Candidate forename		Candidate surname	

Centre number						Candidate number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

B622/01

GATEWAY SCIENCE

SCIENCE B

Unit 2 Modules B2 C2 P2 (Foundation Tier)

MONDAY 17 JANUARY 2011: Morning
DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

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)

READ INSTRUCTIONS OVERLEAF

DC (LEO/SW) 11MEP01098 39942/2

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **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).**
- **Answer ALL the questions.**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **A list of physics equations is printed on page three.**
- **The Periodic Table is printed on the back page.**
- **The total number of marks for this paper is 60.**

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

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

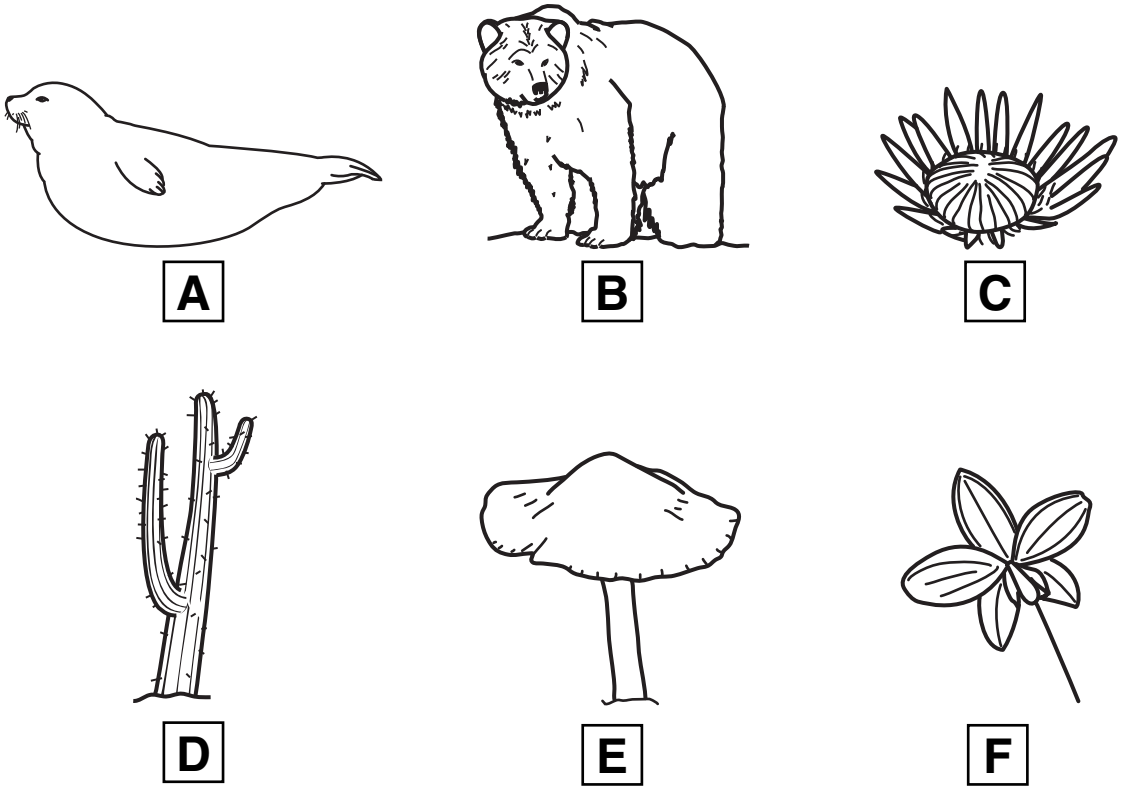
$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

Answer ALL the questions.

SECTION A – MODULE B2

1 Look at the pictures of different organisms.



(a) Which THREE organisms are plants?

Choose from A, B, C, D, E and F.

_____ **[1]**

(b) Plants and animals are different.

Look at the statements.

Which ONE is a correct statement about the difference between plants and animals?

Put a tick (✓) in the box next to the correct statement.

Most animals are more compact than plants so they can move.	☐
Only animals carry out respiration.	☐
Parasites are only found in the plant kingdom.	☐
Plants are invertebrates and animals are vertebrates.	☐

[1]

(c) Plants make their own food by a process called photosynthesis.

The food they make is a type of sugar.

(i) Write down the name of this sugar.

_____ **[1]**

(ii) The sugar is changed into starch.

Explain why.

_____ **[1]**

[Total: 4]

2 Read the report about ospreys.

OSPREY NEST PROTECTED

Ospreys have laid the first eggs of the season. The Royal Society for the Protection of Birds (RSPB) will protect the nest from illegal egg collectors.
Last year the ospreys raised two chicks. A spokesman from the RSPB said this would help to increase the small numbers of these special birds in Britain.

(a) Finish the sentences about ospreys.

Choose from the list.

