

Forces Up Close

Read how one investigation reveals a force pattern.

4.7 "Force, motion, and energy. The student knows the nature of forces and the patterns of their interactions. The student is expected to plan and conduct descriptive investigations to explore the patterns of forces such as gravity, friction..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each force named in the passage. Circle each observation that shows what a force did to an object, so you can find the pattern.

Maya Tests a Magnet

- ① Maya planned a descriptive investigation about magnetism. She asked, "How does the distance between a bar magnet and a paper clip affect the paper clip?" She placed a ruler on her desk and set one paper clip at the zero mark. The magnet would not touch the clip. She kept the same magnet, clip, and tabletop for every trial.
- ② First, Maya held the magnet 10 centimeters from the clip and watched for movement. Then she moved it closer, one centimeter at a time. At 10 and 8 centimeters, the clip stayed still. At 6 centimeters, it slid toward the magnet. At 4 and 2 centimeters, it moved quickly and stuck to the magnet. She recorded each observation in a notebook.
- ③ Maya found a pattern: the clip moved only when the magnet was close enough, and it moved more strongly at closer distances. Magnetism acted at a distance because the magnet did not need to touch the clip to pull it. If Maya changed the paper clip or used a different magnet, she would need to make a new fair comparison. Gravity also pulls objects without touching them, while friction happens when surfaces touch.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What question was Maya trying to investigate?

2 Name two things Maya kept the same. What did she change during her trials?

3 Give two observations that support Maya’s pattern about distance and magnetism.

4 Which forces in the passage act at a distance, and which force happens through contact?

3 YOUR TURN _____ Your own words

Plan a three-trial investigation of friction with a toy car. Choose three surfaces, keep the car and push the same, and write what you will observe in each trial.

TRIAL	SURFACE YOU CHANGE	WHAT YOU KEEP THE SAME	WHAT YOU OBSERVE

PART 1 • READ AND MARK

Underline each force named in the passage. Circle each observation that shows what a force did to an object, so you can find the pattern. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What question was Maya trying to investigate?	She investigated how the distance between a bar magnet and a paper clip affects the paper clip.
2	Name two things Maya kept the same. What did she change during her trials?	She kept the same magnet, paper clip, and tabletop. She changed the distance between the magnet and the clip.
3	Give two observations that support Maya's pattern about distance and magnetism.	At 10 and 8 centimeters, the clip stayed still. At 4 and 2 centimeters, it moved quickly and stuck to the magnet. Also accept the 6-centimeter observation.
4	Which forces in the passage act at a distance, and which force happens through contact?	Magnetism and gravity act at a distance. Friction happens through contact between surfaces.

PART 3 • YOUR TURN (SAMPLE ANSWER)

TRIAL	SURFACE YOU CHANGE	WHAT YOU KEEP THE SAME	WHAT YOU OBSERVE
1	smooth tile	same toy car and same push	how far the car rolls
2	cardboard	same toy car and same push	how far the car rolls
3	carpet	same toy car and same push	how far the car rolls

Accept any safe, testable plan that changes one surface while holding the car and push constant. The observation should describe a relevant result, such as how far the car rolls or whether it slows quickly.