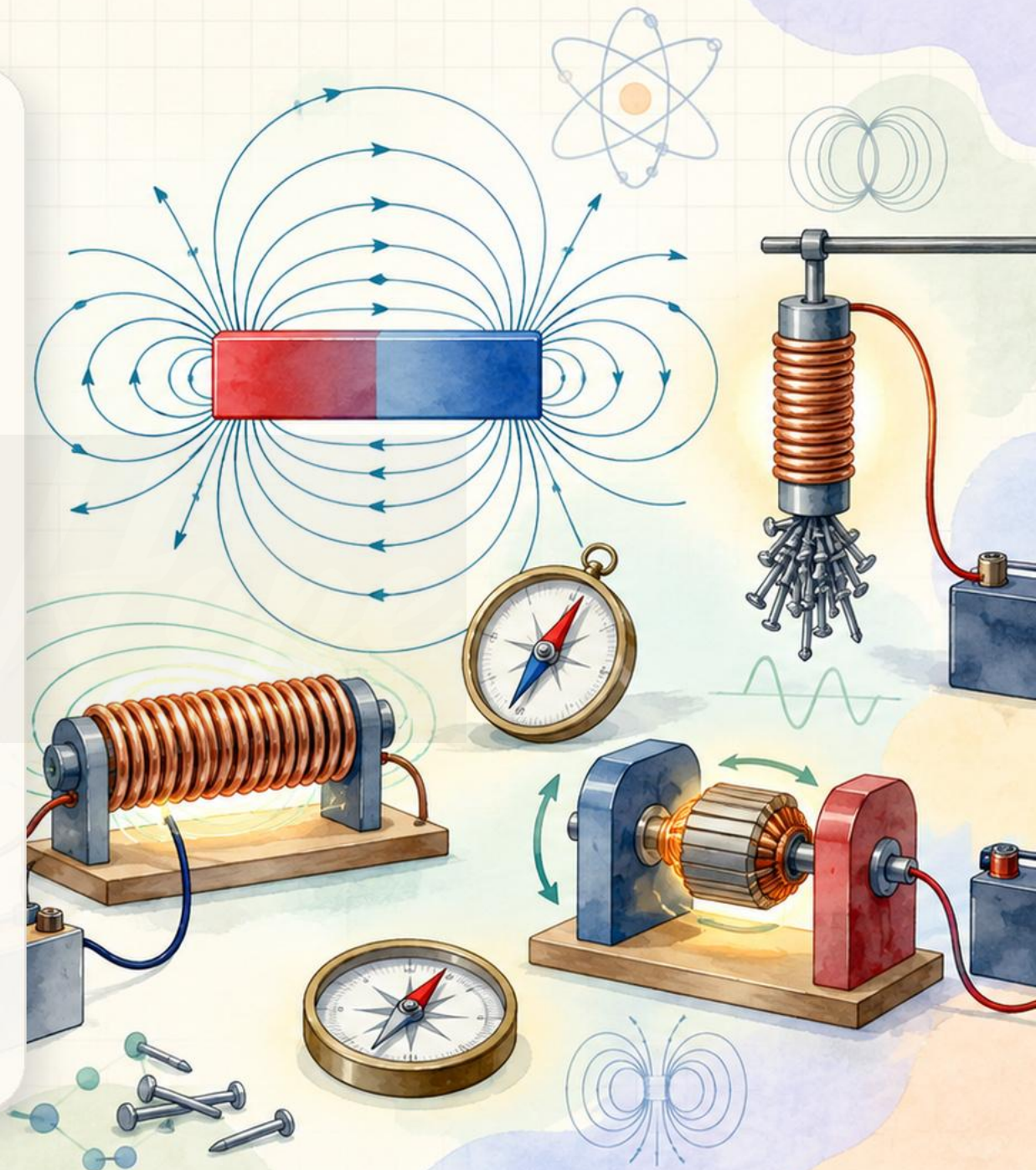


SCIENCE • CLASS 10

CHAPTER 12

Magnetic Effects of Electric Current

CHAPTER NOTES



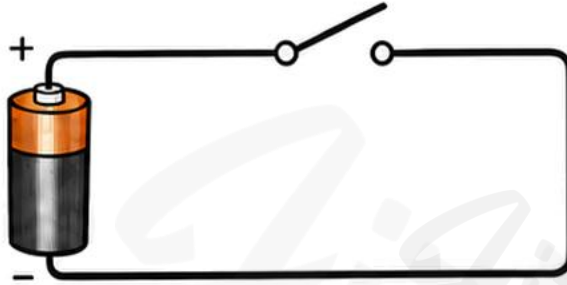
MAGNETIC EFFECT OF ELECTRIC CURRENT

A COMPASS NEEDLE
IS A SMALL MAGNET



SWITCH OPEN

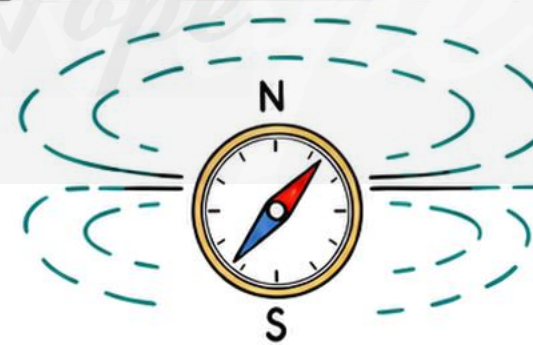
NO CURRENT



NEEDLE POINTS
NORTH-SOUTH

SWITCH CLOSED

CURRENT FLOWS



COMPASS DEFLECTS

A CURRENT-CARRYING
CONDUCTOR PRODUCES
A MAGNETIC FIELD

1820 - HANS
CHRISTIAN OERSTED

OBSERVED A CURRENT
DEFLECTING A COMPASS

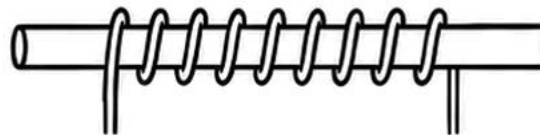


ELECTRICITY AND
