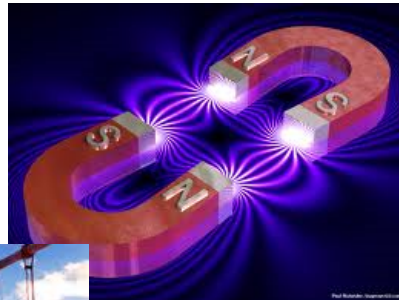


get your clicker

Magnetism (chapter 22)



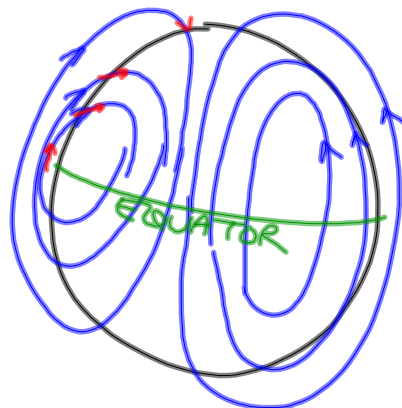
Apr 21-8:13 AM

CAUSE OF MAGNETISM?

WE'LL GET TO THAT

EARTH'S MAGNETIC FIELD

- POINTS DOWN INTO GROUND AT THIS LATITUDE
- THE GEOGRAPHIC N POLE IS A MAGNETIC SOUTH POLE

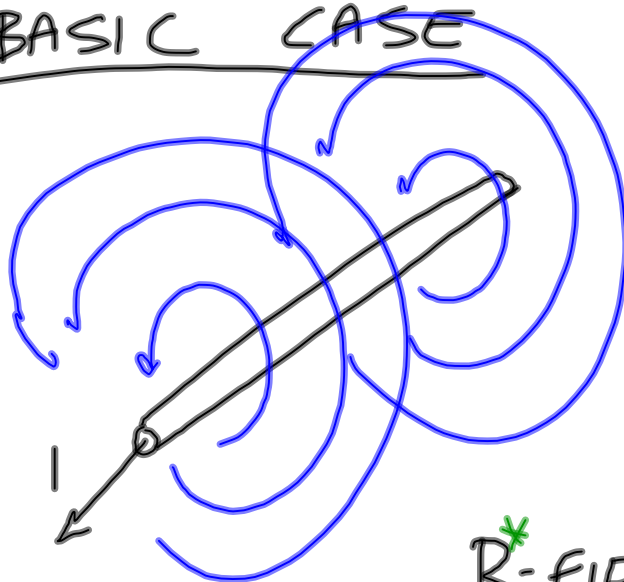


Apr 21-8:32 AM

MAGNETISM IS CAUSED BY CURRENT (MOVING CHARGE)

