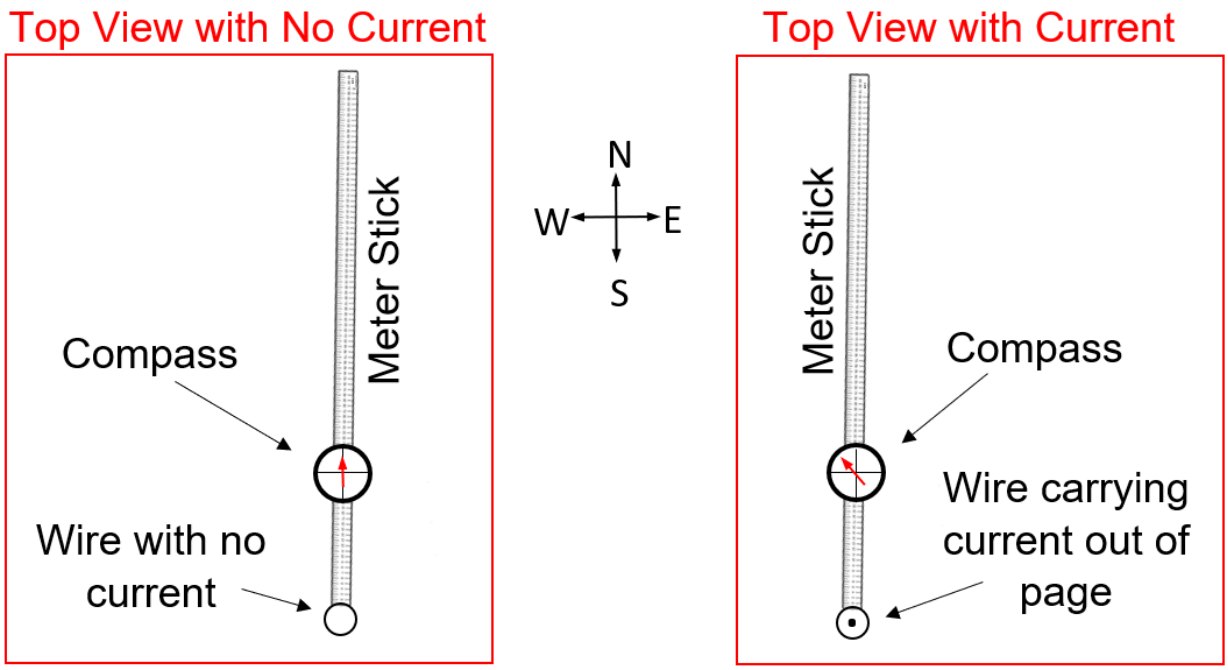
Activity 1: Planning an Investigation

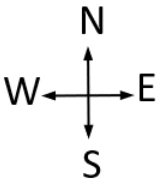
Experiment Design: Students were investigating if electric current in a wire creates a magnetic field around the wire. They conducted an experiment in which they first had no current in a wire and then later passed current through that same wire. To detect the presence of a magnetic field, they used a compass. Students decided place their compass on a meter stick that extended from the wire in the northward direction as shown.

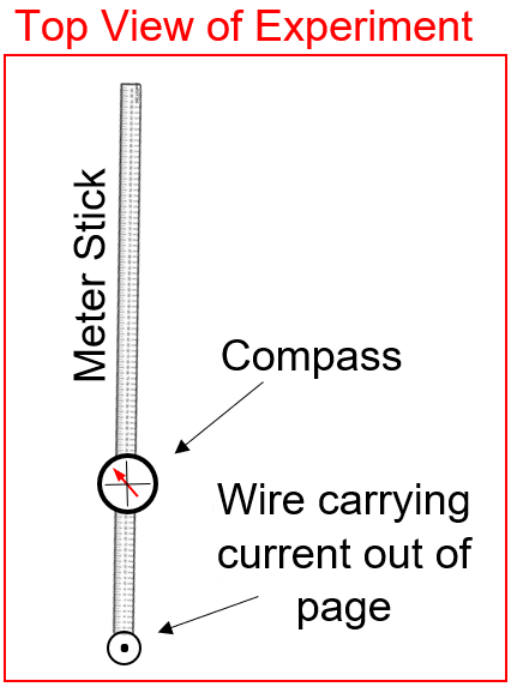
Observation: When no current was in the wire, the compass needle pointed north (0°) due to the earth's magnetic field. When they passed current through the wire, the compass needle now pointed at 30° west of north.



