

# Specimen Paper

Centre Number						Candidate Number					
Surname											
Other Names											
Candidate Signature											



General Certificate of Secondary Education  
Foundation Tier

## Science A 2 Unit 6

# F

### For this paper you must have:

- a ruler
- the Chemistry Data Sheet (enclosed)
- the Physics Equation Sheet (enclosed).

You may use a calculator.

### Time allowed

- 90 minutes

### Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 13 should be answered in continuous prose.  
In this question you will be marked on your ability to:
  - use good English
  - organise information clearly
  - use specialist vocabulary where appropriate.

### Advice

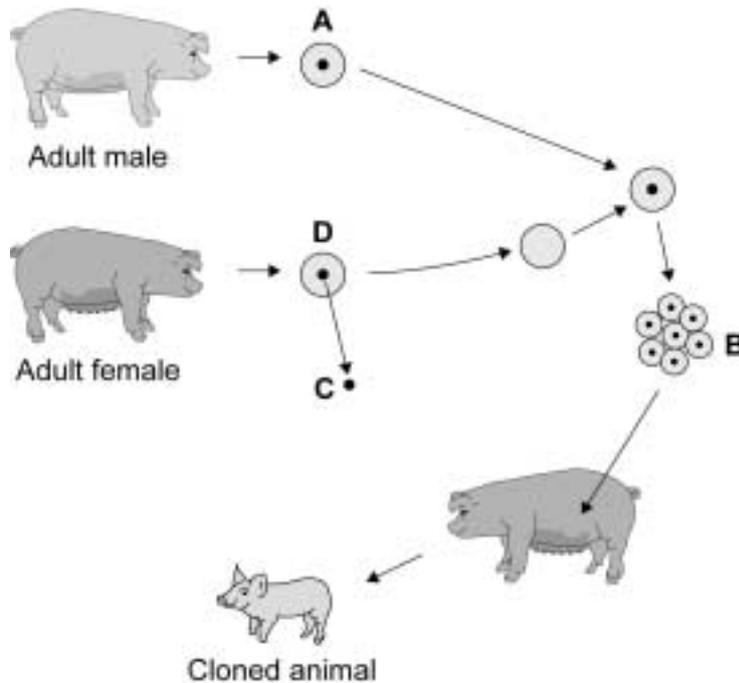
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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11	
12	
13	
14	
15	
TOTAL	

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

### Biology Questions

1 (a) The diagram shows how pigs can be cloned.



For each question write the correct letter in the box.

Which structure, **A**, **B**, **C** or **D** is:

1 (a) (i) an egg cell

(1 mark)

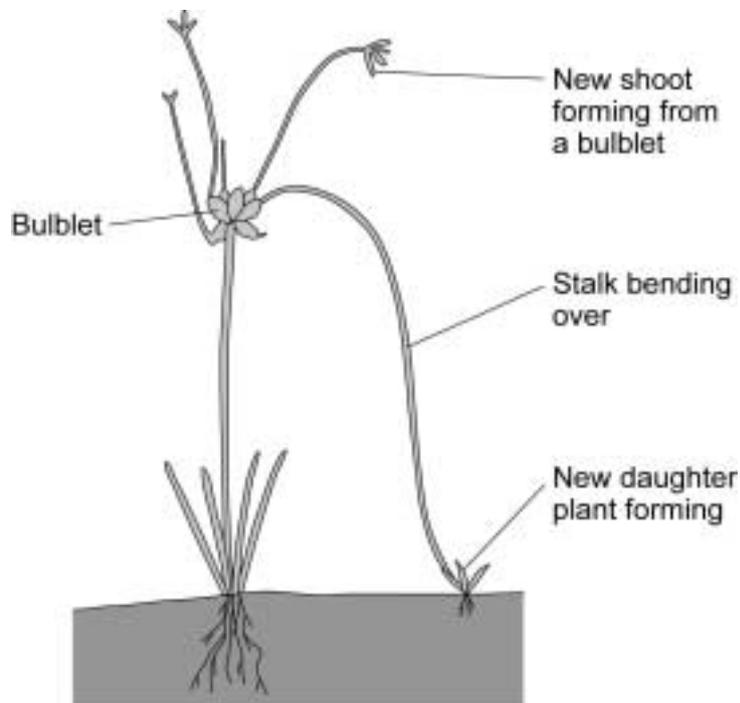
1 (a) (ii) a nucleus

(1 mark)

1 (a) (iii) an embryo?

(1 mark)

- 1 (b)** Walking onion plants grow a bunch of bulblets (tiny bulbs).  
The bulblets start to grow and the stalks bend over with the weight of the new growth.  
This makes the onion plant seem to walk across the garden.



Producing plants in this way is called asexual reproduction.

Use words from the box to complete the following sentences.

<b>chromosome</b>	<b>clone</b>	<b>gamete</b>	<b>gene</b>	<b>parent</b>
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Asexual reproduction needs only one .....

Asexual reproduction does not involve production of a .....

The daughter plant is called a .....

