*Name*_____
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Guided Reading Chapter 5: Forces

Section 5-1: The Nature of Force

1. In science, a force is a _____ or a _____.

2. When one object pushes or pulls another object, the first object is _____ a force on the second object.

3. Circle the letters of the two ways that forces are described.
   a. direction
   b. velocity
   c. strength
   d. acceleration

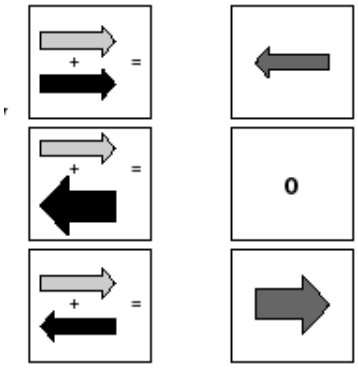
4. When two forces act in the same direction, they _____ together.

5. Adding a force acting in one direction to a force acting in another direction is the same as adding a(n) _____ number and a(n) _____ number.

6. Look at Figure 1 on page 143. What does the width of the arrows tell you about the forces they represent?

7. The overall force on an object after all the forces are added together is called the _____.

8. The illustrations to the right represent ways that two forces can combine. Draw lines from the left column to the right column to show the result of each combination.



9. Unbalance forces can cause an object to do three things. What are they?

10. Is the following sentence true or false? Unbalanced forces acting on an object will change the object's motion.

11. Circle the letter of each sentence that is true about unbalanced forces.
    a. When two forces act in opposite directions, the net force is the difference between the two forces.
    b. When two forces act in the same direction, the net force is the difference between the two forces.
    c. When two forces act in opposite directions, the net force is equal to the greater force.
    d. When two forces act in the same direction, the net force is the sum of the two individual forces.

12. Equal forces acting on one object in opposite directions are called _____.

13. Is the following sentence true or false? Balanced forces action on an object will change the object's motion.

14. When you add equal forces exerted in opposite directions, the net force is _____.

15. For an object to start moving, a(n) _____ has to act on it.

16. Is the following sentence true or false? Once an object is in its natural resting place, it cannot move by itself.

17. What is inertia?

18. What is Newton's first law of motion?

19. Newton's first law of motion is also called the law of _____.

20. What explains why you continue moving forward if you are in a car that suddenly stops?

21. What is mass?

22. What is the SI unit of mass?

23. The amount of inertia an object has depends on its _____.

24. How can mass be defined in terms of inertia?

Section 5-2: Force, Mass, and Acceleration

1. What is Newton's second law of motion?

2. What is the equation that describes the relationship among quantities of force, mass, and acceleration?

3. Circle the letters of the two answers below that are different names for the same unit of measure.
   a. m/s^2
   b. N
   c. $kg \cdot m/s^2$
   d. 1 kg

4. What equation for Newton's second law can you use to find acceleration?

5. How does an increase of force affect acceleration?

6. What are two ways you can increase the acceleration of an object?

7. How does an increase of mass affect acceleration?

8. Is the following sentence true or false? One way to increase the force used to pull a wagon is to decrease the mass in the wagon.

Section 5-3: Friction and Gravity

1. Is the following sentence true or false? When two surfaces rub, the irregularities of one surface get caught on those of the other surface.

2. What is friction?

3. Friction acts in a direction _____ to the object's direction of motion.

4. The strength of the force of friction depends on what two factors?

5. How is friction useful in helping you walk?

6. How does friction help an automobile move?

7. Complete the following table about the different kinds of friction.

Kinds of Friction	
Kind of Friction	**Friction Occurs When . . .**
	An object moves through a liquid or a gas
	Solid surfaces slide over each other
	An object rolls over a surface

8. Which kind of friction requires more force to overcome, rolling friction or sliding friction?

9. What kind of friction occurs when moving parts have ball bearings?

10. How does oil between machine parts reduce friction?

11. The force that pulls objects toward each other is called _____.

12. When is an object said to be in free fall?

13. Near the surface of Earth, what is the acceleration of an object due to the force of gravity?

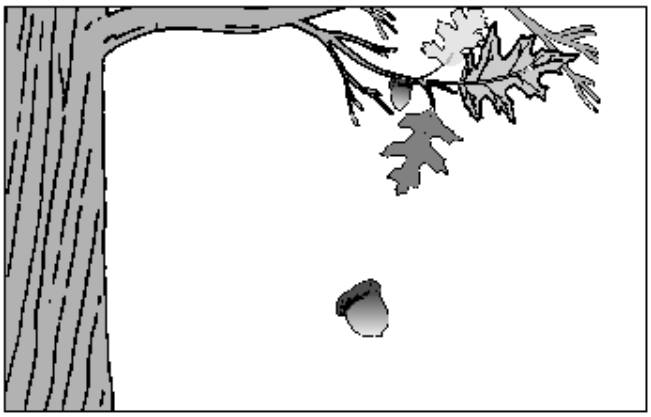
14. An object that is thrown is called a(n) _____.

15. Is the following sentence true or false? An object that is dropped will hit the ground before an object that is thrown horizontally.

