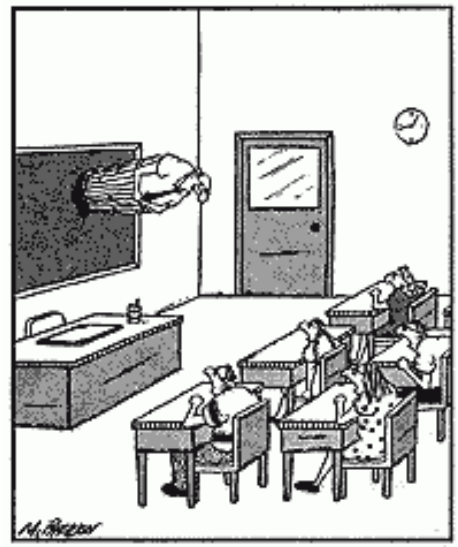


Regents Physics

(9) Students

Learning at Home

Dates: 5/25 – 6/5

Hello FCS Physics Students!

These worksheets as well as answer keys and additional materials can be found on my website at Forestville.com. **Please complete (1) worksheet per school day and check your answers using the answer key.**

Unfortunately, we will not be in school for the remainder of the academic year. I miss seeing you in class and hope that we never experience a time like this again. So, we push ahead and hope for a new start next year. Regents exams are CANCELLED for this year. Please contact the school with any questions regarding the district policy on our current situation.

In keeping with the most current school policy, you will be receiving bi-weekly packets and these are also provided on my website. As of (3/17) our district policy is as follows:

- You will be provided reinforcement work, there will be no new concepts introduced.

- Answer keys are provided for each assignment.

- There will be no new grades entered and I will expect nothing back from you.

Please check my Regents Physics website for videos, extra review and other curriculum related materials. Please email me if you have any questions related to our class. As always be safe and take care of yourselves. There are also digital copies of this material included on my website along with the Reference Tables.

- Mr. O'Leary

Questions 1 through 4 refer to the following:

A toy projectile is fired from the ground vertically upward with an initial velocity of 29 meters per second. The projectile arrives at its maximum altitude in 3.0 seconds. [*Neglect air resistance*.]

1) As the projectile rises and then falls back to the ground, its acceleration

A) increases, then decreases
B) decreases, then increases
C) increase, only
D) remains the same

2) What is the displacement of the projectile from the time it left the ground until it returned to the ground?

A) 88 m B) 0. m C) 9.8 m D) 44 m

3) The *greatest* height the projectile reaches is approximately

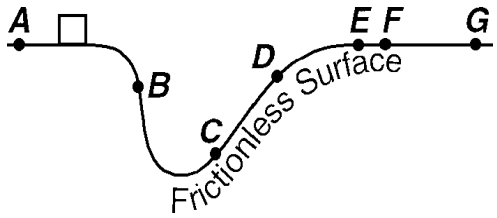
A) 87 m B) 23 m C) 44 m D) 260 m

4) What is the velocity of the projectile when it hits the ground?

A) 0. m/s B) −9.8 m/s C) −29 m/s D) +29 m/s

Questions 5 through 7 refer to the following:

The diagram represents a block sliding along a frictionless surface between points *A* and *G*.



5) Which expression represents the magnitude of the block's acceleration as it moves from point *C* to point *D*?

A) $m\Delta v$ B) $\frac{2\Delta s}{\Delta t}$ C) $\frac{m}{F}$ D) $\frac{\Delta v}{\Delta t}$

6) As the block moves from point *A* to point *B*, the speed of the block will be

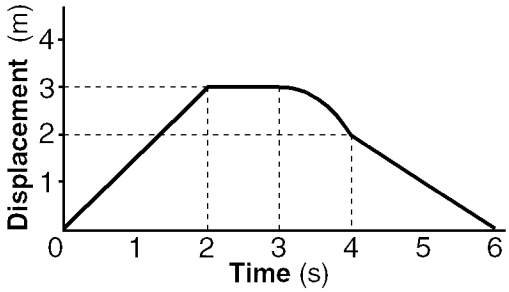
A) decreasing B) increasing C) zero D) constant, but not zero

7) Which formula represents the velocity of the block as it moves along the horizontal surface from point *E* to point *F*?

A) $\bar{v} = \frac{\Delta s}{\Delta t}$ B) $(v_f)^2 = 2a\Delta s$ C) $\Delta v = \frac{1}{2}a(\Delta t)^2$ D) $\bar{v} = \frac{\Delta v}{2}$

Questions 8 through 10 refer to the following:

The graph below represents the displacement of an object as a function of time.



8) What is the velocity of the object at $t = 1$ second?

A) 1.5 m/s B) 2.0 m/s C) 1.0 m/s D) 3.0 m/s

9) What is the average velocity of the object from $t = 0$ to $t = 3$ seconds?

A) 2.0 m/s B) 1.0 m/s C) 3.0 m/s D) 0 m/s

10) During which time interval is the object accelerating?

A) 0-2 s B) 3-4 s C) 4-6 s D) 2-3 s

1) D. remains the same
Physics, Ch 1 #101

2) B. 0. m
Physics, Ch 1 #102

3) C. 44 m
Physics, Ch 1 #103

4) C. −29 m/s
Physics, Ch 1 #104

5) D. $\frac{\Delta v}{\Delta t}$
Physics, Ch 1 #105

6) B. increasing
Physics, Ch 1 #106

7) A. $v = \frac{\Delta s}{\Delta t}$
Physics, Ch 1 #107

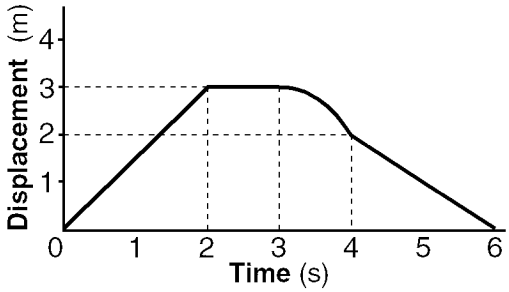
8) A. 1.5 m/s
Physics, Ch 1 #108

9) B. 1.0 m/s
Physics, Ch 1 #109

10) B. 3-4 s
Physics, Ch 1 #110

Questions 1 through 3 refer to the following:

The graph below represents the displacement of an object as a function of time.



1) During which time interval is the object accelerating?

A) 0-2 s B) 2-3 s C) 4-6 s D) 3-4 s

2) How far is the object from the starting point at the end of 3 seconds?

A) 3.0 m B) 0 m C) 9.0 m D) 2.0 m

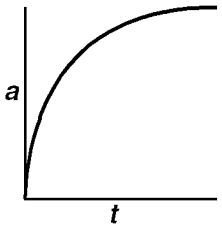
3) During which time interval is the object at rest?

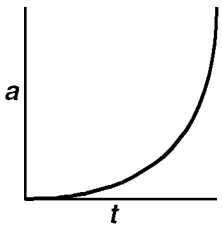
A) 2-3 s B) 3-4 s C) 4-6 s D) 0-2 s

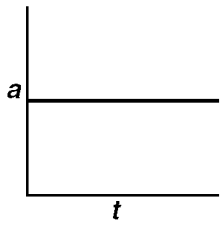
Questions 4 through 6 refer to the following:

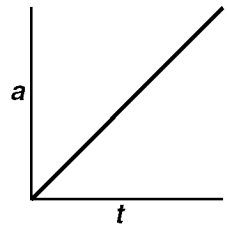
A 10.-kilogram object, starting from rest, slides down a frictionless incline with a constant acceleration of 2.0 m/sec^2 for 4.0 seconds.

