GradeMax

Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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2390818827

PHYSICS **0625/32**

Paper 3 Theory (Core) **February/March 2023**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m / s^2).

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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1 Fig. 1.1 shows two strips of staples.

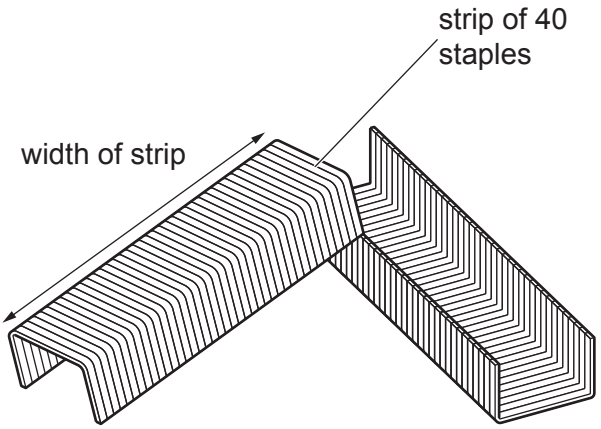

Fig. 1.1 NOT to scale

(a) The width of one strip is 56 mm. There are 40 staples in the strip.

Calculate the average width of **one** staple.

average width of **one** staple = ... mm [2]

(b) A student wants to find the volume of one strip of 40 staples. The student has a measuring cylinder and a beaker of water as shown in Fig. 1.2.

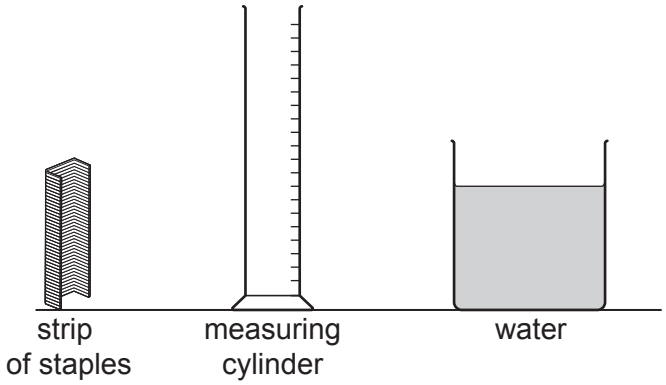

Fig. 1.2

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Describe how the student can determine the volume of one strip of staples by using the equipment shown in Fig. 1.2.

.....

.....

.....

.....

.....

..... [4]

(c) The staples are made from a block of metal.
The mass of the block is 296 g. The volume of the block is 33.2 cm^3.
Calculate the density of the metal. Include the unit.

density of the metal = ... unit ..... [4]

[Total: 10]

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2 **(a)** A student has a spring of length 14.0 cm. She stretches the spring by adding different loads to the spring.
She measures the length of the spring for each load. She plots a graph of the results.
Fig. 2.1 shows the graph of her results.

