be moving upward or downward

____ 148. You are riding an elevator from the parking garage in the basement to the tenth floor of an apartment building. As you approach your floor, the elevator begins to slow. The net force acting on you is
a. always equal to your weight
b. directed upward
c. directed downward
d. zero

____ 149. If you stand on a spring scale in your bathroom at home, it reads 600 N, which means your mass is 60 kg. If instead you stand on the scale while accelerating at 2 m/s^2 upward in an elevator, what would the scale read?
a. 120 N
b. 480 N
c. 600 N
d. 720 N

____ 150. If a race car is traveling around a circular track at a constant speed of 100 mph, we know that the car experiences
a. no net force.
b. a centripetal force.
c. a centrifugal force.
d. a net force in the forward direction.

____ 151. A bug rides on a phonograph record. In which direction does the acceleration of the bug point?
a. tangent to the circular path
b. toward the center of the record
c. away from the center of the record
d. up

____ 152. A bug rides on a phonograph record. In which direction does the change in velocity of the bug point?
a. tangent to the circular path
b. toward the center of the record
c. away from the center of the record
d. up

____ 153. In straight line motion the
a. acceleration is parallel (or antiparallel) to the velocity.
b. acceleration is perpendicular to the velocity.
c. acceleration is vertical, while the velocity can be in any direction.
d. acceleration is vertical and the velocity is horizontal.

____ 154. What is the change in velocity if a car traveling 30 m/s north slows to 20 m/s north?
a. 20 m/s north
b. 10 m/s north
c. 10 m/s south
d. 30 m/s south

____ 155. An airplane is flying south at 40 m/s. What is the magnitude of the airplane's change in velocity if it is later flying west at 30 m/s?
a. 10 m/s
b. 30 m/s
c. 40 m/s
d. 50 m/s

____ 156. A migrating bird is initially flying south at 8 m/s. To avoid hitting a high-rise building, the bird veers and changes its velocity to 6 m/s east over a period of 2 s. What is the magnitude of the bird's average acceleration during this 2-s interval?
a. 5 m/s^2
b. 7 m/s^2
c. 10 m/s^2
d. 14 m/s^2

____ 157. By what factor does the centripetal acceleration change if a car goes around a corner twice as fast?
a. 0.5
b. It stays the same.
c. 2
d. 4

____ 158. A 60-kg person on a merry-go-round is traveling in a circle with a radius of 3 m at a speed of 3 m/s. What is the magnitude of the acceleration experienced by this person?
a. 1 m/s^2
b. 3 m/s^2
c. 10 m/s^2
d. 180 m/s^2

____ 159. A cyclist turns a corner with a radius of 50 m at a speed of 20 m/s. What is the magnitude of the cyclist's acceleration?
a. 0.4 m/s^2
b. 2.5 m/s^2
c. 8 m/s^2
d. 10 m/s^2

____ 160. A 2-kg ball is thrown horizontally at a speed of 10 m/s. At the same time a 1-kg ball is dropped from the same height. Ignoring air resistance, which ball hits the ground first?
a. the 1-kg ball
b. the 2-kg ball
c. It's a tie.

____ 161. A red ball is thrown straight down from the edge of a tall cliff with a speed of 30 m/s. At the same time a green ball is thrown straight up with the same speed. Which ball (if either) will be traveling faster when it reaches the ground below?
a. the red ball
b. the green ball
c. Both balls will have the same speed.

____ 162. In projectile motion the
a. acceleration is parallel (or antiparallel) to the velocity.
b. acceleration is perpendicular to the velocity.
c. acceleration is vertical, while the velocity can be in any direction.

d. acceleration is vertical and the velocity is horizontal.

____ 163. A football quarterback throws a long pass toward the end zone. Assume that you can neglect the effects of air resistance. At the instant the ball reaches its highest point, what is the direction of the net force on the ball?
a. up
b. down
c. horizontal
d. The net force is zero.

____ 164. A football quarterback throws a long pass toward the end zone. Assume that you can neglect the effects of air resistance. At the instant the ball reaches its highest point, what is the acceleration of the ball?
a. zero
b. 10 m/s^2 downward
c. 10 m/s^2 upward

____ 165. A baseball is hit with a horizontal speed of 22 m/s and a vertical speed of 14 m/s upward. What are these speeds 1 s later?
a. 22 m/s horizontal and 4 m/s upward
b. 22 m/s horizontal and 24 m/s upward
c. 12 m/s horizontal and 4 m/s upward
d. 12 m/s horizontal and 14 m/s upward

____ 166. A rock is thrown off a tall cliff with a vertical speed of 25 m/s upward and a horizontal speed of 30 m/s. What will these speeds be 3 s later?
a. 25 m/s upward and 30 m/s horizontal
b. 5 m/s downward and 30 m/s horizontal
c. 25 m/s upward and 0 m/s horizontal
d. 30 m/s downward and 60 m/s horizontal