4) Which graph *best* represents the relationship between acceleration (a) and time (t) for the object?

A) 

B) 

C) 

D) 

5) What is the velocity of the object at the end of the 4.0 seconds?

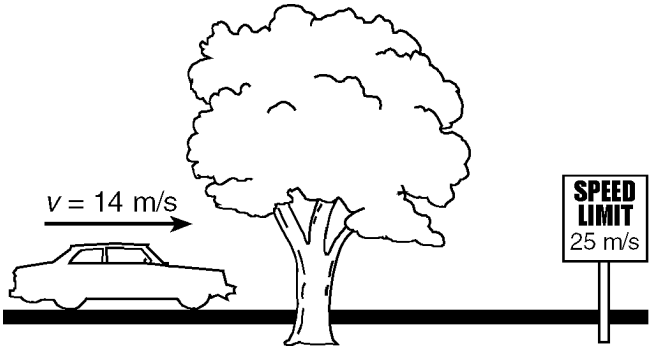
A) 16 m/sec B) 4.0 m/sec C) 8.0 m/sec D) 2.0 m/sec

6) During the 4.0 seconds, the object moves a total distance of

A) 32 m B) 16 m C) 8.0 m D) 4.0 m

Questions 7 and 8 refer to the following:

A car is traveling at a constant speed of 14 meters per second along a straight highway. A tree and a speed limit sign are beside the highway. As it passes the tree, the car starts to accelerate. The car is accelerated uniformly at 2.0 meters per second^2 until it reaches the speed limit sign, 5.0 seconds later.



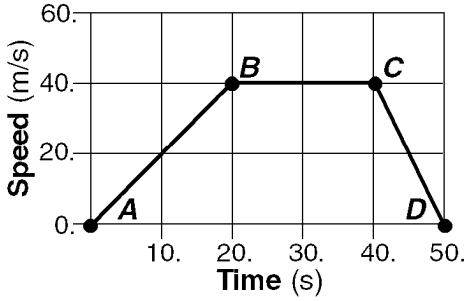
7) When the car reaches the sign, the car's speed is

A) greater than the speed limit
B) equal to the speed limit
C) less than the speed limit

8) What is the distance between the tree and the sign?

A) 10. m
B) 95 m
C) 25 m
D) 70. m

9) The speed-time graph below, which represents the linear motion of a cart.



(a) Determine the magnitude of the acceleration of the cart during interval *AB*. [*Show all calculations, including the equation and substitution with units*.]

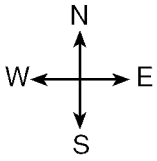
(b) Calculate the distance traveled by the cart during interval *BC*. [*Show all calculations, including the equation and substitution with units*.]

(c) What is the average speed of the cart during interval *CD*?

10) A newspaper carrier on her delivery route travels 200. meters due north and then turns and walks 300. meters due east.

(a) Draw a vector diagram following the directions below.

(1) Using a ruler and protractor and starting at point *P*, construct the sequence of two displacement vectors for the newspaper carrier's route. [*Use a scale of 1.0 cm = 50. m.*] [*Label the vectors.*]



(2) Construct and label the vector that represents the carrier's resultant displacement from point *P*.

(b) What is the magnitude of the carrier's resultant displacement?

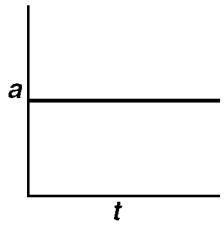
(c) What is the angle (in degrees) between north and the carrier's resultant displacement?

1) D. 3-4 s
Physics, Ch 1 #110

2) A. 3.0 m
Physics, Ch 1 #111

3) A. 2-3 s
Physics, Ch 1 #112

4) C.



Physics, Ch 1 #113

5) C. 8.0 m/sec
Physics, Ch 1 #114

6) B. 16 m
Physics, Ch 1 #115

7) C. less than the speed limit
Physics, Ch 1 #116

8) B. 95 m
Physics, Ch 1 #117

9) (a) 2.0 m/s^2; (b) 800 m OR 8.0×10^2 m; (c) 20. m/s

Physics, Ch 1 #118

10) (a)(1-2) No answer available.; (b) 361 m (≅1 m); (c) 56° (≅1°)

Physics, Ch 1 #119

1) Which term represents a vector quantity?

A) distance B) force C) work D) power

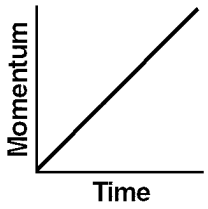
2) As the vector sum of *all* the forces acting on an object increases, the acceleration of the object

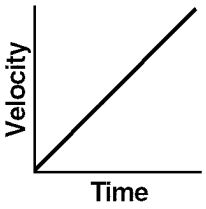
A) remains the same
B) increases
C) decreases

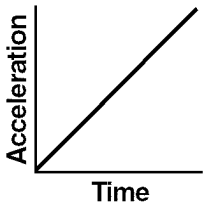
3) A 60.-kilogram astronaut weighs 96 newtons on the surface of the Moon. The acceleration due to gravity on the Moon is

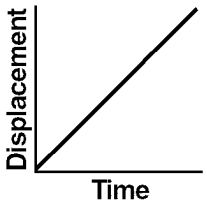
A) 1.6 m/s^2 B) 9.8 m/s^2 C) 0.0 m/s^2 D) 4.9 m/s^2

4) Which graph *best* represents the motion of an object that has *no* unbalanced force acting on it?

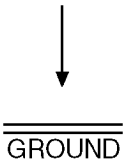
A) 

B) 

C) 

D) 

5) Which diagram represents the vector with the *largest* downward component? [*Assume each vector has the same magnitude*.]

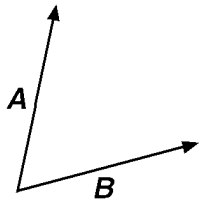
A) 

B) 

C) 

D) 

6) Which vector below represents the resultant of the concurrent vectors *A* and *B* in the diagram below?



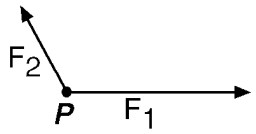
A)

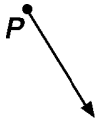
B) 

C)

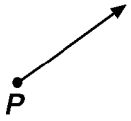
D) 

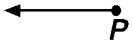
7) Which vector *best* represents the resultant of forces F_1 and F_2 acting concurrently on point P as shown in the diagram below?



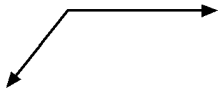
A) 

B) 

C) 

D) 

8) The diagram below represents two concurrent forces acting on a point.



Which vector *best* represents their resultant?

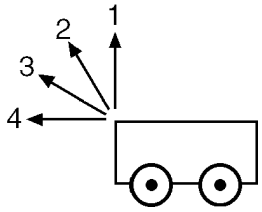
A) 

B) 

C) 

D) 

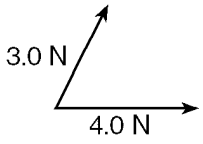
9) In the diagram below, the numbers 1, 2, 3, and 4 represent possible directions in which a force could be applied to a cart.

