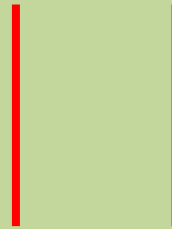


CONCEPT: MUTUAL MAGNETIC FORCE ON PARALLEL CURRENTS

- Remember: Current-carrying wires PRODUCE NEW Magnetic Fields → $B = \underline{\hspace{2cm}}$
- A current-carrying wire in an EXISTING Field FEELS A FORCE → $F = \underline{\hspace{2cm}}$

→ So if you have two PARALLEL currents, you get a MUTUAL Force between them:

- MAGNITUDE:



- Force per unit length =

- DIRECTION: Same Direction → _____ Opposite → _____

EXAMPLE: Two horizontal wires 10 m in length are parallel to each other, separated by 50 cm. The top wire has current 2 A to the right, and the bottom wire has current 3 A to the left. What is the magnitude and direction of the force exerted on the:

(a) top wire?

(b) bottom wire?

PRACTICE: FORCE PER UNIT LENGTH ON PARALLEL WIRES

Two very long wires of unknown lengths are a parallel distance of 2 m from each other. If both wires have 3 A of current flowing through them in the same direction, what must the force per unit length on each wire be?

→ BONUS: Is the mutual force between the wires attractive or repulsive?