COMMUNITY ECOSYSTEM ENDANGERED

EXTINCT POPULATION

Ospreys need protection because in Britain they are _____ .

The lake where they live is a natural _____ .

[2]

(b) Ospreys hunt fish for food.

(i) The fish are prey.

What name is given to animals, like ospreys, which hunt prey?

_____ [1]

(ii) Ospreys are adapted to hunt because they can fly fast.

Describe TWO OTHER ways ospreys are adapted to hunt.

1 _____

2 _____ [2]

(c) There is a large lake near the ospreys' nest.

Some fishermen who use the lake do NOT want the ospreys to be protected.

Suggest why.

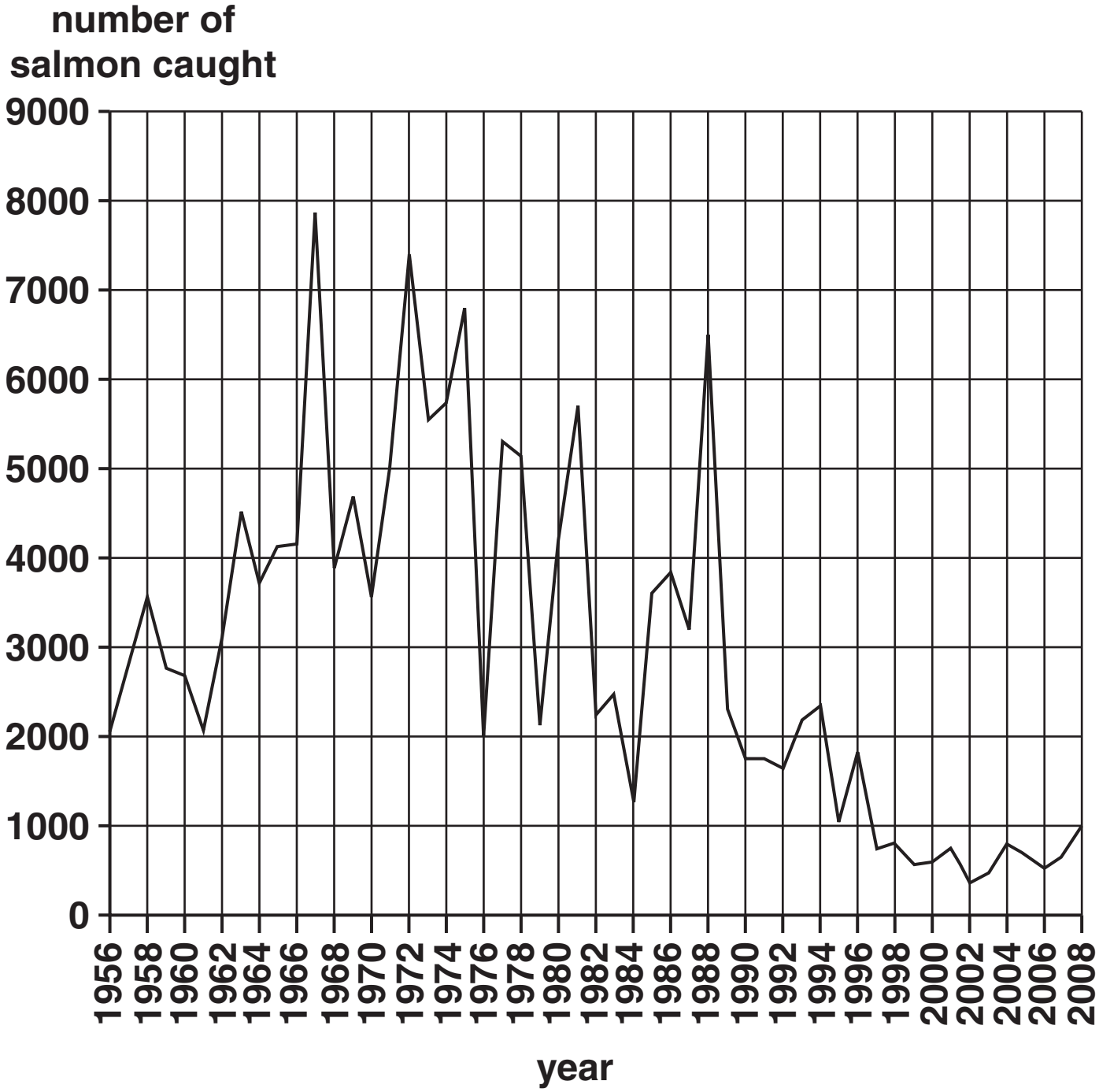
_____

_____ [1]

[Total: 6]

3 Look at the graph.

It shows the number of salmon caught in the river Wye between 1956 and 2008.



(a) Which year had the highest salmon catch?

answer _____ [1]

(b) In 1988 there were 6500 salmon caught in the river Wye.

Calculate the difference between the number caught in 1988 and the number caught in 2008.

