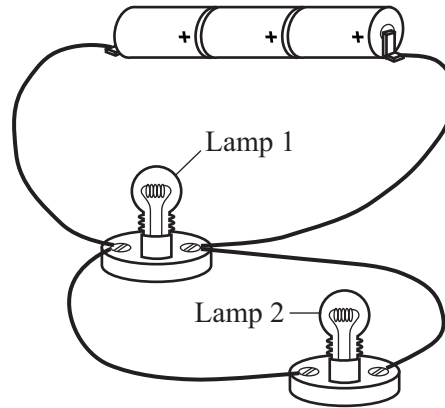


Answer **all** questions in the spaces provided.

- 1 The drawing shows three identical cells and two identical lamps joined in a circuit.



- (a) Use the correct symbols to draw a circuit diagram for this circuit.

(3 marks)

- (b) Each of the cells provides a potential difference (voltage) of 1.5 volts. What is the total potential difference (voltage) provided by all three cells?

.....volts
(1 mark)

- (c) Complete this sentence by crossing out the **two** lines in the box that are wrong.

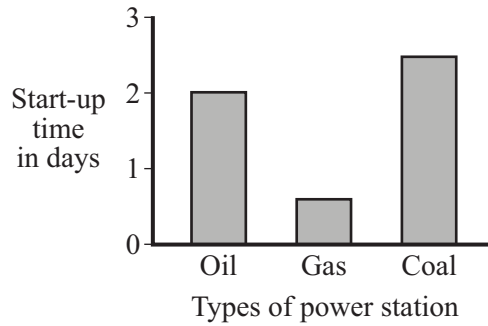
The current through lamp 2 will be

smaller than
the same as
bigger than

 the current through lamp 1.

(1 mark)

2 (a) The bar chart shows the start-up time for different types of fuel-burning power stations.



Which type of power station would be the quickest to start producing electricity?

.....
(1 mark)

(b) A fuel-burning power station is more reliable than a wind generator at producing electricity. Explain why.

.....
.....
.....
.....
(2 marks)

(c) Fuel-burning power stations may produce air pollution. Why does a wind generator not produce any air pollution?

.....
.....
(1 mark)

4

TURN OVER FOR THE NEXT QUESTION

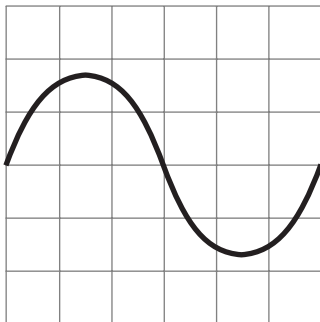
Turn over ►

- 3 (a) In the box are the names of five waves.

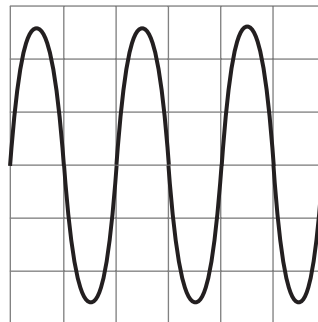
infra red	microwaves	ultrasonic	ultraviolet	X-rays
------------------	-------------------	-------------------	--------------------	---------------

Which wave is used to:

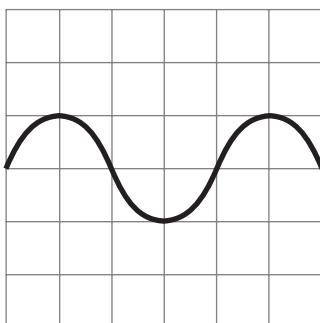
- (i) send information to a satellite, (1 mark)
- (ii) toast bread, (1 mark)
- (iii) clean a valuable ring? (1 mark)
- (b) The diagram shows four oscilloscope wave traces. The controls of the oscilloscope were the same for each wave trace.



