Your notes

GCSE Physics: revision notes

Work done and energy transfer

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Work done

- When a force causes an object to move through a distance, work is done on the object. **Work done** is energy transferred.
- W = F s: **work done** (J) = force (N) × distance moved along the line of action of the force (m).
- One **joule** of work is done when a force of one newton causes a **displacement** of one metre: 1 J = 1 N m.

Work and energy transfers

- When you push a box across a floor, energy is transferred from your chemical store to the kinetic store of the box.
- **Work done** against frictional forces causes a rise in the temperature of the object and its surroundings.
- Lifting an object does work against gravity, increasing its gravitational potential energy (W = m g h).

Using the equation

- Make sure the distance is in the direction of the force.
- Rearranging: F = W ÷ s, and s = W ÷ F.
- Convert kilojoules to **joules** (× 1000) and centimetres to metres (÷ 100) first.

Worked examples

A force of 50 N pushes a box 4 m across the floor. How much work is done?

Use work done = force × distance (in the direction of the force). **W = F × s**

Put the numbers in. **50 × 4**

Answer: 200 J

Key terms

Work done	The energy transferred when a force moves an object: W = Fs.
Joule	The unit of work and energy; 1 J = 1 N m.
Newton metre	A unit equal to the joule when used for work done.
Friction	A force that opposes motion when surfaces rub together.
Displacement	Distance moved in a particular direction.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is the equation for work done?
2. How much work is done pushing a box 5 m with a force of 20 N?
3. What is 1 joule equal to?
4. What happens to the temperature of surfaces when work is done against friction?
5. A force of 50 N does 400 J of work. How far did the object move?
6. 3 kJ of work is done moving a sledge 60 m. What force was used?
7. Is work done when you hold a heavy bag still?
8. What type of energy increases when a crane lifts a load?

Answers

1. W = F s
2. 100 J
3. 1 newton metre
4. It increases
5. 8 m
6. 50 N
7. No, because it doesn't move
8. Gravitational potential energy

What to do next

Practise 10 questions on this topic

Try 5 exam questions, with mark schemes

Read the lesson, one step at a time

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