_____

_____

answer _____ [1]

(c) The decrease in numbers is thought to be due to acid rain.

Acid rain is caused by sulfur dioxide in the air.

(i) How does sulfur dioxide get into the air?

_____ **[1]**

(ii) Sulfur dioxide levels have increased.

Suggest ONE reason why.

_____ **[1]**

(iii) Since 2002 lime has been added to the river to remove the acid.

What evidence is there on the graph to show the effect of this?

_____ **[1]**

[Total: 5]

4 Read the information about rats.

Two species of rat living in Britain are the brown rat (*Rattus norvegicus*) and the black rat (*Rattus rattus*).

Fleas living on black rats caused the plague of 1665.

There were no brown rats in Britain until the 1720s.

Black rats are now one of the rarest mammals in Britain.

Brown rats have increased in number to around 80 million.

In the past, warfarin was used successfully to reduce the rat population.

Now warfarin is no longer as effective so other methods of control are used.

(a) *Rattus rattus* is the scientific name for the black rat.

How do scientists describe this way of using two words to name a species?

_____ [1]

(b) Since the 1720s the number of black rats in Britain has steadily decreased.

At the same time the number of brown rats has increased.

Suggest why the number of black rats has decreased.

_____

_____

_____ **[2]**

(c) Natural selection has led to a change in the way we control the rat population.

Explain why

- **warfarin was used to control the rat population in the past**
- **warfarin is no longer effective.**

_____

_____

_____ **[2]**

[Total: 5]

SECTION B – MODULE C2

5 This question is about building materials.

(a) Concrete is a building material.

Concrete is made by mixing cement, sand, gravel and SUBSTANCE A.

Write down the name of SUBSTANCE A.

Choose from the list.

BRICK

GLASS

WATER

answer _____ [1]

(b) Cement is made using limestone.

The chemical name for limestone is calcium carbonate.

When calcium carbonate is heated, carbon dioxide and calcium oxide are made.

(i) Write down the WORD equation for this reaction.

_____ [1]

(ii) This reaction is an example of THERMAL DECOMPOSITION.

What is meant by thermal decomposition?

_____

_____ **[1]**

(c) Limestone is a rock.

It is used as a building material.

Limestone is removed from the ground in quarries by large digging machines then taken away in lorries.

Removing rocks from a quarry causes environmental problems.

One problem is that a quarry takes up a lot of land space.

Write about TWO other environmental problems.

_____

_____

_____ **[2]**

[Total: 5]

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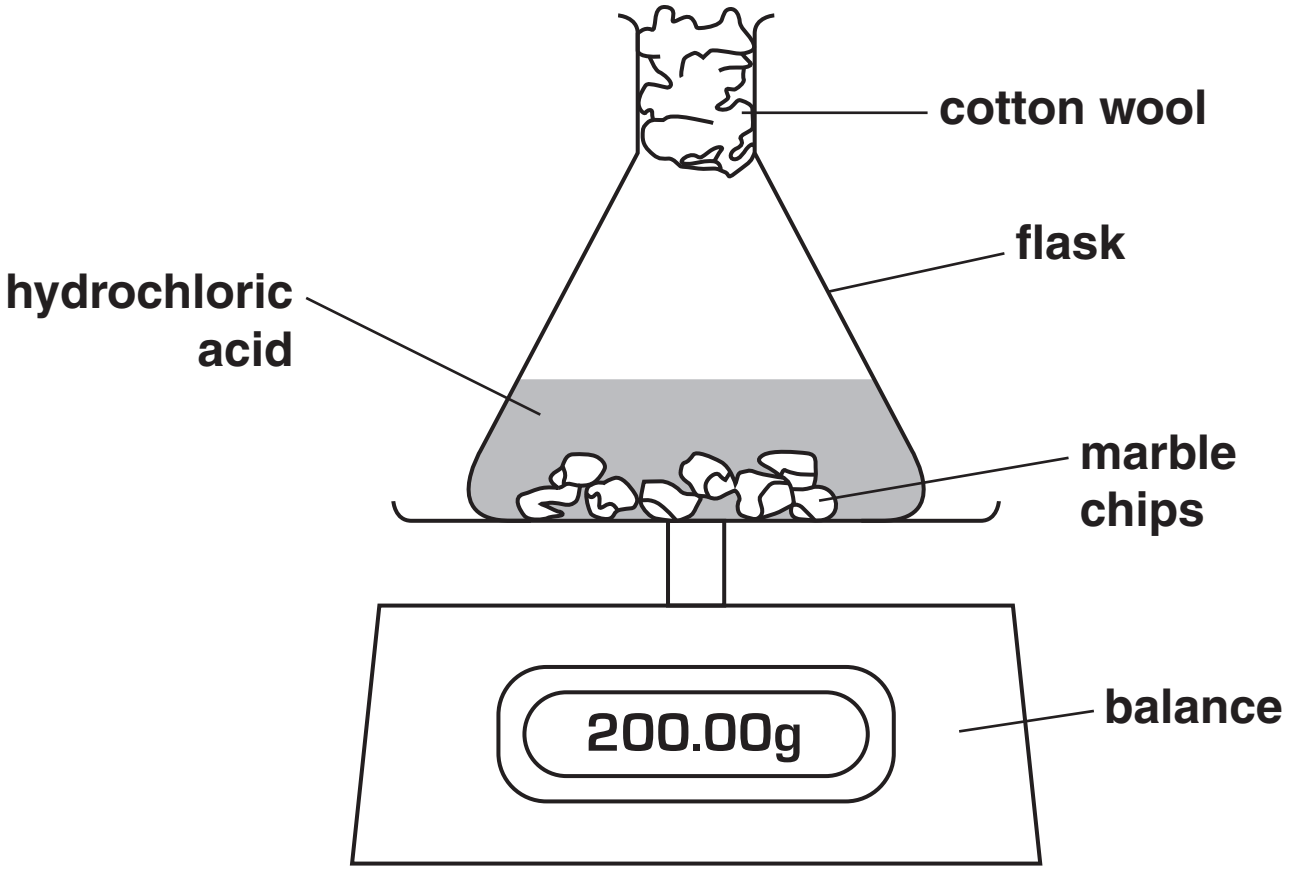
6 Hilary and Jeff investigate the reaction between marble chips and hydrochloric acid.