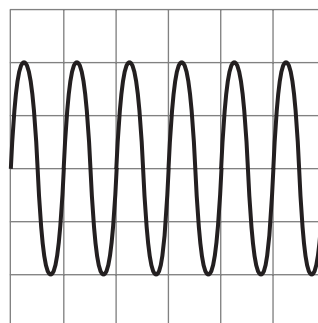
A



B



C

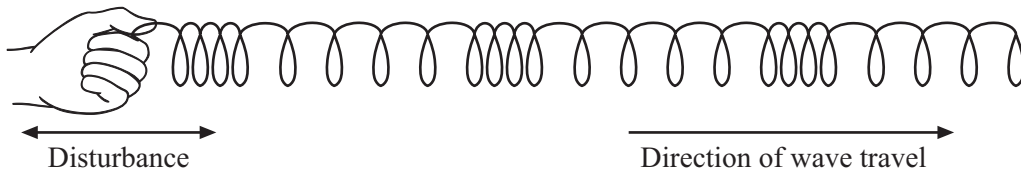


D

Which **one** of the waves traces, **A**, **B**, **C** or **D**, has:

- (i) the largest amplitude, (1 mark)
- (ii) the lowest frequency? (1 mark)

- (c) The diagram shows a longitudinal wave in a stretched spring.



Complete the sentence. You should put only **one** word in each space.

A longitudinal wave is one in which the causing the wave is in the same as that in which the wave moves.

(2 marks)

- (d) Which **one** of the following types of wave is longitudinal? Draw a ring around your answer.

light wave

sound wave

water wave

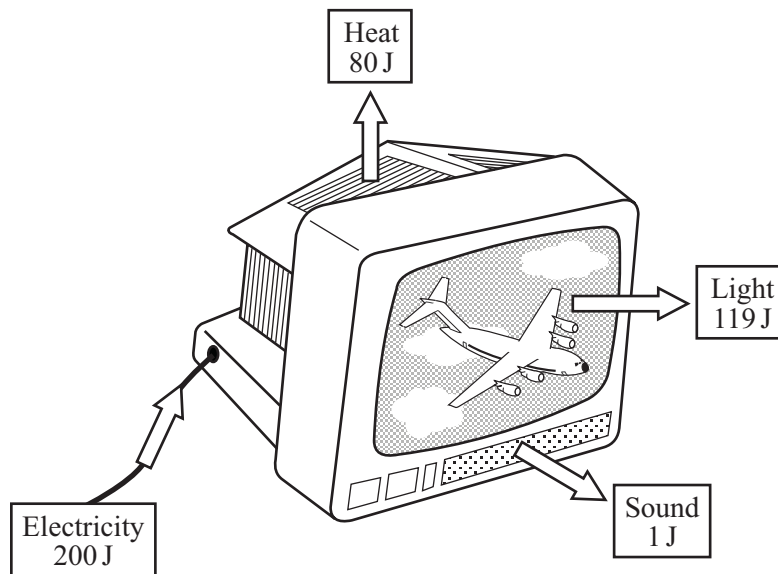
(1 mark)

8

TURN OVER FOR THE NEXT QUESTION

Turn over ►

- 4 (a) The drawing shows the energy transferred each second by a television set.



- (i) What form of energy is transferred as waste energy by the television set?

.....
(1 mark)

- (ii) What effect will the waste energy have on the air around the television set?

.....
(1 mark)

