Use the passage below to answer questions 8–9.

A wire 25 cm long carries a 12 A current from east to west. Earth's magnetic field at the wire's location has a magnitude of 4.8×10^{-5} T and is directed from south to north.

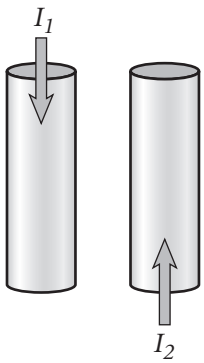
8. What is the magnitude of the magnetic force on the wire?

F. 2.3×10^{-5} N
G. 1.4×10^{-4} N
H. 2.3×10^{-3} N
J. 1.4×10^{-2} N

9. What is the direction of the magnetic force on the wire?

A. north
B. south
C. up, away from Earth
D. down, toward Earth

Use the diagram below to answer questions 10–12.



Wire 1 carries current I_1 and creates magnetic field B_1. Wire 2 carries current I_2 and creates magnetic field B_2.

10. What is the direction of the magnetic field B_1 at the location of wire 2?

F. to the left
G. to the right
H. into the page
J. out of the page

11. What is the direction of the force on wire 2 as a result of B_1?

A. to the left
B. to the right
C. into the page
D. out of the page

12. What is the magnitude of the magnetic force on wire 2?

F. $B_1 I_1 \ell_1$
G. $B_1 I_1 \ell_2$
H. $B_1 I_2 \ell_2$
J. $B_2 I_2 \ell_2$

SHORT RESPONSE

13. Sketch the magnetic field lines around a bar magnet.

14. Describe how to use the right-hand rule to determine the direction of a magnetic field around a current-carrying wire.

15. Draw a diagram showing the path of a positively charged particle moving in the plane of a piece of paper if a uniform magnetic field is coming out of the page.

EXTENDED RESPONSE

16. A proton ($q = 1.6 \times 10^{-19}$ C; $m = 1.7 \times 10^{-27}$ kg) is in a uniform 0.25 T magnetic field. The proton moves in a clockwise circle with a tangential speed of 2.8×10^{5} m/s.

a. What is the direction of the magnetic field? Explain how you determined this.
b. What is the radius of the circle? Show your work.

Test TIP If you are asked to write out an answer, to show your calculations, or to draw a diagram, be sure to write clearly, to show all steps of your work, and to add clear labels to your diagrams. You may receive some credit for using the right approach to a problem, even if you do not arrive at the correct final answer.