

Monday 16 June 2014 – Morning

**GCSE GATEWAY SCIENCE
FURTHER ADDITIONAL SCIENCE B**

B761/01 Further Additional Science modules B5, C5, P5 (Foundation Tier)

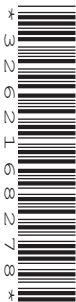
Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 1 hour 15 minutes




| | | | |
|--------------------|--|-------------------|--|
| Candidate forename | | Candidate surname | |
|--------------------|--|-------------------|--|

| | | | | | | | | | | | |
|---------------|--|--|--|--|--|--|------------------|--|--|--|--|
| Centre number | | | | | | | Candidate number | | | | |
|---------------|--|--|--|--|--|--|------------------|--|--|--|--|

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with a pencil .
- A list of equations can be found on page 2.
- The Periodic Table can be found on the back page.
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **75**.
- This document consists of **28** pages. Any blank pages are indicated.

EQUATIONS

$$\text{energy} = \text{mass} \times \frac{\text{specific heat capacity}}{\text{temperature change}} \times \text{temperature change}$$

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

$$\text{energy} = \text{mass} \times \text{specific latent heat}$$

$$v = u + at$$

$$\text{efficiency} = \frac{\text{useful energy output} (\times 100\%)}{\text{total energy input}}$$

$$v^2 = u^2 + 2as$$

$$s = ut + \frac{1}{2}at^2$$

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$m_1u_1 + m_2u_2 = (m_1 + m_2)v$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{refractive index} = \frac{\text{speed of light in vacuum}}{\text{speed of light in medium}}$$

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{magnification} = \frac{\text{image size}}{\text{object size}}$$

$$\text{distance} = \text{average speed} \times \text{time}$$

$$I_e = I_b + I_c$$

$$s = \frac{(u + v)}{2} \times t$$

$$\frac{\text{voltage across primary coil}}{\text{voltage across secondary coil}} = \frac{\text{number of primary turns}}{\text{number of secondary turns}}$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{power loss} = (\text{current})^2 \times \text{resistance}$$

$$\text{weight} = \text{mass} \times \text{gravitational field strength}$$

$$\text{work done} = \text{force} \times \text{distance}$$

$$V_p I_p = V_s I_s$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

$$\text{power} = \text{force} \times \text{speed}$$

$$\text{KE} = \frac{1}{2}mv^2$$

$$\text{momentum} = \text{mass} \times \text{velocity}$$

$$\text{force} = \frac{\text{change in momentum}}{\text{time}}$$

$$\text{GPE} = mgh$$

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Question 1 begins on page 4

PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

SECTION A – Module B5

- 1 Animals use different surfaces to get oxygen.

| Animal | Approximate width of animal in cm | Surface used to get oxygen |
|---------------|--|-----------------------------------|
| amoeba | 0.01 | whole outer surface |
| earthworm | 1 | whole outer surface |
| frog | 4 | whole outer surface and lungs |
| rabbit | 10 | lungs |
| human | 40 | lungs |

- (a) What pattern can you see in the table about the **surfaces** used by different sized animals?

