Electrical power and energy

Physics Paper 1 calculations | AQA Combined Science 8464 and AQA GCSE Physics 8463 | 15 questions, 44 marks

GCSE science calculations

Scan for the solutions

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

- power = potential difference × current learn this one
- power = (current)^2 × resistance learn this one
- energy transferred = charge flow × potential difference learn this one
- energy transferred = power × time learn this one
- charge flow = current × time learn this one
- potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil on the physics equation sheet

Name: _____ **Date:** _____ **Score:** _____ **/ 44**

1 A desk lamp is connected to the 230 V mains supply. The current in the lamp is 0.25 A.

Calculate the power of the lamp.

(2 marks)

Answer _____

2 The heating element in a hand warmer has a resistance of 15 Ω. The current in the element is 4.0 A.

Calculate the power of the heating element.

(2 marks)

Answer _____

3 A charge of 60 C flows through a 12 V car headlight bulb.

Calculate the energy transferred to the bulb.

(2 marks)

Answer _____

4 Amara boils water in a 2.8 kW kettle. The kettle is switched on for 3 minutes.

Calculate the energy transferred by the kettle in joules.

(3 marks)

Answer _____

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5 A phone charger supplies a potential difference of 5.0 V. The current in the charging cable is 800 mA.

Calculate the power supplied to the phone.

(2 marks)

Answer _____

6 A television has a power of 120 W. Callum watches it for 2.5 hours.

Calculate the energy transferred by the television in joules.

Give your answer in standard form.

(3 marks)

Answer _____

7 A hairdryer has a power of 2000 W. It is connected to the 230 V mains supply.

Calculate the current in the hairdryer.

Give your answer to 2 significant figures.

(3 marks)

Answer _____

8 In a Year 10 practical, 1500 J of energy is transferred when a charge of 125 C flows through a motor.

Calculate the potential difference across the motor.

(3 marks)

Answer _____

9 A resistor in a circuit transfers energy at a rate of 36 W when the current in it is 3.0 A.

Calculate the resistance of the resistor.

(3 marks)

Answer _____

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10 The motor of an e-scooter is connected to a 36 V battery. The current in the motor is 6.0 A for a journey of 20 minutes.

a. Calculate the charge that flows through the motor during the journey.

b. Calculate the energy transferred by the battery during the journey. Give your answer in standard form to 2 significant figures. Show your working.

(4 marks)

Answer _____

11 A kettle is connected to the 230 V mains supply. The current in the kettle is 11 A. The kettle is switched on for 4 minutes.

Calculate the energy transferred by the kettle in kilojoules (kJ).

Give your answer to 3 significant figures. Show your working.

(4 marks)

Answer _____

12 **Higher tier**

A step-down transformer in a phone charger has a primary potential difference of 230 V and a primary current of 0.020 A. The secondary potential difference is 5.0 V.

The transformer is 100% efficient.

Calculate the current in the secondary coil. Show your working.

(3 marks)

Answer _____

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13 **Higher tier**

A power station generates electricity at a potential difference of 25 kV and a current of 400 A. A step-up transformer increases the potential difference to 400 kV before the electricity is sent along the National Grid.

The transformer is 100% efficient.

a. Calculate the current in the transmission cables after the step-up transformer.

b. The transmission cables have a total resistance of 40 Ω. Calculate the power transferred to the surroundings by heating the cables. Show your working.

(5 marks)

Answer _____

14 Two lamps, A and B, are connected in series to a 12 V battery. The potential difference across lamp A is 7.5 V. The current in the circuit is 0.40 A.

Calculate the power of lamp A.

(2 marks)

Answer _____

15 A phone charger has an output potential difference of 5.0 V. The charging cable has a resistance of 0.25 Ω. The current in the cable is 2.0 A.

Calculate the power wasted heating the cable.

(3 marks)

Answer _____

End of questions | Total 44 marks

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