Rearranging science equations

Science maths skills | AQA Combined Science 8464 and the separate sciences | 14 questions, 41 marks

GCSE science calculations

Scan for the solutions

Equations for this topic (cover this box to practise recalling them)

- potential difference = current × resistance learn this one
- power = $\frac{\text{energy transferred}}{\text{time}}$ learn this one
- resultant force = mass × acceleration learn this one
- density = $\frac{\text{mass}}{\text{volume}}$ learn this one
- efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$ learn this one
- elastic potential energy = 0.5 × spring constant × (extension)^2 on the physics equation sheet
- power = (current)^2 × resistance learn this one
- kinetic energy = 0.5 × mass × (speed)^2 learn this one
- (final velocity)^2 - (initial velocity)^2 = 2 × acceleration × distance on the physics equation sheet
- energy transferred = power × time learn this one
- change in thermal energy = mass × specific heat capacity × temperature change on the physics equation sheet
- charge flow = current × time learn this one
- work done = force × distance learn this one

Name: _____ **Date:** _____ **Score:** _____ **/ 41**

1 a. Rearrange $V = IR$ to make I the subject.

b. Rearrange $P = \frac{E}{t}$ to make t the subject.

(2 marks)

Answer _____

2 A car headlamp has a resistance of 2.4 Ω. The potential difference across it is 12 V.

Calculate the current through the headlamp.

(2 marks)

Answer _____

3 A motorbike and its rider have a resultant force of 600 N acting on them. They accelerate at 1.5 m/s^2.

Calculate the total mass of the motorbike and rider.

(2 marks)

Answer _____

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4 Oliver uses a 1.5 kW hairdryer for 4 minutes.

Calculate the energy transferred by the hairdryer in joules.

(3 marks)

Answer _____

5 A bottle contains 0.0025 m^3 of olive oil. The density of olive oil is 920 kg/m^3.

Calculate the mass of the olive oil.

(2 marks)

Answer _____

6 A petrol lawnmower has an efficiency of 0.35. It transfers 2800 J of useful energy.

Calculate the total energy input to the lawnmower.

(3 marks)

Answer _____

7 **Higher tier**

A spring in a toy launcher has a spring constant of 40 N/m. It stores 0.20 J of elastic potential energy.

Calculate the extension of the spring. Give your answer in centimetres.

(3 marks)

Answer _____

8 **Higher tier**

A resistor in a heater circuit has a resistance of 4.0 Ω. The power transferred by the resistor is 36 W.

Calculate the current through the resistor.

(3 marks)

Answer _____

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9 **Higher tier**

Jamal and his bike have a total mass of 80 kg. Their kinetic energy is 1440 J.

Calculate their speed. Show your working.

(3 marks)

Answer _____

10 A train speeds up from 12 m/s to 28 m/s over a distance of 400 m.

Calculate the acceleration of the train. Show your working.

(3 marks)

Answer _____

11 An immersion heater of power 1.5 kW is used for 2 minutes to heat 2.0 kg of water in a tank. The water starts at 15 °C.

The specific heat capacity of water is 4200 J/kg °C. Assume all the energy from the heater goes into the water.

Calculate the final temperature of the water. Give your answer to 2 significant figures.

Show your working.

(5 marks)

Answer _____

12 **Higher tier**

The heating element in an electric oven has a resistance of 26 Ω and a power of 2.0 kW.

Calculate the charge that flows through the element in 5 minutes. Give your answer to 2 significant figures.

Show your working.

(5 marks)

Answer _____

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13 Marta pushes a 40 kg crate 6.0 m across a warehouse floor. It takes her 12 s. She does 1500 J of work on the crate.

Assume her pushing force acts in the direction the crate moves.

Calculate the force Marta uses to push the crate.

(2 marks)

Answer _____

14 In a Year 10 practical, Hassan heats 0.80 kg of cooking oil in a beaker. The oil starts at 20 °C and ends at 65 °C. The heater transfers 75 600 J of energy to the oil.

Calculate the specific heat capacity of the oil.

(3 marks)

Answer _____

End of questions | Total 41 marks

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