(3 marks)

6
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**Turn over for the next question**

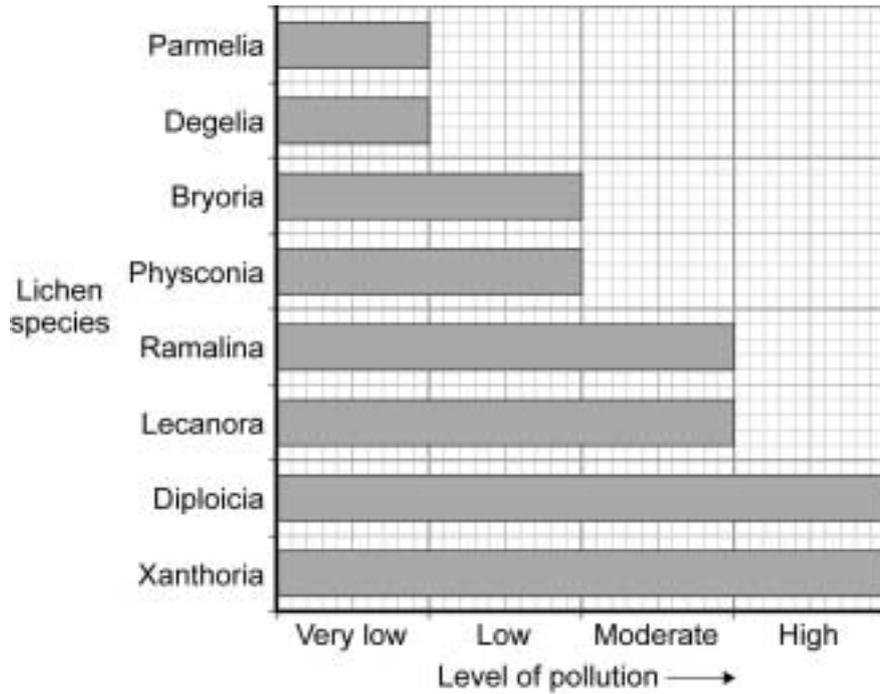
**Turn over** ▶

2 Lichens are pollution indicators.

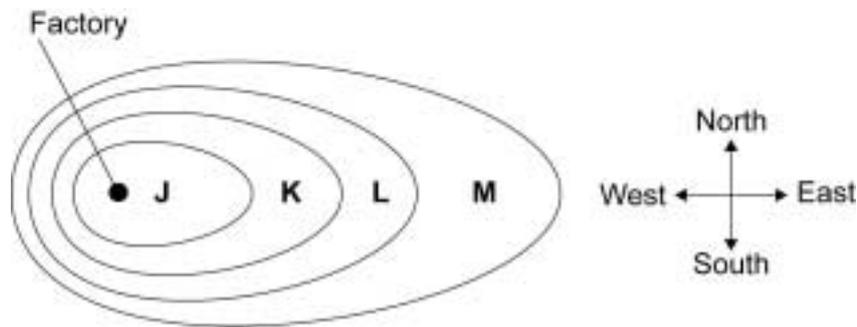
2 (a) Complete the following sentence.

Lichens are indicators of the gas .....  
(1 mark)

The chart shows how much pollution different lichens can tolerate.



- 2 (b)** The diagram shows the areas, **J**, **K**, **L** and **M**, in which different lichen species grew around a factory. The factory burns coal.



- 2 (b) (i)** In which direction does the wind blow the pollution from the factory?

Tick (✓) **one** box.

Wind direction	Tick (✓)
From the factory towards the north	
From the factory towards the east	
From the factory towards the south	
From the factory towards the west	

(1 mark)

- 2 (b) (ii)** Which row in the table shows a correct distribution of lichens?

Tick (✓) **one** row.

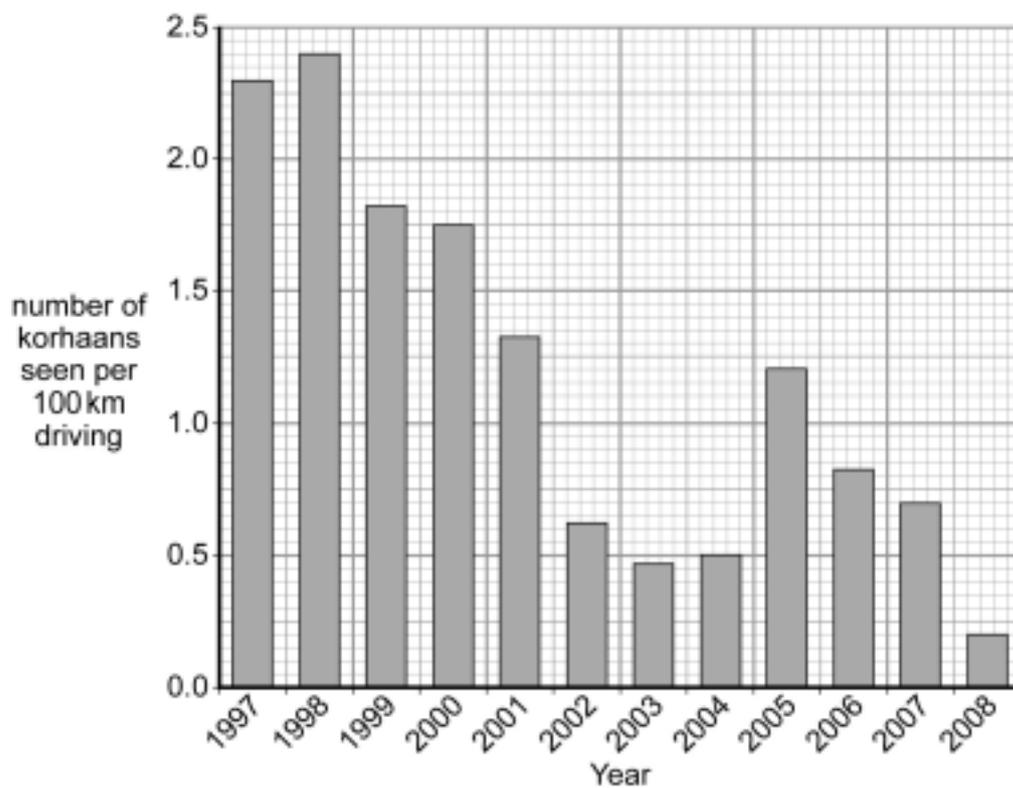
Lichen in area J	Lichen in area K	Lichen in area L	Lichen in area M	Tick (✓)
Xanthoria	Diploicia	Parmelia	Ramalina	
Degelia	Bryoria	Lecanora	Xanthoria	
Xanthoria	Lecanora	Bryoria	Parmelia	