MAGNETISM ARE LINKED

CURRENT



COIL



ELECTROMAGNET

MAGNETIC FIELD AND FIELD LINES

MAGNETIC FIELD

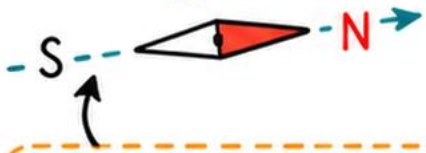
REGION AROUND A
MAGNET WHERE
MAGNETIC FORCE
CAN BE DETECTED

A COMPASS NEEDLE
IS A TINY BAR MAGNET

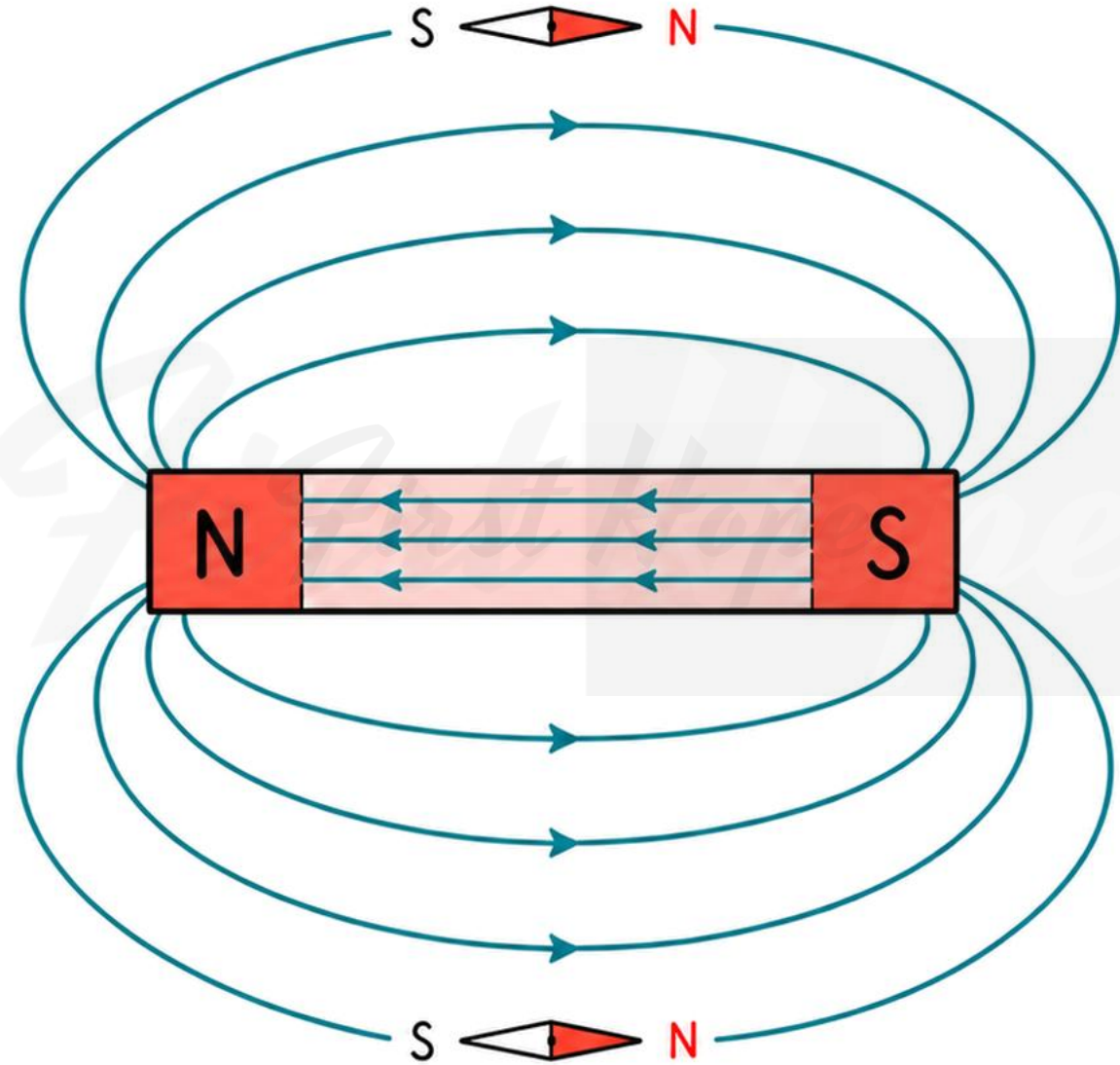


FIELD DIRECTION

THE NORTH END OF
A COMPASS POINTS
ALONG $\vec{B}$



TANGENT GIVES THE
LOCAL DIRECTION OF $\vec{B}$



FIELD-LINE RULES

- 1 CLOSED CURVES
- 2 OUTSIDE: $N \rightarrow S$
- 3 INSIDE: $S \rightarrow N$
- 4 CLOSER LINES = STRONGER FIELD
- 5 FIELD LINES NEVER INTERSECT