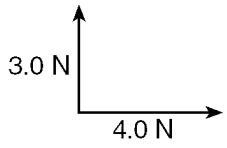


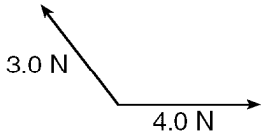
If the force applied in each direction has the same magnitude, in which direction will the vertical component of the force be the *least*?

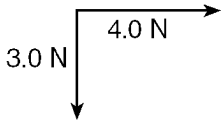
A) 1 B) 2 C) 3 D) 4

10) A 3.0-newton force and a 4.0-newton force act concurrently on a point. In which diagram below would the orientation of these forces produce the *greatest* net force on the point?

A) 

B) 

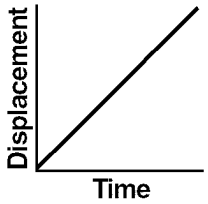
C) 

D) 

1) B. force
Physics, Ch 1 #120

2) B. increases
Physics, Ch 1 #121

3) A. 1.6 m/s^2
Physics, Ch 1 #122

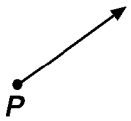
4) D. 

Physics, Ch 1 #123

5) A. 

Physics, Ch 1 #124

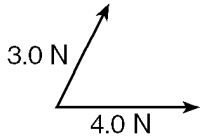
6) D. 
Physics, Ch 1 #125

7) C. 

Physics, Ch 1 #126

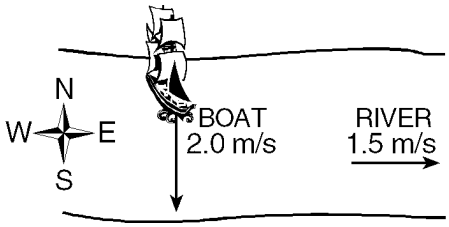
8) C. 
Physics, Ch 1 #127

9) D. 4
Physics, Ch 1 #128

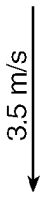
10) A. 

Physics, Ch 1 #129

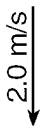
1) A river flows due east at 1.5 meters per second. A ship leaves the north shore of the river and heads due south at 2.0 meters per second, as shown in the diagram below.

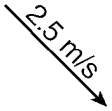


Which vector *best* represents the resultant velocity of the ship relative to the riverbank?

A) 

B) 

C) 

D) 

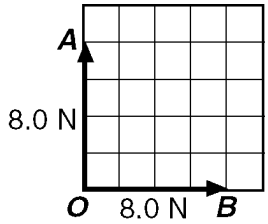
2) A boat heads directly eastward across a river at 12 meters per second. If the current in the river is flowing at 5.0 meters per second due south, what is the magnitude of the boat's resultant velocity?

A) 17 m/s B) 13 m/s C) 8.5 m/s D) 7.0 m/s

3) A table exerts a 2.0-newton force on a book lying on the table. The force exerted by the book on the table is

A) 20. N B) 2.0 N C) 0.20 N D) 0 N

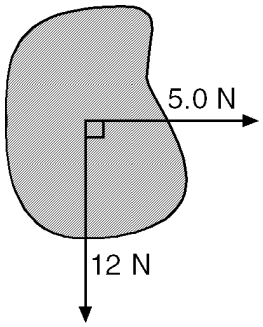
4) Two forces ($\overrightarrow{OA}$ and $\overrightarrow{OB}$) act simultaneously at point *O* as shown on the diagram below.



The magnitude of the resultant force is *closest* to

A) 15 N B) 8.0 N C) 16 N D) 11 N

5) Two perpendicular forces act on an object as shown in the diagram below.



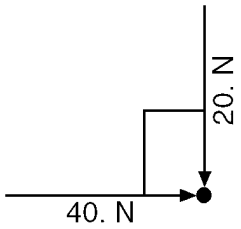
What is the magnitude of the resultant force on the object?

A) 7.0 N B) 5.0 N C) 13 N D) 17 N

6) A force of 6.0 newtons north and a force of 8.0 newtons east act concurrently on an object. The magnitude of the resultant of the two forces is

A) 1.3 N B) 2.0 N C) 10. N D) 14. N

7) The diagram below represents two forces acting concurrently on an object.



The magnitude of the resultant force is *closest* to

A) 45. N B) 20. N C) 60. N D) 40. N

8) Which pair of concurrent forces could produce a resultant force having a magnitude of 10. newtons?

A) 10. N, 10. N B) 4.7 N, 4.7 N C) 4.7 N, 5.0 N D) 10. N, 30. N

9) Two concurrent forces act at right angles to each other. If one of the forces is 40 newtons and the resultant of the two forces is 50 newtons, the magnitude of the other force must be

A) 20 newtons B) 10 newtons C) 40 newtons D) 30 newtons

10) A resultant force of 10. newtons is made up of two component forces acting at right angles to each other. If the magnitude of one of the components is 6.0 newtons, the magnitude of the other component must be

A) 4 N B) 8.0 N C) 6.0 N D) 16 N

1) D. 

Physics, Ch 1 #130

2) B. 13 m/s
Physics, Ch 1 #131

3) B. 2.0 N
Physics, Ch 1 #132

4) D. 11 N
Physics, Ch 1 #133

5) C. 13 N
Physics, Ch 1 #134

6) C. 10. N
Physics, Ch 1 #135

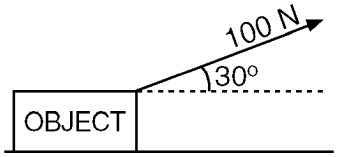
7) A. 45. N
Physics, Ch 1 #136

8) A. 10. N, 10. N
Physics, Ch 1 #137

9) D. 30 newtons
Physics, Ch 1 #138

10) B. 8.0 N
Physics, Ch 1 #139

1) A force of 100. newtons is applied to an object at an angle of 30° from the horizontal as shown in the diagram below.



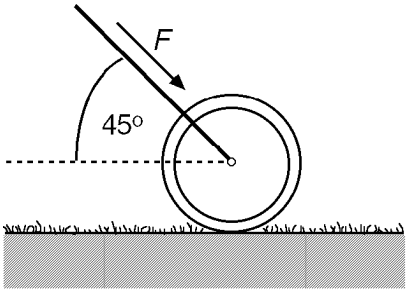
What is the magnitude of the vertical component of this force?

A) 86.7 N B) 100. N C) 50.0 N D) 0 N

2) Two concurrent forces have a maximum resultant of 45 newtons and a minimum resultant of 5.0 newtons. What is the magnitude of each of these forces?

A) 0.0 N and 50. N B) 5.0 N and 9.0 N C) 0.0 N and 45 N D) 20. N and 25 N

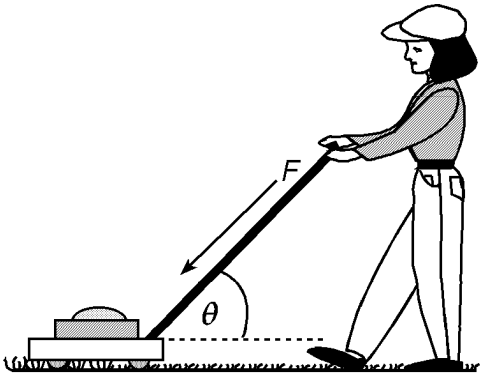
3) The handle of a lawn roller is held at 45° from the horizontal. A force, *F*, of 28.0 newtons is applied to the handle as the roller is pushed across a level lawn, as shown in the diagram below.