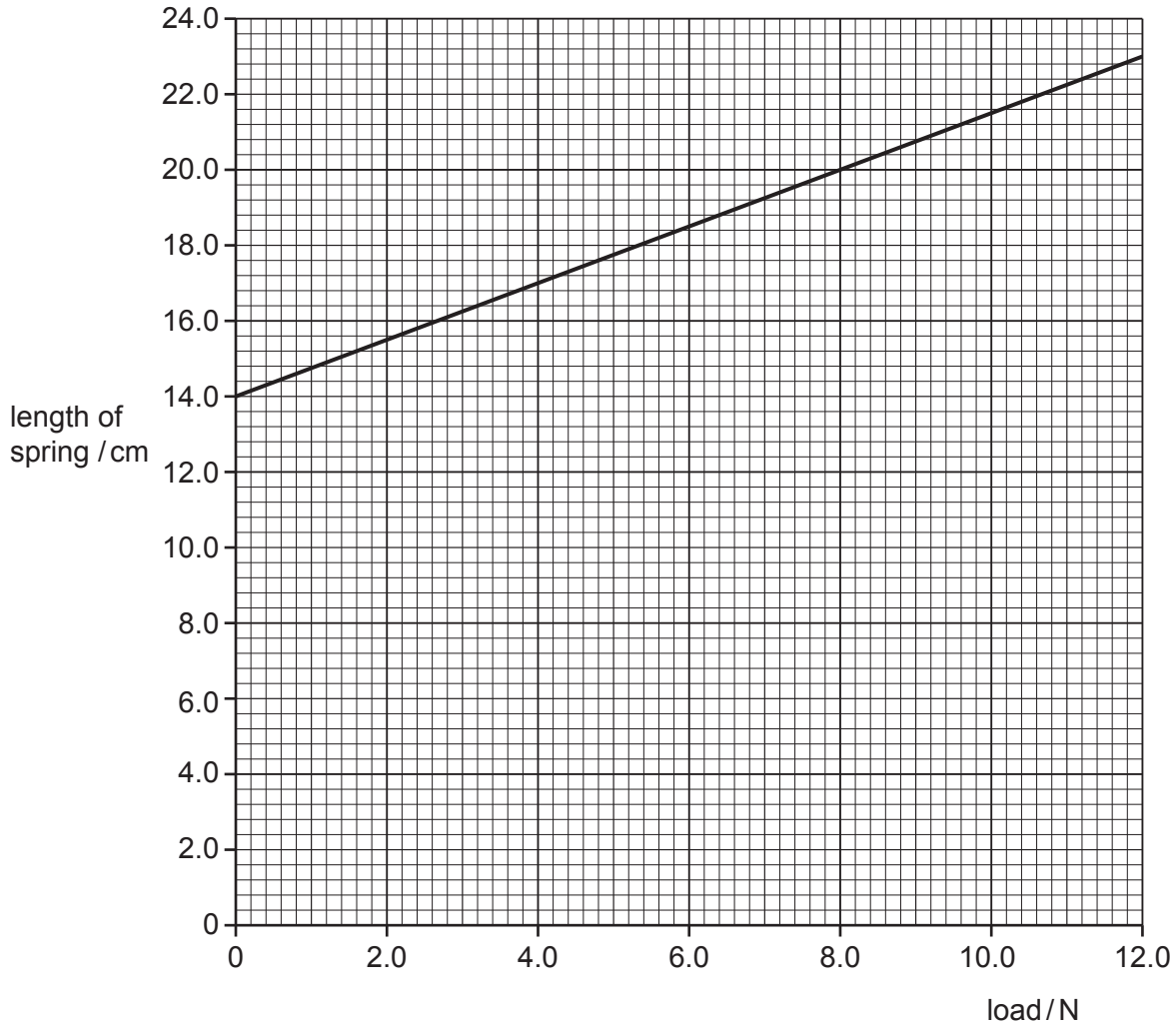

Fig. 2.1

(i) Use the graph to determine the length of the spring when the student adds a load of 8.0 N to the spring.

length of spring = ... cm [1]

(ii) Use the graph to determine the load added to the spring when the **extension** of the spring is 7.0 cm.

load for an extension of 7.0 cm = ... N [2]

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(b) Complete the sentence about effects of forces. Choose a word from the box.

charge	mass	power	shape	velocity

A load stretching a spring is an example of a force changing the size and the ..... of an object. [1]

(c) A clamp stand used in the experiment has a weight of 8.6 N.
Calculate the mass of the clamp stand.

mass of clamp stand = ... kg [3]

[Total: 7]

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3 Fig. 3.1 shows the distance-time graph for a cyclist.
The journey has two sections, PQ and QR.