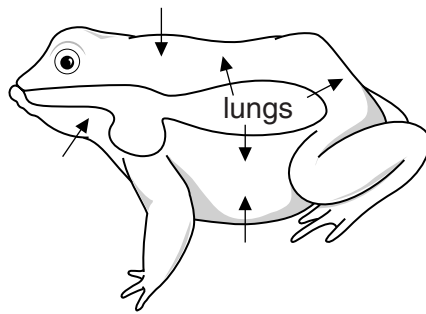
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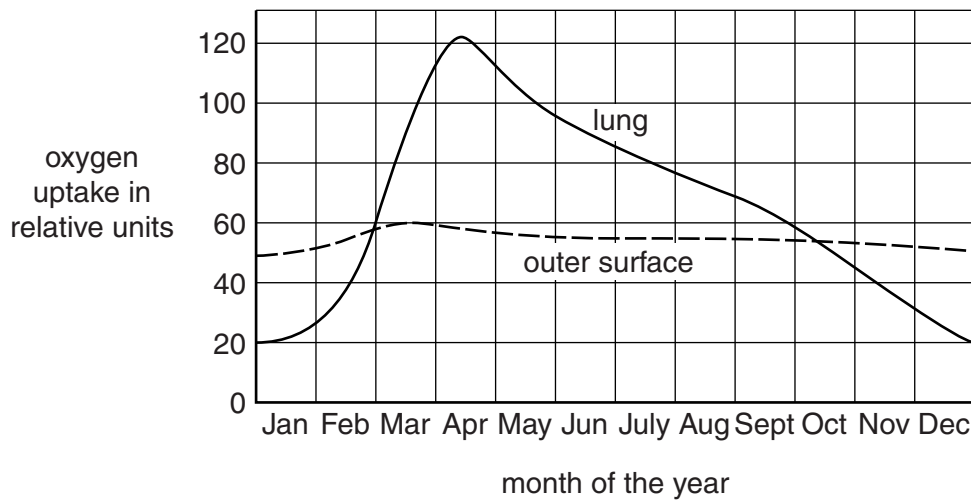
..... [2]

(b) A frog can take in oxygen through its whole outer surface and lungs.



Look at the graph.

It shows the amount of oxygen taken up by a frog at different times of the year.



(i) Describe **two** patterns shown in the graph.

.....

.....

.....

..... [2]

(ii) During which month is a frog most active?

Use information from the graph and your knowledge of respiration to explain your answer.

month

.....

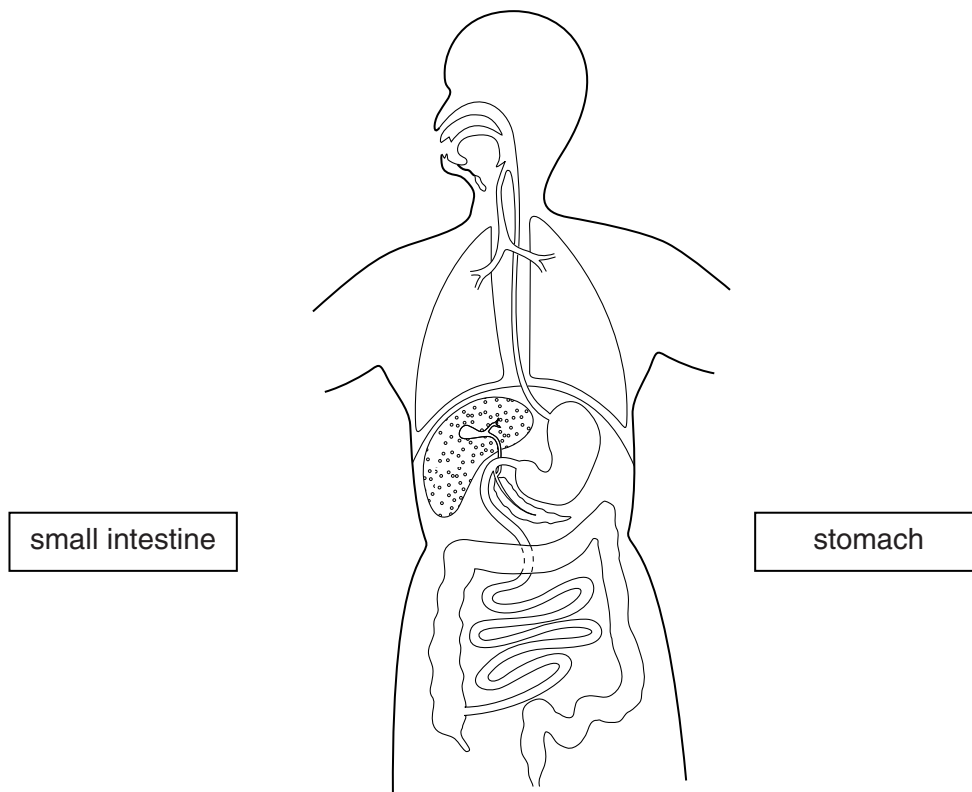
.....

