

## Review Chapters 2, 3, 4, 5

4) The gain in speed each second for a freely-falling object is about

- A) 0.
- B) 5 m/s.
- C) 10 m/s.
- D) 20 m/s.
- E) depends on the initial speed

Answer: C

Diff: 1

Topic: Linear Motion

9) Whirl a rock at the end of a string and it follows a circular path. If the string breaks, the tendency of the rock is to

- A) continue to follow a circular path.
- B) follow a straight-line path.
- C) increase its speed
- D) revolve in a smaller circle

Answer: B

Diff: 1

Topic: Newton's 1st Law

10) A moving body must undergo a change in

- A) velocity.
- B) distance.
- C) position.
- D) direction.

Answer: A

Diff: 1

Topic: Newton's 1st Law

12) If no external forces are acting on a moving object it will

- A) continue moving at the same speed.
- B) continue moving at the same velocity.
- C) move slower and slower until it finally stops.

Answer: B

Diff: 1

Topic: Newton's 1st Law

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

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

Answer: B

Diff: 1

Topic: Linear Motion

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

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

Answer: A

Diff: 1

Topic: Linear Motion

7) While an object near the earth's surface is in free fall, its

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

Answer: A

Diff: 1

Topic: Linear Motion

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

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

Answer: A

Diff: 2

Topic: Newton's 1st Law

9) An object, at rest near the surface of a distant planet, starts to fall freely. If the acceleration there is twice that of the earth, its speed one second later would be

- A) 10 m/s.
- B) 20 m/s.
- C) 30 m/s.
- D) 40 m/s.

Answer: B

Diff: 1

Topic: Linear Motion

10) If an object falling freely were somehow equipped with an odometer to measure the distance it travels, then the amount of distance it travels each succeeding second would be

- A) constant.
- B) less and less each second.
- C) greater than the second before.

D) doubled.

Answer: C

Diff: 1

Topic: Linear Motion

12) If an object moves with constant acceleration, its velocity must

A) be constant also.

B) change by the same amount each second.

C) change by varying amounts depending on its speed.

D) always decrease.

Answer: B

Diff: 1

Topic: Linear Motion

13) A heavy object and a light object are dropped at the same time from rest in a vacuum. The heavier object reaches the ground

A) sooner than the lighter object.

B) at the same time as the lighter object.

C) later than the lighter object.

D) almost immediately

Answer: B

Diff: 1

Topic: Linear Motion

14) If a car increases its velocity from zero to 60 km/h in 10 seconds, its acceleration is

A) 3 km/h/s.

B) 6 km/h/s.

C) 10 km/h/s.

D) 60 km/h/s.

E) 600 km/h/s.

Answer: B

Diff: 1

Topic: Linear Motion

15) If a rocket initially at rest accelerates at a rate of 50 m/s<sup>2</sup> for one minute, its speed will be

A) 50 m/s.

B) 500 m/s.

C) 3000 m/s.

D) 3600 m/s.

Answer: C

Diff: 1

Topic: Linear Motion

16) Drop a rock from a 5-m height and it accelerates at 10 m/s<sup>2</sup> and strikes the ground 1 s later. Drop the same rock from a height of 2.5 m and its acceleration of fall is about

A) half as much.

B) the same amount.

C) twice as much.

D) four times as much.

Answer: B

Diff: 1

Topic: Linear Motion

19) If a car accelerates from rest at 2 meters per second per second, its speed 3 seconds later will be about

A) 2 m/s.

B) 3 m/s.

C) 4 m/s.

D) 6 m/s.

Answer: D

Diff: 2

Topic: Linear Motion

20) A ball is thrown upwards and returns to the same position. Compared with its original speed after release, its speed when it returns is about

A) half as much.

B) the same.

C) twice as much.

D) four times as much.

Answer: B

Diff: 2

Topic: Linear Motion

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

A) 0.

B) 5.

C) 8.

D) 24.

Answer: A

Diff: 2

Topic: Linear Motion

25) A ball is thrown upwards and caught when it comes back down. In the presence of air resistance, the speed with which it is caught is always

A) more than the speed it had when thrown upwards.

B) less than the speed it had when thrown upwards.

C) the same as the speed it had when thrown upwards.

D) impossible to determine.

Answer: B

Diff: 2

Topic: Linear Motion

26) Starting from rest, the distance a freely-falling object will fall in 0.5 second is about

A) 1 m.

B) 10 m.

C) 1.00 m.

D) none of the above

Answer: D

Diff: 2

Topic: Linear Motion

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

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

Answer: C

Diff: 2

Topic: Linear Motion

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

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

Answer: B

Diff: 2

Topic: Linear Motion

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

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

Answer: C

Diff: 2

Topic: Linear Motion

36) Consider drops of water that leak at a steady rate from a dripping faucet. As the drops fall they

- A) get closer together.
- B) get farther apart.
- C) remain at a relatively fixed distance from one another.

Answer: B

Diff: 2

Topic: Linear Motion

37) Disregarding air drag, how fast must you toss a ball straight up in order for it to take 2 seconds to return to the level from which you tossed it?