Carbon dioxide is given off during the reaction.

Look at the apparatus they use.



Hilary and Jeff measure the total mass of the flask and reaction mixture every minute.

Look at their results.

time in minutes	total mass of flask and reaction mixture in g
0	200.00
1	199.50
2	199.20
3	199.00
4	198.86
5	198.80
6	198.80

(a) The total mass of the flask and reaction mixture at the start of the experiment is 200.00 g.

Write down the total mass of the flask and

reaction mixture after 3 minutes. _____ g

Use this answer to work out the total mass of carbon dioxide given off after 3 minutes.

_____ g [1]

(b) Hilary and Jeff do the experiment again.

They use the same volume of acid and the same amount of marble chips.

This time they use POWDERED marble chips.

After each measurement they work out the total mass of carbon dioxide given off.

Look at the graph, opposite. It shows their results from both experiments.

(i) Look at the line for the POWDERED marble chips.

How long does it take for the reaction to finish?

_____ minutes [1]

(ii) The reaction using powdered marble chips is faster than the reaction using large chips.

How can you tell from the TWO LINES?

_____

_____ [1]

(iii) Explain why the reaction is faster using POWDERED MARBLE chips.

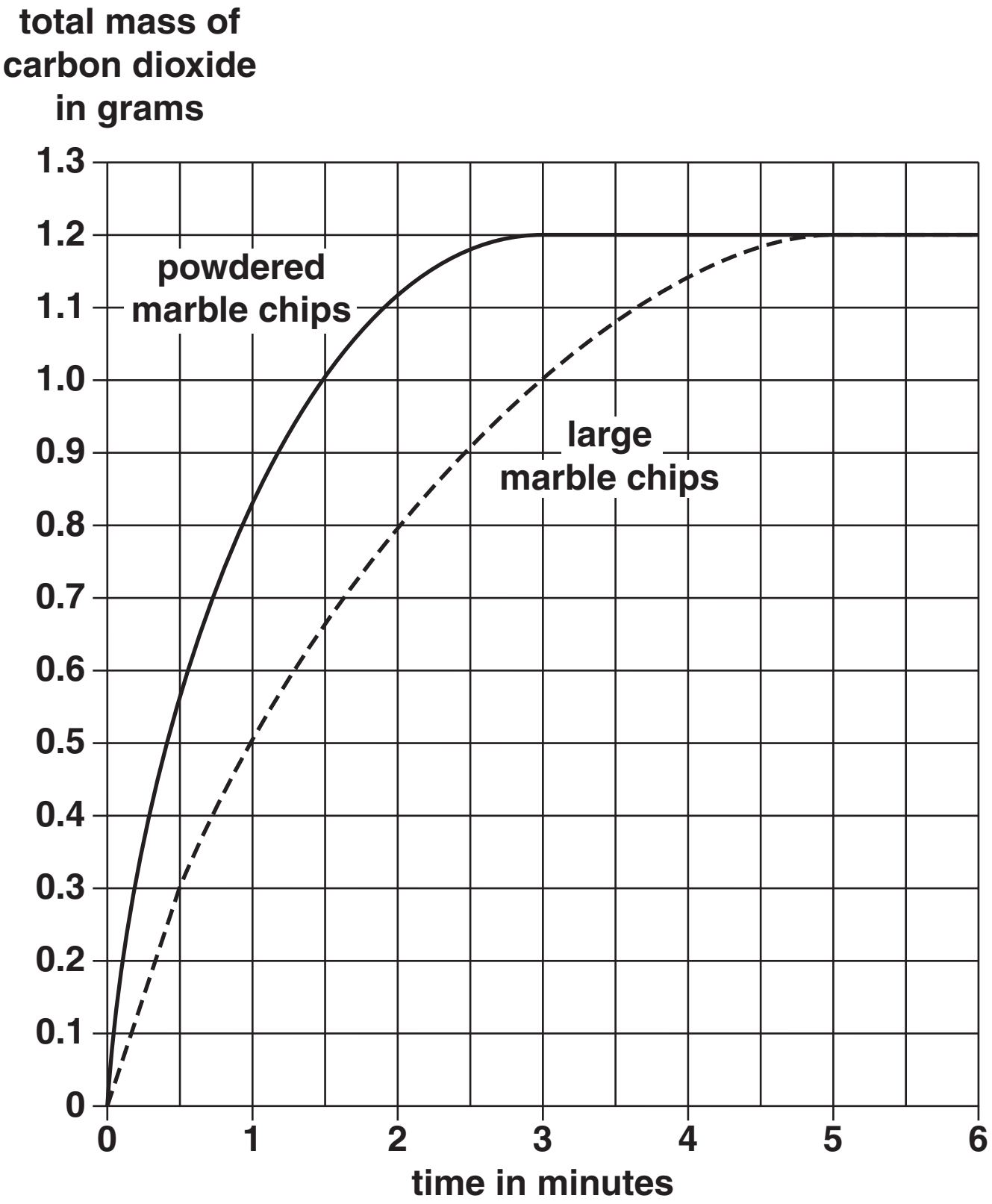
Use ideas about particles.