LIKE POLES REPEL

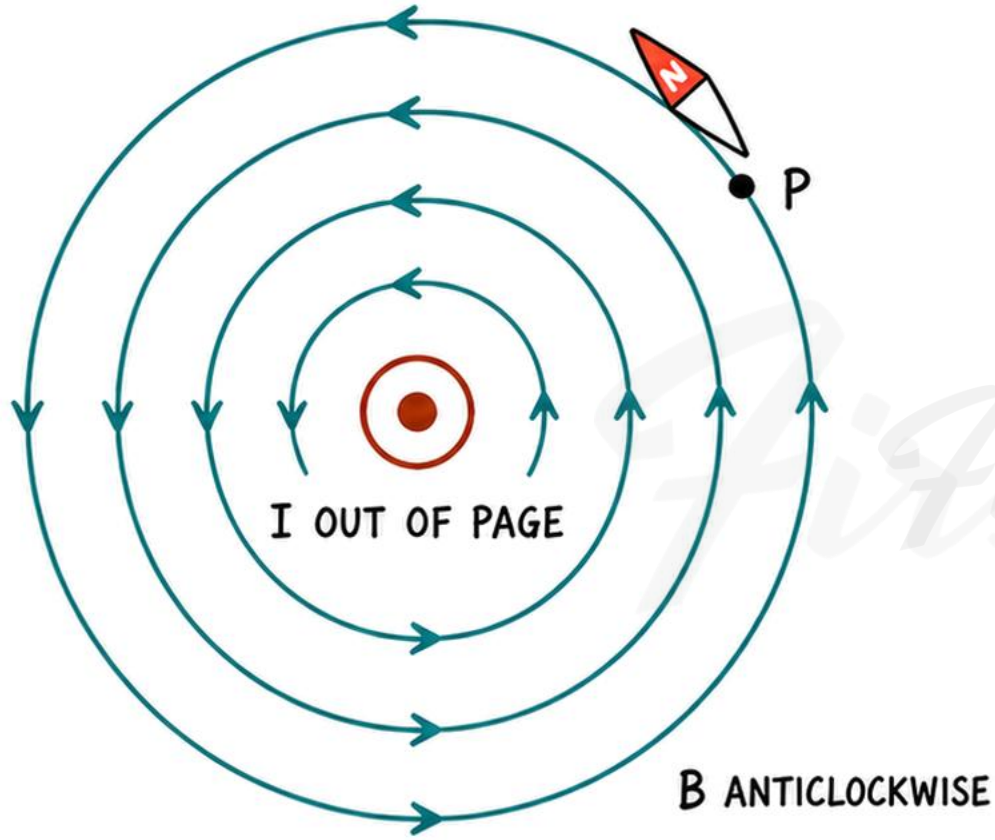


UNLIKE POLES ATTRACT



FIELD AROUND A STRAIGHT CONDUCTOR

CONCENTRIC FIELD LINES



I OUT OF PAGE

B ANTICLOCKWISE



= COMPASS IS TANGENT TO THE FIELD

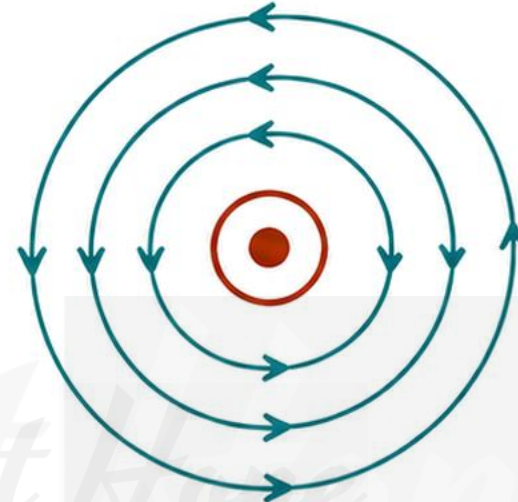


= DOT = OUT OF PAGE

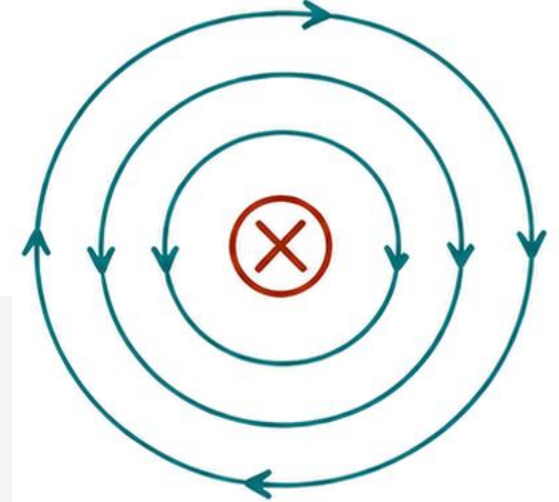


= CROSS = INTO PAGE

CURRENT REVERSAL



OUT OF PAGE



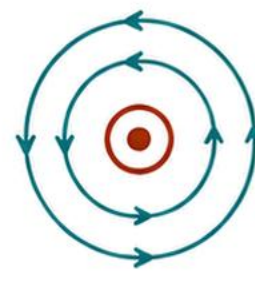
INTO PAGE

LARGER I $\rightarrow$ STRONGER B

LARGER I

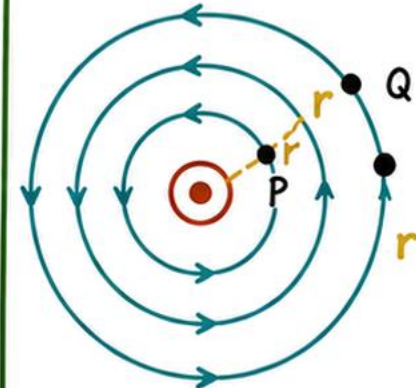


SMALLER I



REVERSING I REVERSES B

LARGER $r \rightarrow$ WEAKER B



NEAR P:
STRONGER

FAR Q:
WEAKER

RIGHT-HAND THUMB RULE

