Standard form in science

Science maths skills | AQA Combined Science 8464 and the separate sciences | 14 questions, 39 marks

GCSE science calculations

Scan for the solutions

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

- wave speed = frequency × wavelength learn this one
- charge flow = current × time learn this one
- gravitational potential energy = mass × gravitational field strength × height learn this one
- density = $\frac{\text{mass}}{\text{volume}}$ learn this one
- energy transferred = power × time learn this one
- energy transferred = charge flow × potential difference learn this one

Name: _____ **Date:** _____ **Score:** _____ **/ 39**

1 Write each quantity in standard form.

a. The energy stored in a fully charged car battery is about 3 400 000 J.

b. The thickness of a sheet of paper is 0.00062 m.

(2 marks)

Answer _____

2 Write each quantity as an ordinary number.

a. Radio waves travel through air at 3.0×10^{8} m/s.

b. The current in a small sensor is 4.5×10^{-3} A.

(2 marks)

Answer _____

3 Mega (M) means $\times 10^{6}$ and micro (μ) means $\times 10^{-6}$.

a. A wind turbine has a power output of 6.8 MW. Write the power in watts, in standard form.

b. The current through a smoke alarm sensor is 25 μA. Write the current in amperes, in standard form.

(2 marks)

Answer _____

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4 Microwaves used in a microwave oven have a frequency of 2.4×10^9 Hz and a wavelength of 0.125 m.

Calculate the speed of the microwaves. Give your answer in standard form.

(2 marks)

Answer _____

5 A current of 3.2×10^{-3} A flows through a resistor for 1.5×10^3 s.

Calculate the charge that flows through the resistor.

(2 marks)

Answer _____

6 An aircraft of mass 7.5×10^4 kg is flying at a height of 11 km.

Gravitational field strength = 9.8 N/kg.

Calculate the gravitational potential energy gained by the aircraft as it climbs from the ground to this height. Give your answer in standard form to 3 significant figures.

(3 marks)

Answer _____

7 A mobile phone mast sends out radio waves with a wavelength of 0.12 m. Radio waves travel at 3.0×10^8 m/s.

Calculate the frequency of the radio waves. Give your answer in standard form.

(3 marks)

Answer _____

8 A steel ball bearing has a mass of 2.0×10^{-3} kg. The density of steel is 7.8×10^3 kg/m^3.

Calculate the volume of the ball bearing. Give your answer in standard form to 2 significant figures.

(3 marks)

Answer _____

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9 Kemi charges her phone. A charge of 2.7×10^4 C flows into the battery. The charging current is 1.5 A.

Calculate the charging time in seconds. Give your answer in standard form.

(3 marks)

Answer _____

10 The radius of an atom is about 1×10^{-10} m. The radius of its nucleus is about 1×10^{-14} m.

a. How many times larger is the radius of the atom than the radius of the nucleus?

b. How many orders of magnitude larger is the radius of the atom?

(2 marks)

Answer _____

11 A gas-fired power station has a power output of 1.8 GW.

a. Calculate the energy transferred by the power station in 1 hour. Give your answer in standard form to 2 significant figures.

b. An LED light bulb has a power of 8.0 W. Calculate how many of these bulbs the power station could supply at the same time. Give your answer in standard form.

Show your working.

(4 marks)

Answer _____

12 A lightning strike has a current of 3.0×10^4 A for a time of 2.0×10^{-4} s. The potential difference between the cloud and the ground is 1.5×10^8 V.

Calculate the energy transferred by the lightning strike. Give your answer in standard form.

Show your working.

(4 marks)

Answer _____

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13 A phone mast is 2.4×10^3 m from Leila's house. It sends out radio waves with a frequency of 1.8×10^9 Hz. Radio waves travel at 3.0×10^8 m/s.

Calculate the wavelength of the radio waves. Give your answer in standard form to 2 significant figures.

(3 marks)

Answer _____

14 On a windy day, the wind supplies a total power input of 5.0×10^6 W to an offshore wind turbine. The useful power output of the turbine is 2.1×10^6 W.

Calculate the useful energy transferred by the turbine in 24 hours. Give your answer in standard form to 2 significant figures.

Show your working.

(4 marks)

Answer _____

End of questions | Total 39 marks

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