What is the magnitude of the force moving the roller forward?

A) 7.00 N B) 19.8 N C) 39.0 N D) 14.0 N

4) A lawnmower is pushed with a constant force *F*, as shown in the diagram below.



As angle θ between the lawnmower handle and the horizontal increases, the horizontal component of *F*

A) decreases C) increases

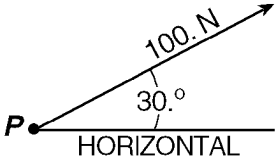
B) remains the same

5) The diagram below shows a person exerting a 300.-newton force on the handle of a shovel that makes an angle of 60.0 with the horizontal ground.

The component of the 300.-newton force that acts perpendicular to the ground is approximately

A) 260. N B) 350. N C) 150. N D) 300. N

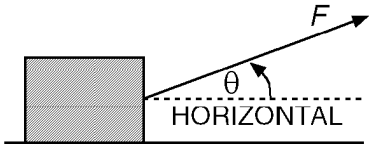
6) A 100.-newton force acts on point *P*, as shown in the diagram below.



The magnitude of the vertical component of this force is approximately

A) 71 N B) 50. N C) 87 N D) 30. N

7) The diagram below represents a constant force *F* acting on a box located on a frictionless horizontal surface.



As the angle θ between the force and the horizontal increases, the acceleration of the box will

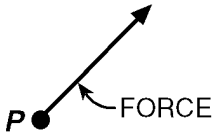
A) remain the same C) decrease

B) increase

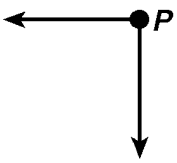
8) A 1.0×10^2-kilogram box rests on the bed of a truck that is accelerating at 2.0 meters per second^2. What is the magnitude of the force of friction on the box as it moves with the truck without slipping?

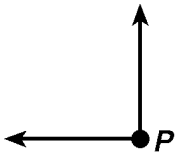
A) 0.0 N B) 1.0×10^3 N C) 5.0×10^2 N D) 2.0×10^2 N

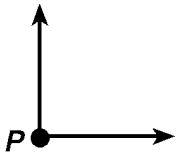
9) The diagram below represents a force acting at point *P*.

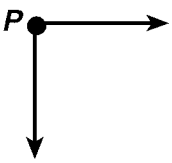


Which pair of concurrent forces would produce equilibrium when added to the force acting at point *P*?

A) 

B) 

C) 

D) 

10) What is an essential characteristic of an object in equilibrium?

A) zero acceleration B) zero velocity C) zero potential energy D) zero kinetic energy

11) Which combination of concurrent forces could *not* produce equilibrium?

A) 20. N, 30. N, and 50. N
B) 40. N, 40. N, and 50. N
C) 10. N, 20. N, and 50. N
D) 30. N, 40. N, and 50. N

1) C. 50.0 N
Physics, Ch 1 #140

2) D. 20. N and 25 N
Physics, Ch 1 #141

3) B. 19.8 N
Physics, Ch 1 #142

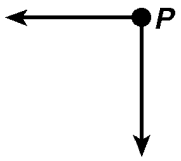
4) A. decreases
Physics, Ch 1 #143

5) A. 260. N
Physics, Ch 1 #144

6) B. 50. N
Physics, Ch 1 #145

7) C. decrease
Physics, Ch 1 #146

8) D. 2.0×10^2 N
Physics, Ch 1 #147

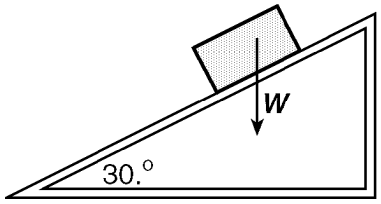
9) 

A.
Physics, Ch 1 #148

10) A. zero acceleration
Physics, Ch 1 #149

11) C. 10. N, 20. N, and 50. N
Physics, Ch 1 #150

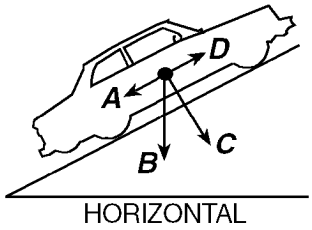
1) In the diagram below, the weight of a box on a plane inclined at 30.° is represented by the vector *W*.



What is the magnitude of the component of the weight (*W*) that acts parallel to the incline?

A) *W* B) 0.87*W* C) 1.5*W* D) 0.50*W*

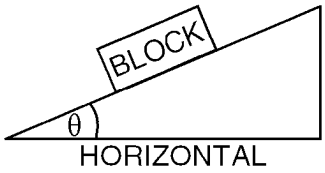
2) The diagram below represents a car resting on a hill.



Which vector *best* represents the weight of the car?

A) *A* B) *B* C) *C* D) *D*

3) A block is at rest on an inclined plane as shown in the diagram below.



As angle θ is increased, the component of the block's weight parallel to the plane

A) decreases C) increases

B) remains the same

4) Two forces act on an object concurrently. The resultant will be *greatest* when the angle between the forces is

A) 0° B) 180° C) 60° D) 90°

5) A force of 3 newtons and a force of 5 newtons act concurrently to produce a resultant of 8 newtons. The angle between the forces must be

A) 90° B) 60° C) 180° D) 0°

6) The resultant of two forces acting on the same point at the same time will be *greatest* when the angle between the forces is

A) 90°C B) 0°C C) 45°C D) 180°C

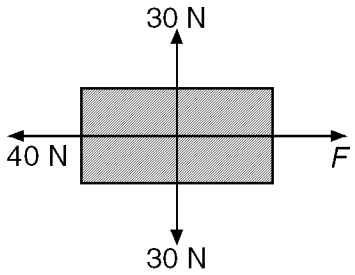
7) If two 10.-newton concurrent forces have a resultant of zero, the angle between the forces must be

A) 45° B) 180° C) 0° D) 90°

8) As the angle between a force and level ground decreases from 60° to 30°, the vertical component of the force

A) decreases
B) increases
C) remains the same

9) Four forces are acting on an object as shown in the diagram below.



If the object is moving with a constant velocity, the magnitude of force *F* must be

A) 20 N B) 0 N C) 40 N D) 100 N

1) D. $0.50W$
Physics, Ch 1 #152

2) B. B
Physics, Ch 1 #153

3) C. increases
Physics, Ch 1 #154

4) A. 0°
Physics, Ch 1 #155

5) D. 0°
Physics, Ch 1 #156

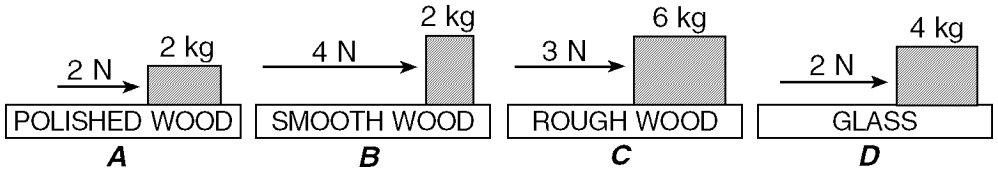
6) B. 0°C
Physics, Ch 1 #157

7) B. 180°
Physics, Ch 1 #158

8) A. decreases
Physics, Ch 1 #159

9) C. 40 N
Physics, Ch 1 #160

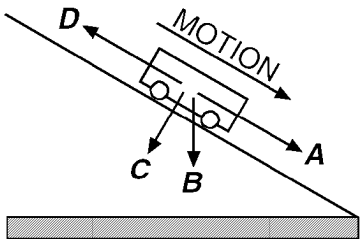
1) Each diagram below shows a different block being pushed by a force across a surface at a constant velocity.



