



**GCSE BITESIZE Examinations**

**General Certificate of Secondary Education**

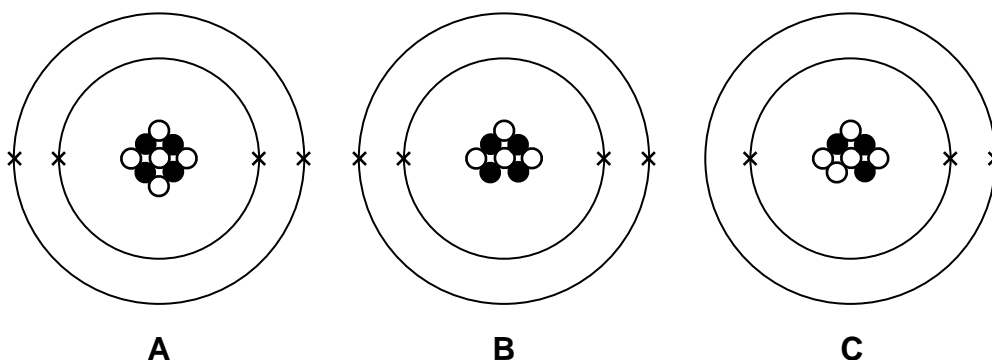
**SCIENCE DOUBLE AWARD (PHYSICS)**  
**FOUNDATION TIER**

**Specimen Paper**

**Time allowed: 1 hour 30 minutes**

**Maximum marks: 90**

1. (a) The diagrams below show three different atoms, **A**, **B** and **C**.



- (i) What is found at the centre of an atom?

.....  
(1 mark)

- (ii) What are the objects represented by the crosses in the diagrams?

.....  
(1 mark)

- (iii) Which **two** atoms are isotopes of the same element?  
Give a reason for your answer.

Atom ..... and atom .....

Reason .....

.....  
(2 marks)

- (b) (i) Which type of particle in an atom has a positive charge?

.....  
(1 mark)

- (ii) Why are atoms as a whole electrically neutral?

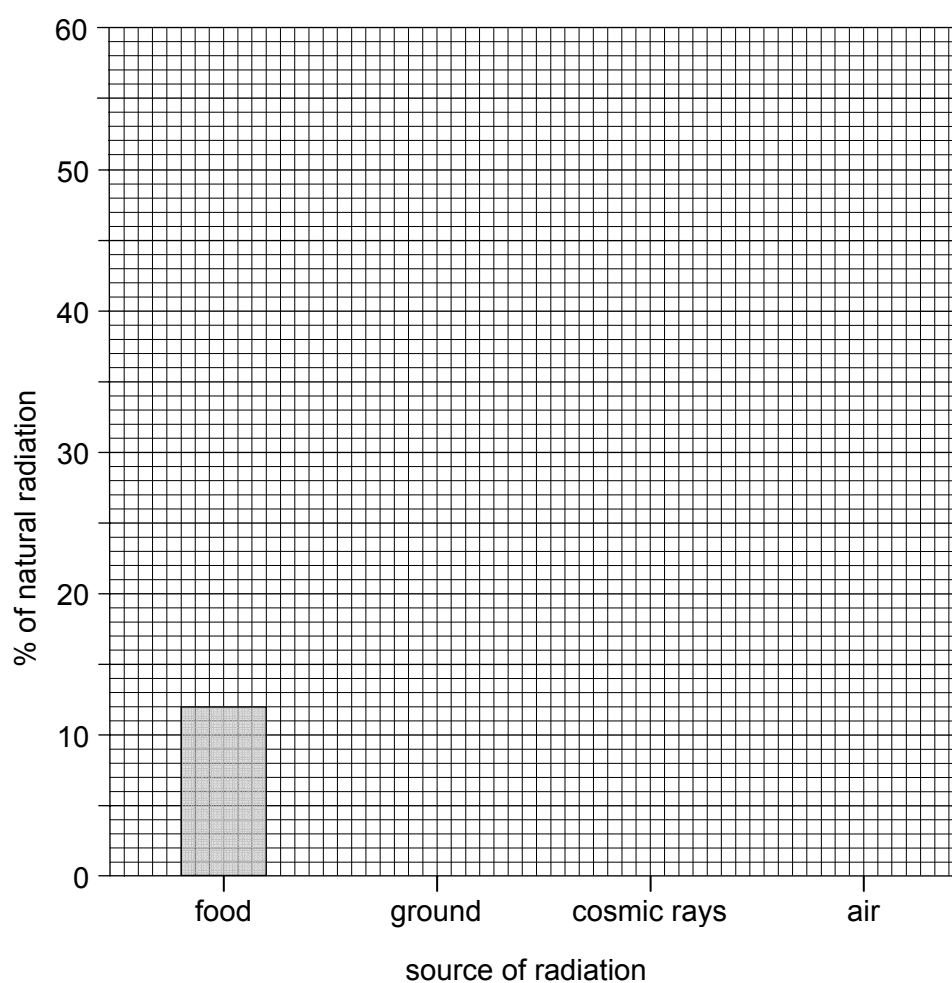
.....  
(1 mark)