..... [3]

[Total: 7]

Turn over

2 The diagram shows the human digestive system.



The small intestine and stomach are two parts of the digestive system.

(a) Add label lines to the diagram to show the position of the

(i) small intestine

(ii) stomach.

[2]

3 Infertility means that some couples have problems having a baby.

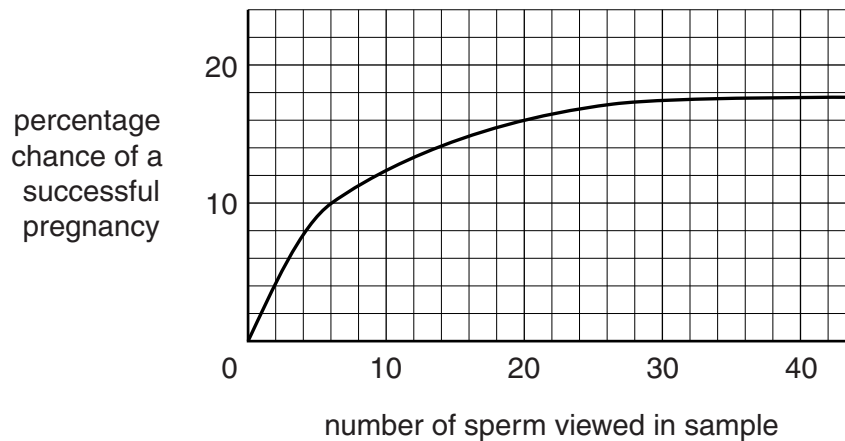
(a) Draw lines to join the **cause of infertility** to the best **method for treatment**.

| cause of infertility | method for treatment |
|------------------------------------|----------------------|
| blocked fallopian tubes | egg donation |
| no eggs produced | IVF |
| uterus cannot maintain a pregnancy | surrogacy |

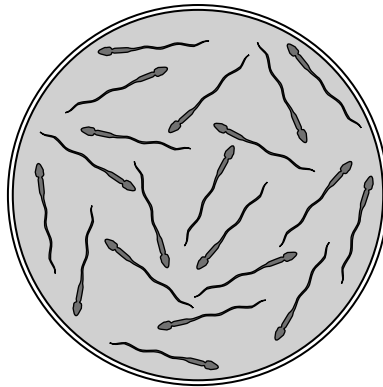
[2]

(b) Artificial insemination is also used to treat some types of infertility.

The graph shows the chance of pregnancy from artificial insemination with different samples of sperm.



(i) A doctor looks at a sample of sperm with a microscope.

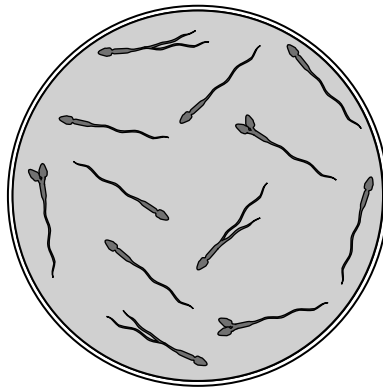


Use the graph to find out the percentage chance of a successful pregnancy using **this** sperm sample.

..... %

[1]

(ii) The doctor looked at a sample from another person.



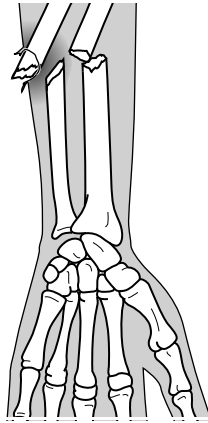
Using this sample is less likely to result in a successful pregnancy.

Suggest **two** reasons why.

.....
.....
..... [2]

[Total: 5]

4 The picture shows a fractured arm.



(a) Write about the fracture shown in the picture.

In your answer include:

- the name of the machine used to take the picture
- the type of fracture and the names of the bones damaged.

.....

.....

.....

.....