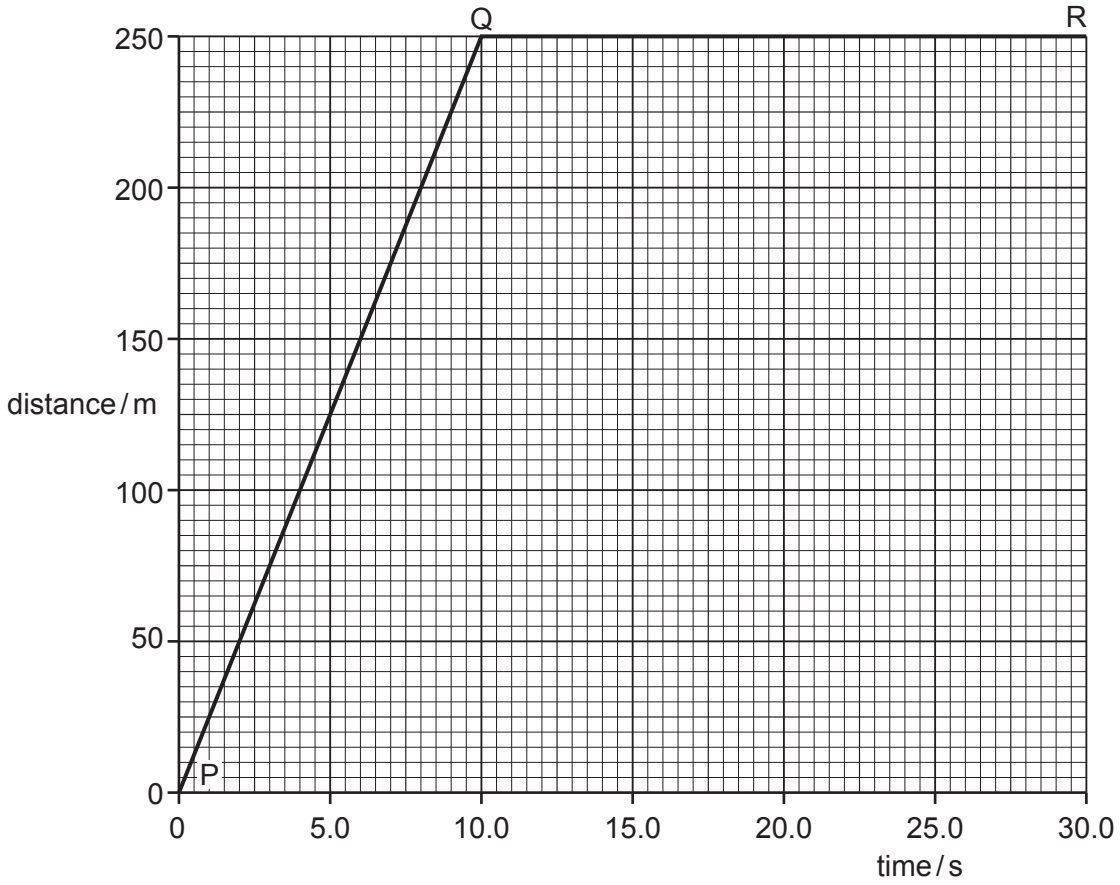


Fig. 3.1

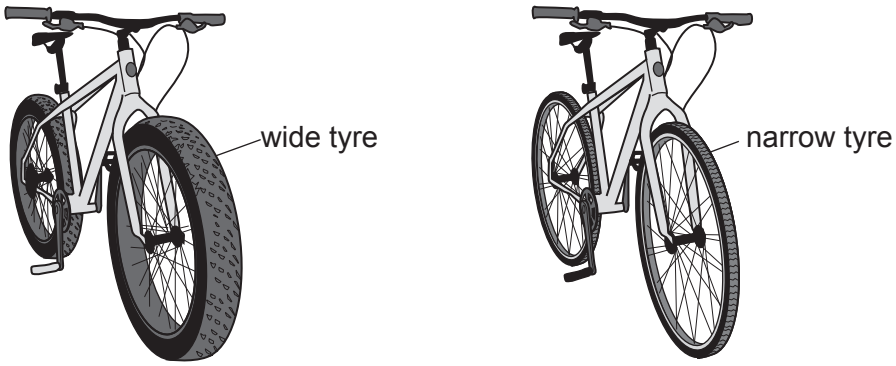
(a) (i) Calculate the speed of the cyclist in section PQ.

speed = ... m / s [3]

(ii) Describe the motion of the cyclist in section QR on the graph.