Total marks for question: 6

2. (a) The table shows the different sources of natural background radiation.

source of radiation	% of natural radiation
air	58
cosmic rays	14
food	12
ground	16

- (i) Use the information in the table to complete the bar chart.  
One bar has been done for you.



(2 marks)

- (ii) Where do cosmic rays come from?

.....  
(1 mark)

- (b) State **one** artificial source of background radiation.

.....  
(1 mark)

- (c) Radioactive sources can emit three types of radiation, alpha radiation, beta radiation and gamma radiation.

(i) Name one type of radiation that is stopped by a sheet of paper.

.....  
(1 mark)

(ii) Name two types of radiation that are stopped by a sheet of aluminium.

1 .....

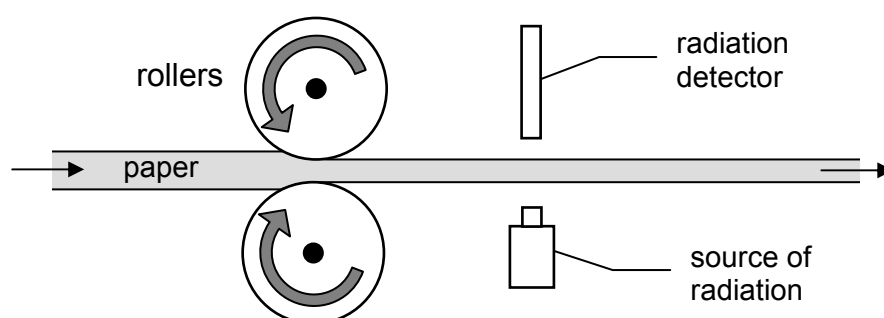
2 .....

(2 marks)

(iii) Which type of radiation is the most dangerous if it gets inside the body?

.....  
(1 mark)

- (d) Radiation can be used to monitor the thickness of paper in a paper mill.  
The radiation detector in the diagram is connected to machines that adjust the gap between heavy rollers.



(i) What will happen to the reading on the radiation detector if the paper becomes thicker?

.....  
(1 mark)

(ii) What will happen to the reading on the radiation detector if the gap between the radiation detector and the source of radiation is increased?

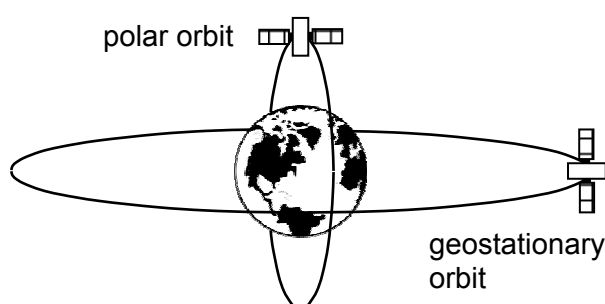
.....  
(1 mark)

(iii) Explain why the engineers who look after this machinery might need to wear radiation badges.

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

Total marks for question: 12

3. (a) The diagram shows the orbits of two artificial satellites around the Earth.



- (i) State one use of artificial satellites, other than observing space.

.....  
(1 mark)

- (ii) The polar orbit is lower than the geostationary orbit.  
Circle the phrase that correctly completes the sentence below.

The orbital time of the polar satellite is ..... the geostationary satellite.

<b>longer than</b>	<b>shorter than</b>	<b>the same as</b>
--------------------	---------------------	--------------------

(1 mark)

- (iii) State one advantage of a polar orbit compared to a geostationary orbit.