____ 167. A car drives off a vertical cliff at a speed of 24 m/s. If it takes 3 s for the car to hit the ground, how far from the base of the cliff does it land?
a. 3 m
b. 8 m
c. 24 m
d. 72 m

____ 168. A bowling ball rolls off the edge of a giant's table at 15 m/s. If it takes 4 s for the ball to hit the ground, how far does it land from the base of the table?
a. 10 m
b. 15 m
c. 40 m
d. 60 m

____ 169. Angel Falls in southeastern Venezuela is the highest uninterrupted waterfall in the world, dropping 979 m (3212 ft). Ignoring air resistance, it would take 14 s for the water to fall from the lip of the falls to the river below. If the water lands 50 m from the base of the vertical cliff, what was its horizontal speed at the top?
a. 3.6 m/s
b. 9.8 m/s
c. 50 m/s
d. 700 m/s

____ 170. A tennis ball is hit with a vertical speed of 10 m/s and a horizontal speed of 30 m/s. How far will the ball travel horizontally before landing?

a. 30 m
b. 40 m
c. 60 m
d. 80 m

____ 171. What force drives the planets along their orbits?
a. gravity
b. magnetism
c. solar wind
d. No force is needed to drive them along their orbits.

____ 172. If we imagine launching an apple into a circular orbit about Earth and ignore the effects of air resistance, we know that the apple will experience
a. a constant velocity.
b. no net force.
c. a force due to its inertia.
d. a centripetal force due to gravity.

____ 173. Which of the following statements about Venus is correct?
a. Venus has a constant velocity.
b. There is no net force acting on Venus.
c. The Sun exerts a stronger force on Venus than Venus exerts on the Sun.
d. Venus is continually accelerating toward the Sun.

____ 174. Which of the following statements about Venus is <u>not</u> correct?
a. The Sun's gravitational pull on Venus equals Venus' gravitational pull on the Sun.
b. There is a net force acting on Venus.
c. Venus is accelerating toward the Sun.
d. There is no gravity on the surface of Venus.

____ 175. The size of the gravitational force that Earth exerts on the Moon is ____ that the Moon exerts on Earth.
a. greater than
b. the same as
c. smaller than

____ 176. Earth is held in its orbit by the gravitational force of the Sun. Therefore, the force that the Sun exerts on Earth is ____ that Earth exerts on the Sun.
a. greater than
b. smaller than
c. the same as

____ 177. What is the acceleration due to Earth's gravity at a distance of one Earth radius above Earth's surface?
a. 2.5 m/s^2
b. 5 m/s^2
c. 10 m/s^2
d. 20 m/s^2

____ 178. An astronaut weighs 900 N when measured on the surface of Earth. How large would the force of gravity on him be if he were in an Earth satellite at an altitude equal to Earth's radius?
a. 225 N
b. 450 N
c. 900 N
d. 3600 N

____ 179. If you double the length of each side of a cube, its volume increases by what factor?
a. 2
b. 4
c. 6
d. 8

____ 180. If you double the radius of a sphere, its volume increases by what factor?
a. 2
b. 4
c. 6
d. 8

____ 181. A future space traveler, Skip Parsec, lands on the planet MSU3, which has the same mass as Earth but twice the radius. If Skip weighs 800 N on Earth's surface, how much does he weigh on MSU3's surface?
a. 50 N
b. 100 N
c. 200 N
d. 400 N

____ 182. In the law of universal gravitation the force ____ as the mass increases and ____ as the distance increases.
a. increases ... increases
b. decreases ... increases
c. increases ... decreases
d. decreases ... decreases

____ 183. The gravitational force between two metal spheres in outer space is 1800 N. How large would the force be if the two spheres were twice as far apart?
a. 7200 N
b. 3600 N
c. 900 N
d. 450 N

____ 184. A solid lead sphere of radius 10 m (about 66 ft across!) has a mass of about 57 million kg. If two of these spheres are floating in deep space with their centers 20 m apart, the gravitational attraction between the spheres is only 540 N (about 120 lb). How large would this gravitational force be if the distance between the centers of the two spheres were tripled?
a. 60 N
b. 180 N
c. 1620 N
d. 4860 N

____ 185. Does the Moon orbit the Sun?
a. Yes. It goes in a circle about the Sun.
b. No. It orbits Earth.
c. Yes, but it also orbits Earth.
d. No, but it would if Earth were not present.

____ 186. The numerical value of G, the gravitational constant, was determined
a. from knowledge of Earth's mass.
b. from the law of universal gravitation and the value of the acceleration due to gravity.
c. from the value of the Moon's acceleration.
d. by measuring the force between masses in the laboratory.

