Forces at Work

Compare how four forces act on everyday objects.

P.6.6.4 "Compare and contrast magnetic, electric, frictional, and gravitational forces."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one example of each of the four forces in the passage. Circle words that show whether objects must touch for each force to act.

A Classroom Force Test

1. At a classroom station, a student holds a magnet near a pile of steel paper clips. Several clips jump toward it without touching it first. Magnetic force can pull certain metals, including iron and steel, toward a magnet. Two magnets can also push apart when matching poles face each other. Across the table, a balloon rubbed on a sweater pulls tiny bits of tissue toward it without touching them. Rubbing gives the balloon an electric charge. Electric force can attract nearby objects, and two charged objects can attract or repel.

2. Next, a student lets one paper clip fall. Gravity pulls it toward Earth, even while the clip moves through the air. Gravity also pulls the balloon, the tissue, and the magnet downward. Unlike magnetic force, gravity acts on all of these objects, not just certain metals or magnets. Like the electric pull between the balloon and tissue, gravity can act without the two objects touching. Near Earth, gravity pulls objects toward the ground, but electric and magnetic forces may pull objects together or push them apart.

3. To clear the station, the student slides a book across the desk. Friction between the book and desk acts against the sliding and slows the book. Unlike gravity, magnetic force, and electric force in these examples, friction requires touching surfaces. Friction also helps the student's shoes grip the floor instead of slipping. Each of the four forces can change how something moves, but they do not act in the same way. Some pull, some can push, and friction resists sliding between surfaces that touch.

2 ANSWER WITH EVIDENCE

Use the passage

1. What do the magnet's pull on the clips and the balloon's pull on the tissue have in common? How are the sources of these forces different?

2. How are gravity and magnetic force alike in the passage? How do the objects they affect differ?

3. Compare gravity's effect on the falling clip with friction's effect on the sliding book. Which force requires touching surfaces?

4. How are electric and magnetic forces alike in what they can do? How do they differ from gravity near Earth?

3 YOUR TURN

Your own words

Choose an everyday object not named in the passage. In 3 or 4 sentences, describe how two of the four forces act on it in a new situation. Explain one similarity and one difference between the forces, including whether contact is needed.

ANSWER KEY # Forces at Work

PART 1 · READ AND MARK

Underline one example of each of the four forces in the passage. Circle words that show whether objects must touch for each force to act. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What do the magnet's pull on the clips and the balloon's pull on the tissue have in common? How are the sources of these forces different?	**Both pull objects without touching them. The magnet produces magnetic force, while the charged balloon produces electric force.**
2	How are gravity and magnetic force alike in the passage? How do the objects they affect differ?	**Both can pull without contact. Gravity pulls all the listed objects toward Earth, while the magnet pulls the steel clips and can act on certain metals.**
3	Compare gravity's effect on the falling clip with friction's effect on the sliding book. Which force requires touching surfaces?	**Gravity pulls the clip toward Earth without contact. Friction slows the sliding book and requires the book and desk to touch.**
4	How are electric and magnetic forces alike in what they can do? How do they differ from gravity near Earth?	**Electric and magnetic forces can pull objects together or push them apart. Near Earth, gravity pulls objects toward the ground.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A bicycle slows when its brakes press on its wheel. Friction between the brake pads and wheel acts against the wheel's motion, while gravity pulls the bicycle toward Earth. Both forces act on the bicycle, but friction requires touching surfaces and gravity acts without contact.

Accept accurate comparisons supported by the passage. For Your Turn, the student must use an object not named in the passage and correctly compare two forces, including contact.