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

- (b) Scientists are planning to launch satellites to look for planets like the Earth around other stars. The satellites will be able to analyse the light coming from the planets to work out which gases are in their atmospheres.

- (i) State one advantage of putting a telescope in space.

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

- (ii) Why do the scientists hope to find evidence for oxygen in the atmospheres of these planets?

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

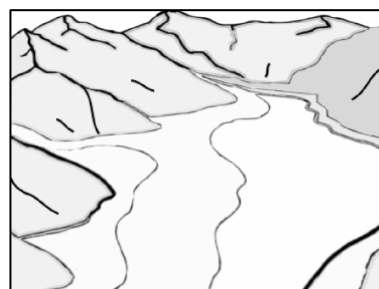
- (iii) State one reason why astronauts have not gone to these other planets.

.....  
(1 mark)

Total marks for question: 6

4. Glaciers are large masses of snow and ice that form in cold parts of the world.

There is evidence that many glaciers are melting as a result of global warming, caused by an increased greenhouse effect.



- (a) Name **one** gas, formed when fossil fuels burn, that increases the greenhouse effect.

.....  
(1 mark)

- (b) Tiny black particles of soot may be formed when fuels burn. This is carried a long way by the wind and may land on glaciers.

- (i) Explain why soot may speed up the melting of glaciers.

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

- (ii) Glaciers reflect heat energy from the sun back into space. What effect will soot have on the amount of heat energy reflected by glaciers?

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

- (c) Fuels may be renewable or non-renewable. They may also be fossil fuels or non-fossil fuels.

- (i) Tick the correct boxes in the table below.

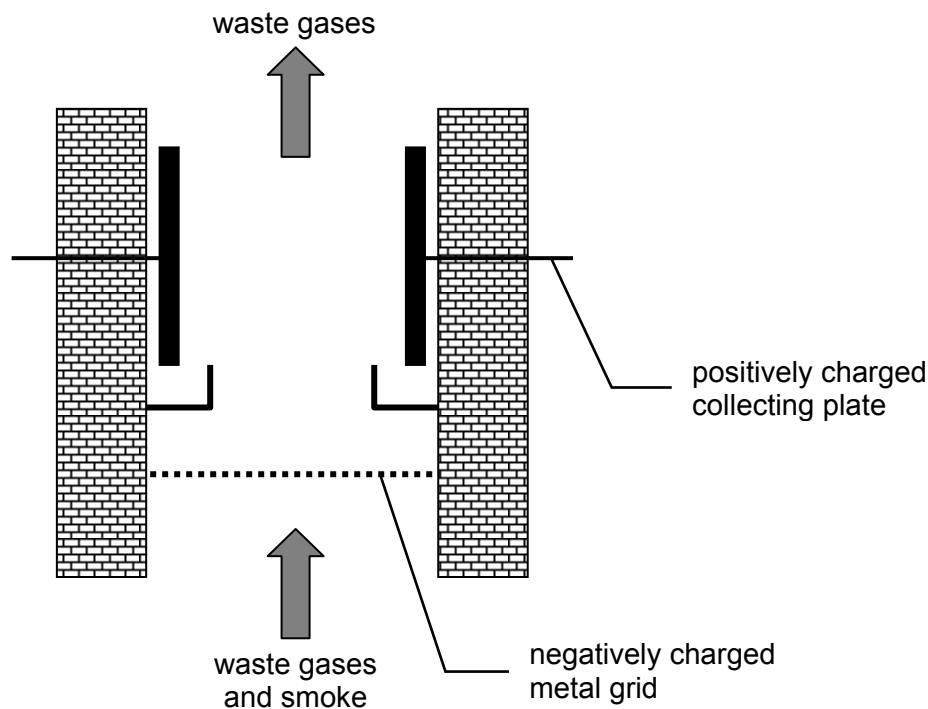
fuel	renewable	non-renewable	fossil fuel	non-fossil fuel
coal				
oil				
wood				
uranium				

(4 marks)

- (ii) Name one fossil fuel, not mentioned in the table above.

.....  
(1 mark)

- (d) The diagram shows an electrostatic precipitator. These are fitted in the chimneys of power stations fuelled by fossil fuels. They remove smoke from the waste gases and help to reduce pollution.



