

① Phys 2426 2014-10-06

Magnetism

Speakers / microphones

Motor / Generator

Move materials / Braking

MRT

Inductors

Navigation

Magnetic Effects

Forces - on other magnets

- on currents

- on moving charges

Torques - on magnetic dipoles

- on coils

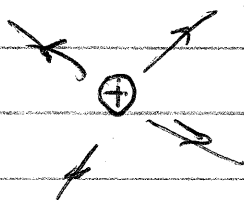
Voltages

Electric Fields

Vectors

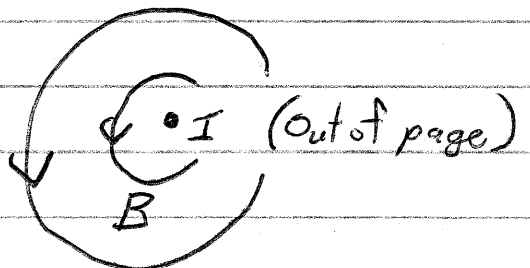
Caused by Q
Emitted / Absorbed

by Source



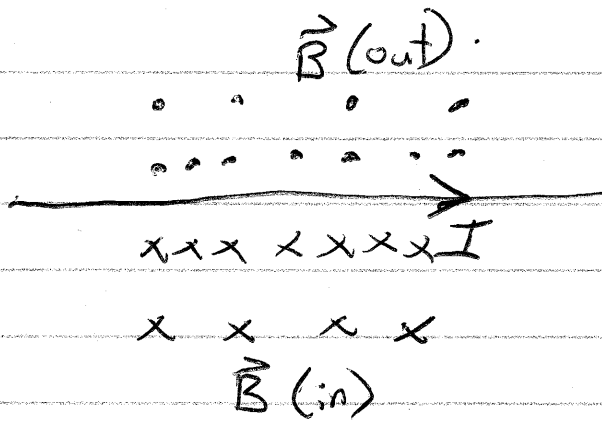
Magnetic Fields

Caused by I
"Stirred up" by sources



②

Ex:

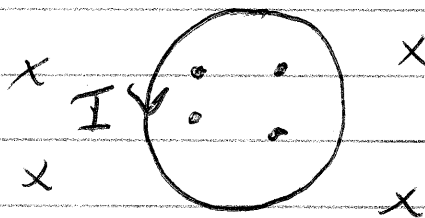


Magnetic Field (B) measured in tesla (T).

Due to a wire $B = \frac{\mu_0 I}{2\pi r}$
 (long, straight)
 $r =$ our dist. from wire.

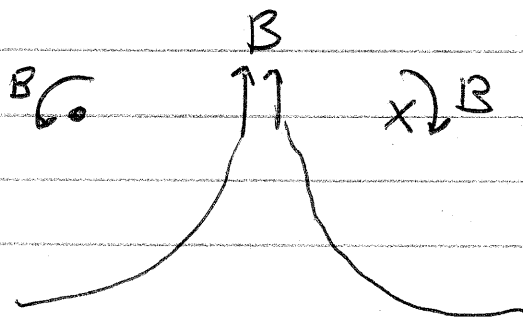
Due to a loop/coil: $B = \frac{\mu_0 I}{2R}$ (@ center)

$R =$ radius of coil



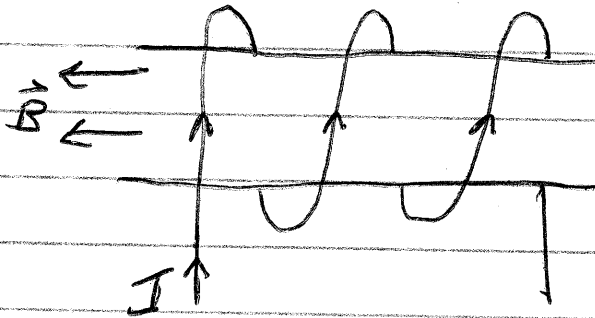
RHR for coil

Two straight currents



3)

Solenoid Coil



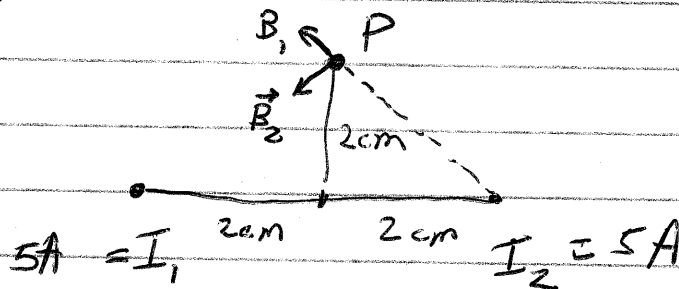
$$B = \mu_0 NI / l = \mu_0 n I$$

$N = \# \text{ loops of wire}$

$l = \text{length of coil}$

$$n = \frac{N}{l} = \# \text{ loops per unit length} \\ = \text{turns density}$$

Multiple Sources add as vectors.



@ P, I_1 causes:

$$B_1 = \frac{\mu_0 I}{2\pi r} = \frac{\mu_0 (5A)}{2\pi (2\sqrt{2})\text{cm}} = 3.54 \times 10^{-5} \text{ T}$$

$$\vec{B}_2 = 35.4 \mu\text{T}$$

	x	y
B_1	$-35.4 \cos(45^\circ)$	$35.4 \sin 45^\circ$
B_2	$-35.4 \cos(45^\circ)$	$-35.4 \sin 45^\circ$
Tot	$-50 \mu\text{T}$	0