MR SULLY UNFOLDS PHYSICS

# Power

**AQA 4.1.1.4**
Energy · Paper 1
Foundation & Higher

Name _____ Class _____ Date _____

Power tells you how **quickly** energy is transferred. Two machines can do the same job, but the more powerful one does it faster.

### KEY EQUATION

$$P = E \div t$$

$$P = W \div t$$

P = power (W)
E = energy transferred (J)
W = work done (J)
t = time (s)
1 watt = 1 joule per second

### WORKED EXAMPLE

A motor transfers 3000 J in 20 s.
P = E ÷ t = 3000 ÷ 20 = **150 W**

## Section A · Recall and calculate

Grade 4–5

**1** Define power. [1]

**2** State the unit of power and what it means. [2]

**3** A lamp transfers 1200 J of energy in 20 s. Calculate its power. [2]

## Section B · Rearrange and apply

Grade 5–6

**4** Complete the table. [4]

| Energy (J) | Time (s) | Power (W) |
|---|---|---|
| 5000 | 10 | |
| | 60 | 200 |
| 36 000 | | 3000 |
| 450 000 | 300 | |

**5** Two motors each lift a 20 kg box onto a shelf 1.5 m high. Motor A takes 4 s and motor B takes 6 s. (g = 9.8 N/kg)

**a** Calculate the work done on the box. [2]

**b** Calculate the power of each motor and state which is more powerful. [3]

**6** A 2.4 kW kettle is switched on for 3 minutes. Calculate the energy transferred. [3]

## Section C · Stretch

Grade 7+

**7** A 65 kg student runs up a flight of stairs 3.5 m high in 5 s. Calculate their useful power output. (g = 9.8 N/kg) [3]

## Exam-style question

AQA style

**8** An electric car's motor has a power output of 60 kW.

**a** Calculate the energy transferred by the motor in 2 minutes. [3]

**b** The car has a mass of 1500 kg. Starting from rest, all this energy goes into the car's kinetic store. Calculate its speed. [3]

**c** Suggest why the car's real speed would be much lower. [1]

**Total: _____ / 27**

**How confident am I?**

| | Not yet | Nearly | Got it |
|---|---|---|---|
| I can define power and give its unit | ☐ | ☐ | ☐ |
| I can use P = E ÷ t and P = W ÷ t | ☐ | ☐ | ☐ |
| I can convert kW to W and minutes to seconds | ☐ | ☐ | ☐ |