.....

..... [3]

(b) Other parts of the body can also be damaged or develop problems.

Draw lines to join the **part of the body** with the **machine used** to take over the job of the damaged part.

| part of the body | machine used |
|------------------|------------------|
| heart | dialysis machine |
| lungs | pacemaker |
| kidneys | ventilator |

[2]

[Total: 5]

SECTION B – Module C5

- 5 This question is about scientific units.

Draw a straight line between the **physical quantity** and its correct **unit**.

You should only draw five straight lines.

physical quantity

concentration

mass

molar mass

temperature

volume

unit

g/mol

g

mol/dm³dm³

°C

[3]**[Total: 3]**

6 This question is about acids.

(a) Nitric acid has similar reactions to hydrochloric acid.

Nitric acid reacts with calcium carbonate.

A gas is made.

Which gas?

Choose from:

ammonia

carbon dioxide

hydrogen

nitrogen

nitrogen dioxide

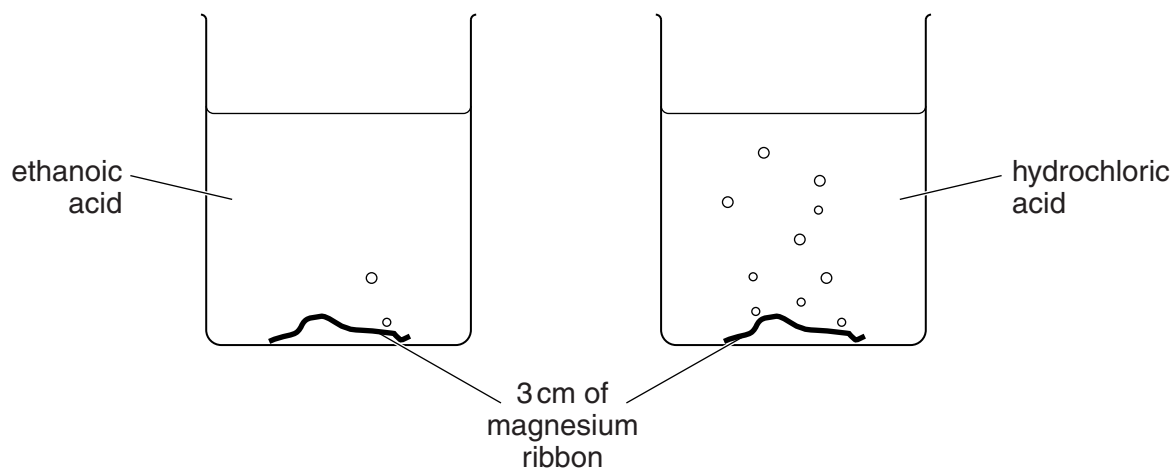
answer

[1]

(b) Julie puts a 3 cm length of magnesium into dilute ethanoic acid.

She puts another 3 cm length of magnesium into dilute hydrochloric acid.

She uses the same volume and concentration of both acids.



(i) What is the name of the gas made in both reactions?

..... [1]

(ii) Ethanoic acid reacts much more slowly than hydrochloric acid.

Explain why using the reacting particle model.

.....

.....

.....

.....

.....

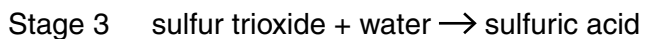
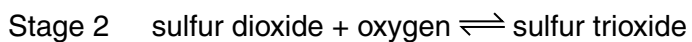
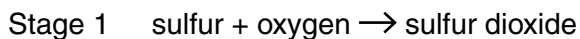
.....

..... [3]

[Total: 5]

7 Sulfuric acid is made by the Contact Process.

Look at the word equations. They show how sulfuric acid is made.



(a) Write down the names of the **three raw materials** needed to make sulfuric acid.

.....
..... [3]

(b) One of the three stages is a reversible reaction.

Which stage?

How can you tell from the equations?

.....
..... [1]

[Total: 4]

15
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Question 8 begins on page 16
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(b) Phil also thinks the water is polluted by an acid.

