

Test Bank for Conceptual Physics 13th Hewitt

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Conceptual Physics, 13e (Hewitt)**Chapter 2 Newton's First Law of Motion: Inertia****2.1 Multiple-Choice Questions**

1) The earliest and most influential Greek philosopher was Aristotle, who among many contributions taught that

- A) the four elements are earth, water, air, and fire.
- B) all motion is either natural or violent.
- C) violent motion requires a sustained push or pull.
- D) all of the above

Answer: D

Diff: 1

Topic: Aristotle on Motion

2) Science later greatly advanced when Galileo favored

- A) philosophical discussions over experiment.
- B) experiment over philosophical discussions.
- C) nonmathematical thinking.
- D) none of the above

Answer: B

Diff: 1

Topic: Aristotle on Motion

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3) The first scientist to be credited for postulating that Earth circled the Sun was

- A) Aristotle.
- B) Copernicus.
- C) Galileo.
- D) Newton.

Answer: B

Diff: 1

Topic: Aristotle on Motion

4) The first scientist to introduce the concept of inertia was

- A) Aristotle.
- B) Galileo.
- C) Newton.
- D) Copernicus.

Answer: B

Diff: 1

Topic: Galileo's Experiments

5) Inertia is defined as a

- A) force.
- B) property of matter.
- C) change in motion.
- D) none of the above

Answer: B

Diff: 1

Topic: Galileo's Experiments

6) Galileo's use of inclined planes allowed him to effectively

- A) slow down the ball's changes in speed.
- B) reduce the time of the ball's changes in speed.
- C) eliminate all changes in speed.
- D) eliminate friction.

Answer: A

Diff: 1

Topic: Galileo's Experiments

7) Galileo's interpretation of motion differed from Aristotle's in that Galileo emphasized

- A) the acceleration of free fall.
- B) rates of time.
- C) the role of distance in describing motion.
- D) none of the above

Answer: B

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Diff: 2

Topic: Galileo's Experiments

8) If no external forces act on a moving object, it will

- A) continue moving at the same speed.
- B) move slower and slower until it finally stops.
- C) come to an abrupt halt.
- D) none of the above

Answer: A

Diff: 1

Topic: Galileo's Experiments

9) Galileo taught us that if you roll a ball along a level surface it will

- A) soon slow down due to its natural place.
- B) keep rolling if friction is absent.
- C) roll as long as its inertia nudges it along.
- D) soon roll in the opposite direction.

Answer: B

Diff: 1

Topic: Galileo's Experiments

10) A hockey puck sliding across the ice finally comes to rest because

- A) it seeks its proper and natural state.
- B) of friction.
- C) that's just the way it is.

Answer: B

Diff: 1

Topic: Galileo's Experiments

11) 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) equal to its weight.
- B) equal to its weight divided by its mass.
- C) equal to its mass times its weight.
- D) none of the above

Answer: D

Diff: 1

Topic: Newton's First Law

12) The amount of force needed to sustain motion of a rock in outer space is

- A) a force equal to its weight.
- B) a force less than its weight if friction is absent.
- C) none of these

Answer: C

Diff: 1

Topic: Newton's First Law

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13) When no forces act on moving objects their paths are normally

- A) straight lines.
- B) circles.
- C) ellipses.
- D) all of the above

Answer: A

Diff: 1

Topic: Newton's First Law

14) If gravity between the Sun and Earth suddenly vanished, Earth would continue moving in

- A) a curved path.
- B) an outward spiral path.
- C) an inward spiral path.
- D) a straight-line path.

Answer: D

Diff: 1

Topic: Newton's First Law

15) 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) follow a circular path.
- B) slow down.
- C) follow a straight-line path.
- D) stop.

Answer: C

Diff: 1

Topic: Newton's First Law

16) Which concept is being illustrated when a tablecloth is quickly yanked beneath dishes resting on a table?

- A) equilibrium
- B) friction
- C) support force
- D) inertia

Answer: D

Diff: 1

Topic: Newton's First Law

17) When you flick a card from beneath a coin that hardly moves, you're illustrating

- A) inertia.
- B) equilibrium.
- C) support force.
- D) friction.

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Answer: A

Diff: 1

Topic: Newton's First Law

18) A sheet of paper can be quickly jerked beneath a container of milk without toppling, which best demonstrates

- A) net force.
- B) the difference between force and mass.
- C) inertia.

Answer: C

Diff: 1

Topic: Newton's First Law

19) A roller-coaster ride with 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: 3

Topic: Newton's First Law

20) A package falls off a truck that is moving at 30 m/s. Neglecting air resistance, the horizontal speed of the package just before it hits the ground is

- A) zero.
- B) less than 30 m/s but more than zero.
- C) about 30 m/s.
- D) more than 30 m/s.