..... [1]

(b) Fig. 3.2 shows a bicycle fitted with wide tyres and a bicycle fitted with narrow tyres. The two bicycles have the same weight.
People use bicycles fitted with wide tyres to ride over soft ground.



bicycle with wide tyres bicycle with narrow tyres

Fig. 3.2

Explain why people use bicycles fitted with wide tyres to ride over soft ground. Use your ideas about pressure.

.....

.....

..... [2]

[Total: 6]

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4 Fig. 4.1 shows some gas, at room temperature, in a cylinder with a piston that can move. The gas cannot escape from the cylinder.

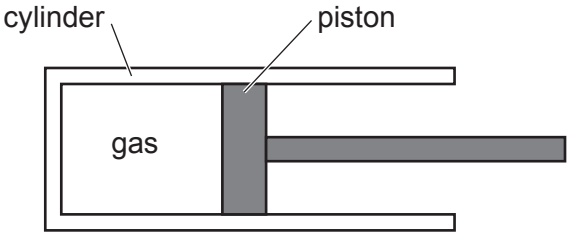

Fig. 4.1

(a) (i) Describe the movement of the gas particles.

.....

..... [2]

(ii) Describe how the gas particles exert a pressure on the walls of the cylinder and piston.

.....

..... [1]

(b) The piston in Fig. 4.1 moves to the left.
The volume of the gas decreases. The temperature of the gas does not change.
State and explain any change in the pressure of the gas when the piston moves to the left.

.....

.....

.....

..... [3]

[Total: 6]

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5 This question is about work, energy stores and energy transfers.

(a) Fig. 5.1 shows a child pulling a toy trolley across the floor.

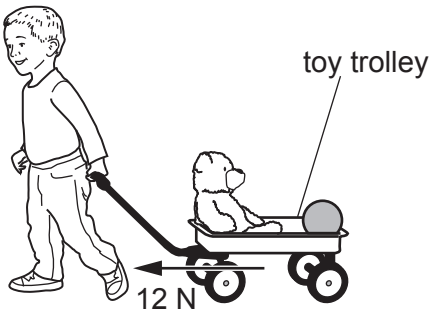

Fig. 5.1

The child pulls the toy trolley with a horizontal force of 12 N. The distance moved by the trolley is 5.0 m.

Calculate the mechanical work done on the toy trolley by the 12 N force.

mechanical work done = ... J [3]

(b) Fig. 5.2 shows a candle burning.



Fig. 5.2

Describe the energy transfers taking place as the candle burns.
Your answer should refer to energy stores as well as transfers between energy stores.

.....

.....

.....

..... [3]

[Total: 6]

6 Fig. 6.1 shows how the displacement of a transverse wave varies with time.

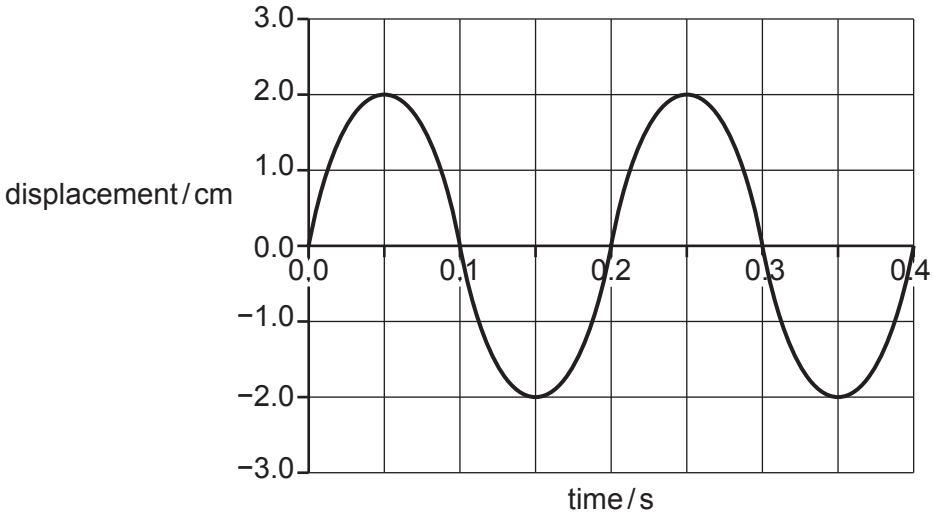

Fig. 6.1

(a) **(i)** Determine the amplitude of the wave in Fig. 6.1.