- A) 5 m/s
- B) 7.5 m/s
- C) 10 m/s
- D) 15 m/s
- E) 20 m/s

Answer: C

Diff: 2

Topic: Linear Motion

40) Ten seconds after starting from rest, a car is moving at 40 m/s. What is the car's acceleration in meters per second per second?

- A) 0.25
- B) 2.8
- C) 4.0
- D) 10
- E) 40

Answer: C

Diff: 3

Topic: Linear Motion

41) When a rock thrown straight upwards gets to the exact top of its path, its

- A) velocity is zero and its acceleration is zero.
- B) velocity is zero and its acceleration is about 10 meters per second per second.
- C) velocity is about 10 m/s and its acceleration is zero.
- D) velocity is about 10 m/s and its acceleration is about 10 meters per second per second.
- E) none of these

Answer: B

Diff: 3

Topic: Linear Motion

46) Someone standing at the edge of a cliff throws one ball straight up and another ball straight down at the same initial speed. Neglecting air resistance, the ball to hit the ground below the cliff with the greater speed will be

- A) the one thrown upward.
- B) the one thrown downward.
- C) neither  they will both hit with the same speed.

Answer: C

Diff: 3

Topic: Linear Motion

47) A ball is thrown upwards. Neglecting air resistance, what initial upward speed does the ball need to remain in the air for a total time of 10 seconds?

- A) about 50 m/s
- B) about 60 m/s
- C) about 80 m/s
- D) about 100 m/s
- E) about 110 m/s

Answer: A

Diff: 3

Topic: Linear Motion

48) A ball is thrown 125 meters upward and then falls the same distance back to Earth. Neglecting air resistance, its total time in the air is

- A) about 5 seconds.
- B) about 10 seconds.

C) about 15 seconds.  
D) more than 20 seconds.  
Answer: B  
Diff: 3  
Topic: Linear Motion

9) Strange as it may seem, it is just as hard to accelerate a car on a level surface on the moon as it is here on the Earth. This is because  
A) the mass of the car is independent of gravity.  
B) the weight of the car is independent of gravity.  
C) Nonsense! A car is much more easily accelerated on the moon than on the Earth.  
Answer: A  
Diff: 1  
Topic: Newton's 1st Law

10) A ride on a roller-coaster car containing 6 passengers takes 3 minutes. Neglecting friction, a similar ride with 12 passengers aboard would take  
A) 1.5 minutes.  
B) 3 minutes.  
C) 6 minutes.  
D) 18 minutes.  
Answer: B  
Diff: 2  
Topic: Newton's 1st Law

12) In which case would you have the largest mass of gold? If your chunk of gold weighed 1 N on the  
A) moon.  
B) Earth.  
C) planet Jupiter.  
Answer: A  
Diff: 3  
Topic: Newton's 2nd Law

16) A 10-kg brick and a 1-kg book are dropped in a vacuum. The force of gravity on the 10-kg brick is  
A) the same as the force on the 1-kg book.  
B) 10 times as much  
C) one-tenth as much.  
D) zero.  
Answer: B  
Diff: 1  
Topic: Newton's 2nd Law

17) An object is propelled along a straight-line path by a force. If the net force were doubled, the object's acceleration would be  
A) half as much.  
B) the same.  
C) twice as much.  
D) four times as much.  
E) none of these.

Answer: C  
Diff: 1  
Topic: Newton's 2nd Law

18) If an object's mass is decreasing while a constant force is applied to the object, the acceleration  
A) decreases.  
B) increases.  
C) remains the same.  
Answer: B  
Diff: 1  
Topic: Newton's 2nd Law

20) An object is pulled northward by a force of 10 N and at the same time another force of 15N pulls it southward. The magnitude of the resultant force on the object is  
A) 0 N.  
B) 5 N.  
C) 25 N.  
D) 150 N.  
Answer: B  
Diff: 1  
Topic: Newton's 2nd Law

21) The force of friction on a sliding object is 10 newtons. The applied force needed to maintain a constant velocity is  
A) more than 10 N.  
B) less than 10 N.  
C) 10 N.  
Answer: C  
Diff: 1  
Topic: Newton's 2nd Law

26) Which has zero acceleration? An object  
A) at rest.  
B) moving at constant velocity.  
C) in mechanical equilibrium.  
D) all of these  
E) none of these  
Answer: D  
Diff: 1  
Topic: Newton's 2nd Law

28) The maximum acceleration of a car while towing a second car twice its mass, compared to its acceleration with no car in tow, is  
A) one half.  
B) one third.  
C) one fourth.  
D) the same.  
E) none of these  
Answer: B  
Diff: 2  
Topic: Newton's 2nd Law

32) If a non-rotating object has no acceleration, then we can say for certain that it is

- A) at rest.
- B) moving at constant non-zero velocity.
- C) in mechanical equilibrium.
- D) all of these
- E) none of these

Answer: C

Diff: 2

Topic: Newton's 2nd Law

34) Hang from a pair of gym rings and the upward support forces of the rings will always

- A) each be half your weight.
- B) each be equal to your weight.
- C) add up to equal your weight.

