Guided Exploration: AR Model of a Current Carrying Loop

Group ID:		Date:
Student Name		
Members present		

Objective

To explore and visualize the magnetic field lines around a current-carrying loop using an Augmented Reality (AR) simulation.

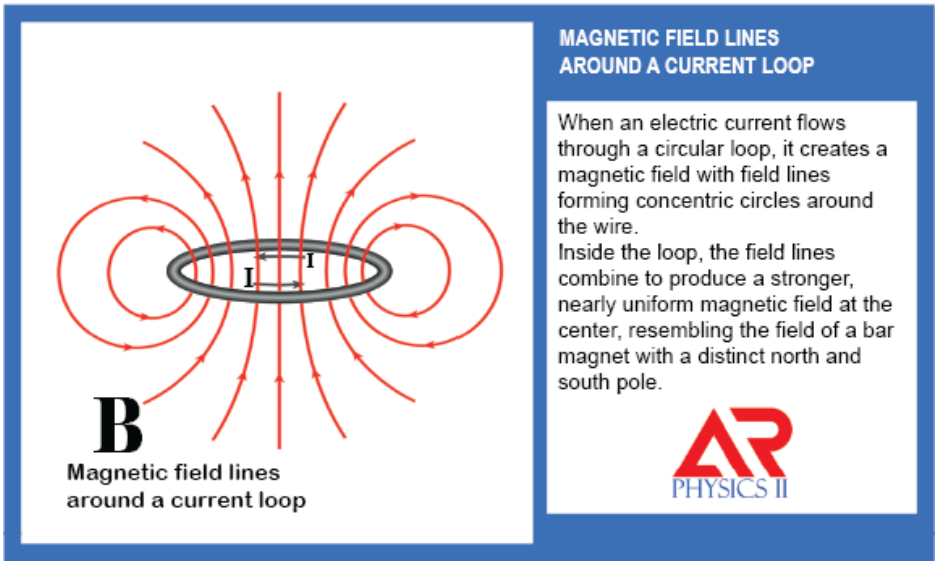
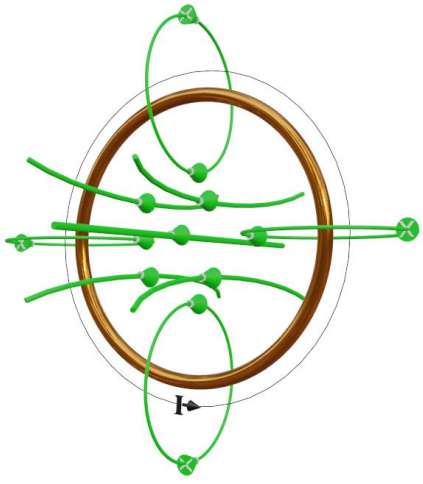


Figure 1: AR marker showing the magnetic field pattern around a current-carrying loop

Part A: Getting Started with the AR Current Loop

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 current-carrying wire loop with the direction of current clearly indicated
   - Magnetic field lines around the loop and through the center of the loop

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Part B: Guided Exploration and discussions

3. Properties of the Magnetic Field Lines

- ☐ Observe the current carrying loop from multiple viewing angles
- ☐ Examine the direction of the magnetic field lines relative to the current flow
- ☐ When you are facing the loop and the current flows counterclockwise, in which direction do the magnetic field lines point inside the loop—toward you or away from you?
- ☐ When you are facing the loop and the current flows clockwise, in which direction do the magnetic field lines point inside the loop—toward you or away from you?
- ☐ 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 loop with your right hand and pointing your thumb in the direction of the current as you move along the loop. Notice the direction in which your fingers naturally curl. What does the direction of your curled fingers indicate about the magnetic field around the loop?
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)

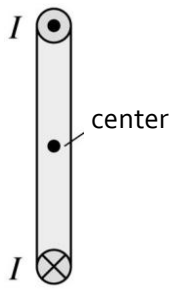
1) Which rule is used to determine the direction of the magnetic field around a current-carrying wire loop?
    a) Fleming's left-hand rule
    b) Fleming's right-hand rule
    c) Right-hand grip rule
    d) Lenz's law

2) According to the right-hand rule, which finger/(s) points in the direction of the magnetic field around a wire loop?
    a) Thumb
    b) Index finger
    c) Middle finger
    d) The four curled fingers excluding the thumb

3) When viewed face-on, if the current in a loop flows counterclockwise, what is the direction of the magnetic field at the center of the loop?
    a) Into the page
    b) Out of the page
    c) Tangent to the loop
    d) Radially outward

4) The magnetic field pattern of a current-carrying loop is most similar to which object?
    a) A straight wire
    b) A charged ring
    c) A bar magnet
    d) A solenoid

5) The diagram shows a current carrying loop viewed edge-on. What is the direction of the magnetic field at a point in the center of the loop?
    a) To the left
    b) Up
    c) To the right
    d) Down

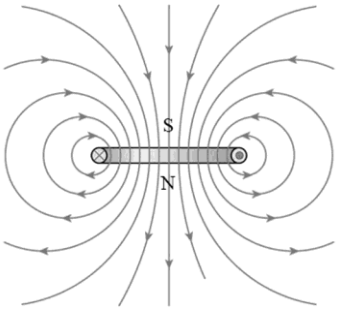


6) What happens to the magnetic field direction inside the loop if the direction of the current is reversed?
   a) It remains unchanged
   b) It becomes weaker
   c) It reverses direction
   d) It disappears

7) The diagram shows a current carrying loop viewed edge-on. What is the direction of the magnetic field at a point in the center of the loop?
   a) To the left
   b) Up
   c) To the right
   d) Down

8) When viewed face-on, if the current in a loop flows clockwise, what is the direction of the magnetic field outside the loop?
   a) Into the page
   b) Out of the page
   c) Tangent to the loop
   d) Radially outward

9) A diagram shows a current-carrying loop. The magnetic field lines inside the loop are drawn close together, while those outside are more spread out. What does the spacing of the field lines indicate?
   a) Direction of current
   b) Direction of force
   c) Strength of the magnetic field
   d) Shape of the wire



10) When Where is the magnetic field strongest in a current-carrying loop?
   a) Far from the loop
   b) At the center of the loop
   c) Outside the loop on the sides
   d) At random points