

Thursday 24 May 2012 – Morning

**GCSE GATEWAY SCIENCE
SCIENCE B**

B622/01 Unit 2 Modules B2 C2 P2 (Foundation Tier)

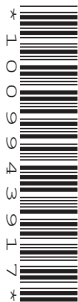
Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 1 hour



Candidate forename		Candidate surname	
Centre number		Candidate number	

MODIFIED LANGUAGE

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 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 two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **20** pages. Any blank pages are indicated.

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** The photograph shows an island fox.

These foxes live on a number of small islands off the coast of California.



- (a) (i)** Look at the photograph of the island fox.

What type of animal is the fox?

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

an invertebrate and a reptile

☐

a vertebrate and a mammal

☐

a vertebrate and a reptile

☐

an invertebrate and a mammal

☐

[1]

- (ii)** The fox is a predator.

It has eyes on the front of its head.

How does this eye position help predators to catch prey?

.....
 [1]

- (iii)** Write down one **other** way that the fox is adapted to being a predator.

..... [1]

(b) Read this information about the island fox.

The island fox lives on six small islands.

Recently, the foxes have almost disappeared on the two most northern islands.

The island foxes have been listed as endangered to try to save them.

At first, biologists could not find why the foxes died.

Finally, a golden eagle feather was found beside a dead fox.

In the past, bald eagles lived on the islands and killed other birds.

Bald eagles did not prey on the island fox.

The bald eagles on the northern islands disappeared due to the effects of a pesticide.

Golden eagles were then attracted to the northern islands once the bald eagles were gone. It was easy for the golden eagles to catch the island foxes.

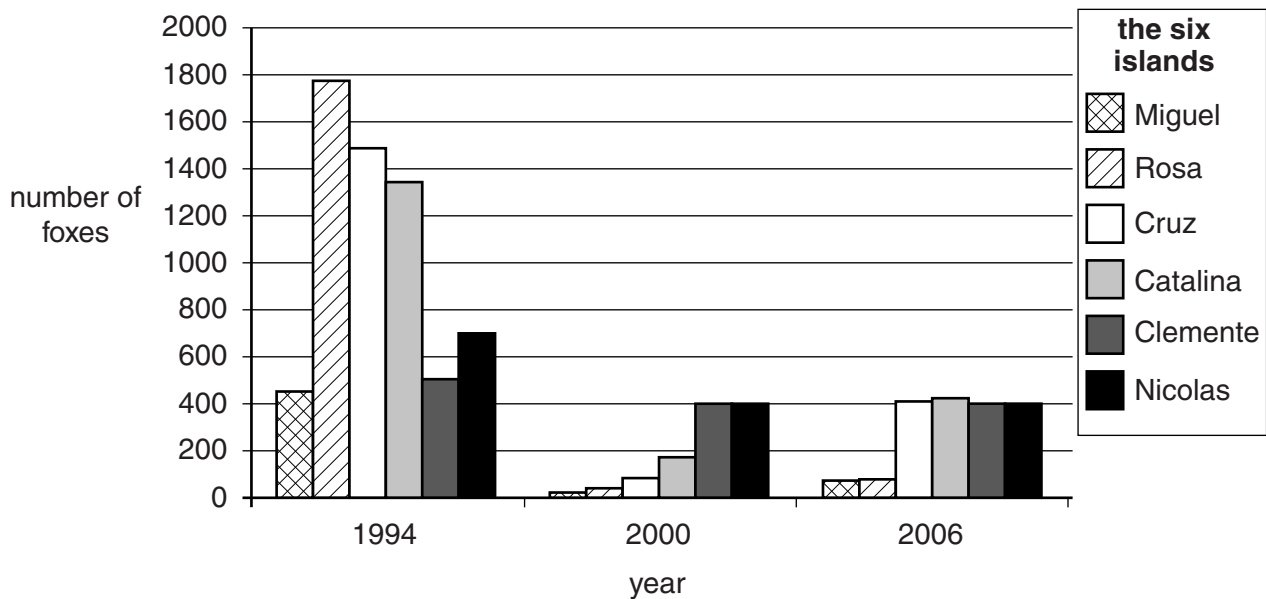
The fox is **endangered**.

What does this mean?

.....
 [1]

(c) The graph shows changes in the number of foxes on the six different islands.

Use the graph and the information in (b) to answer the questions.



(i) What are the names of the two northern islands?

..... and [1]

- (ii) Explain how you can tell this from the graph.