_____

_____

_____ [2]

[Total: 5]


total mass of carbon dioxide in grams
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
powdered marble chips
large marble chips
0
1
2
3
4
5
6
time in minutes

7 This question is about paints.

Paint is made up of three ingredients.

The ingredients are a solvent, a binding medium and a pigment.

(a) Join each INGREDIENT to its JOB IN THE PAINT.

Draw only three straight lines.

INGREDIENT	JOB IN THE PAINT
solvent	helps to stick the paint to a surface
binding medium	colours the paint
pigment	thins the paint

[2]

(b) Louise paints the wooden window frames in her house.

Write down ONE reason why.

_____ **[1]**

[Total: 3]

BLANK PAGE

8 This question is about metals.

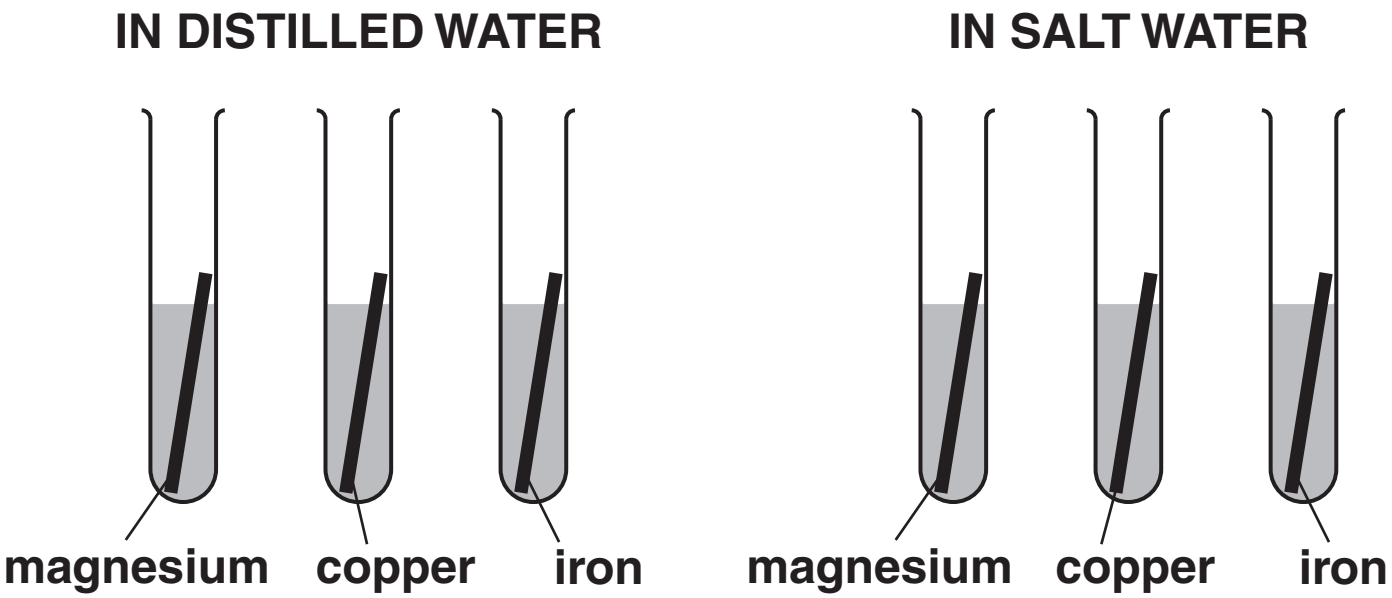
Jess and Dawn investigate the corrosion of magnesium, copper and iron.

