Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 18: Forces Vocabulary**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a push or a pull that causes an object to move, stop, or change directions. P. 576

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a force that opposes (stops) motion. P. 577
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the attraction between objects and Earth. P. 578
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-the pull of all in the universe on one another. P. 578
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- having the property of attracting iron objects. P. 580
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the force produced by a magnet. P. 580
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- balanced forces are forces that act on each other, but cancel each other out. P. 584
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-forces that act on an object and don’t cancel; unbalanced forces cause a change in motion. P. 584
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the combination of all the forces acting on an object. P. 586
9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the upward force exerted on an object by water. P. 588
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the use of force to move an object through a distance. P. 592
11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a device that makes a task easier by changing the size and direction of a force on the direction over which the force acts. P. 594
12. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a bar that makes it easier to move things. P. 594
13. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the balance point on a lever that supports the arm, but does not move. P594
14. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a wheel with a rod, or axle in the center. P. 594
15. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a wheel with a rope on it that lets you change the direction in which you move an object. P. 595
16. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a ramp or other sloping surface. P. 595

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 18: Force Lesson 1: What Forces Affect Objects on Earth Every Day? P. 578-580**

**Strand:** 2.2.A.a. Identify the forces acting on a load and use a spring scale to measure the weight (resistance force) of the load.

**Strand:** 2.2.D.a. Describe how friction affects the amount of force needed to do work over different surfaces or through different media.

1. A force is a push or a pull that causes changes in motion. A force \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ things up, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ things down, or makes them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ directions. P. 576
2. Nothing changes its position, speed, or direction unless a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ acts on it. P. 576
3. Friction is a force that works against motion. Friction can make things \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_down or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 577
4. Friction is present when two surfaces touch. Friction is greater between two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ surfaces than it is between two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ surfaces. P. 577
5. By rubbing your hands together, friction can also create \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 577
6. Gravity is the attraction between you and Earth. Gravity \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ you to the floor is you fall out of a chair. If you drop a ball, it also \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it to the ground. P.578
7. Gravity causes falling objects speed up, or accelerate as they fall. The speed of any falling object is about \_\_\_\_\_\_\_ m/second (\_\_\_\_\_\_\_ ft/second) after the 1st second; \_\_\_\_\_\_\_ m/second (\_\_\_\_\_\_\_ ft/second) after the 2nd second; \_\_\_\_\_\_\_ m/second (\_\_\_\_\_\_\_ ft/second) after the 3rd second; and the pattern goes on. P. 578
8. All objects in the universe pull on one another. They are exerting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Gravitational force can be weak, or strong. It depends on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the masses of the objects, and how \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ apart they are. P. 578
9. There is a simple way to measure an objects gravitational force. This can be done by finding the object’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the measurement of gravitational force acting on an object. P. 579
10. Objects weigh more on Earth than they do the moon. Earth has more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the moon, therefore Earth pulls harder, so they weigh more. P. 579
11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (size) doesn’t change, so an astronaut’s mass will be the same on Earth and the moon. P. 579
12. An object that attracts iron is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 580
13. The force exerted by a magnet is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 580
14. A magnet is surrounded by a force called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 580
15. A magnet has two ends, called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 580
16. A magnet’s poles are often marked \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_. P. 580
17. If 2 magnets are held with both N poles together, or both S poles together, they will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ apart. P. 580

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 18: Force Lesson 2: What Are Balanced and Unbalanced Forces? P. 584-588**

**Strand:** 7.1.A.d.- Make suggestions for reasonable improvements or extensions of a fair test.

1. Forces that act on an object but cancel each other out are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 584

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can cause an object to start, stop, speed up, slow down, or change direction. P. 584
2. When two teams are playing tug of war and both teams are pulling with the same amount of force, this is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 585
3. On a seesaw, if the weight is greater on one end than it is on the other end, this is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 585
4. The combination of all forces acting on an object is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. To know how an object will move, you need to know the details of all of the forces. When forces are balanced (equal weights on each end of a seesaw), the net force is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. When the net force is zero, there is no change in motion. P. 587
5. The upward force, when lifting an object in water, is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Because it pushes up on the object, it seems to weigh less. P. 588

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 18: Force Lesson 3: What Is Work, and How Is It Measured? P. 592-596**

**Strand:** 2.2.F.a.- Explain how work can be done on an object (force applied and distance moved).

**Strand:** 2.2.F.b. - Identify the simple machines in common tolls and household items.

**Strand:** 2.2.F.c. - Compare the measures of effort force (measured using a spring scale to the nearest Newton) needed to lift a load with and without the use of simple machines.

**Strand:** 2.2.F.d.- Observe and explain that simple machines change the amount of effort force and/or direction of force.

1. Work is an everyday word, however, in Science it has a different definition. In science, work means to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 592
2. Work is measured in units called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The force used to lift and apple that weighs about 1 N is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of work. P. 593
3. A machine that is used to makes tasks easier by changing the strength or direction of force or the distance over which the force acts is known as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. P. 594
4. A\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a bar that makes is easier to move things. A lever has two parts; a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The lever arm moves, but the fulcrum doesn’t, it supports the arm. P. 594
5. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a wheel with a rod through the center of it. P. 594
6. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a wheel with a grove for a rope. It works by changing the direction of force. It allows you to lift things by pulling down on the rope rather than pushing up on the object. P. 495
7. An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a ramp that allows you to use less force over a distance to make work easier. P. 595
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are made up of two or more simple machines. They also make work easier. Examples of compound machines are push lawn mowers (the blade is a wedge and the wheels are wheel-and-axles), and hand operated can openers. P. 596

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 18: Force Study Guide**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is using a force to move an object through a distance.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the balance point of a lever.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is a machine that allows you to lift things by pulling down on a rope.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the combination of all the forces acting on an object.
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is forces acting on an object that are equal and opposite.
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is a force that works against motion.
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is a bar that moves against a fulcrum.
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- a ramp is an example of this.
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the force that Earth applies to objects near its surface.
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is a machine that makes work easier.
9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a can opener is an example of this because it is made up of 2 simple machines.
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is the upward force pushing an object up to the surface of water.
11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- is what makes a compass work.
12. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- (block and tackle) can be used to lift heavy objects such as a piano to a second story window.