amplitude = ... cm [1]

(ii) Determine the frequency of the wave in Fig. 6.1.

frequency = ... Hz [2]

(b) Describe the motion of particles in a transverse water wave.

.....

.....

..... [3]

(c) A wave has a frequency of 400 Hz and a wavelength of 0.90 m.

Calculate the velocity of the wave.

velocity = ... m / s [3]

[Total: 9]

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7 **(a)** A student places a book in front of a plane mirror.

State **three** characteristics of the image of the book formed by the plane mirror.

1 .....

2 .....

3 .....

[3]

(b) Visible light is one region of the electromagnetic spectrum. Another region is ultraviolet radiation.

(i) Give **one** use of ultraviolet radiation.

..... [1]

(ii) Give **one** possible harmful effect of excessive exposure to ultraviolet radiation.

..... [1]

[Total: 5]

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8 **(a)** A student uses a dry cloth to rub a plastic rod.

State how the plastic rod gains a positive charge from friction between the cloth and the rod.

.....

.....

..... [2]

(b) Three balls, P, Q and R, are electrically charged. The balls are suspended by threads of insulating material. Fig. 8.1 shows the arrangement.

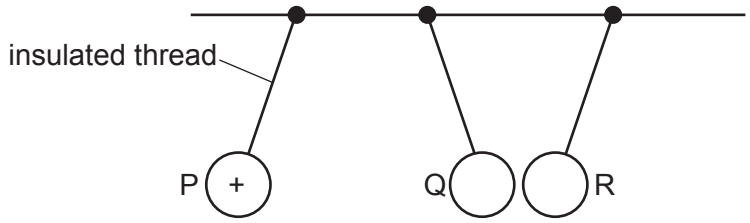

Fig. 8.1

The charge on ball P is positive.

State the charge on ball Q and the charge on ball R.

ball Q .....

ball R .....
[2]

(c) The student connects ball P to earth with a copper wire. Charges from the earth flow in the copper wire to ball P.

State the name of the electrically charged particles moving in the copper wire.

..... [1]

[Total: 5]

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9 Fig. 9.1 shows an electric kettle.

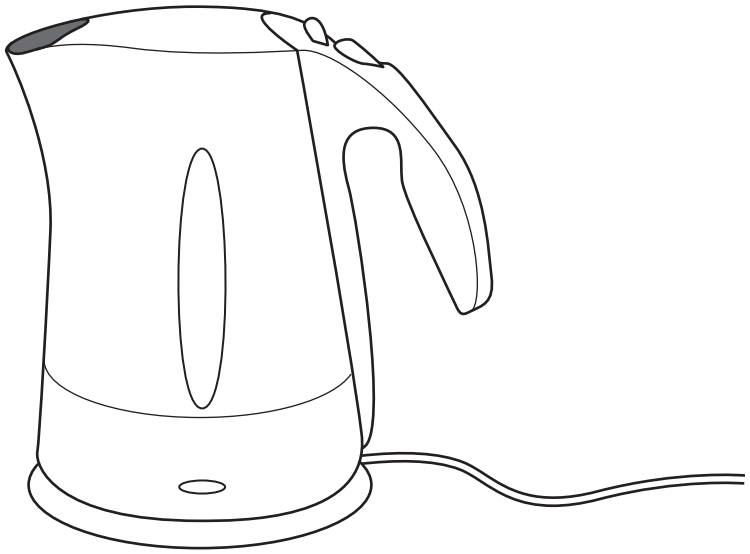

Fig. 9.1

(a) (i) The power input of the kettle is 1.5 kW. The potential difference of the mains electrical supply for the kettle is 220 V.

