

Wire Field Detectives

Use compass evidence to trace the magnetic field around a current-carrying wire.

5.4.e "a current flowing through a wire creates a magnetic field."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that tells what electric current does to the space around a wire or to a compass needle. This will help you trace the evidence that current creates a magnetic field.

A Compass Near a Wire

- ① When Maya placed a compass near a straight wire, the compass needle pointed north. Then she connected the wire to a battery so electric current could flow. The needle turned away from north. Nothing touched the compass. The change showed that something around the wire was affecting the needle. That something was a magnetic field created by the moving electric charges in the wire.
- ② A magnetic field is an area where magnetic forces can act. A wire with current has a magnetic field around it, even though people cannot see the field directly. A compass helps detect it because its needle is a tiny magnet. When current flows, the wire's field pushes or pulls on the compass needle, causing the needle to change direction.
- ③ Scientists can change this field by changing the current. If the battery connections are switched, current travels through the wire in the opposite direction. The magnetic field also reverses, so a nearby compass needle turns the other way. More current can make the field stronger. Coiling the wire can make a stronger field too. A coil with current is used in devices such as electric bells and some door locks.

2 ANSWER WITH EVIDENCE Use the passage

1 What happened to Maya's compass needle when current began to flow through the wire?

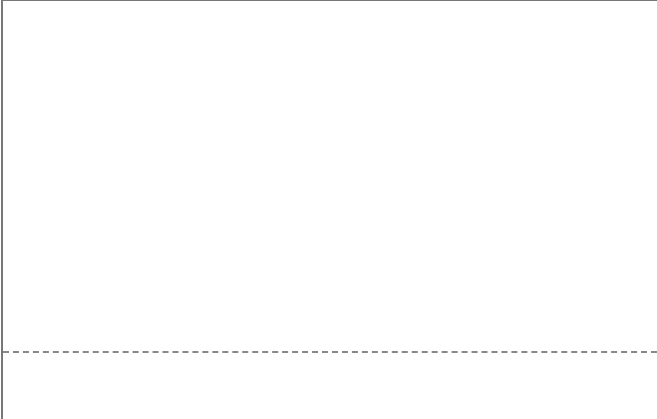
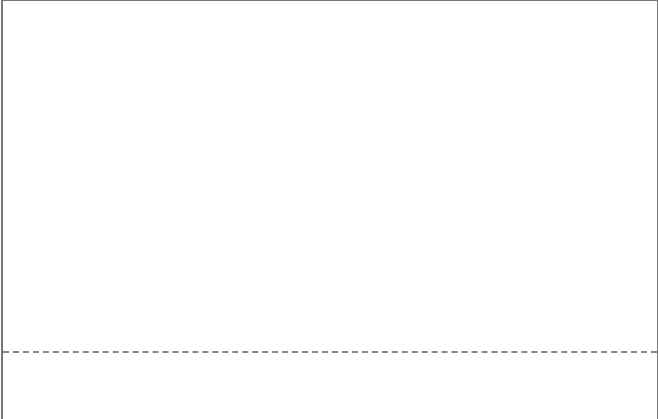
2 What does the compass needle's movement show about the space around the wire?

3 Why can a compass help detect the magnetic field around a wire with current?

4 If the battery connections are switched, what happens to the magnetic field and a nearby compass needle?

3 YOUR TURN Your own words

Draw a two-panel sketch of a wire, battery, and nearby compass. In Panel 1, show current flowing in one direction. In Panel 2, reverse the battery and show the opposite current direction and the compass needle turning the other way. Write one sentence explaining the change.

	
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PART 1 • READ AND MARK

Underline each sentence that tells what electric current does to the space around a wire or to a compass needle. This will help you trace the evidence that current creates a magnetic field. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What happened to Maya's compass needle when current began to flow through the wire?	It turned away from north.
2	What does the compass needle's movement show about the space around the wire?	It shows that a magnetic field around the wire was affecting the compass needle.
3	Why can a compass help detect the magnetic field around a wire with current?	A compass needle is a tiny magnet, so the wire's magnetic field can push or pull it.
4	If the battery connections are switched, what happens to the magnetic field and a nearby compass needle?	The magnetic field reverses, and the compass needle turns the other way.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: A battery sends current through a wire in one direction, and the nearby compass needle points one way. Panel 2: The battery is reversed, current moves in the opposite direction, and the compass needle points the opposite way. Reversing the current reverses the wire's magnetic field, so the compass needle turns the other way.

Accept descriptions that connect current in a wire to a magnetic field and compass movement. In the open task, accept any clear sketch with opposite current directions and opposite compass needle directions.