(1 mark)

- 3 The photograph shows a bird called the korhaan. Korhaans live in South Africa.



- Scientists have studied changes in the numbers of korhaans since 1997
- The scientists asked volunteer drivers to record the number of korhaans they see for every 100 km they drive on particular roads
- The bar chart shows changes in the numbers of korhaans seen by the volunteers between the start of 1997 and the end of 2008.



- 3 (a)** This method of counting korhaans could have led to an inaccurate estimate of the number of korhaans.

Explain how.

.....

.....

.....

.....

(2 marks)

- 3 (b)** Which statement best describes the change in the number of korhaans between 1997 and 2008?

Tick (✓) **one** box.

Statement	Tick (✓)
There was a steady fall in the number of korhaans.	
The number of korhaans went up and down, but there was an overall fall in numbers.	
The number of korhaans went up and down, and there was no overall trend.	

(1 mark)

- 3 (c)** Korhaans live only amongst tall vegetation in areas of the country where there are few people.

Which is the most likely explanation for the change in the numbers of korhaans between 1997 and 2008?

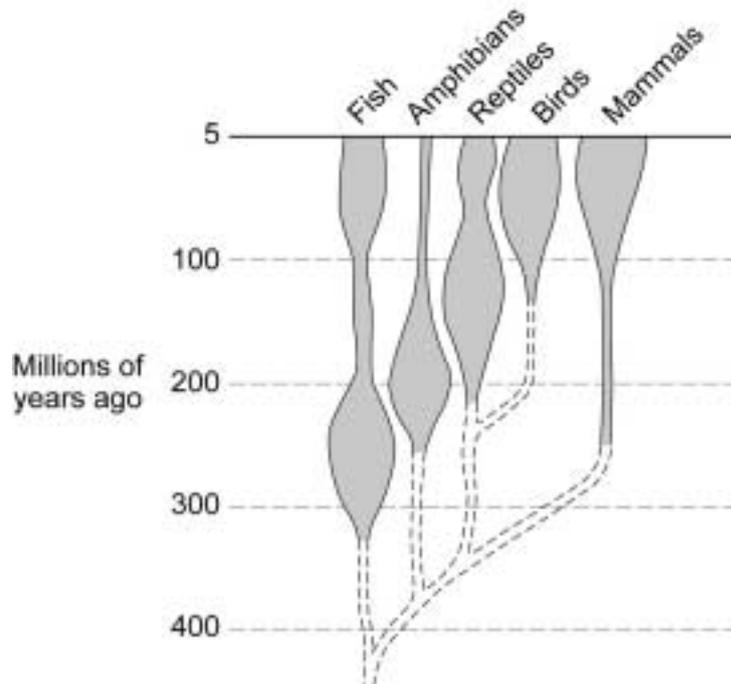
Tick (✓) **one** box.

Statement	Tick (✓)
Many korhaans have been killed by cars.	
Many korhaans have been killed by people for food.	
The habitat of the korhaans is disappearing.	

(1 mark)

- 4 The diagram shows how the number of species in different vertebrate groups changed between 400 million years ago and 5 million years ago.

The wider a block is, the more species there are.



- 4 (a) Which group had most species 200 million years ago?

.....  
(1 mark)

- 4 (b) To which group are birds most closely related?

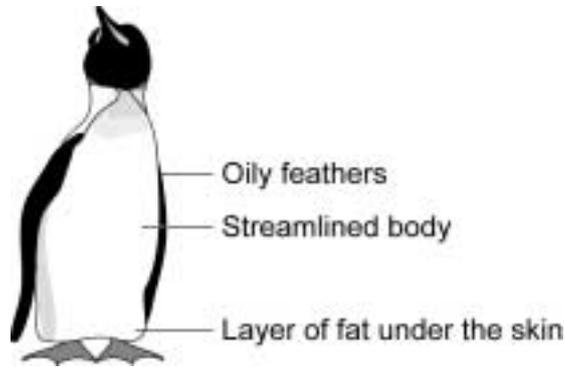
.....  
(1 mark)

- 4 (c) Complete the following sentence.