- (i) When smoke particles pass through the metal grid they become negatively charged. Will they be attracted to the grid or repelled by it?

.....  
(1 mark)

- (ii) Will the smoke particles be attracted to the collecting plates or repelled by them?

.....  
(1 mark)

- (e) Electricity may be generated by nuclear power stations.

- (i) State one advantage of a nuclear power station compared to a power station fuelled by coal.

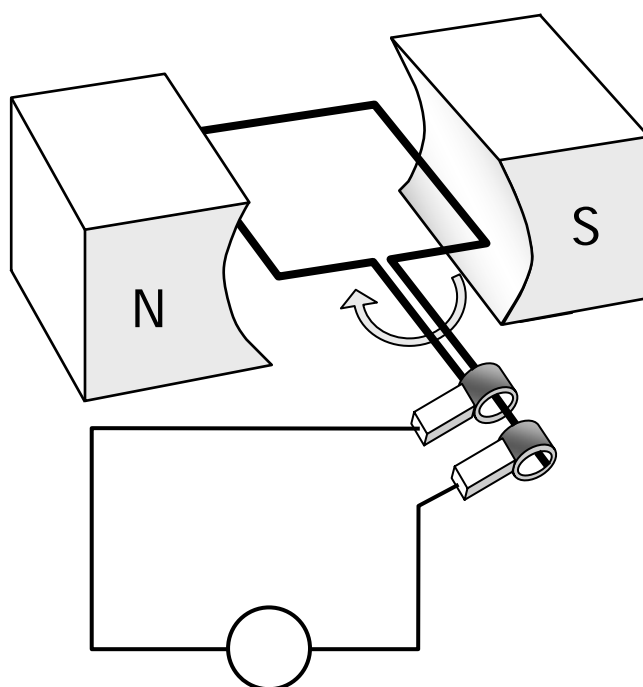
.....  
.....  
(1 mark)

- (ii) State one disadvantage of a nuclear power station compared to a power station fuelled by coal.

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

Total marks for question: 13

5. Electricity can be generated by spinning a coil of wire in a magnetic field.



- (a) Complete the diagram to show the circuit symbol for a voltmeter. (1 mark)

- (b) What happens to the induced voltage if the coil is turned in the opposite direction to the one shown in the diagram?

.....  
(1 mark)

- (c) State **three** ways in which the size of the induced voltage can be increased.

1 .....  
2 .....  
3 .....  
(3 marks)

- (d) What is the approximate voltage of the UK mains electricity supply?

.....  
(1 mark)

- (e) Why are there electricity transformers between overhead electricity cables and the electricity supply to homes? Circle the correct answer below.

**to reduce the current**  
**to change d.c. electricity to a.c. electricity**

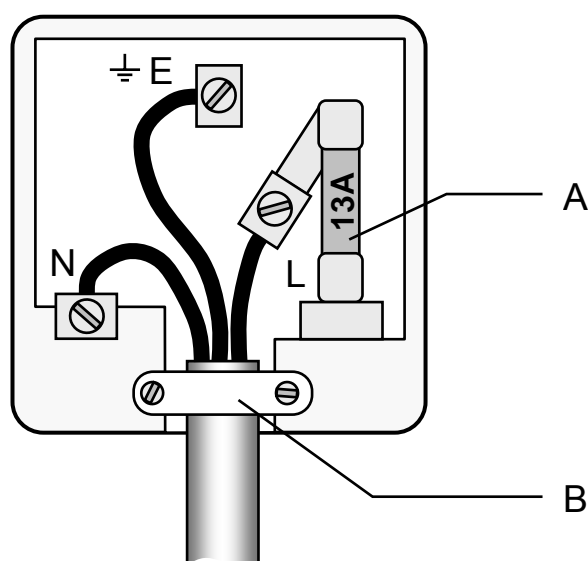
**to change a.c. electricity to d.c. electricity**  
**to reduce the voltage**

(1 mark)

Total marks for question: 7



6. The diagram shows the inside of a 3-pin electrical plug.



(a) Name the correct colours of each the three wires.

Wire N .....

Wire E .....

Wire L .....

(3 marks)

(b) Name a suitable material for making the case of the plug, and explain why you have chosen this material.