He decides to test the pH of the river water.

He does not have a pH meter.

Describe how Phil could find the pH of the river water.

.....

.....

..... [2]

[Total: 8]

9 Nick is eating a potato snack.

He looks at the label on the packet.

The label shows Guideline Daily Amounts, GDA, and some other nutritional information.

| | Amount in 100 g of snack | Adult GDA value | Percentage of GDA in 100 g of snack (%) |
|---------------|--------------------------|-----------------|---|
| energy | 1910 kJ | 8300 kJ | 23 |
| protein | 4.5 g | 45 g | 10 |
| carbohydrates | 61.8 g | 230 g | 27 |
| fat | 14.0 g | 70 g | 20 |
| fibre | 3.2 g | 24 g | 13 |
| sodium | 1.27 g | 2.4 g | 53 |

(a) Nick got all his GDA for fat from the potato snack.

(i) How many grams of the snack did he eat?

.....

 answer [1]

(ii) Suggest problems with eating this much potato snack.

.....

 [2]

(b) Scientists decide the GDA value by doing experiments.

Suggest **two** reasons why the GDA values on the packet are provisional and in future years may change.

.....

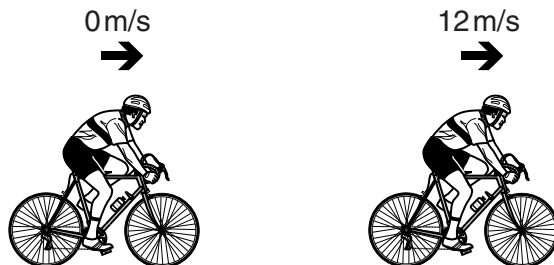
 [2]

[Total: 5]

SECTION C – Module P5

10 Bradley races on his bike. His cycling coach takes measurements of his performance in the race.

- (a) Bradley starts from rest and accelerates steadily to 12 m/s. This takes him 7 s.

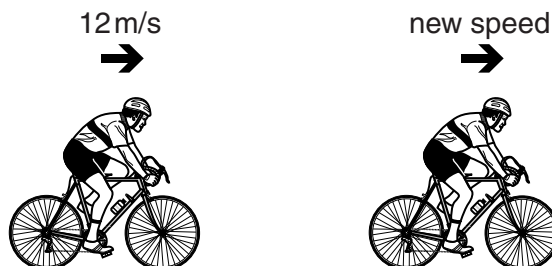


How far does Bradley travel in this time?

.....

answer m [2]

- (b) Bradley travels at a steady speed of 12 m/s.



He now pedals harder and accelerates at 0.25 m/s^2 for 20 s. Calculate Bradley's new speed.

.....

answer m/s [2]

- (c) Bradley now cycles into the wind. He pedals with the same force as before. His cycling coach notices that his speed decreases as he cycles into the wind. Use ideas about forces to suggest why.

.....

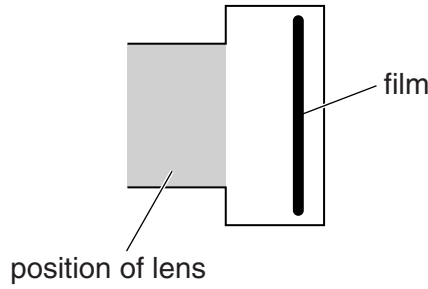
..... [2]

[Total: 6]

Turn over

11 Ellie has an old camera which uses a lens to focus an image onto a film.

Look at the diagram of her simple camera with a single lens.



(a) What **type** of lens is used in this camera?

Choose from

- concave convex diverging reflecting**

..... [1]

(b) The lens in Ellie’s camera has a focal length of 30 mm.

Describe what focal length means.

.....
..... [2]

(c) Ellie’s camera produces an image on the film.

What **type** of image does the camera produce on the film?

..... [1]

(d) Ellie points the camera at a **nearby** insect.

The image of the insect is not in focus.

Describe what must happen to the lens in the camera to focus the image of the insect.

