Web practice Chapter 4 Newton's Laws of Motion

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

_____ 1. If we know an object is moving at constant velocity, we may assume:
   a. the net force acting on the object is zero.
   b. there are no forces acting on the object.
   c. the object is accelerating.
   d. the object is losing mass.
   e. the net force acting on the object isn't zero.

_____ 2. What condition must apply to a system's state of motion for it to be regarded as an inertial frame of reference?
   a. in decreasing velocity
   b. in constant velocity
   c. in constant acceleration
   d. in increasing acceleration
   e. in increasing velocity

_____ 3. A 7.0-kg bowling ball experiences a net force of 5.0 N. What will be its acceleration?
   a. 35 m/s^2
   b. 7.0 m/s^2
   c. 5.0 m/s^2
   d. 0.71 m/s^2
   e. 0.52 m/s^2

_____ 4. The acceleration due to gravity on the Moon's surface is one-sixth that on Earth. What net force would be required to accelerate a 20-kg object at 6.0 m/s^2 on the moon?
   a. 1.3 N
   b. 20 N
   c. 33 N
   d. 120 N
   e. 130 N

_____ 5. A 2 000-kg sailboat experiences an eastward force of 3 000 N by the ocean tide and a wind force against its sails with magnitude of 6 000 N directed toward the northwest (45° N of W). What is the magnitude of the resultant acceleration?
   a. 2.2 m/s^2
   b. 2.1 m/s^2
   c. 1.5 m/s^2
   d. 3.0 m/s^2
   e. 1.2 m/s^2

_____ 6. A cart of weight 20 N is accelerated across a level surface at 0.15 m/s^2. What net force acts on the wagon? ($g = 9.8$ m/s^2)
   a. 0.92 N
   b. 0.31 N
   c. 3.0 N
   d. 4.5 N
   e. 5.2 N

_____ 7. Rita accelerates a 0.40-kg ball from rest to 9.0 m/s during the 0.15 s in which her foot is in contact with the ball. What average force does she apply to the ball during the kick?
a. 48 N
b. 72 N
c. 24 N
d. 60 N
e. 76 N

_____ 8. A 70.0-kg man jumps 1.00 m down onto a concrete walkway. His downward motion stops in 0.0200 seconds. If he forgets to bend his knees, what force is transmitted to his leg bones?
a. 15 500 N
b. 7 010 N
c. 4 900 N
d. 3 500 N
e. 2.600 N

_____ 9. The accelerating force of the wind on a small 200-kg sailboat is 707 N northeast. If the drag of the keel is 500 N acting west, what is the acceleration of the boat?
a. 1.5 m/s^2 due east
b. 2.5 m/s^2 due north
c. 3.0 m/s^2 northeast
d. 2.0 m/s^2 north by northwest
e. 1.5 m/s^2 due west

_____ 10. A shot-putter moves his arm and the 7.0-kg shot through a distance of 1.0 m, giving the shot a velocity of 10 m/s from rest. Find the average force exerted on the shot during this time.
a. 175 N
b. 350 N
c. 525 N
d. 700 N
e. 855 N

_____ 11. A thrown stone hits a window, but doesn't break it. Instead it reverses direction and ends up on the ground below the window. In this case, we know:
a. the force of the stone on the glass > the force of the glass on the stone.
b. the force of the stone on the glass = the force of the glass on the stone.
c. the force of the stone on the glass < the force of the glass on the stone.
d. the stone didn't slow down as it broke the glass.
e. No conclusion can be made with the information given.

_____ 12. Two blocks, joined by a string, have masses of 6.0 and 9.0 kg. They rest on a frictionless horizontal surface. A 2nd string, attached only to the 9-kg block, has horizontal force = 30 N applied to it. Both blocks accelerate. Find the tension in the string between the blocks.
a. 18 N
b. 28 N
c. 12 N
d. 15 N
e. 16 N

_____ 13. Three forces, 5.0 N, 15.0 N, and 20.0 N, are acting on a 9.81-kg object. Which of the following forces could also be acting on the object if it is moving with constant velocity?
  a. 1.0 N
  b. 19.0 N
  c. 39.0 N
  d. 45.0 N
  e. any of the above

_____ 14. Two blocks of masses 20 kg and 8 kg are connected together by a light string and rest on a frictionless level surface. Attached to the 8-kg mass is another light string, which a person uses to pull both blocks horizontally. If the two-block system accelerates at 0.5 m/s² what is the tension in the connecting string between the blocks?
  a. 14 N
  b. 6 N
  c. 10 N
  d. 4.0 N
  e. 9.0 N

_____ 15. Two blocks of masses 20 kg and 8.0 kg are connected together by a light string and rest on a frictionless level surface. Attached to the 8-kg mass is a second light string, which a person uses to pull both blocks horizontally. If the two-block system accelerates at 0.5 m/s², what is the tension in the second string attached to the 8-kg mass?
  a. 14 N
  b. 6.0 N
  c. 10 N
  d. 4.0 N
  e. 9.0 N

_____ 16. An elevator weighing 20 000 N is supported by a steel cable. What is the tension in the cable when the elevator is being accelerated upward at a rate of 3.00 m/s²? ($g = 9.80$ m/s²)
  a. 13 900 N
  b. 23 100 N
  c. 20 000 N
  d. 26 100 N
  e. 17.800 N

_____ 17. As a basketball player starts to jump for a rebound, he begins to move upward faster and faster until he leaves the floor. During this time that he is in contact with the floor, the force of the floor on his shoes is:
  a. bigger than his weight.
  b. equal in magnitude and opposite in direction to his weight.
  c. less than his weight.
  d. zero.
  e. the answer depends on his weight.