16. Objects falling through air experience a type of fluid friction called _____.

17. Is the following sentence true or false? The greater the surface area of an object, the greater the air resistance.

18. On the diagram below, draw arrows that show the forces acting on the falling acorn. Label each arrow with the name of the force.



19. The greatest velocity a falling object reaches is called _____.

20. What is weight?

21. How is weight different than mass?

22. Weight is usually measured in _____.

23. Is the following sentence true or false? The force that makes an apple fall to the ground is the same force that keeps Earth orbiting the sun.

24. What does the universal law of gravitation state?

25. Is the following sentence true or false? On the moon, your mass would be less than it is on Earth, but your weight would be the same?

26. The force of attraction between two objects varies with what two factors?

Section 5-4: Action and Reaction

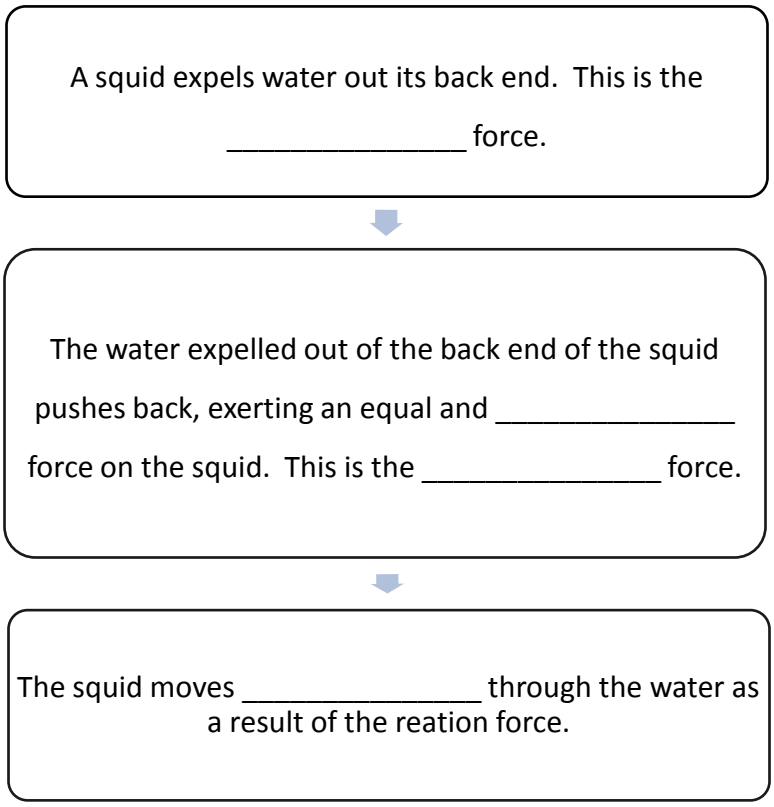
1. What is Newton's third law of motion?

2. What did Newton call the force exerted by the first object on a second object?

3. What did Newton call the force exerted by the second object back on the first object?

4. The action and reaction forces in any situation will always be _____ and _____.

5. Complete the flowchart below, which describes how a squid moves through water.



6. Explain why the equal action and reaction forces do not cancel each other when one person hits a ball.

7. The product of an object's mass and velocity is its _____.

8. What is the equation you use to determine the momentum of an object?

9. What is the unit of measurement for momentum?

10. What does the law of conservation of momentum state?

11. Suppose a train car moving down a track at 10 m/s hits another train car that is not moving. Explain how momentum is conserved after the collision.

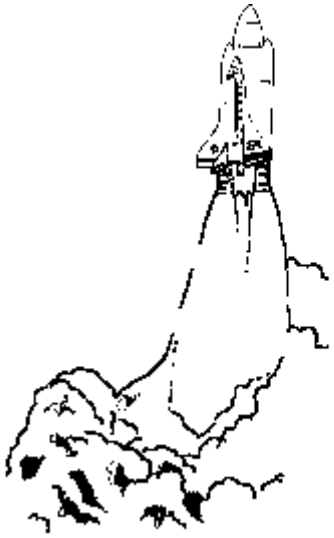
Section 5-5: Orbiting Satellites

1. Which of Newton's laws explains the lifting of a rocket into space?

2. When a rocket rises, what causes the action force?

3. When a rocket rises, what causes the reaction force?

4. On the diagram of a rocket lifting off the ground, draw and label arrows that show the action force and the reaction force.



5. When a rocket lifts off the ground, the net force is in an upward direction. Is the upward pushing force greater or lesser than the downward pull of gravity?

6. Any object that travels around another object in space is a(n) _____.

7. An object traveling in a circle is accelerating because it is constantly changing _____.

8. What is a force called that causes an object to move in a circle?

9. For a satellite, what is the centripetal force that causes it to move in a circle?

10. Is the following sentence true or false? Satellites in orbit around Earth continually fall toward Earth.

11. Explain why a satellite in orbit around Earth does not fall into Earth.

12. A satellite is a projectile that falls _____ Earth rather than into Earth.

13. Why doesn't a satellite need fuel to keep orbiting?

14. What force continually changes a satellite's direction?