

Physics Equations

GCSE Physics · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

A 2.0 kW heater is on for 5.0 minutes. Choose the right equation and calculate the energy transferred. (3 marks)

Step 1 · What do you know?

Power (2.0 kW) and time (5.0 minutes). You want energy.

Step 2 · Choose

$E = P t$ links energy, power and time.

Step 3 · Convert and calculate

2.0 kW = 2000 W; 5.0 min = 300 s; $E = 2000 \times 300 = 600\,000\text{ J}$

Answer: 600 000 J

Check: List the quantities and units first, then pick the equation that contains all of them.

2. Now try one with the steps

Rearrange $E_k = \frac{1}{2} m v^2$ to make v the subject. (2 marks)

Step 1 · Multiply both sides by 2

Step 2 · Divide by m

Step 3 · Square root

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Write the equation that links weight, mass and gravitational field strength. [1]

2. Write the equation for kinetic energy. [1]

3. Write the equation that links charge flow, current and time. [1]

4. Write the equation that links wave speed, frequency and wavelength. [1]
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5. Write the equation for density. [1]
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6. Rearrange $P = E \div t$ to make t the subject. [1]
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7. Rearrange $V = I R$ to make I the subject. [1]
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8. State the units of P , I and R in the equation $P = I^2 R$. [2]
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9. Calculate the kinetic energy of a 1500 kg car travelling at 12 m/s, in joules. [2]
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10. Use $E = m L$ to calculate the energy needed to boil away 0.30 kg of water at 100 °C. $L = 2\,260\,000$ J/kg. Give your answer in joules. [2]
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11. An object starts at 4.0 m/s and accelerates at 2.0 m/s² over 12 m. Use $v^2 - u^2 = 2as$ to find its final velocity, in m/s. [3]
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12. Rearrange $E_k = \frac{1}{2} m v^2$ to make v the subject. [2]
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13. Show how $P = V^2 \div R$ can be found from $V = I R$ and $P = V I$. [2]
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14. Calculate the pressure due to 3.0 m of water using $p = h \rho g$. Density = 1000 kg/m^3 ; $g = 9.8 \text{ N/kg}$. [2]
Give your answer in pascals.

4. Before you hand it in

Relying on the equation sheet for everything

Learn all the 'recall' equations. In the exam, the sheet only helps with the ones it lists.

Using formula triangles for equations with squares or halves

Rearrange algebraically, step by step, for equations like $E_k = \frac{1}{2} m v^2$ or $P = I^2 R$.

Substituting before converting units

Convert to base SI units (W, A, s, m, kg) before substituting.

Writing 'P = 2000' with no unit

Always finish with a value and a unit, for example $P = 2000 \text{ W}$.