

AMPÈRE'S RULE APPARATUS

AMPR01

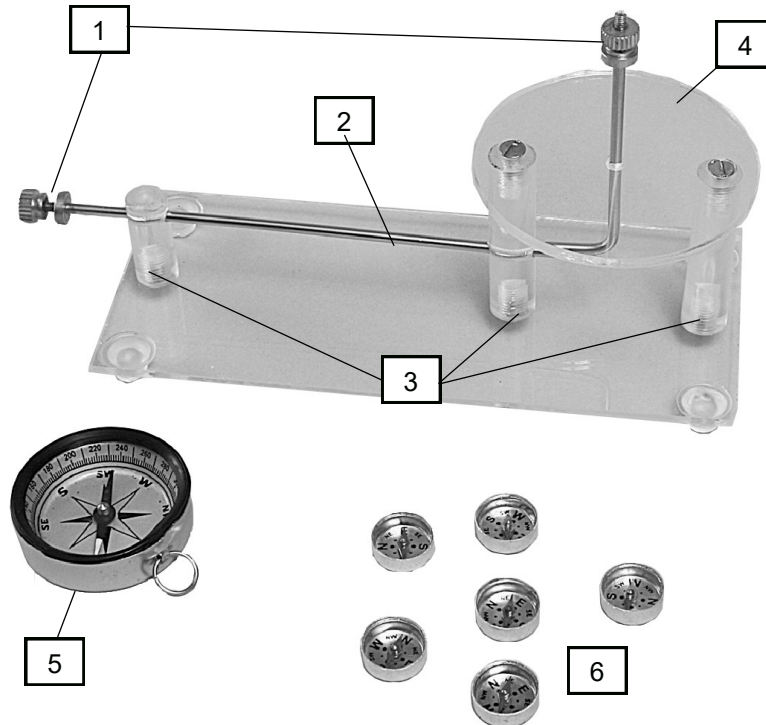


Figure 1

DESCRIPTION

Ampère's Rule Apparatus is used to investigate the direction of the magnetic field generated by an electric current in a straight wire. It consists of a thick brass wire bent at right angles to form two straight sections, one horizontal and one vertical. The ends of the wire have screw terminals for attaching wires to connect the apparatus to a current source.

IDENTIFICATION OF COMPONENTS

1. Connecting screws
2. Thick brass wire
3. Insulating supports
4. Circular platform

NGSS STANDARDS

Middle School	High School
MS-PS2 Motion and Stability: Forces and Interactions <ul style="list-style-type: none"> • MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. • MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects 	HS-PS2 Motion and Stability: Forces and Interactions <ul style="list-style-type: none"> • HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

SUGGESTED ACTIVITIES

1. Current and Magnetic Field

Students will investigate the affect of the intensity of a current and the magnetic field it creates.

2. Magnetic field and current direction

Students will investigate the affect of the direction of the current and the resulting magnetic field.

3. Magnetic field around a wire

Students will investigate the affect of the direction of the current and the resulting magnetic field that created around a wire.

ADDITIONAL MATERIALS REQUIRED

Variable low voltage power supply 0-6VDC, at least 2A, preferably 3A

Two Patch cords with alligator clips

Multimeter (optional) with DC range 3A or more and additional patch cord

PRE-LAB ASSEMBLY

The French physicist André-Marie Ampère (1775 – 1836) investigated the magnetic field generated by an electric current flowing in a conductor and discovered that its direction is always at right angles to the direction of the current flow. The result of this property is that the shape of the magnetic field of a straight current-carrying wire is a series of concentric circles around the wire. Ampère's Rule (also called Ampère's Right Hand Rule) is a way of remembering the relationship between the directions of the current and the magnetic field.

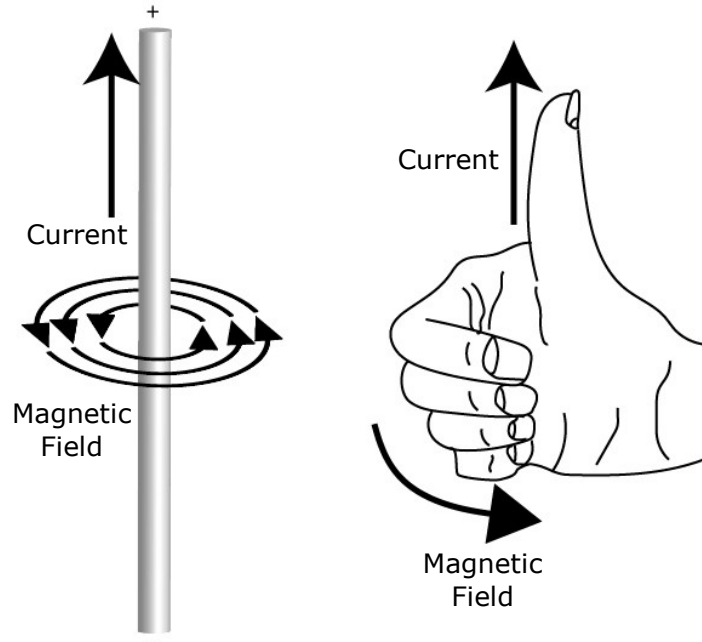


Figure 2

For the purpose of this activity, we are assuming the traditional direction of current flow is from positive to negative and using the right hand rule. If you use the convention of current flow from negative to positive (electron flow), then use the left hand. Both methods will yield the same direction for the magnetic field.

Apparatus set up:

- Connect the power supply to a wall outlet, make sure the lowest voltage setting is selected and the supply is turned off.
- Using the large compass, orient the Ampère's Rule Apparatus so that the horizontal portion of the wire points North-South.
- Connect the patch cords to the power supply and the screw terminals on the ends of the wire. Note which end of the wire is connected to the positive terminal of the power supply.
- If a multimeter is available to monitor the wire current, connect it into the circuit in series with the Ampère's Rule Apparatus and set it to measure 3A DC.