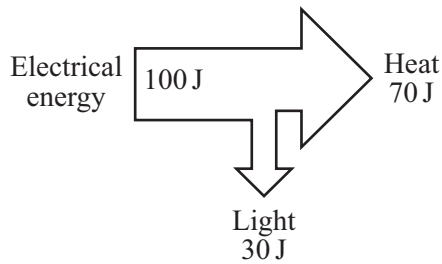
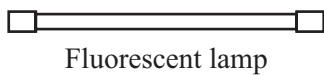
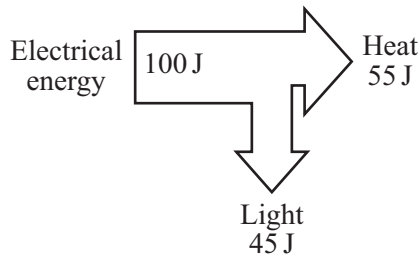
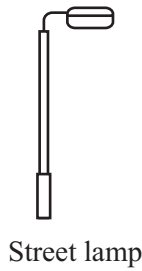
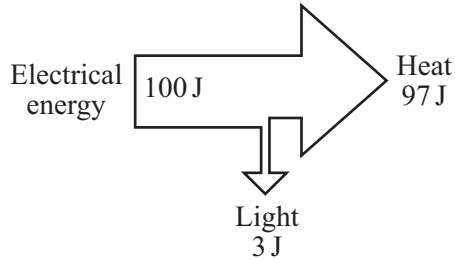
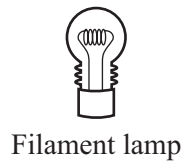
- (iii) Use the following equation to calculate the efficiency of the television set.

$$\text{efficiency} = \frac{\text{useful energy transferred by device}}{\text{total energy supplied to device}}$$

.....
.....

Efficiency =
(2 marks)

(b) The diagrams show the energy transferred each second for three different types of lamp. For each lamp the electrical energy input each second is 100 joules.



Which type of lamp is the most efficient?

.....

Give a reason for your choice.

.....

.....

(2 marks)

6

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

5 (a) Some scientists are involved in the search for *extra-terrestrial* intelligence (SETI).

(i) What does *extra-terrestrial* mean?

.....
(1 mark)

(ii) What equipment is used to carry out this search?

.....
(1 mark)

(b) In 1967, radio pulses, one every 1.337 seconds, were discovered coming from a point in space. Some scientists thought the pulses were being produced by intelligent life elsewhere in the *Universe*. Later, it was discovered that the pulses were emitted by a *neutron star*.

(i) Complete this sentence.

The *Universe* is made up of at least a billion
(1 mark)

(ii) Suggest **one** reason why scientists might have thought that the pulses were produced by intelligent life.

.....
.....
(1 mark)

(iii) What is the link between a *neutron star* and a *super nova*?

.....
.....
.....
(2 marks)

(c) In 2001, equipment was carried by balloons to a height of 41 km above the Earth’s surface. The equipment detected the presence of bacteria.

(i) The natural movement of air in the Earth’s atmosphere may have carried the bacteria up **or** the bacteria may have come from outer space.

Suggest **one** other explanation.

.....

.....

(1 mark)

(ii) Suggest **one** way in which bacteria may have travelled through space to reach the edge of our atmosphere.

.....

.....

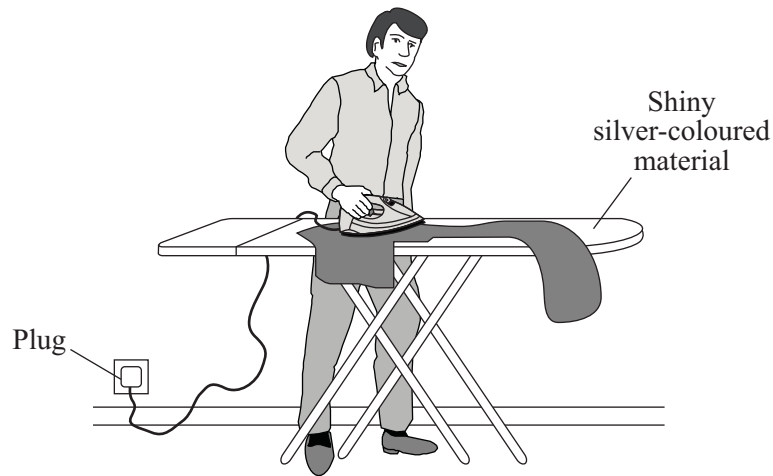
(1 mark)



TURN OVER FOR THE NEXT QUESTION

Turn over ►

- 6 The drawing shows someone ironing a shirt. The top of the ironing board is covered in a shiny silver-coloured material.