Activity 2: Collecting and Analyzing Data

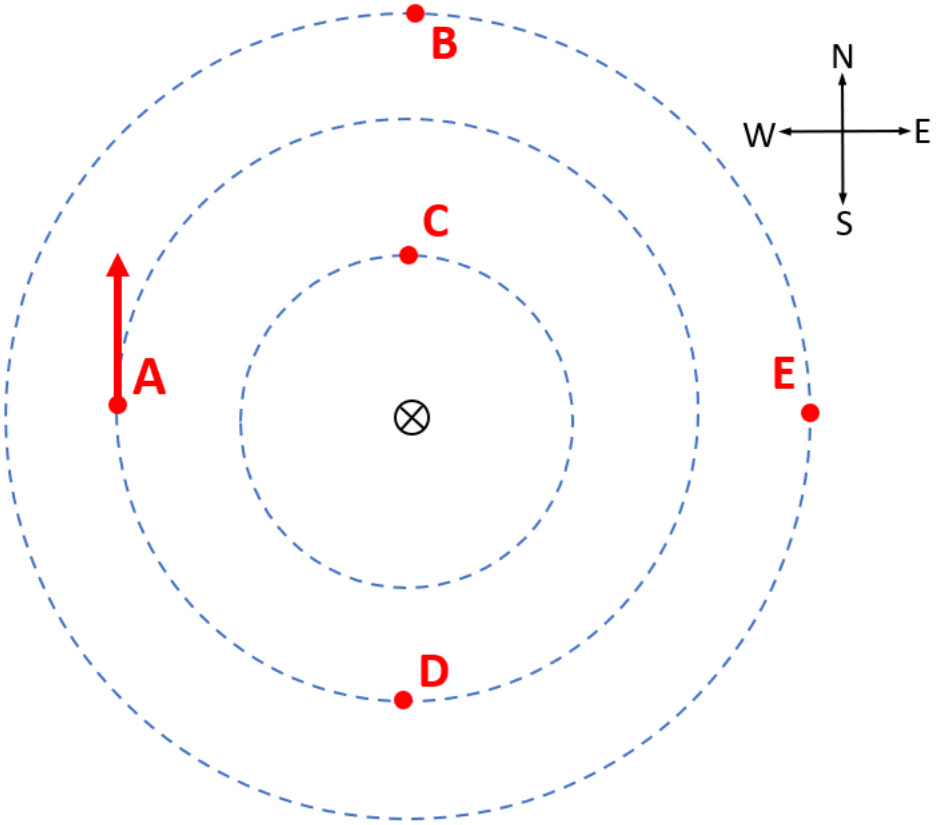
Experiment Design: Students were investigating how changing current in a wire and distance from a wire affects the magnetic field caused by the current. To detect the presence of a magnetic field, they used a compass. Students decided place their compass on a meter stick that extended from the wire in the northward direction as shown. They also installed an ammeter (not shown) to measure current. Their data is summarized in the table.

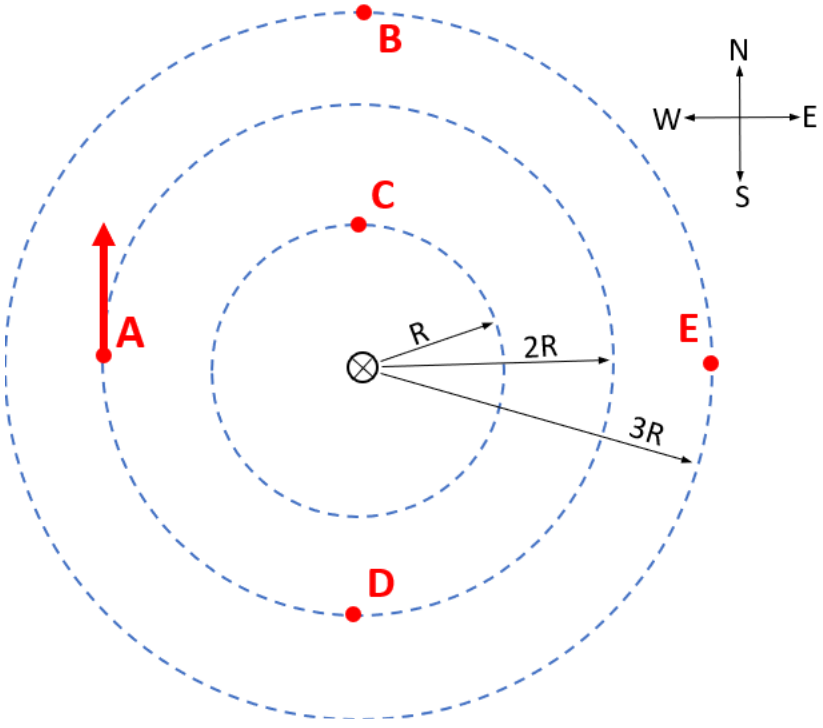




Trial	Current in Wire (Amps)	Compass Distance from Wire (m)	Compass Needle Deflection (Degrees)
1	3.0	0.02	28
2	6.0	0.02	47
3	9.0	0.02	58
4	9.0	0.20	9
5	9.0	2.00	1