Answer: C

Diff: 2

Topic: Newton's First Law

21) If your automobile runs out of fuel while driving, the engine stops. You don't come to an abrupt stop due to

- A) inertia.
- B) gravity.
- C) resistance.
- D) the principle of continuation.

Answer: A

Diff: 2

Topic: Newton's First Law

22) When a rocket ship gaining speed in outer space runs out of fuel, it

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

Answer: C

Diff: 2

Topic: Newton's First Law

23) A moving van with a stone lightly glued to the midpoint of its ceiling smoothly moves at constant velocity. When the glue gives way, the stone falls and hits the floor

- A) ahead of the midpoint of the ceiling.
- B) exactly below the midpoint of the ceiling.
- C) behind the midpoint of the ceiling.
- D) none of the above

Answer: B

Diff: 2

Topic: Newton's First Law

24) While you are standing in the aisle of a bus, the driver suddenly makes a left turn. You lurch to the right due to

- A) an unbalanced force.
- B) your tendency to keep moving forward.
- C) an equilibrium challenge.

Answer: B

Diff: 2

Topic: Newton's First Law

25) Due to inertia, perhaps a railroad train in motion should continue moving indefinitely when its engine is turned off. This is not observed because railroad trains

- A) aren't massive enough.
- B) are too heavy.
- C) ride on straight tracks.
- D) encounter opposing forces.

Answer: D

Diff: 2

Topic: Newton's First Law

26) Tension is actually a force that tends to

- A) stretch something.
- B) compress something.
- C) break something.
- D) balance something.

Answer: A

Diff: 1

Topic: Newton's First Law

27) Nellie pulls with a force of 50 N on a horizontal rope tied to a tree at rest. The net force on the rope is

- A) 50 N and rope tension is 0 N.
- B) 50 N and rope tension is also 50 N. [TBEXAM.COM](https://www.tbexam.com)
- C) zero and rope tension is 50 N.
- D) zero and rope tension is also zero.

Answer: C

Diff: 2

Topic: Newton's First Law

28) Two students engaged in a tug-of-war each pull a rope in opposite directions with a force of 400 N. The net force on the rope is

- A) zero and rope tension is 400 N.
- B) zero and rope tension is 800 N.
- C) 400 N and rope tension is 800 N.
- D) 400 N and rope tension is also 400 N.

Answer: A

Diff: 2

Topic: Newton's First Law

- 29) When you quickly jerk a cart forward that has a ball resting in the middle, the
- A) front of the cart hits the ball.
 - B) back of the cart hits the ball.
 - C) neither, for the ball rides along in the middle as the cart moves forward.
 - D) All of the above depending on how quickly the cart is pulled.

Answer: B

Diff: 2

Topic: Newton's First Law

- 30) A force is a vector quantity because it has both
- A) magnitude and direction.
 - B) mass and velocity.
 - C) action and reaction counterparts.
 - D) speed and direction.

Answer: A

Diff: 1

Topic: Net Force and Vectors

- 31) Which of the following is a vector quantity?

- A) area
- B) volume
- C) mass
- D) none of the above

Answer: D

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Diff: 2

Topic: Net Force and Vectors

- 32) A block pulled to the left with 15 N and to the right with 5 N at the same time experiences a net force of

- A) 5 N.
- B) 10 N.
- C) 15 N.
- D) 20 N.

Answer: B

Diff: 2

Topic: Net Force and Vectors

- 33) A tree stump is pulled northward by a 10-N force at the same time a 25-N force pulls it southward. The resultant force has a magnitude of

- A) 0 N.
- B) 15 N.
- C) 25 N.
- D) 150 N.

Answer: B

Diff: 2

Topic: Net Force and Vectors

34) When a pair of 10-N forces act on a box of candy, the net force on the box is

- A) zero.
- B) about 14 N.
- C) 20 N.
- D) Any of the above depending on the directions of forces.

Answer: D

Diff: 2

Topic: Net Force and Vectors

35) A pair of 10-N vectors at right angles to each other has a resultant of about

- A) 10 N.
- B) 14 N.
- C) 20 N.
- D) none of the above

Answer: B

Diff: 2

Topic: Net Force and Vectors

36) The resultant of a 40-N force at right angles to a 30-N force is

- A) 30 N.
- B) 40 N.
- C) 50 N.
- D) greater than 50 N.