_____ 18. As I slide a box at constant speed up a frictionless slope, pulling parallel to the slope, the tension in the rope will be:
  a. greater than the tension would be if the box were stationary.
  b. greater than the weight of the box.
  c. equal to the weight of the box.
  d. less than the weight of the box.
  e. less than the tension would be if the box were stationary.

_____ 19. As a 3.0-kg bucket is being lowered into a 10-m-deep well, starting from the top, the tension in the rope is 9.8 N. The acceleration of the bucket will be:
   a.   6.5 m/s² downward.
   b.   9.8 m/s² downward.
   c.   zero.
   d.   3.3 m/s² upward.
   e.   5.6 m/s² upward.

_____ 20. A 5 000-N weight is held suspended in equilibrium by two cables. Cable 1 applies a horizontal force to the right of the object and has a tension, T_1. Cable 2 applies a force upward and to the left at an angle of 37.0° to the negative x axis and has a tension, T_2. What is the tension, T_1?
   a.   4 000 N
   b.   6 640 N
   c.   8 310 N
   d.   3 340 N
   e.   9 120 N

_____ 21. Three identical 6.0-kg cubes are placed on a horizontal frictionless surface in contact with one another. The cubes are lined up from left to right and a force is applied to the left side of the left cube causing all three cubes to accelerate to the right at 2.0 m/s². What is the magnitude of the force exerted on the middle cube by the left cube in this case?
   a.   12 N
   b.   24 N
   c.   36 N
   d.   48 N
   e.   none of the above

_____ 22. Three identical 6.0-kg cubes are placed on a horizontal frictionless surface in contact with one another. The cubes are lined up from left to right and a force is applied to the left side of the left cube causing all three cubes to accelerate to the right at 2.0 m/s². What is the magnitude of the force exerted on the right cube by the middle cube in this case?
   a.   12 N
   b.   24 N
   c.   36 N
   d.   48 N
   e.   none of the above

_____ 23. A sled weighs 100 N. It is held in place on a frictionless 20° slope by a rope attached to a stake at the top; the rope is parallel to the slope. Find the tension in the rope.
   a.   94 N
   b.   47 N
   c.   37 N
   d.   34 N
   e.   28 N

_____ 24. A sled weighs 100 N. It is held in place on a frictionless 20° slope by a rope attached to a stake at the top; the rope is parallel to the slope. What is the normal force of the slope acting on the sled?
   a.   94 N
   b.   47 N
   c.   37 N
   d.   34 N
   e.   28 N

_____ 25. A 20-kg traffic light hangs midway on a cable between two poles 40 meters apart. If the sag in the cable is 0.40 meters, what is the tension in each side of the cable?
   a.   12 000 N
   b.   9 800 N
   c.   4 900 N
   d.   3 200 N
   e.   980 N

_____ 26. A karate master strikes a board with an initial velocity of 10.0 m/s, decreasing to 1.0 m/s as his hand passes through the board. If the time of contact with the board is 0.002 0 s, and the mass of the coordinated hand and arm is 1.0 kg, what is the force exerted on the board?
   a.   1 000 N
   b.   1 800 N
   c.   2 700 N
   d.   4 500 N
   e.   5 600 N

_____ 27. Find the tension in an elevator cable if the 1 000-kg elevator is descending with an acceleration of 1.8 m/s², downward.
   a.   5 700 N
   b.   8 000 N
   c.   9 800 N
   d.   11 600 N
   e.   12 800 N

_____ 28. A block of mass 5.00 kg rests on a horizontal surface where the coefficient of kinetic friction between the two is 0.200. A string attached to the block is pulled horizontally, resulting in a 2.00-m/s² acceleration by the block. Find the tension in the string. ($g = 9.80$ m/s²)
   a.   0.200 N
   b.   9.80 N
   c.   19.8 N
   d.   10.0 N
   e.   15.6 N

_____ 29. A horizontal force of 750 N is needed to overcome the force of static friction between a level floor and a 250-kg crate. If $g = 9.8$ m/s², what is the coefficient of static friction?
   a.   3.0
   b.   0.15
   c.   0.28
   d.   0.31
   e.   2.5

_____ 30. Three identical 6.0-kg cubes are placed on a horizontal frictionless surface in contact with one another. The cubes are lined up from left to right and a 36-N force is applied to the left side of the left cube causing all three cubes to accelerate to the right. If the cubes are each subject to a frictional force of 6.0 N, what is the magnitude of the force exerted on the right cube by the middle cube in this case?
   a.   12 N
   b.   24 N
   c.   36 N
   d.   48 N
   e.   none of the above

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Answer Section

MULTIPLE CHOICE

1. A
2. B
3. D
4. D
5. A
6. B
7. C
8. A
9. B
10. B
11. B
12. C
13. E
14. C
15. A
16. D
17. A
18. D
19. A
20. B
21. B
22. A
23. D
24. A
25. C
26. D
27. B
28. C
29. D
30. A