

10-145 Ampere's Rule



Parts List:

057283	Apparatus
005010	16mm compass (6)
005011	45mm compass (1)
24-10145	Instructions

Additional Materials Needed:

- 6 Volt Battery or low voltage power supply
- Two conducting wires with alligator clips

Caution: Always make sure the power supply is turned off before connecting leads to it or making any adjustments to the leads. Do not touch the current carrying conductor while the power is on.

Warranty and Parts:

We replace all missing or defective parts free of charge. We accept Mastercard, Visa, checks, school P.O.'s. All products guaranteed free from defect for 90 days after sale, defined as 90 days after date of invoice. This guarantee does not include accident, misuse, or normal wear and tear.

Visit us online at:
www.sciencefirst.com

Theory:

What is Ampere's Rule? It can be defined as: *around a wire carrying a current towards the observer, the magnetic field curls in the counter clockwise direction.*

What is a magnetic field? It can be defined as: *the lines of force around a permanently charged magnet or a moving charged particle.*

What is a magnet? It can be defined as: *a piece of equipment that can attract pieces of iron or steel.*

What is a compass? It can be defined as: *a magnetized needle, mounted on a pivot, which points in a north direction.*

Demonstration 1: Magnetic Field about a Conductor

Additional Items Needed: DC power supply

Procedure Part A.:

- 1) Put the demonstrator on a flat surface such as a lab bench.
- 2) Align the unit so that

the horizontal wire is pointing north and south

- 3) Place the large compass beneath the horizontal wire.
- 4) Position a 6 Volt battery behind the apparatus. Open the alligator clip on one wire and place it on the positive terminal of the battery. Repeat using a second wire on the negative terminal of the battery.
- 5) Loosen the screw caps on the horizontal and vertical sides of the instrument
- 6) Open the free end of the alligator clip of the positive wire and put it on the horizontal side of the apparatus.
- 7) Open the alligator clip on the free end of the negative wire and put it on the vertical side of the instrument.
- 8) Without changing the overall north to south alignment, move the large compass to the 9:00 or 3:00 o'clock position, alongside the vertical conductor. See diagram next page.



9. With current flowing, there will be little noticeable effect on the compass needle.

10. Now, move the large compass to the 12:00 or 6:00 o'clock position. You should observe an immediate and large deflection of the needle. See the diagram below.



11. Turn off the power supply and remove the large compass and set it aside.

Procedure Part B:

1. Arrange the six small diameter compasses in a circle on the apparatus' plastic circle with the vertical rod protruding through the center.

2. Turn on the current and observe the needle directions of each of the six smaller compasses.

Discussion Points:

1. This demonstration shows that:

- A magnetic field surrounds a conductor of electric current.
- The direction of the magnetic field is determined by the direction of the electric current.
- The strength of the magnetic field decreases with increasing distance from the electrical conductor.

Ampere devised a rule to predict the direction of a magnetic field around a straight conductor. It is called the "right hand rule". If the conductor is grasped with the right hand in such a way that the right thumb points in the direction of the current, the fingers wrap around the conductor in the direction of the magnetic field.

Visit us online at:
www.sciencefirst.com

Related Science First® products:

20-110 Magnetic Field Demonstrator - Wow your students with this handy magnetic field demonstration! Shake the unit so that the iron filings are distributed throughout the unit. This transparent acrylic case holds iron filings in such a way as to maximize the visible lines of force from a magnet placed either on top of or underneath the case. Note: Magnets not included.

20-112 Magnetic Field Viewer, 3D - Explore the mysteries of magnets in three dimensions! Iron filings mixed with oil inside and acrylic plastic cube will react in fascinating ways to a magnetic field or electric current.

10-145 Ampere's Rule teaching concepts:
Ampere's Rule, right hand rule, magnetic field, magnet, conductor, and compass.
Curriculum Fit
Magnetic Field and Magnetism

P/N 24-10145

©Science First® is a registered trademark of Morris & Lee, Inc. All rights reserved. Revised 02-08