.....
..... [1]

(e) Ellie takes a picture of the insect.

The insect is 5 mm long.

The image produced on the film is 12.5 mm long.

Calculate the image **magnification**.

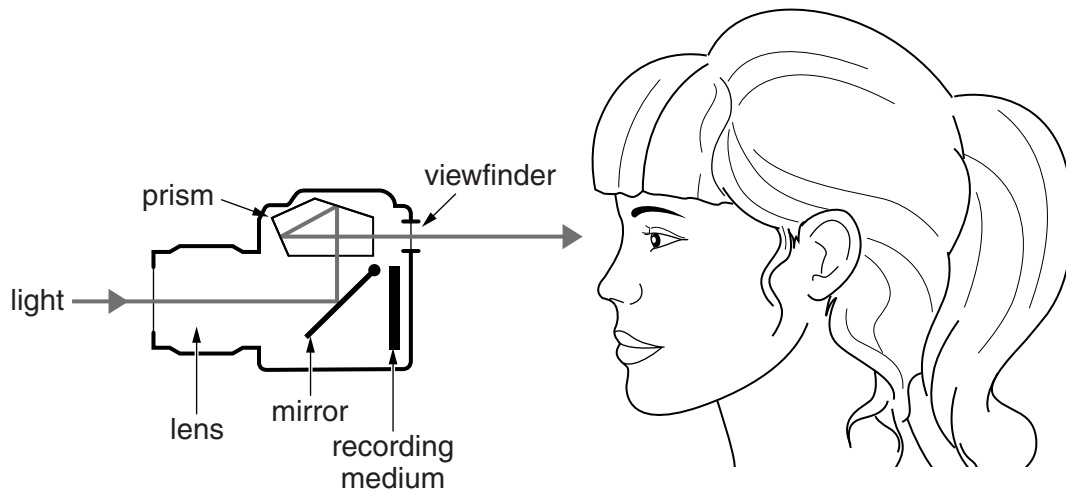
.....

magnification = [2]

(f) Ellie has another camera. It has a mirror that reflects some of the light into a prism.

The light then comes out of the viewfinder so that Ellie can see the image.

Look at the diagram.



Name the process which describes what happens to the light in the prism.

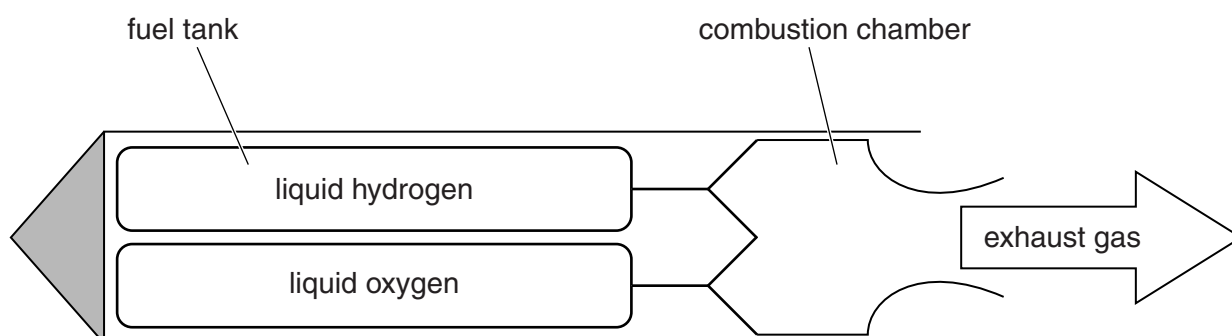
.....

[Total: 9]

12 Rockets are used for space travel.

They use hydrogen fuel which reacts with oxygen in a combustion chamber.

Look at the simple diagram of a rocket.



In order for the rocket to move:

- The hydrogen particles react violently with the oxygen particles in the combustion chamber.
- This produces a high temperature and pressure.
- The exhaust gas is forced out of the combustion chamber.

Explain what causes the high pressure in the combustion chamber and how this makes the rocket move forward.

Use ideas about particles and forces in your answer.