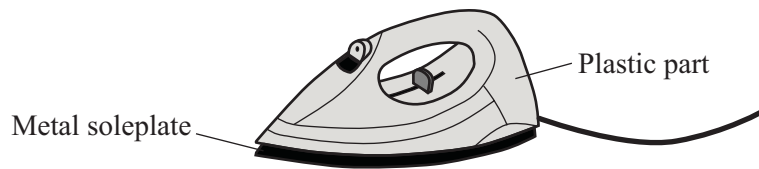


- (a) Explain why the shiny silver-coloured material helps to make ironing easier.

.....

(2 marks)

- (b) The iron must be earthed to make it safe. Which part of the iron is connected to the earth pin of the plug?



.....

(1 mark)

- (c) Name a material that could be used to make the outside case of the plug.

.....

Give a reason for your choice.

.....

(2 marks)

(d) *To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

Some electrical circuits are protected by a circuit breaker. These switch the circuit off if a fault causes a larger than normal current to flow. The diagram shows one type of circuit breaker. A normal current (15 A) is flowing.

The diagram is not reproduced here due to third-party copyright constraints.
The full copy of this paper can be obtained by ordering 3463/3F from AQA Publications
Tel: 0161 953 1170

Explain what happens when a current larger than 15 A flows. The answer has been started for you.

When the current goes above 15 A, the electromagnet becomes stronger and.....

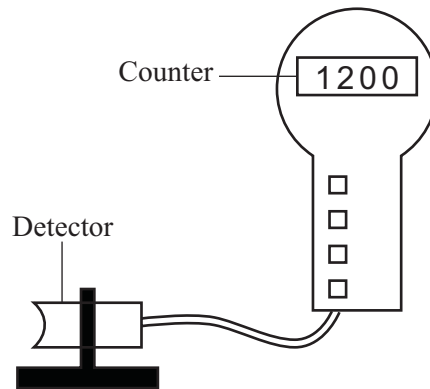
.....
.....
.....
.....
.....
.....

(3 marks)

8

Turn over ►

- 7 (a) The diagram shows a radiation detector and counter being used to measure background radiation. The number shows the count ten minutes after the counter was reset to zero.



- (i) Name **one** source of background radiation.

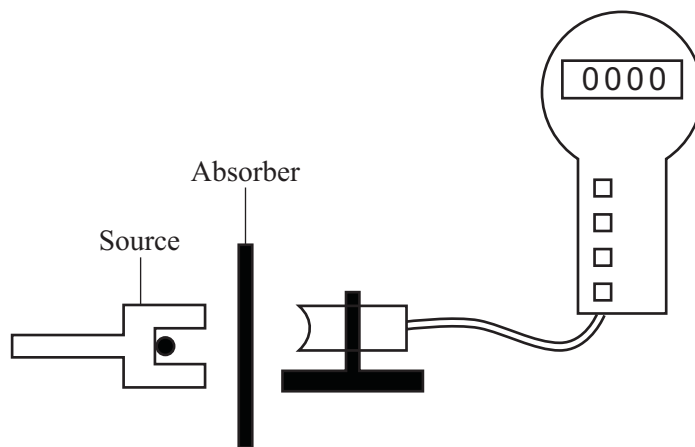
.....
(1 mark)

- (ii) Calculate the average background radiation level, in counts per second. Show clearly how you work out your answer.

.....
.....

Background radiation level =counts per second
(2 marks)

- (b) The detector and counter are used in an experiment to show that a radioactive source gives out alpha and beta radiation only.



Two different types of absorber are placed one at a time between the detector and the source. For each absorber, a count is taken over ten minutes and the average number of counts per second worked out. The results are shown in the table.

Absorber used	Average counts per second
No absorber	33
Card 1 mm thick	20
Metal 3 mm thick	2

Explain how these results show that alpha and beta radiation is being given out, but gamma radiation is **not** being given out.

.....

.....

.....

.....

.....

.....

(3 marks)

END OF QUESTIONS