.....
 [1]

- (iii) Put ticks (✓) next to **any** conservation methods that could be used to help the fox.

captive breeding of foxes

☐

shooting bald eagles

☐

captive breeding of golden eagles

☐

capturing golden eagles and releasing them a long distance away

☐

[1]

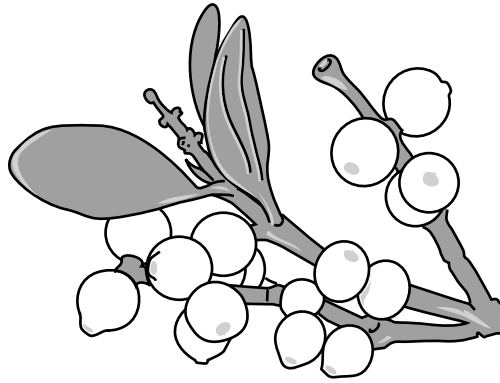
- (d) Scientists think that the island fox first appeared on the island tens of thousands of years ago.

Write down **one** way that scientists can find out about animals that lived tens of thousands of years ago.

..... [1]

[Total: 8]

- 2 The photograph shows part of a mistletoe plant.



Mistletoe plants have green leaves and they live attached to the branches of trees, such as apple trees.

Many different birds feed on mistletoe berries.

- (a) Mistletoe, apple trees and birds all live in the same area.

What word describes all the different types of organism that live in an area?

Choose from this list.

community

habitat

population

species

answer [1]

- (b) Mistletoe plants can photosynthesise.

Write the word equation for photosynthesis.

..... [2]

- (c) Write down **one** thing that the apple tree and the mistletoe compete for.

..... [1]

- (d) Mistletoe is described as a partial parasite as it obtains some sugar from the apple tree.

What word is used to describe an organism that a parasite feeds on?

..... [1]

- (e) The mistletoe needs sugar to survive.

Write down **one** thing that it uses sugar for.

..... [1]

[Total: 6]

- 3 Some students want to see if more daisy plants grow close to a busy road or further away.



They collect these results.

distance from the road in metres	number of daisy plants per 1 m ² of ground			
	first sample	second sample	third sample	average
1	1	2	0	1
2	4	3	5	4
3	5	3	7
4	7	6	8	7

- (a) Describe how the students found the number of daisy plants in 1 m² of the ground.

.....
 [2]

- (b) Calculate the missing average in the table.

..... [1]

- (c) What happens to the number of daisy plants as the students sample further from the road?

..... [1]

- (d) The students think that the daisy plants might be sensitive to sulfur dioxide in the air.

Explain how this could account for the students' results.

.....

 [2]

[Total: 6]

Turn over

Section B – Module C2

- 4 This question is about pigments in paints.

Pigments give paints their colour.

Look at the table. It shows some information about some pigments used in paints.

pigment	colour	effect of light	effect of increasing the temperature	type of paint made
A	green	colour fades	no change	emulsion
B	red	keeps its colour	changes to yellow	emulsion
C	yellow	absorbs light and later gives off light	no change	oil based
D	blue	keeps its colour	no change	oil based

- (a) (i) Which pigment is **thermochromic**?

Choose from **A, B, C** or **D**.

answer

[1]

- (ii) Which pigment is **phosphorescent**?

Choose from **A, B, C** or **D**.

answer

[1]

- (b) Pigments are one ingredient used in paint.

Write about the other **two** ingredients and the jobs they do.

.....

.....

.....

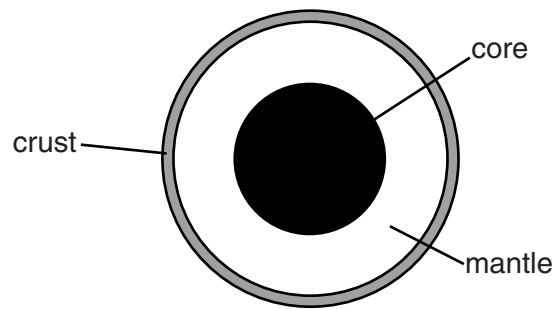
.....

.....

..... [4]

[Total: 6]

5 Look at the diagram of the Earth.



(a) The outer part of the Earth is divided into tectonic plates.

Write down two of the effects of plates moving against each other.

1

2 [2]

(b) Which metal makes up most of the core?

..... [1]

(c) The outer part of the Earth includes the crust and the outer part of the mantle.

What is this outer part of the Earth called?

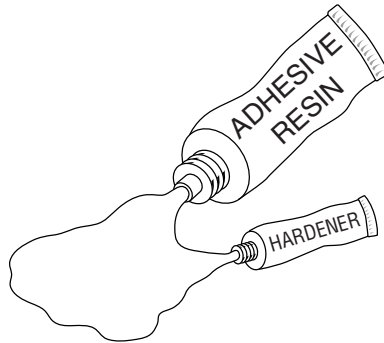
..... [1]

[Total: 4]

6 Epoxy glues are used to stick surfaces together.

Epoxy glues come in two parts

- resin
- hardener.



A chemical reaction happens when the resin and hardener are mixed.

