

Forces Across Space

Read how electric charges can pull or push without touching.

SC.5.P.10.3 "Investigate and explain that an electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that describes attraction or repulsion, and circle the words *uncharged*, *same*, and *opposite* to track why the objects move.

Maya Tests Electric Forces

- ① During a lunch cleanup, Maya rubbed a plastic ruler with a wool sleeve. The rubbing moved tiny electric charges, so the ruler became charged. When she held it near small, uncharged paper bits, the bits slid toward the ruler before it touched them. Charges inside each paper bit shifted slightly. The nearer side became attracted to the ruler, pulling the neutral paper closer.
- ② Maya then rubbed two balloons with wool and hung them on strings. Both balloons received the same kind of charge from the rubbing. As Maya moved one balloon close to the other, the balloons pushed apart without touching. Objects with the same kind of charge repel. This push is an electric force that acts across the space between the balloons.
- ③ Next, Maya brought a positively charged strip near a second strip that had a negative charge. The strips moved together even though a gap remained between them. Objects with opposite charges attract. Her tests showed two important patterns: a charged object can attract an uncharged object, and charged objects can attract or repel. Whether charged objects attract or repel depends on their charge types.

2 ANSWER WITH EVIDENCE Use the passage

1 What did the uncharged paper bits do when Maya held the charged ruler near them? Why did they move?

2 What observation showed that the charged ruler attracted the paper bits without contact?

3 What happened when Maya moved the two balloons with the same kind of charge near each other? What rule does this show?

4 How did the positively charged strip and the negatively charged strip move? What charge relationship caused this movement?

3 YOUR TURN Your own words

Make a three-panel sketch that shows electric forces without contact. In Panel 1, show a charged object attracting an uncharged object. In Panel 2, show two objects with the same charge repelling. In Panel 3, show two objects with opposite charges attracting. Use arrows to show movement and write a label for each panel.

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PART 1 • READ AND MARK

Underline each sentence that describes attraction or repulsion, and circle the words *uncharged*, *same*, and *opposite* to track why the objects move. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What did the uncharged paper bits do when Maya held the charged ruler near them? Why did they move?	The paper bits slid toward the ruler before it touched them. Charges in the paper shifted, and the nearer side was attracted to the ruler.
2	What observation showed that the charged ruler attracted the paper bits without contact?	The paper bits moved toward the ruler before it touched them.
3	What happened when Maya moved the two balloons with the same kind of charge near each other? What rule does this show?	The balloons pushed apart without touching. Objects with the same kind of charge repel.
4	How did the positively charged strip and the negatively charged strip move? What charge relationship caused this movement?	The strips moved together even though a gap remained. Opposite charges attract.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1 shows a charged ruler and an uncharged foil ball, with arrows pointing toward each other. Label: Charged objects can attract uncharged objects. Panel 2 shows two negatively charged balls, with arrows pointing away from each other. Label: Same charges repel. Panel 3 shows a positive ball and a negative ball, with arrows pointing toward each other. Label: Opposite charges attract.

Accept equivalent descriptions of movement as long as students identify attraction or repulsion and correctly connect it to uncharged, same-charge, or opposite-charge objects. In the sketch, accept any objects and charge symbols that clearly show no contact and correct arrow directions.