In which two diagrams is the force of friction the same?

A) *A* and *D* B) *A* and *B* C) *B* and *D* D) *C* and *D*

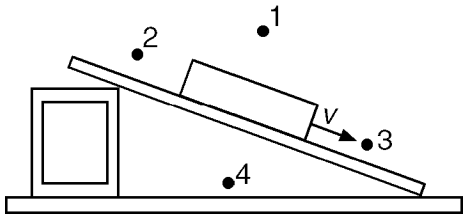
2) A cart rolls down an inclined plane with constant speed as shown in the diagram below.



Which arrow represents the direction of the frictional force?

A) *A* B) *B* C) *C* D) *D*

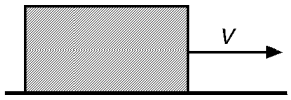
3) The diagram below represents a box shown sliding down an incline plane.



Toward which point will the force of friction on the box be directed?

A) 1 B) 2 C) 3 D) 4

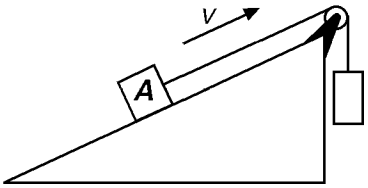
4) A box decelerates as it moves to the right along a horizontal surface, as shown in the diagram below.



Which vector *best* represents the force of friction on the box?

A) B) C) D)

5) Block *A* is pulled with constant velocity up an incline as shown in the diagram below.



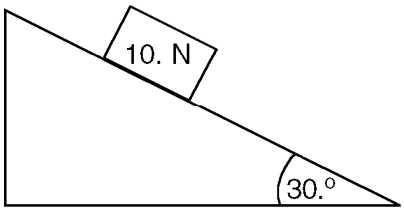
Which arrow *best* represents the direction of the force of friction acting on block *A*?

A)  B)  C)  D) 

6) A constant unbalanced force of friction acts on a 15.0-kilogram mass moving along a horizontal surface at 10.0 meters per second. If the mass is brought to rest in 1.50 seconds, what is the magnitude of the force of friction?

A) 147 N B) 10.0 N C) 150. N D) 100. N

7) The diagram below represents a 10.-newton block sliding down a 30.° incline at a constant speed.



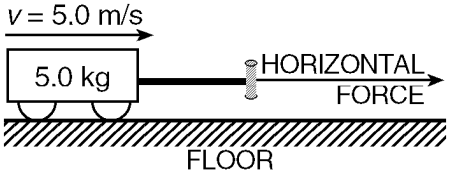
The force of friction of the block is approximately

A) 98 N B) 5.0 N C) 49 N D) 10. N

8) A 100-newton box rests on a horizontal surface. A force of 10 newtons parallel to the surface is required to start the box moving. What is the maximum coefficient of static friction between the box and the surface?

A) 0.5 B) 1,000 C) 10 D) 0.1

9) A horizontal force is used to pull a 5.0-kilogram cart at a constant speed of 5.0 meters per second across the floor as shown in the diagram below.



If the force of friction between the cart and the floor is 10. newtons, the magnitude of the horizontal force along the handle of the cart is

A) 10. N B) 50. N C) 5.0 N D) 25 N

10) The table below lists the coefficients of kinetic friction for four materials sliding over steel.

MATERIAL	μ_k
aluminum	0.47
brass	0.44
copper	0.36
steel	0.57

A 10.-kilogram block of each of the materials in the table is pulled horizontally across a steel floor at constant velocity. Which block would require the *smallest* applied force to keep it moving at constant velocity?

A) aluminum B) steel C) copper D) brass

11) Which two quantities are measured in the same units?

A) mass and weight
B) weight and force
C) velocity and acceleration
D) force and momentum

12) Which pair of terms are vector quantities?

A) speed and velocity
B) force and mass
C) momentum and acceleration
D) distance and displacement

13) As the unbalanced force applied to an object increases, the time rate of change of the object's momentum

A) increases
B) remains the same
C) decreases

14) A cart is uniformly accelerating from rest. The net force acting on the cart is

A) decreasing B) constant C) increasing D) zero

1) A. *A* and *D*
Physics, Ch 1 #161

2) D. *D*
Physics, Ch 1 #162

3) B. 2
Physics, Ch 1 #163

4) C.
Physics, Ch 1 #164

5) B. 
Physics, Ch 1 #165

6) D. 100. N
Physics, Ch 1 #166

7) B. 5.0 N
Physics, Ch 1 #167

8) D. 0.1
Physics, Ch 1 #168

9) A. 10. N
Physics, Ch 1 #169

10) C. copper
Physics, Ch 1 #170

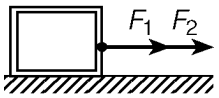
11) B. weight and force
Physics, Ch 1 #171

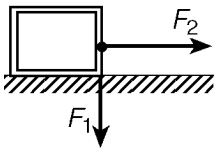
12) C. momentum and acceleration
Physics, Ch 1 #172

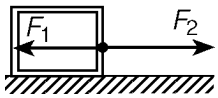
13) A. increases
Physics, Ch 1 #173

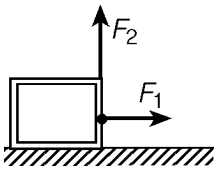
14) B. constant
Physics, Ch 1 #174

1) A 150.-newton force, F_1, and a 200.-newton force, F_2, are applied simultaneously to the same point on a large crate resting on a frictionless, horizontal surface. Which diagram shows the forces positioned to give the crate the *greatest* acceleration?

A) 

B) 

C) 

D) 

2) A 5.0-kilogram cart moving with a velocity of 4.0 meters per second is brought to a stop in 2.0 seconds. The magnitude of the average force used to stop the cart is

A) 20. newtons B) 4.0 newtons C) 10. newtons D) 2.0 newtons

3) A 1.2×10^3-kilogram automobile in motion strikes a 1.0×10^{-4}-kilogram insect. As a result, the insect is accelerated at a rate of 1.0×10^2 meters per second^2. What is the magnitude of the force the insect exerts on the car?

A) 1.2×10^{-2} N B) 1.2×10^3 N C) 1.0×10^{-2} N D) 1.0×10^1 N

4) An object with a mass of 0.5 kilogram starts from rest and achieves a maximum speed of 20 meters per second in 0.01 second. What average unbalanced force accelerates this object?

A) 0.001 N B) 10 N C) 0.1 N D) 1,000 N

5) A 50.-kilogram woman wearing a seat belt is traveling in a car that is moving with a velocity of +10. meters per second. In an emergency, the car is brought to a stop in 0.50 second. What force does the seat belt exert on the woman so that she remains in her seat?