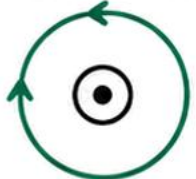
RIGHT HAND

↑ CURRENT I

THUMB → CURRENT I

CURLED FINGERS →
MAGNETIC FIELD B

VIEW FROM ABOVE
(LOOKING DOWN
ALONG WIRE)



I OUT OF PAGE
 B ANTICLOCKWISE

- ① HOLD THE CONDUCTOR IN YOUR RIGHT HAND
- ② THUMB GIVES I , FINGER CURL GIVES B

EXAMPLE 12.1

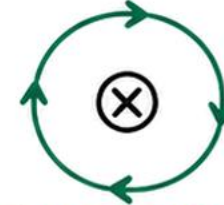
CURRENT: EAST → WEST



ABOVE THE WIRE: B POINTS NORTH

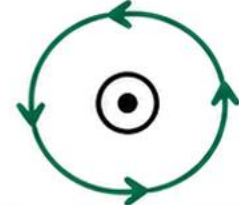
BELOW THE WIRE: B POINTS SOUTH

EAST-END VIEW



I INTO PAGE
 B CLOCKWISE

WEST-END VIEW



I OUT OF PAGE
 B ANTICLOCKWISE

MAXWELL'S CORKSCREW RULE



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