A study of fossils gives evidence for the theory of .....

(1 mark)

5 Emperor penguins have adaptations that help them to survive in very cold antarctic conditions.



Emperor penguins catch fish in the sea.

Use this information and information from the drawing to explain how the Emperor penguin is adapted to survive in the antarctic.

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(3 marks)

3
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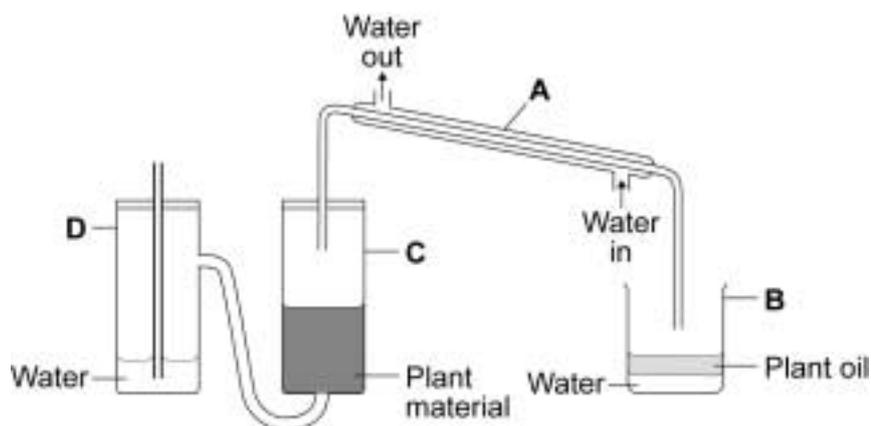
**Turn over for the next question**

**Turn over ▶**

## Chemistry questions

6 Many plants produce useful oils.

6 (a) The diagram shows some apparatus used to obtain oil from plant material.



Four parts of the apparatus are labelled, **A**, **B**, **C** and **D**.

Use the information in the diagram to complete the following sentences.

Steam is made in part .

Oil from the plant material is vaporised in part .

Steam and oil vapour are condensed in part .

(3 marks)

**6 (b)** A student investigated a mixture of a plant oil and water.

**6 (b) (i)** A mixture of the plant oil and water was shaken and left to stand for 10 minutes.



Draw a ring around the correct answer to complete the sentence.

The plant oil separates from the water because it

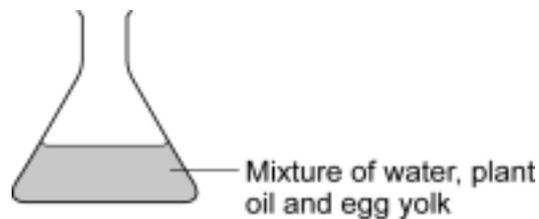
dissolves.

floats.

sinks.

(1 mark)

**6 (b) (ii)** A mixture of the plant oil, water and egg yolk was shaken and left to stand for 10 minutes. The mixture did not separate.



Draw a ring around the correct answer to complete the sentence.

The plant oil, water and egg yolk make

a compound.

an emulsion.

a fat.

(1 mark)

**Question 6 continues on the next page**

**Turn over** ►

6 (c) Water has a boiling point of 100°C. Sunflower oil has a boiling point above 232°C.

Tick (✓) **two** possible reasons why sunflower oil and not water is used to make crisps from thin slices of potato.

Reason	Tick (✓)
The thin slices of potato cook quicker	
Sunflower oil is cheaper than water	
Water would make the thin slices of potato soft	
The temperature needs to be above 100°C to cook potato	

(2 marks)

6 (d) A student found the following information about three oils that are used to make crisps.

	Sunflower oil	Olive oil	Corn oil
<b>Saturated fat (%)</b>	12.0	14.3	14.4
<b>Mono-unsaturated fat (%)</b>	20.5	73.0	29.9
<b>Poly-unsaturated fat (%)</b>	63.3	8.2	51.3
<b>Melting point (°C)</b>	-18	-12	-15

Oils are thought to be healthy if they are:

- low in saturated fat
- high in poly-unsaturated fat.

6 (d) (i) Use the information to decide which oil should be most healthy.

.....  
(1 mark)

6 (d) (ii) Changing an unsaturated fat into a saturated fat alters its melting point.

Does the oil with the most saturated fat have the highest melting point?

Explain your answer .....

.....  
(1 mark)

**7** Billions of years ago, the Earth's early atmosphere was probably like the atmosphere of Venus today.

The table shows the temperature and the percentage composition of the atmospheres of the Earth and Venus today.

Name of gas	Percentage (%) composition of atmosphere	
	Earth today	Venus today
Nitrogen	78	3.5
Oxygen	20.6	a trace
Argon	0.97	a trace
Carbon dioxide	0.03	96.5
Water vapour	0.4	a trace
<b>Average surface temperature</b>	20°C	460°C

**7 (a)** Use information from the table to help you to answer each part.

**7 (a) (i)** In the Earth's atmosphere billions of years ago

the main gas was .....