____ 187. When Cavendish claimed that he "weighed" Earth, he actually calculated the
a. force that the Moon exerts on Earth.
b. weight of Earth.
c. mass of Earth.
d. force that the Sun exerts on Earth.

____ 188. Which of the following would NOT cause the gravitational force on an object near Earth's surface to increase?
a. an ore deposit just under the surface
b. a lower elevation
c. an increase in its mass
d. a horizontal velocity

____ 189. If an astronaut with a weight of 800 N on Earth steps on a bathroom scale while he is in Earth orbit, the scale will read
a. zero.
b. less than 800 N.
c. 800 N.
d. more than 800 N.

____ 190. From film taken in SkyLab and the Space Shuttle, we learned that objects in SkyLab
a. have mass but no weight.
b. have mass but no force due to gravity.
c. have neither mass nor weight.
d. fall to the floor with an acceleration of 9.5 m/s^2.

____ 191. NASA uses the famous “Vomit Comet,” a KC-135 cargo plane, to provide astronauts and scientiest a simulated zero-gravity environment. The plane flies in a parabolic arc, at the top of which a passenger feels “weightless.” This is because
a. the acceleration of the passenger is nearly zero at the top of the arc
b. the gravitational force exerted by Earth on the passenger is nearly zero at the top of the arc
c. the force exerted by the floor of the plane on the passenger is nearly zero at the top of the arc
d. a and b
e. a, b, and c

____ 192. Over which of the following locations is it possible to have a synchronous satellite?
a. New York City
b. Los Angeles
c. North Pole
d. equator

____ 193. The highest high tides and the lowest low tides occur when the Moon is
a. full or new.
b. full only.
c. new only.
d. first and third quarter.

____ 194. In a typical 24 hour day, there are
a. one high tide and one low tide.
b. one high tide and two low tides.
c. two high tides and one low tide.
d. two high tides and two low tides.

____ 195. Which of the following celestial bodies has the greatest influence on Earth's tides?
a. Moon
b. Sun
c. Venus
d. Jupiter

____ 196. Mercury orbits the sun about once every 80 days. Mercury is observed to keep the same side facing the sun at all times. If Mercury had oceans, how much time would elapse between its high tides
a. 20 days
b. 40 days
c. 80 days
d. 160 days
e. there would be no tides

____ 197. What is the magnitude of Earth's gravitational field at a distance equal to twice Earth's radius?
a. 20 N/kg
b. 10 N/kg
c. 5 N/kg
d. 2.5 N/kg

____ 198. Suppose that the planet Mercury were magically replaced with a baseball. The magnitude of the net force exerted on the baseball would be
a. equal to that exerted on Mercury
b. greater than that exerted on Mercury
c. less than that exerted on Mercury

____ 199. For simplicity, a professor uses 9.8 (meters per second) per second for the acceleration due to gravity instead of the more precise 9.81 (meters per second) per second. If Cavendish had made the same approximation, his estimate for Earth's mass have been
a. too high
b. too low

____ 200. On the surface of a certain planet, the gravitaional field strength has numerical value 5.2. This means that
a. an object of mass 1 kg will experience a gravitational force of 5.2 newtons
b. an object must have a mass of 5.2 kg in order to experience a gravitational force of 1 newton

____ 201. If Earth's mass were suddenly and magically reduced to half its present value, the Sun's gravitational force on Earth would
a. be reduced by a factor of 4.
b. be reduced by a factor of 2.
c. remain the same.
d. increase by a factor of 2.

____ 202. If Earth's mass were suddenly and magically reduced to half its present value, the magnitude of Earth's acceleration about the Sun would
a. be reduced by a factor of 4.
b. be reduced by a factor of 2.
c. remain the same.
d. increase by a factor of 2.

____ 203. A 320-kg satellite experiences a gravitational force of 800 N. What is the radius of the satellite's orbit? (Earth's radius is 6,400 km.)
a. 6,400 km

b. 12,800 km
c. 19,200 km
d. 25,600 km

____ 204. What is the gravitational force between two 20-kg iron balls separated by a distance of 0.5 m? The gravitational constant is $G = 6.67 \times 10^{-11}$ N-m^2/kg^2.
a. 2.67×10^{-9} N
b. 5.34×10^{-9} N
c. 5.34×10^{-8} N
d. 1.07×10^{-7} N

____ 205. If an astronaut in full gear has a weight of 1200 N on Earth, how much will the astronaut weigh on the Moon?
a. 20 N
b. 120 N
c. 200 N
d. 720 N

____ 206. Mercury has a radius of about 0.38 Earth radii and a mass of only 0.055 Earth masses. Estimate the acceleration due to gravity on Mercury.
a. 1.45 m/s^2
b. 3.81 m/s^2
c. 26.3 m/s^2
d. 69.1 m/s^2