

## Force and Motion Test

### Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question. (1 point each)

- \_\_\_\_\_ 1. Your best guess of how an experiment might turn out is known as a
- answer
  - control
  - hypothesis (prediction)
- \_\_\_\_\_ 2. Why does an experiment need a control (what you don't change in an experiment)?
- Because someone needs to be in charge of the experiment.
  - Because if you change too many parts of the experiment, you won't know which one caused it to turn out the way it did.
  - Because an experiment always needs to give you the right answer.
- \_\_\_\_\_ 3. You are racing a cart down the hallway. If you go 10 meters in 5 seconds, what is your speed? (Remember speed equals distance divided by time.)
- 2 meters per second
  - 2 miles per hour
  - 50 meters per second
- \_\_\_\_\_ 4. Ms. Parks can run 50 yards in 10 seconds and Ms. Briscoe can run 100 yards in 20 seconds. Who has a faster speed? (Remember speed equals distance divided by time.)
- Ms. Parks has a faster speed.
  - Ms. Briscoe has a faster speed.
  - They both have the same speed.

*Speed equals distance divided by time. On the computer scroll down to see the question.*



- \_\_\_\_\_ 5. Which team went farther after 30 seconds? (Use the graph above.)
- a. Team Alpha.
  - b. Team Beta.
  - c. They both went the same distance.
- \_\_\_\_\_ 6. Which team started out faster? (Use the graph above.)
- a. Team Alpha
  - b. Team Beta
  - c. The both started out at the same speed.
- \_\_\_\_\_ 7. Which team went the same speed during the race? (Use the graph above.)
- a. Team Alpha
  - b. Team Alphabet Soup
  - c. Team Beta
- \_\_\_\_\_ 8. How far did Team Alpha go after 20 seconds? (Use the graph above.)
- a. 5 meters
  - b. 10 meters

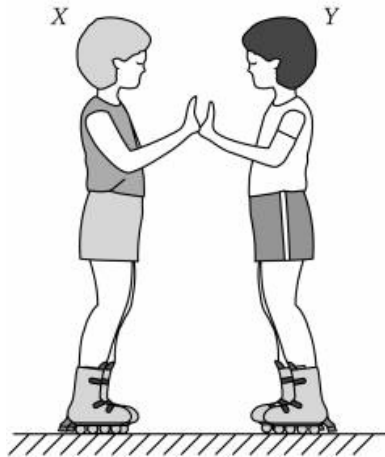
c. 11 meters

- \_\_\_ 9. The tendency of an object to resist change in its motion (not wanting to change its motion) is known as
- mass.
  - inertia.
  - force.
- \_\_\_ 10. A net force (an unbalanced force that changes motion) causes an object to
- stay at the same speed.
  - not move.
  - accelerate (speed up) or decelerate (slow down).
- \_\_\_ 11. Forces that are equal in size and opposite in direction are known as
- balanced forces
  - net forces
  - friction forces
- \_\_\_ 12. You are riding fast on a skateboard when your wheel suddenly gets stuck in a crack on the sidewalk. Why does your body go flying forward?
- there is a net force pushing you off your skateboard
  - your inertia keeps you moving forward
  - someone pushed you
- \_\_\_ 13. You just collected a huge bag of leaves in your yard, and you need to move it out to the curb. How could you get the bag to move faster?
- use more force (push harder)
  - take some leaves out to make it weigh less (make it lighter)
  - both of the above would work (both pushing harder and making it lighter)
- \_\_\_ 14. The force that pulls falling objects toward Earth is called
- gravity.
  - free fall.

c. acceleration.

- \_\_\_15. The force that one surface exerts on another when the two rub against each other is called
- friction.
  - acceleration.
  - inertia.
- \_\_\_16. Which of the following is an example of increasing friction intentionally?
- waxing skis
  - adding grease to gears on a bike
  - throwing sand on an icy driveway
- \_\_\_17. In science, a push or a pull is called a(n)
- force.
  - acceleration.
  - inertia.
- \_\_\_18. According to Newton's third law of motion, when a hammer strikes and exerts force on a nail, the nail
- creates a friction with the hammer.
  - disappears into the wood.
  - exerts an equal force back on the hammer.  
moves at a constant speed.
- \_\_\_19. Objects falling through air experience a type of friction called
- terminal velocity.
  - air resistance.
  - inertia.
- \_\_\_20. If you are launching a matchstick rocket, the action force is the rocket pushing the gases down. What is the reaction force?
- The table pushing the rocket down.
  - The gases pushing the rocket up.
  - The gases pushing the rocket down.

- \_\_\_21. Two boys wearing in-line skates are standing on a smooth surface with the palms of their hands touching and their arms bent, as shown above. If Boy X pushes by straightening his arms out while Boy Y holds his arms in the original position, what is the motion of the two boys?