(1 mark)

**7 (a) (ii)** The Earth's surface is mainly covered with water.

There is no water on the surface of Venus.

Suggest why.

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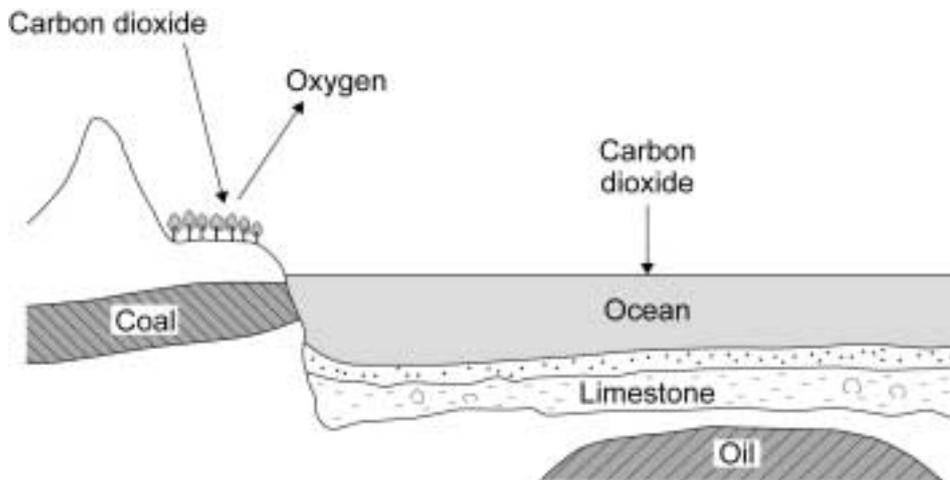
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(2 marks)

**Question 7 continues on the next page**

**Turn over** ►

- 7 (b) The diagram shows part of the Earth and ways that carbon dioxide can be removed from the Earth's atmosphere.



Give **three** ways that carbon dioxide can be removed from the Earth's atmosphere.

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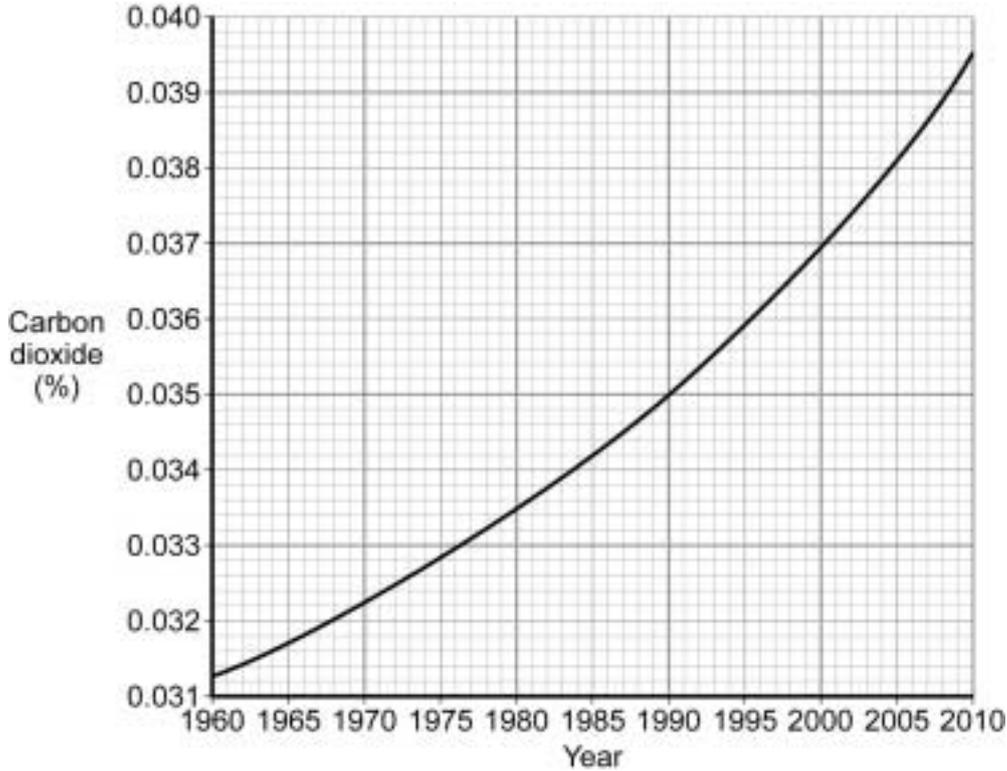
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(3 marks)

7 (c) In the Earth's atmosphere the percentage of carbon dioxide has remained at about 0.03% for many thousands of years.

The graph shows the percentage of carbon dioxide in the Earth's atmosphere over the last 50 years.



7 (c) (i) What was the percentage of carbon dioxide in the Earth's atmosphere in 1965?

..... %  
(1 mark)

7 (c) (ii) What change has happened to the percentage of carbon dioxide in the Earth's atmosphere over the last 50 years?