Activity 3: Predicting Fields Around Wires



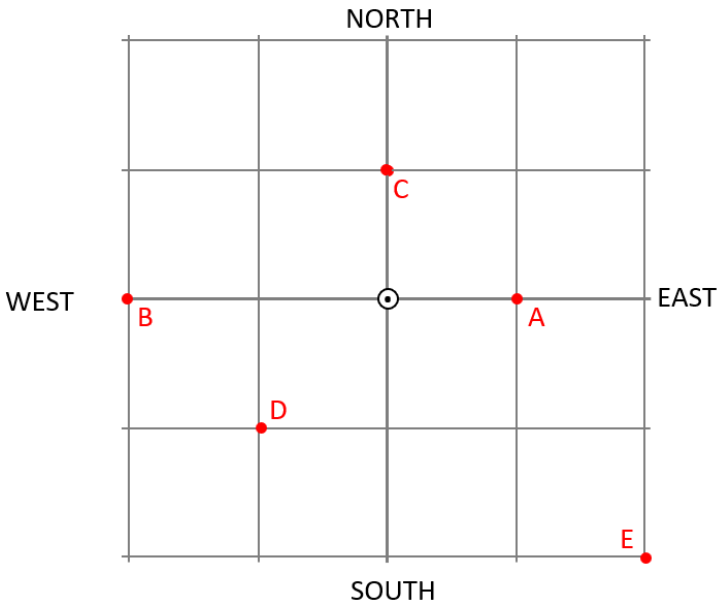


Activity 4: Calculating Magnetic Field Strength 1

A lab group was making magnetic field measurements around a current carrying wire, shown at the center of the diagram. They know that the magnetic field (B) is proportional to current (I) and inversely proportional to distance (d):

$$B \sim \frac{I}{d}$$

Unfortunately, they only collected data for their first trial. Help the group predict the rest of their values in their table.



Trial	Current (Amps)	Magnetic Field (Tesla)	Magnetic Field Direction
A	2.0	0.08	N
B	2.0		
C	4.0		
D	4.0		
E	6.0		

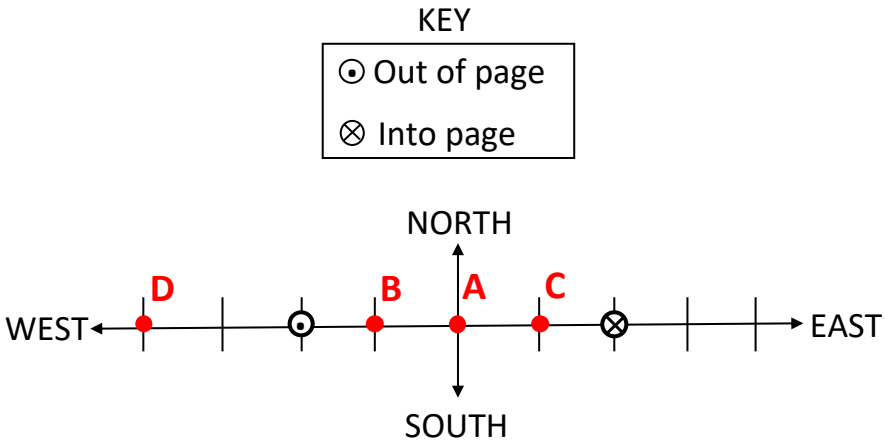
Given value in Row A is random and may differ from above.

Activity 5: Calculating Magnetic Field Strength 2

A lab group was making magnetic field measurements around a current carrying wire, shown at the center of the diagram. They know that the magnetic field (B) is proportional to current (I) and inversely proportional to distance (d):

$$B \sim \frac{I}{d}$$

Unfortunately, they only collected data for their first trial. Help the group predict the rest of their values in their table.



Trial	Magnetic Field (Tesla)	Magnetic Field Direction
A	2.0	
B		
C		
D		

Given value in Row A is random and may differ from above.