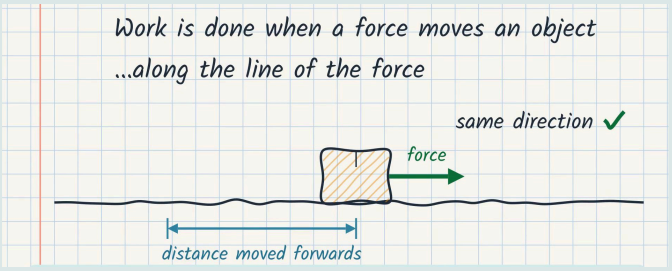
Work done

W = F s, joules and newton-metres, and where the energy goes

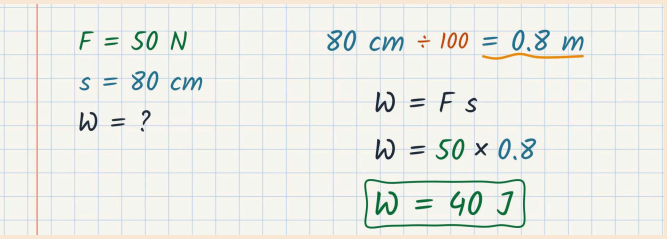
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Summary sheet

1 What work means



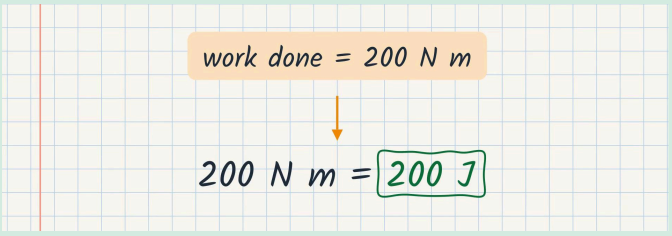
- **Work is done** when a force makes an object **move through a distance**. Push a wall that doesn't move: no distance, so **no work** is done on it.
- The distance must be **along the line of the force**: push a box forwards, and the distance it moves forwards is what counts.

2 The equation



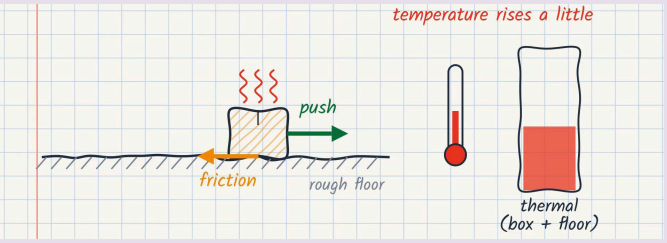
- **W = F s**: work done (J) = force (N) × distance (m). It's on the equation sheet, but know it by heart.
- Example: 50 N moves a box 80 cm. Convert first: 80 cm = **0.8 m**. W = 50 × 0.8 = **40 J**.

3 Joules and newton-metres



- **1 joule** of work is done when a force of **1 newton** moves an object **1 metre**.
- So **1 J** = **1 N m**: a work done of 200 N m is the same as 200 J.

4 Where the energy goes



- **Work done** = **energy transferred.** Lifting a box onto a shelf moves energy from your chemical store to the box's **gravitational potential** store.
- Work done **against friction** warms the box and the floor: their **temperature rises** (thermal store). Rubbing your hands together warms them for the same reason.

W = F s

work done = force × distance

Exam tip

The commonest slip is the distance unit: if it's in centimetres, divide by 100 before you multiply.

Check yourself

1. A crane lifts a load with a force of 2000 N through 15 m. How much work does it do?
2. A force of 12 N moves a toy 50 cm. What is the work done?

Answers: 1. 2000 × 15 = 30 000 J 2. 50 cm = 0.5 m; 12 × 0.5 = 6 J