.....  
(1 mark)

7 (c) (iii) Suggest **one** reason for this change.

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

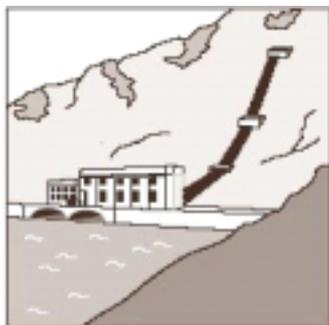
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### Physics questions

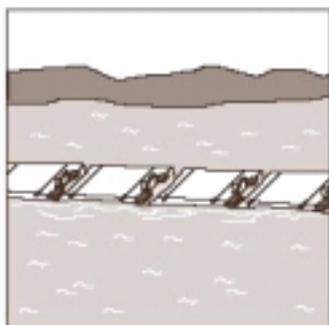
- 8 (a) Some power stations must be built in special places.  
The drawings show the sites of four different types of power station.

Draw **one** line from each power station to its energy source.

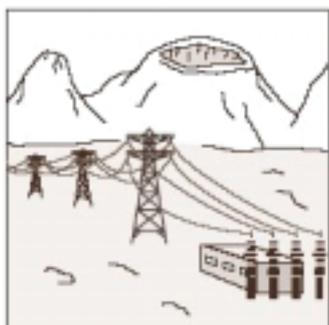
#### Power station



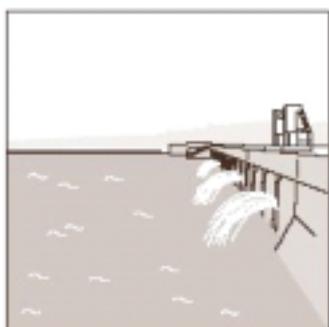
Mountainous region



Coastal region



Volcanic region



River estuary

#### Energy source

geothermal

falling water  
(hydroelectric)

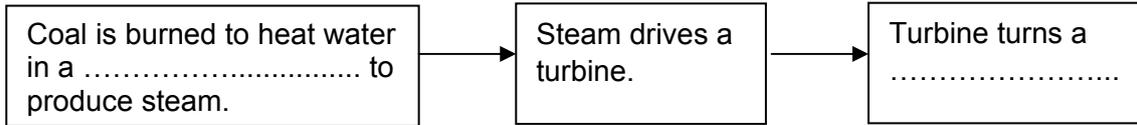
oil

tides

waves

(4 marks)

8 (b) The block diagram shows the important parts of a coal burning power station.



Use words from the box to complete the block diagram.

<b>boiler</b>	<b>condenser</b>	<b>furnace</b>	<b>generator</b>
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(2 marks)

8 (c) Draw a ring around the correct answer to complete the following sentence.

If fewer coal burning power stations are used to generate electricity the amount of

carbon dioxide emitted into the atmosphere will

- |             |
|-------------|
| decrease.   |
| not change. |
| increase.   |

(1 mark)

8 (d) Some types of power station generate electricity by burning a biofuel.

Give **one** example of a biofuel.

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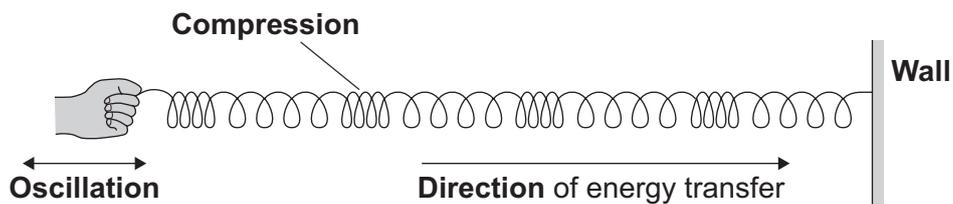
(1 mark)

8
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**Turn over for the next question**

**Turn over** ▶

- 9 (a) The diagram shows a longitudinal wave being produced in a stretched spring.



- 9 (a) (i) Use the bold words from the diagram to complete the following sentence. Put only **one** word in each space.

A longitudinal wave is one in which the ..... causing  
the wave is parallel to the ..... of energy transfer.

(2 marks)

- 9 (a) (ii) Name the type of energy that is transferred by longitudinal waves.

.....

(1 mark)

- 9 (b) The diagram shows water waves made by a wave machine in a swimming pool.



Every second, two waves go past a person standing in the swimming pool.

The waves have a wavelength of 0.8 metres.

Calculate the speed of the water waves.

Write down the equation you use, and then show clearly how you work out your answer.

Give the correct unit in your answer.