They find the mass of each metal.

Jess places each metal into a test tube of DISTILLED water.

Dawn places each metal into a test tube of SALT water.

They leave the tubes for two weeks.



Jess and Dawn remove the metals from the water.

They dry them and find the mass of each metal again.

(a) Look at the table of their results.

metal	distilled water		salt water	
	mass of metal before in g	mass of metal after 2 weeks in g	mass of metal before in g	mass of metal after 2 weeks in g
magnesium	0.60	0.25	0.60	0.15
copper	0.80	0.80	0.80	0.80
iron	1.00	0.80	1.00	0.50

(i) One metal did not corrode in distilled water or in salt water.

Which metal?

_____ [1]

(ii) Iron rusts faster in salt water.

How can you tell? Use the table to help you.

_____ [1]

(b) Iron, copper and magnesium are used in making cars.

European Law says that 85% of a car should be recycled.

Write down TWO advantages of recycling these metals.

1 _____

_____

2 _____

_____ **[2]**

[Total: 4]

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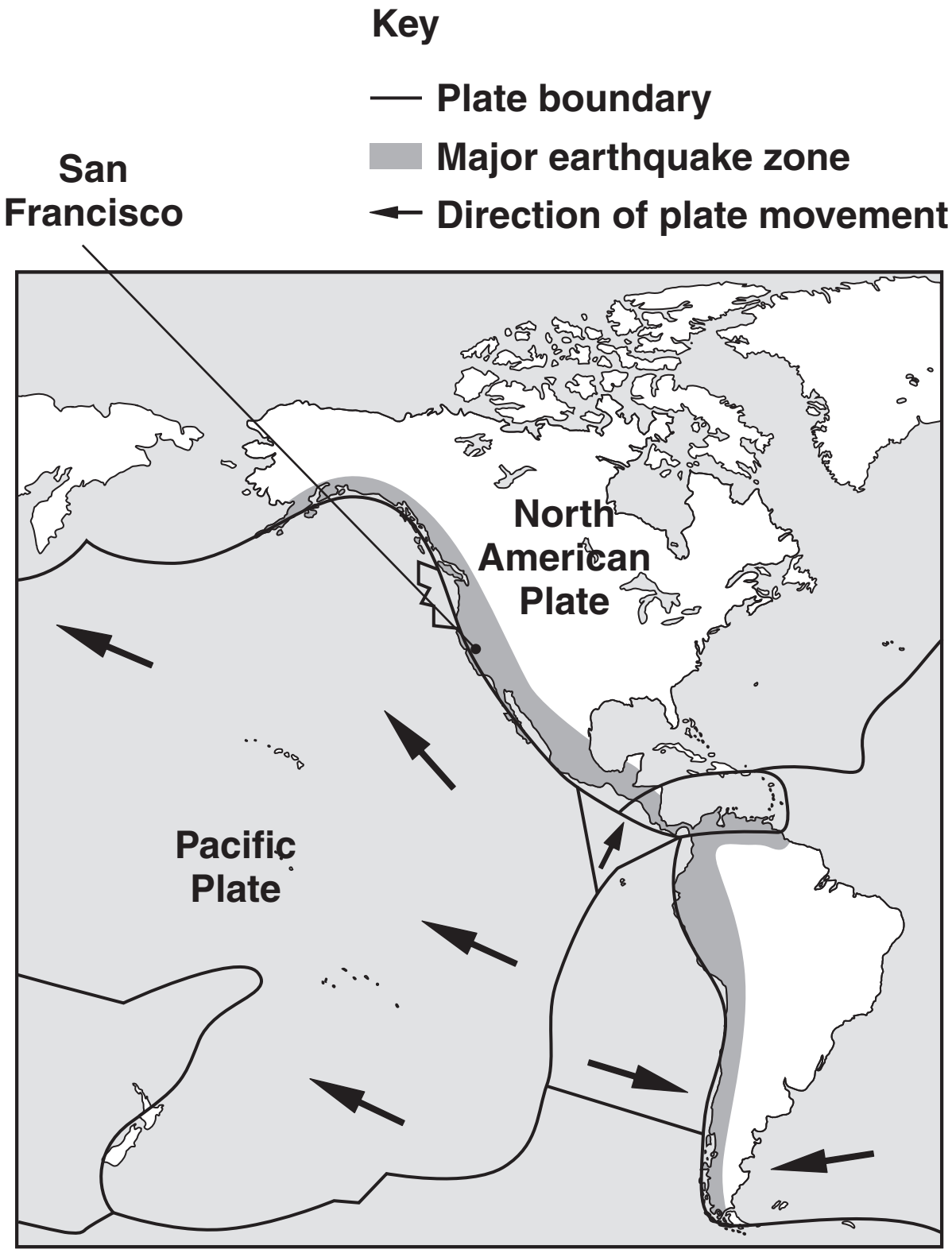
9 This question is about the structure of the Earth.