Material .....

Explanation .....

(2 marks)

(c) (i) Name the object labelled **A** and explain what it does.

.....

.....

(3 marks)

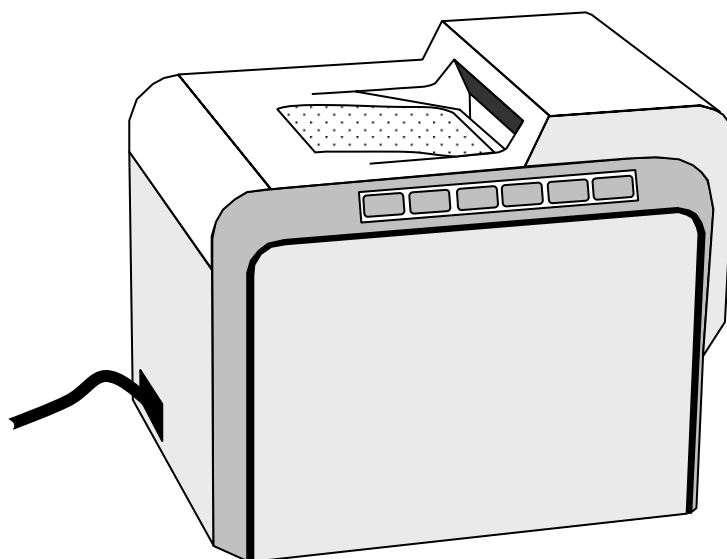
(ii) Name the object labelled **B** and explain what it does.

.....

(2 marks)

Total marks for question: 10

7. Laser printers are electrical devices that print high quality pictures and text.



- (a) Use the following equation to help you answer this question.

$$\begin{array}{ccccc} \text{power} & = & \text{potential difference} & \times & \text{current} \\ \text{(watt, W)} & & \text{(volt, V)} & & \text{(ampere, A)} \end{array}$$

- (i) When it is printing, the laser printer needs 440 W.  
What current flows if the potential difference is 220 V?

.....

Answer ..... A  
(2 marks)

- (ii) Which fuse, 1 A, 3 A, 5 A or 30 A, would be the most suitable to use with the laser printer? Give a reason for your answer.

Fuse ..... A

Reason .....

.....

(2 marks)

- (b) Use the following equation to help you answer this question.

$$\begin{array}{ccccc} \text{energy transferred} & = & \text{power} & \times & \text{time} \\ \text{(kilowatt-hour, kWh)} & & \text{(kilowatt, kW)} & & \text{(hour, h)} \end{array}$$

How many units (kWh) of electricity are transferred if the printer works continuously for 2 hours?

.....

.....

Answer ..... kWh  
(2 marks)

- (c) Use your answer to part (b) and the following equation to help you answer this question.

$$\text{total cost} = \text{number of Units} \times \text{cost per Unit}$$

If one unit of electricity costs 10p, how much would it cost to run the printer for 2 hours?

.....

Answer ..... p  
(2 marks)

- (d) Laser printers become warm while they are working.

- (i) Name **two** ways in which heat energy can be lost from the printer to the surroundings.

1 .....

2 .....

(2 marks)

- (ii) The loss of heat from the printer is not a useful energy transfer. Suggest **one** other energy transfer from the printer that is not useful.

.....  
(1 mark)

- (iii) Use the following equation to help you answer this question.

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

The printer is supplied with 440 J of electricity each second while it is working, but 330 J of energy is lost each second through energy transfers that are not useful.

Calculate the efficiency of the printer.

.....

.....

Efficiency = .....  
(2 marks)

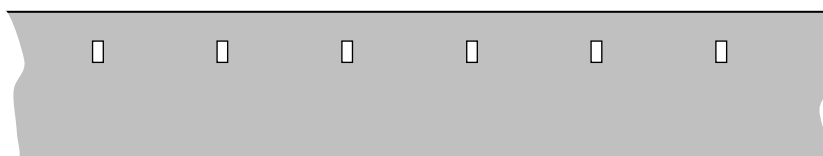
- (iv) When the printer goes into standby mode it needs 44 J of electricity each second. Suggest **one** advantage of having a standby mode.

.....

.....  
(1 mark)

Total marks for question: 14

8. A car has driven over some oil spilled in the road. The oil rubs off onto the road as the car moves along, leaving the trail seen below.