13 Look at the information about different artificial satellites.

| Satellite | Average height above Earth in km | Time taken to make one orbit around Earth in hours | Position | Use |
|-----------------------------|----------------------------------|--|---|--|
| G.O.E.S. | 35 800 | 24.0 | fixed position above a point on the equator | collects weather images of northern hemisphere |
| International Space Station | 360 | 1.5 | moves over North and South poles | collects images of Earth |
| Galaxy | 35 800 | 24.0 | fixed position above a point on the equator | relays TV signals |

Use information from this table to answer the following questions about satellites.

(a) In a town, the TV satellite dishes all point to the sky in the same fixed direction.

Explain why.

.....
 [1]

(b) The International Space Station collects many detailed images of different parts of the Earth's surface.

(i) Explain why different parts of the Earth's surface can be photographed each day.

.....

 [1]

(ii) The pictures from the International Space Station are more detailed than the pictures from the G.O.E.S. satellite.

Explain why.

.....
 [1]

(c) The G.O.E.S. satellite is in a fixed position above one point on the equator.

However it can collect weather images from a large area of the Earth's surface.

Suggest how this is possible.

.....
..... [1]

[Total: 4]

END OF QUESTION PAPER

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The Periodic Table of the Elements

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | | | | | | | | | |
|--|--------------------------------------|------------------------------------|--|--|--------------------------------------|---|---------------------------------------|--------------------------------------|---|---|--|---|------------------------------------|------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|
| | 7 Li lithium 3 | 9 Be beryllium 4 | <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> 1 H hydrogen 1 </div> | | | | | 19 F fluorine 9 | 4 He helium 2 | | | | | | | | |
| | 23 Na sodium 11 | 24 Mg magnesium 12 | <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> relative atomic mass atomic symbol name atomic (proton) number </div> | | | | | 16 O oxygen 8 | 20 Ne neon 10 | | | | | | | | |
| | 39 K potassium 19 | 40 Ca calcium 20 | 45 Sc scandium 21 | 48 Ti titanium 22 | 51 V vanadium 23 | 52 Cr chromium 24 | 55 Mn manganese 25 | 56 Fe iron 26 | 59 Co cobalt 27 | 59 Ni nickel 28 | 63.5 Cu copper 29 | 70 Ga gallium 31 | 73 Ge germanium 32 | 75 As arsenic 33 | 79 Se selenium 34 | 80 Br bromine 35 | 84 Kr krypton 36 |
| | 85 Rb rubidium 37 | 88 Sr strontium 38 | 89 Y yttrium 39 | 91 Zr zirconium 40 | 93 Nb niobium 41 | 96 Mo molybdenum 42 | [98] Tc technetium 43 | 101 Ru ruthenium 44 | 103 Rh rhodium 45 | 106 Pd palladium 46 | 112 Cd cadmium 48 | 115 In indium 49 | 119 Sn tin 50 | 122 Sb antimony 51 | 127 I iodine 53 | 131 Xe xenon 54 | |
| | 133 Cs caesium 55 | 137 Ba barium 56 | 139 La* lanthanum 57 | 178 Hf hafnium 72 | 181 Ta tantalum 73 | 184 W tungsten 74 | 186 Re rhenium 75 | 190 Os osmium 76 | 192 Ir iridium 77 | 195 Pt platinum 78 | 201 Hg mercury 80 | 204 Tl thallium 81 | 207 Pb lead 82 | 209 Bi bismuth 83 | [210] At astatine 85 | [222] Rn radon 86 | |
| | [223] Fr francium 87 | [226] Ra radium 88 | [227] Ac* actinium 89 | [261] Rf rutherfordium 104 | [262] Db dubnium 105 | [266] Sg seaborgium 106 | [264] Bh bohrium 107 | [277] Hs hassium 108 | [268] Mt meitnerium 109 | [271] Ds darmstadtium 110 | [272] Rg roentgenium 111 | Elements with atomic numbers 112-116 have been reported but not fully authenticated | | | | | |

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.