A) -1.0×10^3 N B) -5.0×10^2 N C) -5.0×10^1 N D) -2.5×10^1 N

6) What is the magnitude of the net force acting on a 2.0×10^3-kilogram car as it accelerates from rest to a speed of 15 meters per second in 5.0 seconds?

A) 6.0×10^4 N B) 6.0×10^3 N C) 2.0×10^4 N D) 3.0×10^4 N

7) A force of 50. newtons causes an object to accelerate at 10. meters per second squared. What is the mass of the object?

A) 500 kg B) 5.0 kg C) 60. kg D) 0.20 kg

8) An object accelerates at 2.5 meters per second^2 when an unbalanced force of 10. newtons acts on it. What is the mass of the object?

A) 3.0 kg B) 1.0 kg C) 2.0 kg D) 4.0 kg

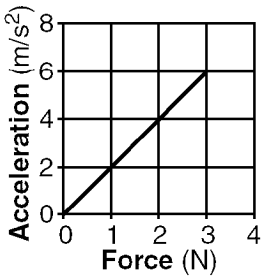
9) A net force of 5.0×10^2 newtons causes an object to accelerate at a rate of 5.0 meters per second^2. What is the mass of the object?

A) 2.5×10^3 kg B) 1.0×10^2 kg C) 2.0×10^{-1} kg D) 6.0×10^2 kg

10) A bullet traveling at 5.0×10^2 meters per second is brought to rest by an impulse of 50. newton-seconds. What is the mass of the bullet?

A) 1.0×10^{-2} kg B) 1.0×10^{-1} kg C) 2.5×10^4 kg D) 1.0×10^1 kg

11) In the graph below, the acceleration of an object is plotted against the unbalanced force on the object.



What is the object's mass?

A) 0.5 kg B) 2 kg C) 0.2 kg D) 1 kg

Questions 12 and 13 refer to the following:

A 10.-kilogram object, starting from rest, slides down a frictionless incline with a constant acceleration of 2.0 m/sec^2 for 4.0 seconds.

12) What is the approximate weight of the object?

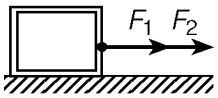
A) 1 newton B) 10 newtons C) 1,000 newtons D) 100 newtons

13) To produce this acceleration, what is the force on the object?

A) 2.0×10^1 newtons B) 10. newtons C) 2.0×10^2 newtons D) 5.0 newtons

14) A 50.0-kilogram object in outer space is attracted to a nearby planet with a net force of 400. newtons. What is the magnitude of the object's acceleration?

A) 9.81 m/s^2 B) 78.4 m/s^2 C) 8.00 m/s^2 D) 2,000 m/s^2

1) A. 

Physics, Ch 1 #175

2) C. 10. newtons
Physics, Ch 1 #176

3) C. 1.0×10^{-2} N
Physics, Ch 1 #177

4) D. 1,000 N
Physics, Ch 1 #178

5) A. -1.0×10^{3} N
Physics, Ch 1 #179

6) B. 6.0×10^{3} N
Physics, Ch 1 #180

7) B. 5.0 kg
Physics, Ch 1 #181

8) D. 4.0 kg
Physics, Ch 1 #182

9) B. 1.0×10^{2} kg
Physics, Ch 1 #183

10) B. 1.0×10^{-1} kg
Physics, Ch 1 #184

11) A. 0.5 kg
Physics, Ch 1 #185

12) D. 100 newtons
Physics, Ch 1 #186

13) A. 2.0×10^{1} newtons
Physics, Ch 1 #187

14) C. 8.00 m/s^2
Physics, Ch 1 #188

1) Two frictionless blocks, having masses of 8.0 kilograms and 2.0 kilograms, rest on a horizontal surface. If a force applied to the 8.0-kilogram block gives it an acceleration of 5.0 m/sec^2, then the same force will give the 2.0-kilogram block an acceleration of

A) 2.5 m/sec^2 B) 20. m/sec^2 C) 1.2 m/sec^2 D) 10. m/sec^2

2) A 3.0-kilogram mass weighs 15 newtons at a given point in the Earth's gravitational field. What is the magnitude of the acceleration due to the gravity at this point?

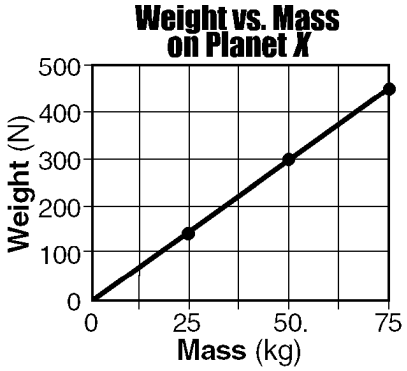
A) 9.8 m/s^2 B) 45 m/s^2 C) 5.0 m/s^2 D) 0.20 m/s^2

3) Two forces are applied to a 2.0-kilogram block on a frictionless, horizontal surface, as shown in the diagram below.

The acceleration of the block is

A) 5.0 m/s^2 to the right B) 3.0 m/s^2 to the right C) 3.0 m/s^2 to the left D) 5.0 m/s^2 to the left

4) The graph below shows the weight of three objects on planet *X* as a function of their mass.



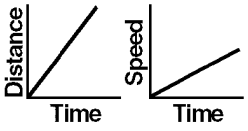
The acceleration due to gravity on planet *X* is approximately

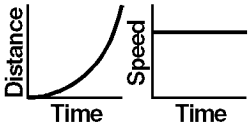
A) 6.0 m/s^2 B) 0.17 m/s^2 C) 50. m/s^2 D) 9.8 m/s^2

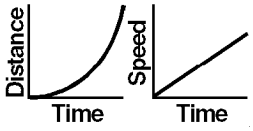
5) A 20.-kilogram mass moving at a speed of 3.0 meters per second is stopped by a constant force of 15 newtons. How many seconds must the force act on the mass to stop it?

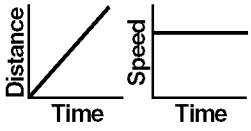
A) 1.3 sec B) 5.0 sec C) 4.0 sec D) 0.20 sec

6) Which two graphs represent the motion of an object on which the net force is zero?

A) 

B) 

C) 

D) 

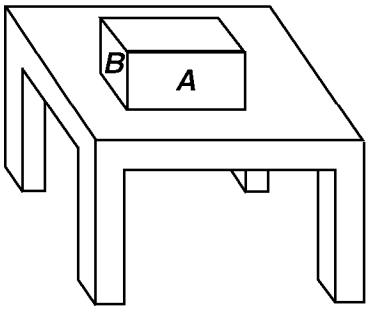
7) The magnitude of the force that a baseball bat exerts on a ball is 50. newtons. The magnitude of the force that the ball exerts on the bat is

A) 50. N B) 5.0 N C) 250 N D) 10. N

8) A baseball bat moving at high velocity strikes a feather. If air resistance is neglected, compared to the force exerted by the bat on the feather, the force exerted by the feather on the bat will be

A) smaller
B) larger
C) the same

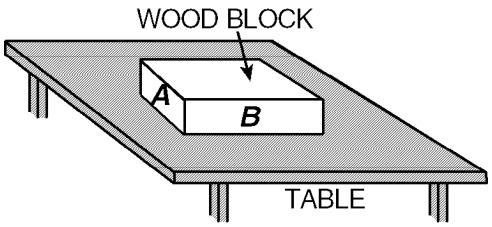
9) In the diagram below, surface *A* of the wooden block has twice the area of surface *B*.



