6.2 The motor effect and electrical energy (P)

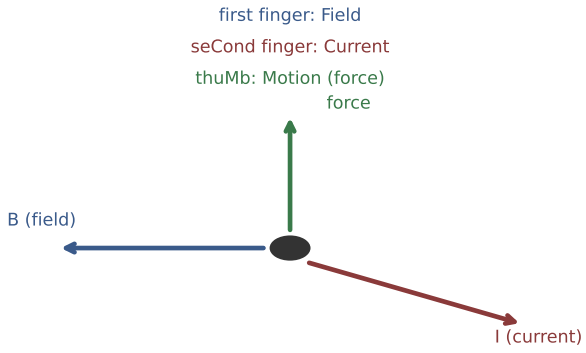
Name: _____ Class: _____ Date: _____ **Total: 18 marks**

Objective

Cover the motor effect and transferring electrical energy (3.6.4–3.6.5): force on a current-carrying conductor with Fleming's left-hand rule, the motor, appliance power P = IV, E = VQ, energy in kWh and electricity costs. All (P) Paper-2 content. Original OxfordAQA practice.

1 Key knowledge and worked examples

■ Motor force, direction and size



the three are mutually at right angles

Force grows with field, current and length of conductor in the field; no force when the wire is parallel to the field.

■ Paying for energy

$$P = IV \qquad E = VQ \qquad E\,(\text{kWh}) = P\,(\text{kW}) \times t\,(\text{h})$$

Worked check. A 230 V washing machine draws 10 A: P = 2300 W = 2.3 kW; a 1.5 h cycle uses 3.45 kWh; at 0.80 per kWh, cost ≈ 2.76.

2 Practice

2.1 State Fleming's left-hand rule. [1]

2.2 When is there NO force on a current-carrying wire in a magnetic field? [1]

2.3 Name three ways to increase the motor force. [3]

2.4 Calculate the power of a 230 V, 5 A heater. [2]

2.5 Calculate the kWh used by a 3 kW tumble dryer running 2 hours. [2]

3 Exam-style questions

3.1 Explain why a current-carrying coil rotates in a magnetic field, and how this makes a motor. [3]

3.2 An electric shower is rated 9.2 kW at 230 V. Calculate its current and choose a fuse from 13 A, 30 A, 45 A. [3]

3.3 A meter reads 45 320 kWh; a month later it reads 45 610 kWh. Electricity costs 0.28 per kWh. Calculate the energy used and its cost. [3]