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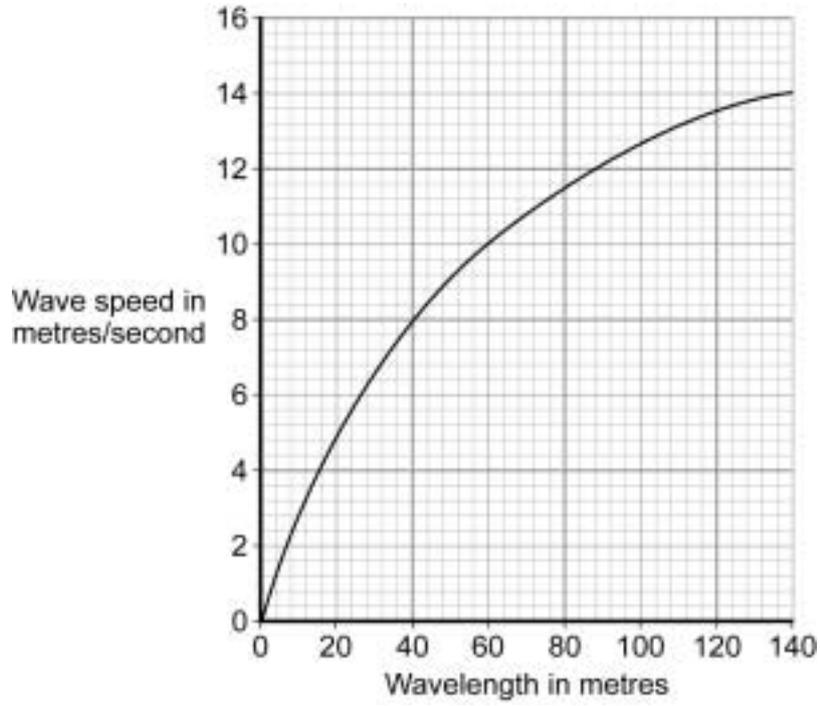
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Wave speed = .....  
(3 marks)

**Question 9 continues on the next page**

**Turn over ►**

9 (c) The graph shows how the speed of deep ocean waves depends on the wavelength of the waves.



What can you conclude from the graph?

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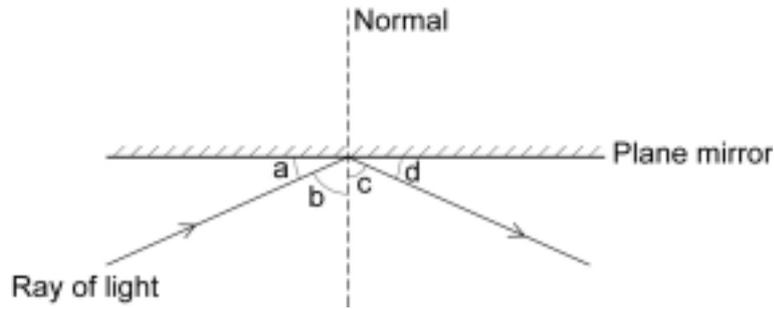
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(2 marks)

8
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10 (a) The diagram shows a ray of light being reflected by a plane mirror.



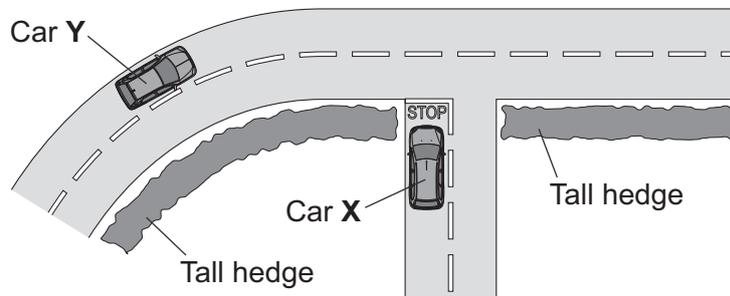
Which of the angles, **a**, **b**, **c** or **d**, is:

the angle of incidence;

the angle of reflection?

(2 marks)

10 (b) The diagram shows a road junction seen from above.



A mirror placed at the side of the road allows the driver of car **X** to see car **Y**.

Using the same mirror symbol given in part (a), draw a plane mirror to show how it should be placed so that the driver of car **X** can see car **Y**.

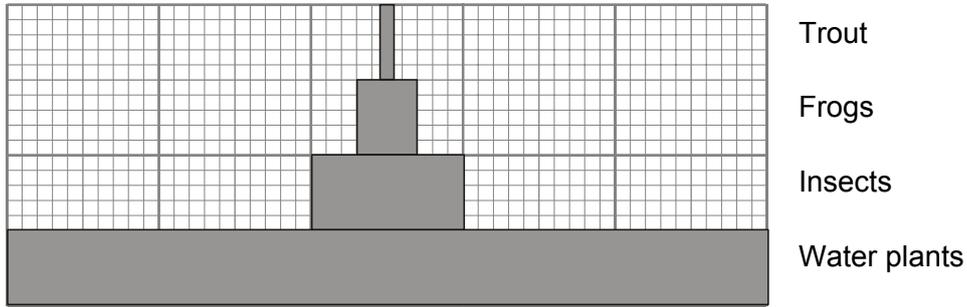
(2 marks)

4
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Turn over ►

### Biology questions

11 The diagram shows a pyramid of biomass drawn to scale.



11 (a) Describe how the water plants obtain biomass.

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.....

(2 marks)

11 (b) The ratio of the biomass of water plants to the biomass of insects is 5 : 1.

Calculate the ratio of the biomass of insects to the biomass of frogs.

Show clearly how you work out your answer.

.....

.....

