

Force Test Review

1. Give two ways to increase acceleration.
You can increase acceleration by decreasing mass or increasing force.
2. Define weight.
The force of gravity on an object at the surface of a planet.
3. The greater the mass of an object the larger/greater its inertia.
4. Define inertia.
The tendency of an object to resist any change in its motion.
5. When two forces act in the same direction, you add the amount of the two forces together.
6. Forces can be added together only when they are acting on the same object.
7. Give three examples of exerting a force.
 - pushing a door open
 - pulling someone on a wagon
 - gravity pulling you to Earth
8. Define gravity.
The force that pulls objects toward each other.
9. A rocket lifting off is an example of Newton's Third Law.

10. State the four types of friction AND give an example of each.
Rolling friction - moving on roller skates, roller blades, a skateboard
Static friction - a person sitting on top of a hill NOT rolling down
Sliding friction - pressing the hand brakes on your bike to slow you down
Fluid friction - putting wax on you skis

11. Define free fall.
The motion of a falling object when the only force acting on it is gravity.
12. Define the law of conservation of momentum.
The rule that in the absence of outside forces the total momentum of objects that interact does not change.
13. momentum = mass × velocity
14. Give two examples of **increasing** friction.
 - rough up the surface
 - putting sand on ice
15. Define mass.
The amount of mater in an object.
16. Give two ways to increase momentum.
 - increase velocity
 - increase mass
17. The momentum of an object is in the same direction as its velocity.
18. Define satellite.
Any object that orbits around another object in space.
19. Define air resistance.
The fluid friction experienced by objects falling through the air.
20. When you kick a ball and exert a force on the ball, the ball exerts a force back on you.
21. Give two units for force.
 - $\text{kg} \cdot \text{m/s}^2$
 - N
22. True or False. Balanced forces never change the object's motion.
23. The total momentum of a group of objects is conserved unless acted on by an outside force.

24. What two factors does friction depend on?

- the surfaces
- how hard the surfaces are pressed together

25. What two factors does gravity depend on?

- mass
- distance between the objects

26. Define Newton's First Law of Motion.

Newton's First Law of Motion states that an object at rest will remain at rest, and an object in moving at a constant velocity will continue moving at a constant velocity, unless it is acted upon by an unbalanced force.

27. Define Newton's Second Law of Motion.

Newton's Second Law of Motion states that acceleration depends on the object's mass and on the net force acting on the object.

28. Define Newton's Third Law of Motion.

Newton's Third Law of Motion states that if one object exerts a force on another object, then the second object exerts a force of equal strength in the opposite direction on the first object.

29. A projectile follows a curved path, because it has forward and downward motion.

30. Explain the relationship between gravity and distance between the objects.

As the distance between two objects increases, the gravitational pull between them decreases.

31. Explain the relationship between mass and inertia.

The more mass an object has the more inertia it has.

32. Are action-reaction pairs balanced forces? Why or why not.

Action-reaction pairs are NOT balanced forces. This is because the forces act on different objects.

33. Give the formula to calculate force and the units for each factor involved.

$$F = m * a$$

F - force - N or kg*m/s²

m - mass - kg

a - acceleration - m/s²

34. Give the formula to calculate momentum and the units for each factor involved.

$$p = m * v$$

p - momentum - kg*m/s

m - mass - kg

v - velocity - m/s

35. A golf ball travels at 16 m/s, while a baseball moves at 7 m/s. The mass of the golf ball is 0.045 kg and the mass of the baseball is 0.14 kg. Which has a greater momentum?

Golf Ball

Formula: $p = m * v$

Work: $p = 0.045 \text{ kg} * 16 \text{ m/s}$

Answer with units: 0.72 kg*m/s

Baseball

Formula: $p = m * v$

Work: $p = 0.14 \text{ kg} * 7 \text{ m/s}$

Answer: 0.98 kg*m/s

36. What is the velocity of a bird who has a mass of 0.018 kg and a momentum of 0.27 kg*m/s?

Formula: $v = p/m$

Work: $v = \frac{0.27 \text{ kg*m/s}}{0.018 \text{ kg}}$

Answer with units: 15 m/s

37. What force is needed to accelerate a 25 kg cart at 14 m/s²?

Formula: $F = m * a$

Work: $F = 25 \text{ kg} * 14 \text{ m/s}^2$

Answer with units: $350 \text{ kg} * \text{m/s}^2$ or 350 N

38. What is the mass of a car that is accelerating at 5 m/s² from a force of 4,000 N?

Formula: $m = F/a$

Work: $m = \frac{4000 \text{ N}}{5 \text{ m/s}^2}$

Answer with units: 800 kg

39. You are sitting on a wagon and as your friend pulls the wagon forward you slide to the back. Use the term *inertia* to explain what happened.

When you are sitting at rest you want to remain at rest because your inertia is resisting any change in your motion, or lack of motion. As your friend applies a force to you by pulling the wagon you try to stay at rest and slide to the back of the wagon as it moves forward under you. You eventually move forward with the wagon because the force overcomes your inertia.

40. You are sitting still on the top of a hill. Your friend brings a scooter over and you sit on the scooter and roll down the hill. Explain the two types of friction involved in this situation.

When you are sitting on a hill and not moving that is an example of static friction. When you sit on the scooter and roll down the hill that is an example of rolling friction.

41. Compare the effects of gravity and air resistance on a falling skydiver before and after she opens her parachute.

The amount of gravity on the skydiver does not change before or after the parachute is opened. Before the parachute opens there is a small amount of air resistance acting on the skydiver, but once she opens her parachute and increases its surface area then there is much more air resistance acting on the parachute which slows the skydiver's motion.

42. Explain how to make two identical sheets of paper fall from a height of 3 meters at different rates. Why does this work?

Since both sheets of paper have the same amount of surface area and mass, gravity and air resistance will act on them in the same way. You must reduce the amount of surface area of one of the sheets of paper to make it have less air resistance and fall faster. You can reduce the amount of surface area by folding or crumpling up the paper. You could also drop one paper vertically and the other horizontally.

43. Draw a picture or sketch that shows action and reaction forces. Label the action and reaction forces in your picture.

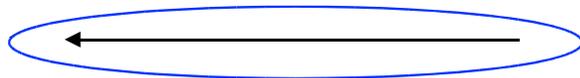
44. What does the head of an arrow showing force indicate?

The head of an arrow indicates the direction the force is applied.

45. What does the length of an arrow showing force represent?

The length of an arrow represents the amount of force.

46. Circle the arrow that shows more force.



47. Which way will the ball move? Why?

To the right because the arrow pointing right is longer and represents a greater force.

