

# Guided Exploration: AR Model of a Current Carrying Wire

Group ID:		Date:	
Student Name			
Members present			

## Objective

To use an Augmented Reality (AR) long straight wire simulation to explore the magnetic field lines around a current-carrying wire.

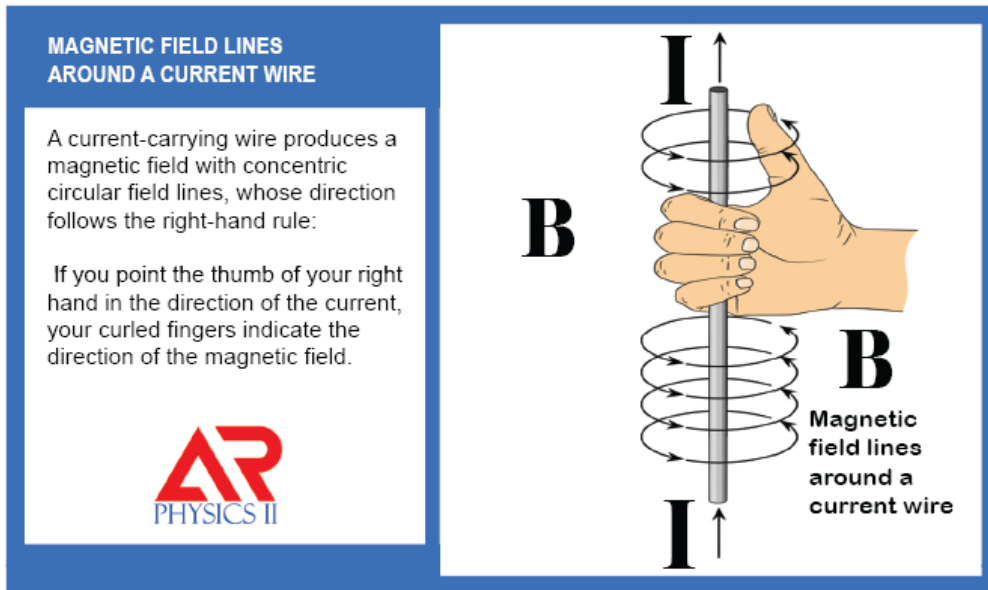


Figure 1: AR marker showing the magnetic field pattern around a current-carrying wire

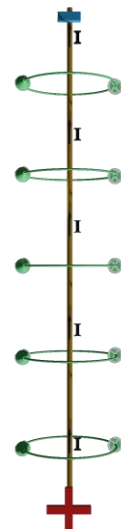
## Part A: Getting Started with the AR long current wire

### 1. Launching the Model

- Open the AR app.
- Scan the above marker
- Move around to view the model from multiple angles.

### 2. What you should see

- A long, straight current-carrying wire with the direction of current clearly indicated
- Magnetic field lines encircling the wire



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## Part B: Guided Exploration and discussions

### 3. Properties of the Magnetic Field Lines

- Observe the wire from multiple viewing angles
  - Examine the direction of rotation of the magnetic field lines relative to the current flow
  - When observing the wire from above on the negative side of the wire, in which direction do the magnetic field lines rotate (clockwise or counterclockwise)?
  - When observing the wire from below on the positive side of the wire, in which direction do the magnetic field lines rotate (clockwise or counterclockwise)?
  - Pay attention to the cross (×) and dot (•) notations on the arrowheads
  - Which rule explains the relationship between the direction of current flow and the magnetic field?
- 

### Think Pair Share

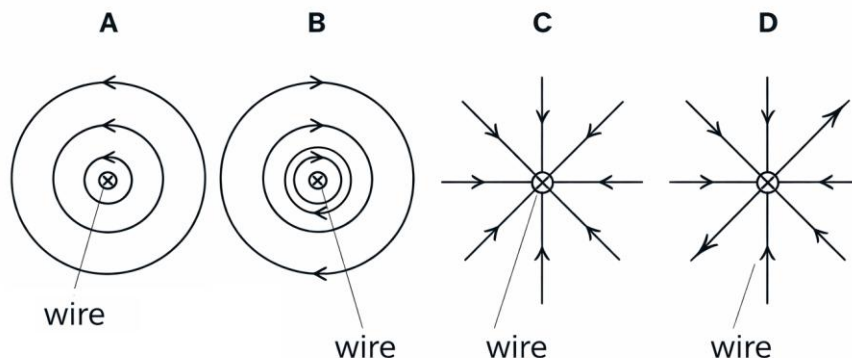
*While observing the AR model, imagine gripping the wire with your right hand. Point your thumb in the direction of the current and notice how your fingers naturally curl. What does the direction of your curled fingers tell you about the magnetic field around the wire?*

*Discuss your observations with a partner. Compare how each of you applied the right-hand rule and whether the direction of the magnetic field matches what you see in the AR model*

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## Part C: Applying Knowledge (Near & Far Transfer)

- 1) What is the shape of the magnetic field produced by a long, straight current-carrying wire?
  - a) Straight lines parallel to the wire
  - b) Radial lines pointing outward from the wire
  - c) Concentric circles centered on the wire
  - d) Random closed loop
- 2) Which rule is used to determine the direction of the magnetic field around a current-carrying wire?
  - a) Fleming's left-hand rule
  - b) Fleming's right-hand rule
  - c) Right-hand grip rule
  - d) Lenz's law
- 3) According to the right-hand rule, which finger/(s) points in the direction of the magnetic field around a straight wire?
  - a) Thumb
  - b) Index finger
  - c) Middle finger
  - d) The four curled fingers excluding the thumb
- 4) If the current in a straight wire flow upward, what is the direction of the magnetic field when viewed from above?
  - a) Clockwise
  - b) Counterclockwise
  - c) Upward
  - d) Downward
- 5) In the following figure, which one of the drawings correctly represent the magnetic field lines around a current carrying wire



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6) What happens to the direction of the magnetic field if the direction of the current is reversed?

- a) It remains the same
- b) It disappears
- c) It becomes stronger
- d) It reverses direction

7) In magnetic field diagrams, what does a cross (×) represent?

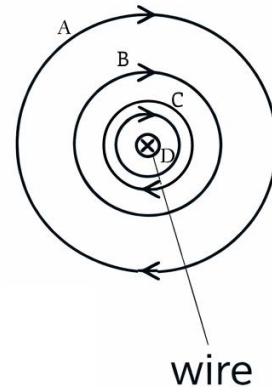
- a. Field or current directed out of the page
- b. Field or current directed into the page
- c. Current flowing upward
- d. No magnetic field

8) How does the strength of the magnetic field change as the distance from the wire increases?

- a. It increases
- b. It remains constant
- c. It decreases
- d. It becomes zero immediately

9) Which location has the highest magnetic field vector strength

- a) A
- b) B
- c) C
- d) D



10) When observing a current-carrying wire from the negative side of an axis, what determines whether the magnetic field appears clockwise or counterclockwise?

- a. The thickness of the wire
- b. The strength of the current
- c. The direction of current flow
- d. The length of the wire