Ratio = ..... : 1  
(2 marks)



### Chemistry questions

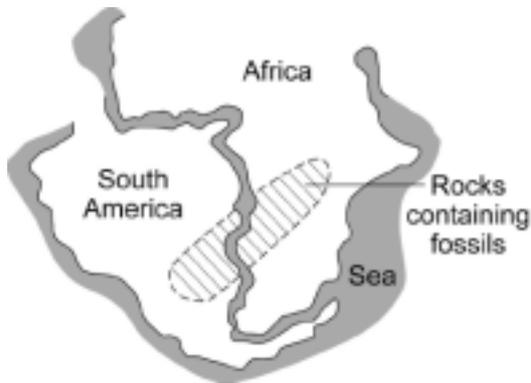
12 Evidence shows that the Earth formed from a molten ball of rocks and minerals.

Before 1900 many scientists thought that the Earth's mountains and continents formed in fixed positions when the molten ball of rocks and minerals cooled and wrinkled.

12 (a) In 1912 Alfred Wegener suggested his hypothesis of continental drift.

The areas of rocks shown on **Map 1** contain fossils of the same type of animals.

Today animals in Africa are different from animals in South America.



**Map 1**  
Wegener suggested his hypothesis that all of the continents, including Africa and South America, had been joined together but then drifted slowly apart.

**Map 2**  
In 1920 other scientists stated that all of the continents were in fixed positions, including Africa and South America, and that they had once been joined together by a land bridge.

12 (a) (i) Use the information to suggest **two** pieces of evidence that may have led Wegener to propose his hypothesis that continents move.

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(2 marks)

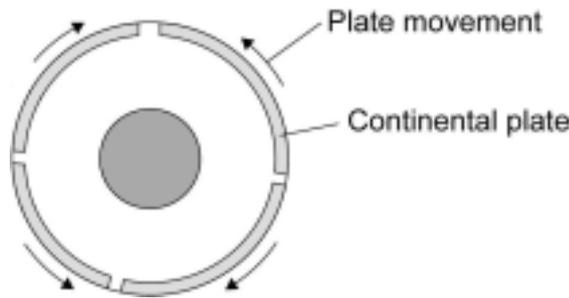
12 (a) (ii) Suggest why, in 1920, other scientists thought that Wegener's hypothesis was wrong.

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(2 marks)

12 (b) In 1962 scientists produced the theory of plate tectonics.

The theory of plate tectonics supported Wegener's hypothesis that continents move.



Tectonic plates move a few centimetres a year.

Complete the sentences about what causes the movement of the Earth's tectonic plates.

Deep inside the Earth ..... processes release large amounts of energy. These processes heat up the substances in the Earth's ..... producing convection currents.

(2 marks)

6

Turn over for the next question

Turn over ►



### Physics questions

**14** A student listens to the sound waves produced by a car siren. When the car is stationary, the student hears a constant frequency sound.

**14 (a)** When the car drives away from the student the sound she hears changes.

What name is given to this effect?

.....  
(1 mark)

**14 (b)** Describe how the wavelength and frequency of the sound waves heard by the student change.

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

3

**Turn over for the next question**

**Turn over ►**

**15 (a)** Scientific research carried out in 13 countries has tried to find out if there are any links between using a mobile phone and developing different types of cancer.

About 13 000 people, half with cancer and half in good health, were interviewed about their mobile phone use.

**15 (a) (i)** Suggest why people in good health were interviewed.

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

(1 mark)

**15 (a) (ii)** Interviewing 13 000 people gave the researchers a large sample size.

Give **one** advantage, in any research project, of having a large sample size rather than a small sample size.

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.....  
.....

(1 mark)

**15 (b)** The following information was included in a newspaper article about the research project.

- It may be difficult to prove there is a link simply by asking people how much they use a mobile phone. People’s memories are not always accurate.
- Scientists in Israel found that people who use a mobile phone a lot are 50% more likely to develop a cancer on the salivary gland just in front of the ears.
- The cost of the research, £20 million, has been partly paid for by mobile phone companies.
- No children were included in the research.

15 (b) (i) Draw a ring around the correct answer to complete the following sentence.

Using children in scientific research raises 

environmental
ethical
social

 issues.

(1 mark)

15 (b) (ii) Suggest **two** reasons why some people are concerned that the research was partly paid for by mobile phone companies.

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(2 marks)

15 (b) (iii) In Germany, mobile phones that emit very low levels of radiation are marked with a special symbol.

Explain why low emission mobile phones should be marked in this way.

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(2 marks)

**END OF QUESTIONS**

7
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**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**



## GCSE Physics Equations Sheet

### Unit 6 F and H

$E = m \times c \times \theta$	<p><math>E</math> energy transferred  <math>m</math> mass  <math>\theta</math> temperature change  <math>c</math> specific heat capacity</p>
$\text{efficiency} = \frac{\text{useful energy out}}{\text{total energy in}} (\times 100\%)$	
$\text{efficiency} = \frac{\text{useful power out}}{\text{total power in}} (\times 100\%)$	
$E = P \times t$	<p><math>E</math> energy transferred  <math>P</math> power  <math>t</math> time</p>
$v = f \times \lambda$	<p><math>v</math> speed  <math>f</math> frequency  <math>\lambda</math> wavelength</p>