Answer: C

Diff: 2

Topic: Newton's 2nd Law

36) A tow truck exerts a force of 3000 N on a car, accelerating it at 2 meters per second per second. What is the mass of the car?

- A) 500 kg
- B) 1000 kg
- C) 1500 kg
- D) 3000 kg
- E) none of these

Answer: C

Diff: 2

Topic: Newton's 2nd Law

38) If the mass of an object does not change, a constant net force on the object produces constant

- A) velocity.
- B) acceleration.
- C) both of these
- D) neither of these

Answer: B

Diff: 2

Topic: Newton's 2nd Law

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

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

Answer: C

Diff: 2

Topic: Newton's 2nd Law

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

- A) equal forces on each block.
- B) 10 times as much force on the heavier block.
- C) 10 squared or 100 times as much force on the heavier block.
- D) 1/10 as much force on the heavier block.
- E) none of these

Answer: B

Diff: 2

Topic: Newton's 2nd Law

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

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

Answer: C

Diff: 2

Topic: Newton's 2nd Law

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

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

Answer: C

Diff: 2

Topic: Newton's 2nd Law

70) If more horizontal force is applied to a sliding object than is needed to maintain a constant velocity,

- A) the object accelerates in the direction of the applied force.
- B) the object accelerates opposite the direction of the applied force.
- C) the friction force increases.
- D) two of the above
- E) none of the above

Answer: A

Diff: 2

Topic: Newton's 2nd Law

71) If less horizontal force is applied to a sliding object than is needed to maintain a constant velocity,

A) the object accelerates in the direction of the applied force.

B) the friction force increases.

C) the object eventually slides to a stop.

D) none of the above

Answer: C

Diff: 2

Topic: Newton's 2nd Law

73) When a falling object has reached its terminal velocity, its acceleration is

A) constant.

B) zero.

C)  $g$ .

Answer: B

Diff: 1

Topic: Falling

74) Two objects of the same size, but unequal weights are dropped from a tall tower. Taking air resistance into consideration, the object to hit the ground first will be the

A) lighter object.

B) heavier object.

C) Both hit at the same time.

D) not enough information

Answer: B

Diff: 1

Topic: Falling

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

A) 90 N.

B) 250 N.

C) 410 N.

D) 500 N.

E) none of these

Answer: D

Diff: 1

Topic: Falling

82) A skydiver steps from a helicopter and falls for a few seconds until he reaches his terminal velocity.

Thereafter, until he opens his parachute, his acceleration

A) is constant.

B) increases.

C) decreases.

D) is zero.

E) none of these

Answer: D

Diff: 2

Topic: Falling

85) A pair of tennis balls fall through the air from a tall building. One of them is filled with lead pellets. The ball to reach the ground first is the

A) regular ball.

B) lead-filled ball.

C) same for both.

Answer: B

Diff: 2

Topic: Falling

87) A ball is thrown vertically into the air. Because of air resistance, its time coming down compared to its time going up is

A) less.

B) the same.

C) more.

Answer: C

Diff: 3

Topic: Falling

1) Wherever there is an action force, there must be a reaction force which

A) always acts in the same direction.

B) is slightly smaller in magnitude than the action force.

C) is slightly larger in amplitude than the action force.

D) is exactly equal in magnitude.

Answer: D

Diff: 1

Topic: Newton's 3rd Law

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

A) player's grip on the glove.

B) force the glove exerts on the ball.

C) friction of the ground against the player's shoes.

D) muscular effort in the player's arms.

E) none of these

Answer: B

Diff: 1

Topic: Newton's 3rd Law

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

A) less than 1000 N.

B) more than 1000 N.

C) 1000 N.

D) impossible to determine.

Answer: C

Diff: 1

Topic: Newton's 3rd Law

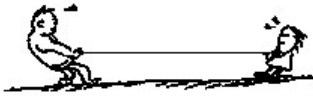


Figure 5-A

- 9) Arnold Strongman and Suzie Small each pull very hard on opposite ends of a massless rope in a tug-of-war. The greater force on the rope is exerted by
- A) Arnold, of course.
  - B) Suzie, surprisingly.
  - C) both the same, interestingly enough.

Answer: C

Diff: 1

Topic: Newton's 3rd Law

- 14) A Mack truck and a Volkswagen traveling at the same speed have a head-on collision. The vehicle that undergoes the greatest change in velocity will be the
- A) Volkswagen.
  - B) Mack truck.
  - C) same for both.

Answer: A

Diff: 2

Topic: Newton's 3rd Law

- 21) Two people, one twice as massive as the other, attempt a tug-of-war with 12 meters of massless rope on frictionless ice. After a brief time, they meet. The heavier person slides a distance of

A) 3 m.

B) 4 m.

C) 6 m.

D) 0 m.

Answer: B

Diff: 3

Topic: Newton's 3rd Law