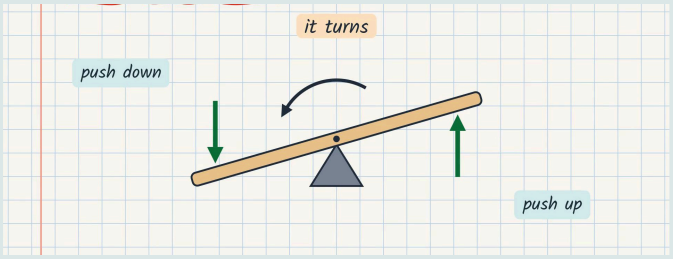
Electric motors

Why a coil turns in a magnetic field

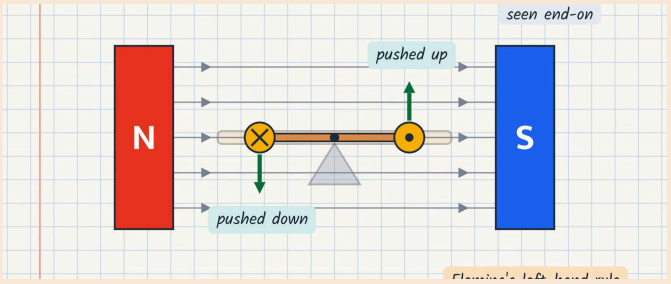
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Summary sheet

1 A turning push



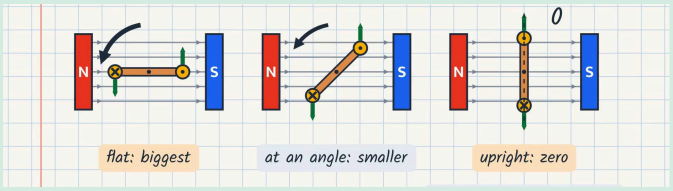
- Two **opposite forces** on **opposite sides** of something make it **rotate**, like a see-saw pushed down at one end and up at the other.

2 A coil in a field



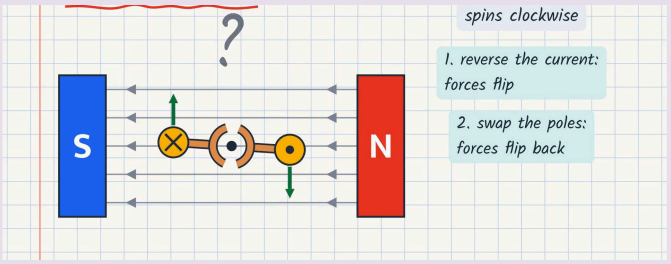
- A current-carrying **coil** between the poles: the current flows in **opposite directions** in the two long sides (into the screen on one, out on the other).
- Fleming's left-hand rule: with N on the left, one side is pushed **down** and the other **up**, so the coil **rotates**. The short ends lie **along the field**, so they feel **no force**.

3 Keeping it turning



- After half a turn the sides swap places; without a fix the forces push the coil back. The turning effect is **biggest when the coil lies flat** (along the field) and **zero when it is upright**.
- Helpful extra (not in the spec): a **split ring (commutator)** reverses the current every half turn, so the coil keeps turning the same way.

4 Speed and direction



- **Faster:** more current, a stronger magnet, or more turns on the coil, so the **forces are bigger**.
- **Reverse:** reverse the current **or** swap the poles. Do both and the two flips cancel: it spins the same way.

Exam tip

Don't say "the magnet attracts the coil". The coil is copper, which isn't magnetic: it turns because of the forces from the motor effect.

Check yourself

- 1 Why are the forces on the two sides of the coil in opposite directions?
- 2 Give two ways to make a motor spin faster.

Answers: 1. The current flows in opposite directions on each side 2. More current, a stronger magnet, more turns (any two)