- Boy X does not move and Boy Y moves backward.
  - Boy Y does not move and Boy X moves backward.
  - Boy X and Boy Y both move backward.
- The motion depends on how hard Boy X pushes.
- \_\_\_22. To keep a heavy box sliding across a carpeted floor at constant speed, a person must continually exert a force on the box. This force is used primarily to overcome which of the following forces?
- Air resistance
  - The weight of the box
  - The frictional force exerted by the floor on the box

### Completion

Complete each sentence or statement with a word from the word bank below. Answers will be counted wrong if they are misspelled! Each word will be used only once. (1 point each)

**bat**

**gravity**

**friction**

**net**

**air resistance**

23. How much one force overpowers the others on an object is called the \_\_\_\_\_ force.

24. If the action force is a bat hitting a ball, the reaction force would be the ball hitting the \_\_\_\_\_.
25. The downward force acting on an object in free fall is the force of \_\_\_\_\_.
26. A parachute allows a skydiver to fall more slowly because the parachute has more \_\_\_\_\_.
27. If you did an experiment where you shoved a little red cart across a rough carpet and across a smooth floor, the cart would not go as far on the rough carpet because the carpet has more \_\_\_\_\_.

**Short Answer**-Write complete sentences to answer each question. (5 points each)



28. Ms. Colucci is standing on the moon. She drops a hammer and a feather at the same time from the same height. Which will hit the ground first? Explain your reasoning.

## Force and Motion Test Answer Section

### MULTIPLE CHOICE

- |            |   |
|------------|---|
| 1. ANS: D  | STO: 8-I-B Design and conduct scientific investigations |
| 2. ANS: B  | STO: 8-I-B Design and conduct scientific investigations |
| 3. ANS: A  | STO: 6-II-D-1 Position and speed of an object           |
| 4. ANS: C  | STO: 6-II-D-1 Position and speed of an object           |
| 5. ANS: A  | STO: 6-II-D-2 Graph position and speed of an object     |
| 6. ANS: B  | STO: 6-II-D-2 Graph position and speed of an object     |
| 7. ANS: A  | STO: 6-II-D-2 Graph position and speed of an object     |
| 8. ANS: B  | STO: 6-II-D-2 Graph position and speed of an object     |
| 9. ANS: B  | STO: 6-II-D-3 Unbalanced forces change motion           |
| 10. ANS: C | STO: 6-II-D-3 Unbalanced forces change motion           |
| 11. ANS: A | STO: 6-II-D-3 Unbalanced forces change motion           |
| 12. ANS: B | STO: 6-II-D-3 Unbalanced forces change motion           |
| 13. ANS: C | STO: 6-II-D-3 Unbalanced forces change motion           |
| 14. ANS: A | STO: 6-II-E Variety of forces govern motion             |
| 15. ANS: A | STO: 6-II-E Variety of forces govern motion             |
| 16. ANS: C | STO: 6-II-E Variety of forces govern motion             |
| 17. ANS: A | STO: 6-II-E Variety of forces govern motion             |
| 18. ANS: C | STO: 6-II-E Variety of forces govern motion             |
| 19. ANS: B | STO: 6-II-E Variety of forces govern motion             |
| 20. ANS: B | STO: 6-II-E Variety of forces govern motion             |
| 21. ANS: C | STO: NAEP 6-II-E Variety of forces govern motion        |
| 22. ANS: C | STO: NAEP 6-II-E Variety of forces govern motion        |

### COMPLETION

23. ANS: net  
STO: 6-II-D-3 Unbalanced forces change motion
24. ANS: bat  
STO: 6-II-E Variety of forces govern motion
25. ANS: gravity  
STO: 6-II-E Variety of forces govern motion
26. ANS: air resistance  
STO: 6-II-E Variety of forces govern motion
27. ANS: friction  
STO: 6-II-E Variety of forces govern motion

## SHORT ANSWER

43. ANS:

Gravity pulls downward; air resistance pushes upward. Before the ball reaches terminal velocity, gravity is the net force accelerating the ball downward. As the ball accelerates, the force of air resistance increases. When the ball is at terminal velocity, gravity and air resistance are balanced forces, and the ball will not accelerate any more.

STO: 6-II-D-3 Unbalanced forces change motion

44. ANS:

The reaction force is the force of Mr. Walseth's foot on the ball.  
This causes the ball to stop.  
(I think he said "ouch!")

STO: 6-II-E Variety of forces govern motion

45. ANS:

They will both hit the ground at the same time, since there is no air resistance to slow them down. In the absence of air resistance, all objects fall at the same rate. (It is true that gravity pulls harder on a more massive object. However, a more massive object also has more inertia, so it will have more resistance to falling or any other change in its motion.)

STO: 6-II-E Variety of forces govern motion