Calculate the current in the kettle when it is switched on.

current in kettle = ... A [4]

(ii) The 1.5 kW kettle is used for a total of 4.0 hours. The cost of 1.0 kW h of electrical energy is 14 pennies (p).

Calculate the cost of the energy used by the kettle in 4.0 hours.

cost of energy = ... p [3]

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(b) Fig. 9.2 shows an overloaded extension lead.

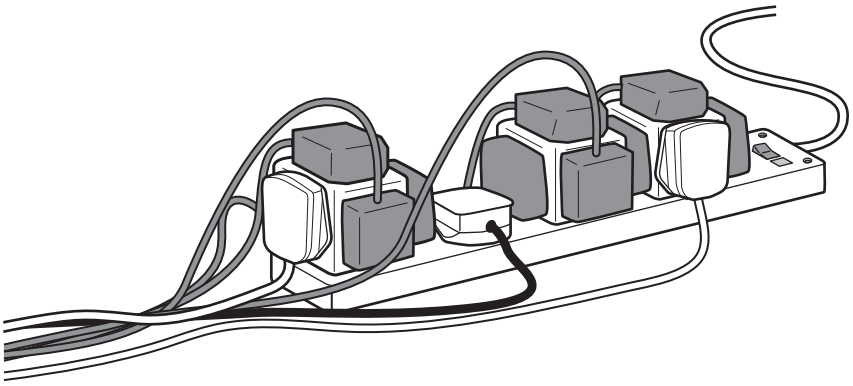

Fig. 9.2

Explain the danger of connecting too many plugs to an extension lead.

.....

.....

..... [2]

[Total: 9]

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10 **(a)** Fig. 10.1 shows two coils of wire P and Q, each in a circuit. The ends of the coils are close but not touching.

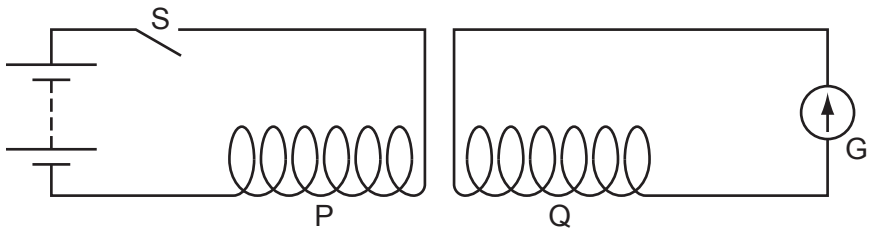

Fig. 10.1

Now, switch S is closed. The pointer in the sensitive ammeter G deflects and then returns to its zero position.

Explain why the pointer in sensitive ammeter G deflects.

.....

.....

..... [3]

(b) Describe the construction of a step-up transformer. You may draw a labelled diagram as part of your answer.

.....

.....

..... [3]

[Total: 6]

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11 Americium-241 is a radioactive nuclide. The nuclide notation for a nucleus of americium-241 is

$$^{241}_{95}\mathrm{Am}$$

(a) Determine the number of:

protons in **one** nucleus of americium-241,

..... [1]

neutrons in **one** nucleus of americium-241.

..... [1]

(b) Americium-241 has a half-life of 430 years.
A radioactive source contains 12 mg of americium-241.
Calculate the mass of americium-241 that remains in the source after 860 years.

mass of americium-241 remaining = ... mg [3]

[Total: 5]

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12 **(a)** State, in order, the names of the **three** planets closest to the Sun.

Closest to the Sun .....

.....

Furthest from the Sun .....

[2]

(b) Define a light-year.

.....

..... [2]

(c) Jupiter is 780 000 000 000 m (7.8×10^{11} m) from the Sun.

The speed of light is 300 000 000 m/s (3.0×10^{8} m/s) .

Calculate the time for light to travel from the Sun to Jupiter.

time = ... s [2]

[Total: 6]

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