Answer: C

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Diff: 2

Topic: Net Force and Vectors

37) When Nellie Newton hangs by the ends of a rope draped over a large pulley, the tension in each supporting vertical strand is

- A) half her weight.
- B) equal to her weight.
- C) twice her weight.
- D) none of the above

Answer: A

Diff: 2

Topic: Net Force and Vectors

38) If Nellie hangs from a horizontal bar that is supported by four vertical ropes, the tension in the ropes

- A) are each half her weight.
- B) are each equal to her weight.
- C) add to equal her weight.
- D) none of the above

Answer: C

Diff: 2

Topic: Net Force and Vectors

39) A parallelogram is a four-sided figure with opposite sides that are

- A) equal.
- B) parallel.
- C) at right angles.
- D) none of the above

Answer: B

Diff: 2

Topic: Net Force and Vectors

40) A pair of wires support a heavy painting. Tension in the wires is greater when they are

- A) vertical.
- B) not vertical.
- C) the same regardless of the wire orientation.
- D) none of the above

Answer: B

Diff: 3

Topic: Net Force and Vectors

41) Suspend your body from a pair of vertical ropes and the tension in each rope will be

- A) half your weight.
- B) equal to your weight.
- C) greater than your weight.
- D) none of the above

Answer: A

Diff: 2

Topic: Net Force and Vectors

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42) Suspend your body from a pair of ropes slightly angled from the vertical and the tension in each rope will be

- A) equal your weight.
- B) half your weight.
- C) greater than half your weight.
- D) none of these

Answer: C

Diff: 3

Topic: Net Force and Vectors

43) When Nellie Newton hangs at rest in the middle of a clothesline, tensions will be the same in each side of the rope when

- A) the lengths of each rope are the same.
- B) the angles for both sides of the rope are equal.
- C) she is in equilibrium.

Answer: B

Diff: 2

Topic: Net Force and Vectors

44) When Nellie Newton hangs at rest in the middle of a clothesline, the tension will *not* be the same in each side of the rope when

- A) the lengths of rope on each side are different.
- B) the angles at each side of the rope are unequal.
- C) she is in equilibrium.
- D) none of the above

Answer: B

Diff: 2

Topic: Net Force and Vectors

45) Monkey Mo hangs from the middle of a horizontal rope. Tension in the rope is greatest if the rope

- A) sags a lot.
- B) sags very little.
- C) sags or doesn't sag, for tension is the same in any case.
- D) none of the above

Answer: B

Diff: 2

Topic: Net Force and Vectors

46) Nellie hangs from a pair of ropes at an angle. Tension in the ropes depends on the

- A) length of the ropes.
- B) angle of the ropes.
- C) both of these
- D) neither of these

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Answer: B

Diff: 2

Topic: Net Force and Vectors

47) The net force on any object in equilibrium is

- A) zero.
- B) equal to its weight.
- C) less than its weight.
- D) non-zero when motion is involved.

Answer: A

Diff: 1

Topic: Equilibrium Rule

48) The equilibrium rule, $\Sigma F = 0$, applies to

- A) objects or systems at rest.
- B) objects or systems in uniform motion in a straight line.
- C) both of these
- D) neither of these

Answer: C

Diff: 2

Topic: Equilibrium Rule

- 49) The equilibrium rule applies to
 A) vector quantities.
 B) quantities that are equal in magnitude.
 C) scalar quantities.
 D) any kind of quantities.

Answer: A

Diff: 2

Topic: Equilibrium Rule

- 50) An object in mechanical equilibrium is an object
 A) moving with constant velocity.
 B) having no changes in velocity.
 C) at rest.
 D) all of the above

Answer: D

Diff: 2

Topic: Equilibrium Rule

- 51) When Burl and Paul stand on opposite ends of a sign-painting scaffold, the tensions in the supporting ropes

- A) are equal.
 B) depend on the relative weights of Burl and Paul.
 C) combine to equal zero.
 D) are in equilibrium.

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Answer: B

Diff: 2

Topic: Equilibrium Rule

- 52) If Burl carries Paul piggy-back while standing in the *middle* of a scaffold, the tensions in the two supporting ropes would

- A) cancel to zero.
 B) be equal.
 C) be in dynamic equilibrium.
 D) more easily support Burl and Paul.

Answer: B

Diff: 2

Topic: Equilibrium Rule

- 53) Burl and Paul paint signs together on a scaffold. Compared to their weights plus the weight of the scaffold, the sum of tensions in the supporting ropes is

- A) less.
 B) the same.
 C) greater.
 D) zero.