- (a) (i) Circle the correct statement below about the movement of the car.

**it is slowing down**

**it is speeding up**

**it is moving at a steady speed**

(1 mark)

- (ii) Explain your answer to part (i).

.....

.....

(1 mark)

- (b) The car driver stops to get out to look at the tyre.

- (i) Name **two** things that would increase the braking distance of the car.

1 .....

2 .....

(2 marks)

- (ii) Name **one** thing that would increase the thinking distance.

.....

(1 mark)

- (c) Use the following equation to help you answer this question.

$$\text{acceleration (m/s}^2\text{)} = \frac{\text{change in velocity (m/s)}}{\text{time taken for change (s)}}$$

After stopping to look at the tyre, the car driver sets off again. The car reaches 10 m/s after 5 s. Calculate the car's acceleration.

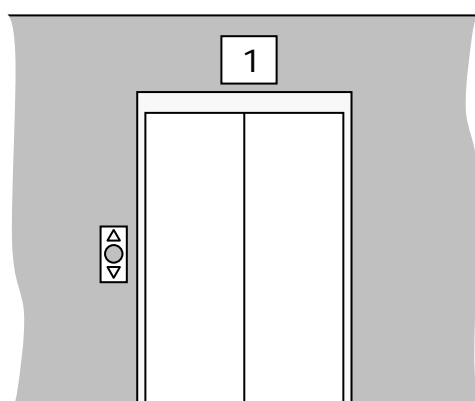
.....

.....

Answer ..... m/s<sup>2</sup>  
(2 marks)

Total marks for question: 7

9. In a lift in a hotel moves 3 m from floor to floor.



- (a) A passenger in the lift has a mass of 70 kg and weighs 700 N. The mass of the empty lift is 1000 kg. Calculate its weight.

.....

Answer ..... N  
(2 marks)

- (b) Use the following equation to help you answer this question.

$$\begin{array}{ccccc} \text{work done} & = & \text{force applied} & \times & \text{distance moved} \\ \text{(joule, J)} & & \text{(newton, N)} & & \text{(metre, m)} \end{array}$$

Calculate the work done when the empty lift moves up two floors.

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

Answer ..... J  
(2 marks)

- (c) (i) Write down the equation that links power, work done, and time taken.

.....  
(1 mark)

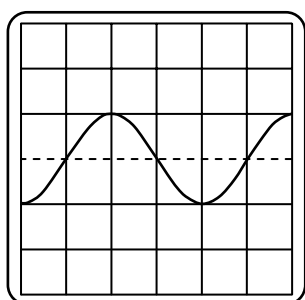
- (ii) Calculate the power needed to move the empty lift up two floors in 15 s.

.....  
.....

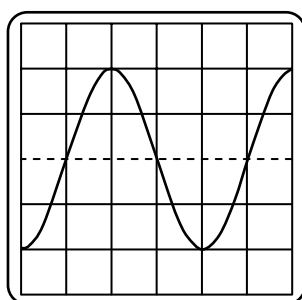
Answer .....  
(3 marks)

Total marks for question: 8

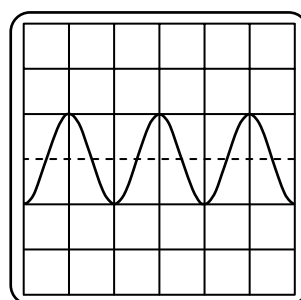
10. The diagrams show three oscilloscope traces.



Trace 1



Trace 2



Trace 3

(a) (i) Which trace has the greatest frequency?

..... (1 mark)

(ii) Which trace has the greatest amplitude?

..... (1 mark)

(b) Which of **one** of the following is a transverse wave?  
Circle the correct answer.

(1 mark)

**sound wave**

**light wave**

**ultrasound wave**

(c) Draw straight lines to match each type of electromagnetic radiation to one of its uses. One has been done already.

gamma radiation

cooking food

infra red

killing cancer cells

microwaves

optical fibre communications

ultraviolet ————— sunbeds

(3 marks)

(d) Information can be sent as digital signals along optical fibres.  
State **one** advantage of digital signals compared to analogue signals.

.....

.....

(1 mark)

Total marks for question: 7

End of Questions