The outer surface of the Earth is made up of tectonic plates.

The map shows the positions of some of these plates.



(a) Find San Francisco on the map.

In 1906 there was a major earthquake in San Francisco.

What causes an earthquake? Use the map to help you.

_____

_____ **[1]**

(b) Underneath the surface of the Earth is a layer of molten rock.

Sometimes the molten rock erupts violently from a volcano.

Complete the sentences.

Choose words from the list.

CORE CRUST IRON LAVA MAGMA

Molten rock under the surface of the Earth is

called _____ .

Molten rock that erupts from a volcano is

called _____ .

[2]

[Total: 3]

SECTION C – MODULE P2

10 This question is about ways of producing electricity.

(a) Carlos has solar powered lamps in his garden.

Energy from the Sun is absorbed by photocells and stored in a battery.

The battery then supplies the solar lamps with energy when it is dark.

Complete the sentences about photocells.

Photocells transfer _____

energy into electricity.

Photocells and batteries produce the same TYPE

of electricity.

The type of electricity produced is

_____ current.

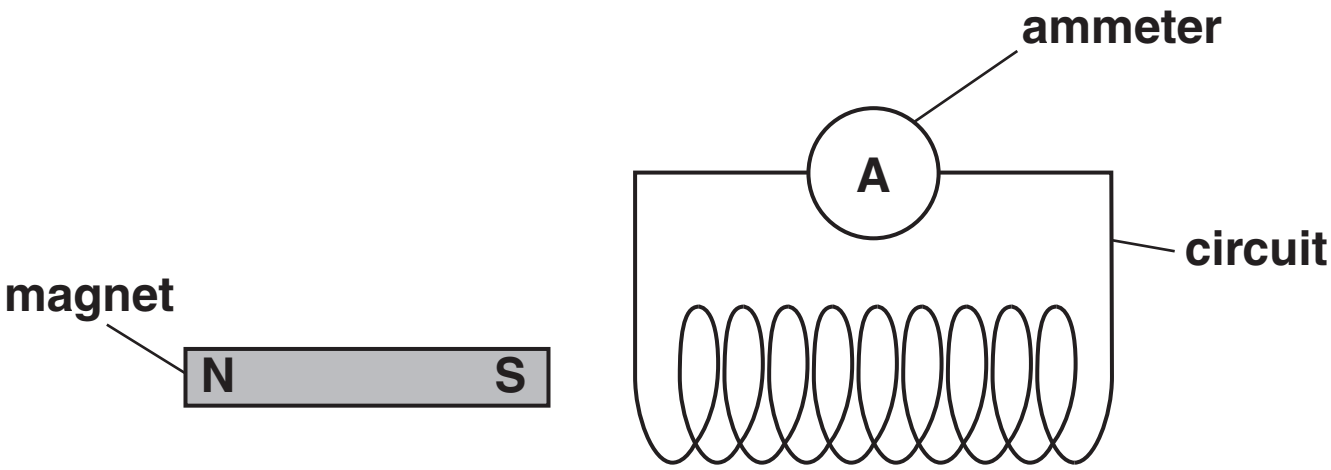
More power is produced if the photocell has a

larger _____ .

[3]

(b) Carlos sets up this circuit. It is a type of GENERATOR.

It is a different way of producing electricity.



(i) What must Carlos do to produce electricity in this circuit?

_____ **[1]**

(ii) Generators in power stations do NOT produce the same type of electricity as photocells or batteries.

What TYPE of electricity do generators in power stations produce?

_____ **[1]**

[Total: 5]

11 Jake investigates the POWER of a light bulb.

He measures the current and voltage for a light bulb.

Look at his results.

current = 1.5 amps (A)

voltage = 12 volts (V)

Calculate the power of the light bulb.

The equations on page 3 may help you.

_____

_____

_____

answer _____ watts (W) [2]

[Total: 2]

12 The Moon is close to our planet, the Earth.

Together they are called the Earth-Moon system.

There are many theories about how the Earth-Moon system was made.

Some scientists think that the Earth-Moon system was made when another planet came towards the 'old' planet Earth.

Describe how the Earth-Moon system could have been made in this way.

_____

_____

_____ **[2]**

[Total: 2]

13 This question is about nuclear power and nuclear radiation.

Two scientists are talking.