If it takes *F* newtons to keep the block moving at a constant speed across the table when it slides on surface *A*, what force is needed to keep the block moving at constant speed when it slides on surface *B*?

A) 2*F* B) *F* C) 4*F* D) *F*

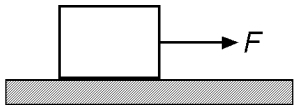
10) In the diagram below, surface *B* of the wooden block has the same texture as surface *A*, but twice the area of surface *A*.



If force *F* is required to slide the block at constant speed across the table on surface *A*, approximately what force is required to slide the block at constant speed across the table on surface *B*?

A) 4F B) F C) 2F D) F

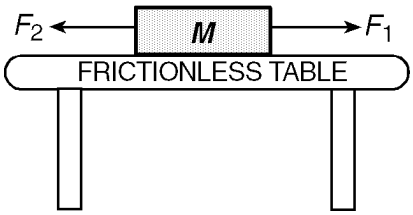
11) A box initially at rest on a level floor is being acted upon by a variable horizontal force, as shown in the diagram below.



Compared to the force required to start the box moving, the force required to keep it moving at constant speed is

A) the same
B) less
C) greater

12) In the diagram below, box M is on a frictionless table with forces F_1 and F_2 acting as shown.



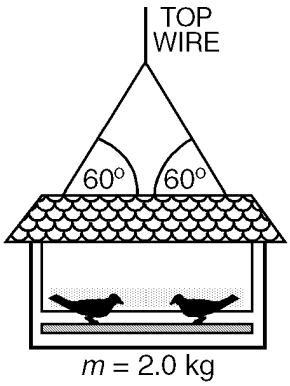
If the magnitude of F_1 is greater than the magnitude of F_2, then the box is

A) accelerating in the direction of F_2
B) accelerating in the direction of F_1
C) moving with a constant speed in the direction of F_1
D) moving with a constant speed in the direction of F_2

13) A test booklet is sitting at rest on a desk. Compared to the force of the booklet on the desk, the force of the desk on the booklet is

A) greater
B) less
C) the same

14) A bird feeder with two birds has a total mass of 2.0 kilograms and is supported by wire as shown in the diagram below.



The force in the top wire is approximately

A) 14 N
B) 10. N
C) 20. N
D) 39 N

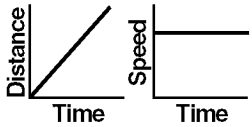
1) B. 20. m/sec^2
Physics, Ch 1 #189

2) C. 5.0 m/s^2
Physics, Ch 1 #190

3) B. 3.0 m/s^2 to the right
Physics, Ch 1 #191

4) A. 6.0 m/s^2
Physics, Ch 1 #192

5) C. 4.0 sec
Physics, Ch 1 #193

6) D. 

Physics, Ch 1 #194

7) A. 50. N
Physics, Ch 1 #195

8) C. the same
Physics, Ch 1 #196

9) D. *F*
Physics, Ch 1 #197

10) D. F
Physics, Ch 1 #198

11) B. less
Physics, Ch 1 #199

12) B. accelerating in the direction of F_1
Physics, Ch 1 #200

13) C. the same
Physics, Ch 1 #201

14) C. 20. N
Physics, Ch 1 #202

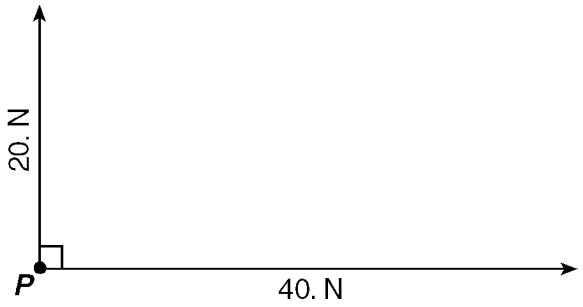
1) An 800-newton person is standing in an elevator. If the upward force of the elevator on the person is 600 newtons, the person is

A) accelerating upward
B) accelerating downward
C) at rest
D) moving downward at constant speed

2) A student weighing 500. newtons stands on a spring scale in an elevator. If the scale reads 520. newtons, the elevator must be

A) accelerating downward
B) moving upward at constant speed
C) moving downward at constant speed
D) accelerating upward

3) A 20.-newton force due north and a 40.-newton force due east act concurrently on a 10.-kilogram object, located at point *P*.



(a) Using a ruler, determine the scale used in the vector diagram by finding the number of newtons represented by each centimeter.

(b) Use a ruler and protractor to construct the vector that represents the resultant force.

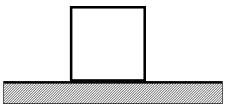
(c) What is the magnitude of the resultant force?

(d) What is the measure of the angle (in degrees) between east and the resultant force?

(e) Calculate the magnitude of the acceleration of the object. [*Show all calculations, including the equation and substitution with units*.]

4) An aluminum block weighing 20. newtons, sliding from left to right in a straight line on a horizontal steel surface, is acted on by a 2.4-newton friction force. The block will be brought to rest by the friction force in a distance of 10. meters.

(a) On the diagram of the block, draw an arrow to identify the direction of each force acting on the block while it is still moving, but is being slowed by the friction force. Identify each force by appropriately labeling the arrow that represents its line of direction.

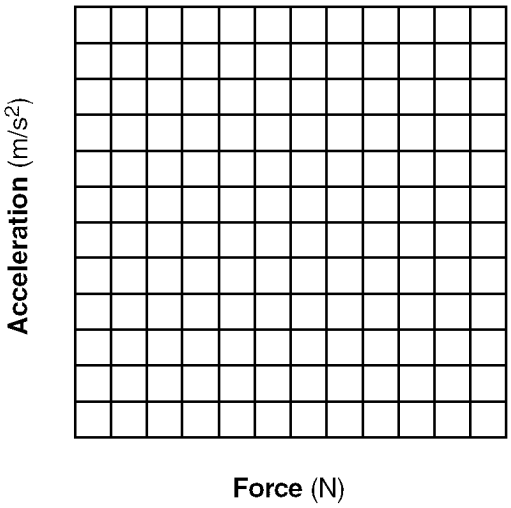


(b) Determine the magnitude of the acceleration of the block as it is brought to rest by friction force. [*Show all work*.]

5) In a laboratory exercise, a student collected the following data as the unbalanced force applied to a body of mass *M* was changed.

DATA TABLE:

Force (newtons)	Acceleration (meters per second^2)
4.0	2.1
8.0	4.0
12.0	6.0
16.0	7.9
20.0	10.0



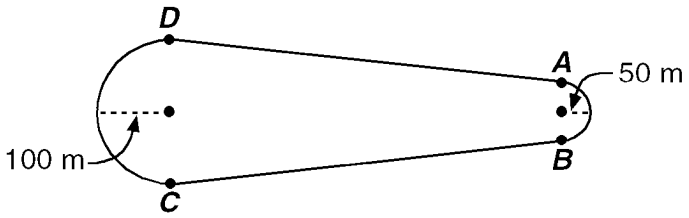
(a) Label the axes of the graph with the appropriate values for force and acceleration.