Apr 21-8:38 AM

BASIC CASE

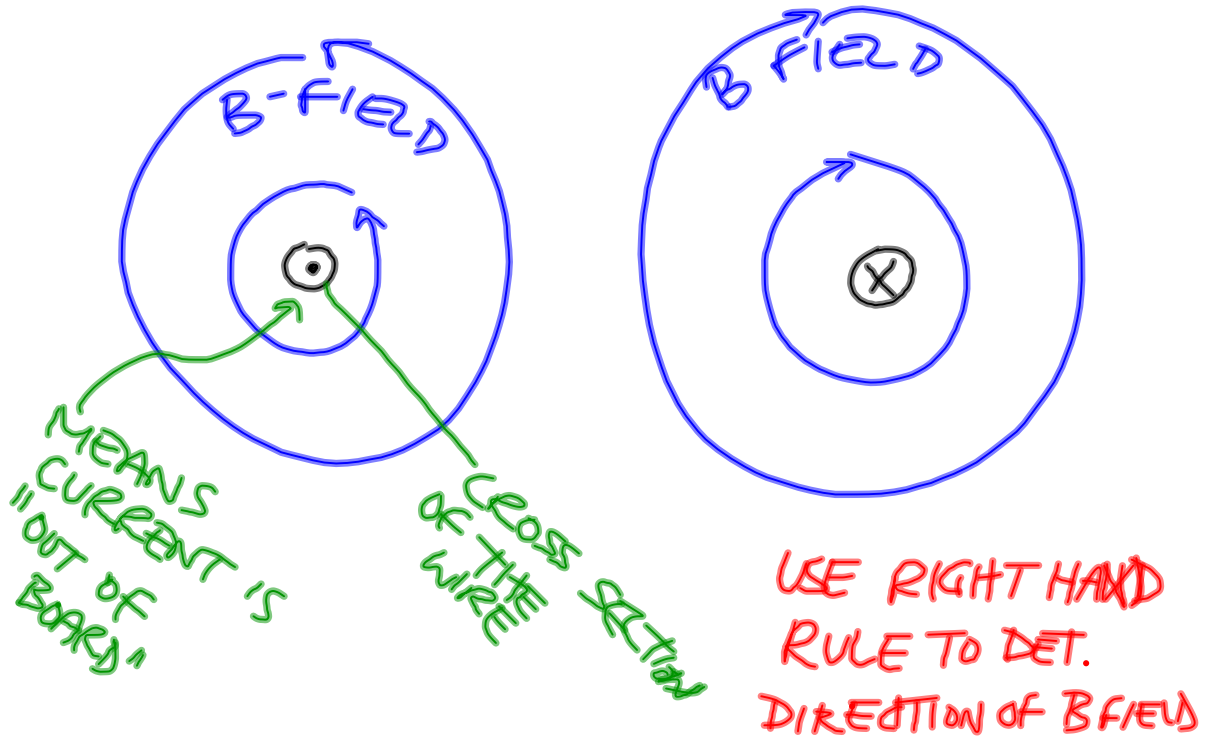


* MAGNETIC

* B-FIELD GETS
WEAKER AS YOU
GET FARTHER AWAY
FROM WIRE

Apr 21-8:47 AM

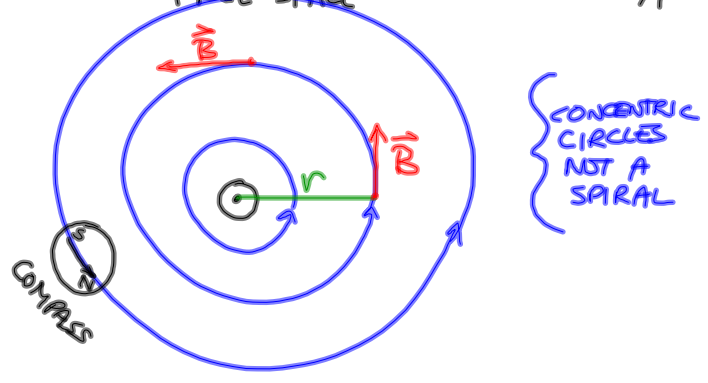
ANOTHER PIC



Apr 21-8:50 AM

$$B = \frac{\mu_0 I}{2\pi r}$$

		UNITS
B	MAG FIELD	TESLA (T)
I	CURRENT	A
r	DISTANCE FROM WIRE	m
μ_0	"PERMEABILITY OF FREE SPACE"	$4\pi \times 10^{-7} \frac{Tm}{A}$



Apr 21-8:56 AM

EX. A WIRE W/ 1 A
HAS A B-FIELD OF
WHAT STRENGTH 1 m AWAY?

$$B = ? \quad B = \frac{(4\pi \times 10^{-7})(1 \text{ A})}{2\pi (1 \text{ m})}$$
$$I = 1 \text{ A}$$
$$r = 1 \text{ m} \quad B = 2 \times 10^{-7} \text{ T}$$

Apr 21-9:03 AM

(EX) $B \approx 45 \times 10^{-6} \text{ T}$
 $r = 1 \text{ cm}$

HOW MUCH CURRENT WOULD
YOU NEED IN A WIRE TO
EQUAL THE EARTH'S B-FIELD

$$B = \frac{\mu_0 I}{2\pi r}$$

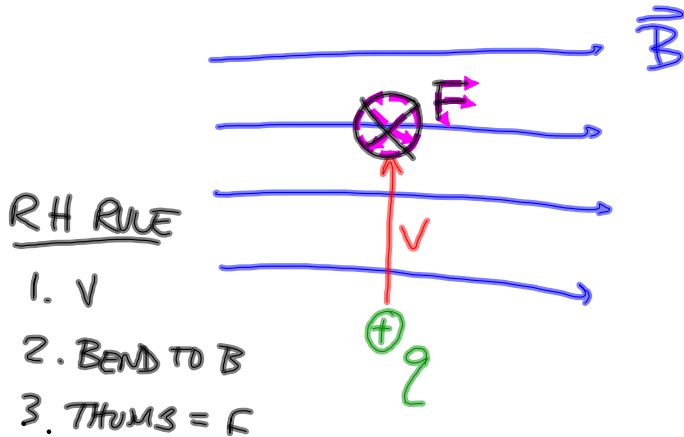
$$I = \frac{2\pi r B}{\mu_0}$$

$$= \frac{2(0.01)(45 \times 10^{-6})}{4 \times 10^{-7}} = 2.25 \text{ A}$$

Apr 21-9:07 AM

NEW SITUATION

A SINGLE MOVING CHARGE
(eg ELECTRON OR PROTON) MOVING
IN A B-FIELD FEELS A
FORCE.

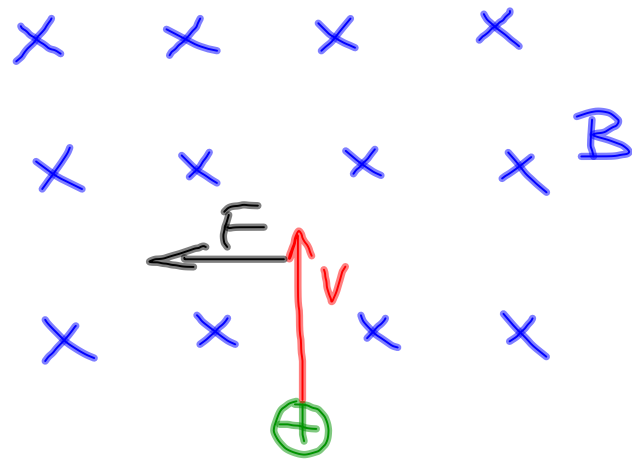


Apr 21-9:14 AM

$$F = q v B \sin \theta$$

F	B-FORCE ON MOVING CHARGE	N
q	CHARGE	C
v	VELOCITY	m/s
B	MAG FIELD	T
θ	ANGLE BETWEEN v & B	$^{\circ}$ (RAD)

Apr 21-9:21 AM



Apr 21-9:23 AM