Answer: B

Diff: 1

Topic: Equilibrium Rule

54) Burl and Paul have a total weight of 1300 N. The tensions in the supporting ropes that support their scaffold add to 1700 N. The weight of the scaffold itself must be

- A) 300 N.
- B) 400 N.
- C) 500 N.
- D) 600 N.

Answer: B

Diff: 2

Topic: Equilibrium Rule

55) A hockey puck sliding at constant velocity across the ice is

- A) in equilibrium.
- B) nearly in equilibrium.
- C) is nowhere near being in equilibrium.
- D) none of the above

Answer: A

Diff: 1

Topic: Equilibrium Rule

56) The net force acting on an insect falling downward at constant velocity is

- A) zero.
- B) the weight of the insect.
- C) upward air resistance.
- D) none of the above

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Answer: A

Diff: 1

Topic: Equilibrium Rule

57) The force of friction on a sliding object is 10 N. 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: Equilibrium Rule

58) The minimum number of forces that act on a book resting on a table is

- A) 1.
- B) 2.
- C) 3.
- D) 4.
- E) none of the above

Answer: B

Diff: 1

Topic: Support Force

59) The support force on a 10-N book at rest on a table is

- A) slightly less than 10 N.
- B) 10 N.
- C) slightly greater than 10 N.
- D) dependent on the position of the book.

Answer: B

Diff: 1

Topic: Support Force

60) Jason weighs 150 N and sits on his big brother's shoulders. Big brother weighs 400 N. The support force supplied by the floor must be

- A) 150 N.
- B) 400 N.
- C) 550 N.
- D) more than 550 N.

Answer: C

Diff: 2

Topic: Support Force

61) The support force on a 30-kg dog sleeping on the floor is

- A) less than 300 N.
- B) about 300 N.
- C) more than 300 N.
- D) nonexistent while asleep.

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Answer: B

Diff: 2

Topic: Support Force

62) When you stand at rest on a pair of bathroom scales, the reading on each scale

- A) is half your weight.
- B) equals your weight.
- C) add up to equal your weight.

Answer: C

Diff: 2

Topic: Support Force

63) Weigh yourself on a weighing scale and the scale shows your normal weight. If you carefully stand on tiptoes, the scale reading will be

- A) slightly more.
- B) slightly less.
- C) about half as much.
- D) no different.

Answer: D

Diff: 2

Topic: Support Force

64) An 800-N man stands at rest on two bathroom scales so that his weight is distributed evenly over both scales. The reading on each scale is

- A) 200 N.
- B) 400 N.
- C) 800 N.
- D) 1600 N.
- E) none of the above

Answer: B

Diff: 2

Topic: Support Force

65) The force that causes Earth to orbit the Sun is due to gravity, while the force needed to keep Earth moving as it circles the Sun is

- A) inertia.
- B) due to gravity.
- C) due to both inertia and gravity.
- D) no force at all.

Answer: D

Diff: 2

Topic: The Moving Earth

66) If you toss a coin straight upward while in a train moving at constant velocity, the coin will land

- A) as if you were at rest.
- B) in front of you.
- C) in back of you.

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Answer: A

Diff: 2

Topic: The Moving Earth

67) If you toss a coin straight upward in train that gains speed while the coin is in the air, the coin will land

- A) as if you were at rest.
- B) in front of you.
- C) in back of you.

Answer: C

Diff: 2

Topic: The Moving Earth

68) If you toss a coin straight upward in train that slows while the coin is in the air, the coin will land

- A) as if you were at rest.
- B) in front of you.
- C) in back of you.

Answer: B

Diff: 2

Topic: The Moving Earth

69) A gymnast performing somersaults in a high-flying plane moving at constant velocity needs to make

- A) small adjustments to compensate for the airplane's velocity.
- B) major adjustments to compensate for the airplane's velocity.
- C) no adjustments.
- D) none of the above

Answer: C

Diff: 2

Topic: The Moving Earth

70) Earth continually moves about 30 km/s through space, which means the wall you stand next to also is moving at 30 km/s. When you jump vertically the wall doesn't slam into you because

- A) the speeds of you and Earth cancel out.
- B) you're moving horizontally just as fast as the wall.
- C) your upward motion is small compared with Earth's speed.
- D) motion of the Sun counteracts your motion.

Answer: B

Diff: 2

Topic: The Moving Earth

71) A bird sitting on the limb of a tree is moving about 30 km/s with respect to the Sun. If the bird takes 1 second to drop down to a worm below, the worm would be 30 km downrange from the bird when it reached the ground. This faulty reasoning is best countered with Newton's

- A) law of inertia.
- B) law of gravity.
- C) laws of motion.
- D) none of the above

Answer: A

Diff: 2

Topic: The Moving Earth