(b) Plot an acceleration versus force graph for the laboratory data provided.

(c) Using the data or your graph, determine the mass, *M*, of the body. [*Show all calculations*.]

Question 6 refers to the following:

The diagram below represents a flat racetrack as viewed from above, with the radii of its two curves indicated. A car with a mass of 1,000 kilograms moves counterclockwise around the track at a constant speed of 20 meters per second.



6) The net force acting on the car while it is moving from *A* to *D* is

A) 8,000 N B) 0 N C) 400 N D) 20,000 N

7) A rocket in space can travel without engine power at constant speed in the same direction. This condition is *best* explained by the concept of

A) inertia B) action-reaction C) gravitation D) acceleration

8) As the mass of an object decreases, its inertia will

A) decrease C) increase

B) remain the same

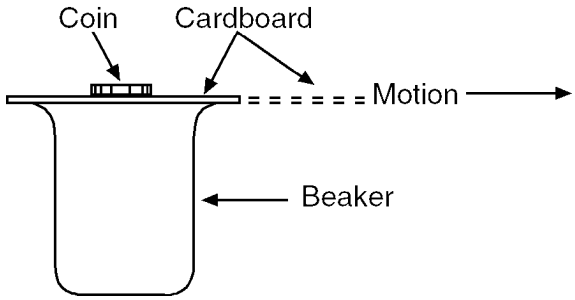
9) If the mass of a moving object could be doubled, the inertia of the object would be

A) unchanged B) halved C) quadrupled D) doubled

10) Compared to the inertia of a 0.10-kilogram steel ball, the inertia of a 0.20-kilogram Styrofoam ball is

A) four times as great B) one-half as great C) twice as great D) the same

11) A copper coin resting on a piece of cardboard is placed on a beaker as shown in the diagram below. When the cardboard is rapidly removed, the coin drops into the beaker.



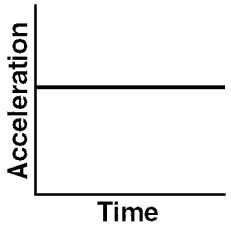
The two properties of the coin which *best* explain its fall are its weight and its

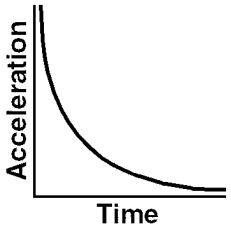
A) electrical resistance B) volume C) inertia D) temperature

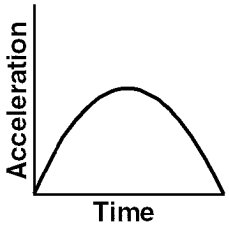
12) Compared to the inertia of a 1-kilogram mass, the inertia of a 4-kilogram mass is

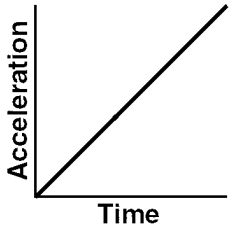
A) 4 times as great B) 16 times as great C) $\frac{1}{16}$ as great D) $\frac{1}{4}$ as great

13) An object is acted upon by a constant unbalanced force. Which graph *best* represents the motion of the object?

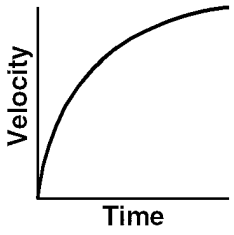
A) 

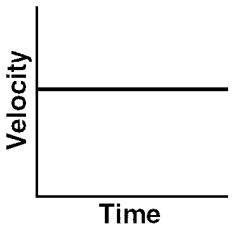
B) 

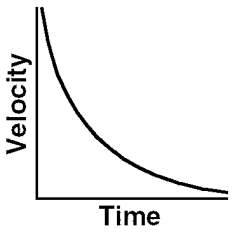
C) 

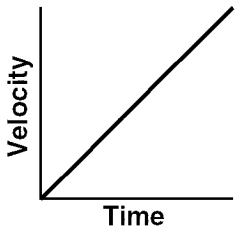
D) 

14) Which graph *best* represents the motion of a moving object with *no* unbalanced force acting on it?

A) 

B) 

C) 

D) 

1) B. accelerating downward

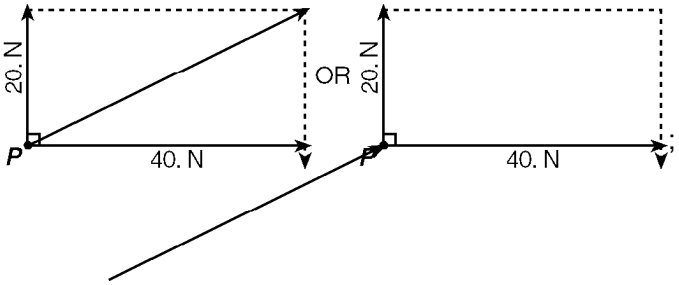
Physics, Ch 1 #203

2) D. accelerating upward

Physics, Ch 1 #204

3)

(a) 5 N/cm; (b)



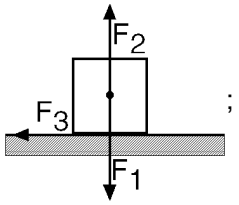
;

(c) 45 N; (d) 27°; (e) 4.5 N/kg

Physics, Ch 1 #205

4)

(a)



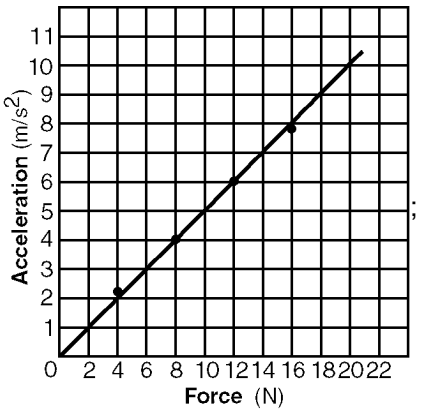
;

(b) $F = ma$, 2.4 N = $(\frac{20.}{9.8})a$, a = 1.2 m/s^2

Physics, Ch 1 #206

5)

(a-b)



;

(c) Applying Newton's second law ($F = ma$): $M = (F \div a)$, MA = (20.0 N) ÷ (10.0 m/s^2) = 2.0 kg

Physics, Ch 1 #207

6) B. 0 N

Physics, Ch 1 #208

7) A. inertia

Physics, Ch 1 #209

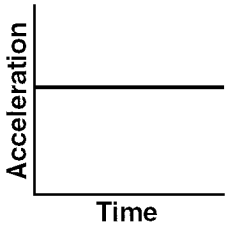
8) A. decrease
Physics, Ch 1 #210

9) D. doubled
Physics, Ch 1 #211

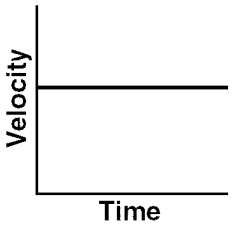
10) C. twice as great
Physics, Ch 1 #212

11) C. inertia
Physics, Ch 1 #213

12) A. 4 times as great
Physics, Ch 1 #214

13)
A.


Physics, Ch 1 #215

14)
B.


Physics, Ch 1 #216