Sharon:
"You have to be very careful when handling radioactive materials."

Gary:
"Radioactive waste is dangerous. It can only be disposed of in certain ways."

Both scientists are correct.

(a) Sharon handles radioactive materials safely.

Write down TWO ways in which she can do this.

1 _____

_____

2 _____

_____ **[2]**

(b) Gary disposes of radioactive waste safely.

Write down TWO ways in which he can do this.

1 _____

_____

2 _____

_____ **[2]**

[Total: 4]

14 This question is about the Universe.

(a) Complete the crossword puzzle using the clues given.

One has been done for you (2 across).

CLUES DOWN

1 Large group of stars

_____

3 Earth orbits this

_____

CLUES ACROSS

2 Planet we live on

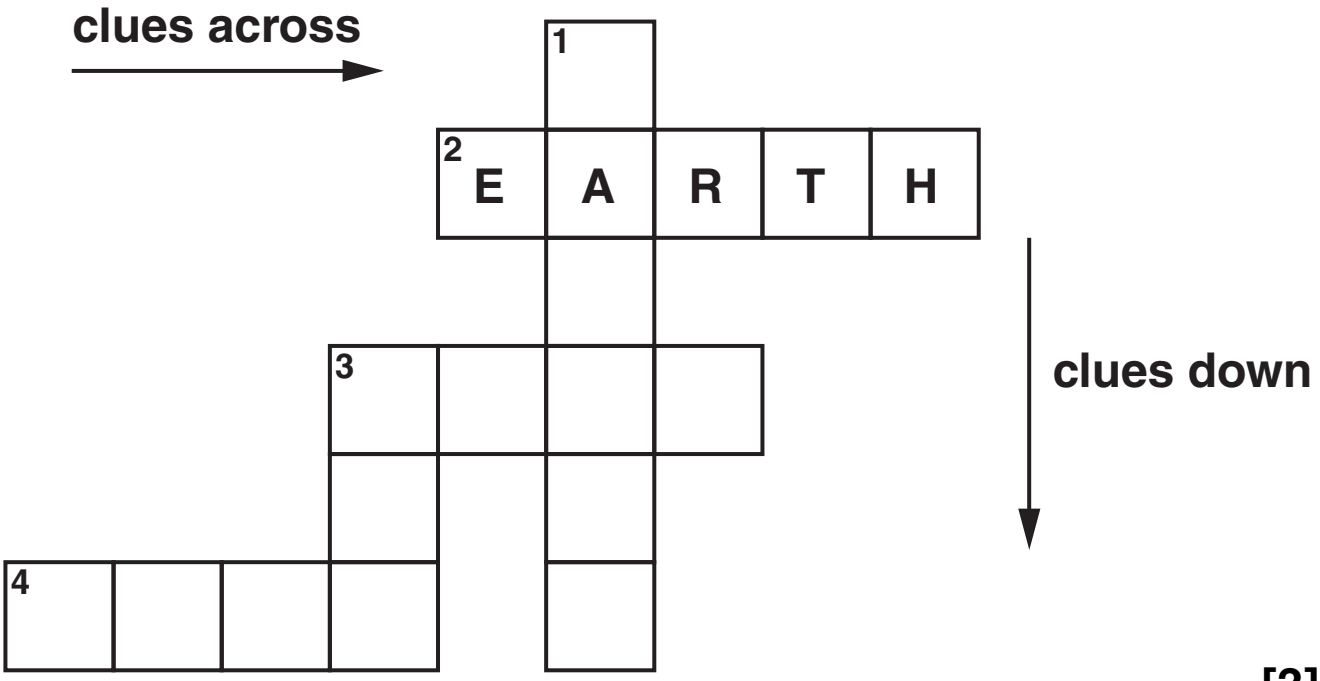
_____

3 Very hot and gives off light

_____

4 Object orbiting Earth

_____



[3]

(b) Asteroids and comets are objects in our Solar System.

Look at the statements about asteroids and comets.

Put a tick (✓) in a box beside each statement to show if it is true or false.

Two have been done for you.

	TRUE	FALSE
ASTEROIDS are made of ice.	☐	☐
ASTEROIDS have caused species to become extinct.	☐	☐
ASTEROIDS have hit the Earth in the past.	✓	☐
The tail of a COMET is a trail of debris.	☐	☐
COMETS cannot be seen with a telescope.	☐	✓

[2]

(c) Finish the sentences about stars and the Universe.

Choose words from this list.

EXPANDING

EXPLOSION

GALAXY

GAS

LIGHT

PLANETS

SHRINKING

The Big Bang theory states that the Universe started with a huge _____ .

Since then the Universe has been _____ .

A star starts its life as a huge cloud of _____ .

[2]

[Total: 7]

END OF QUESTION PAPER

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The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
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	65 **Zn** zinc 30	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	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	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	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[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						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** 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.