CONCEPT: MUTUAL MAGNETIC FORCE ON PARALLEL CURRENTS
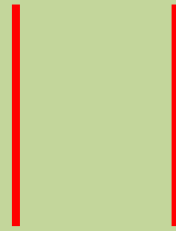
● **Remember:** Current-carrying wires PRODUCE NEW Magnetic Fields ➔ **B = _____**

   - A current-carrying wire in an EXISTING Field FEELS A FORCE ➔ **F = _____**

➔ 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?

→ <u>BONUS</u>: Is the mutual force between the wires attractive or repulsive?