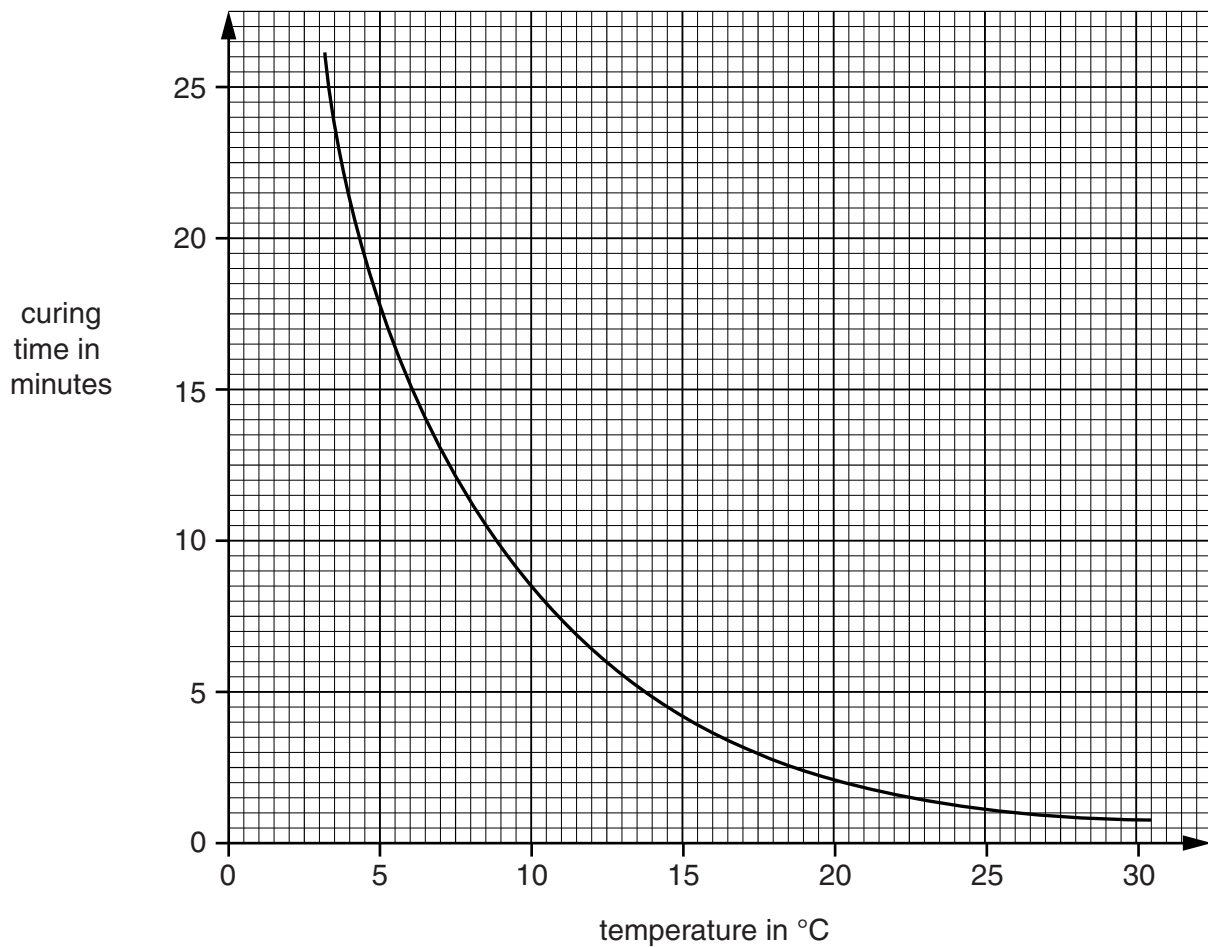
This reaction is called **curing**.

When curing finishes, the glue sets hard.

The time it takes for this to happen is called the **curing time**.

Look at the graph. It shows the effect of temperature on the curing time.

The mixture contains 5% hardener.



(a) (i) What is the curing time at 5 °C?

..... minutes [1]

(ii) What is the temperature needed for a curing time of 5 minutes?

..... °C [1]

(iii) What happens to the **rate** of the reaction as the temperature increases?

..... [1]

(b) A second mixture of hardener and resin is used at a temperature of 5 °C.

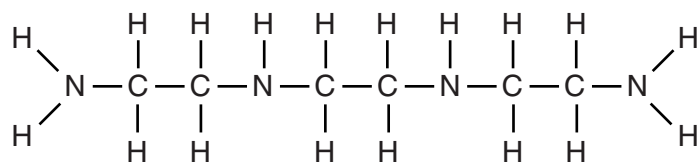
This mixture contains 10% hardener.

This mixture has a higher concentration of hardener than the first mixture.

Suggest the **curing time** of this second mixture.

.....
 [1]

(c) Look at the displayed formula of the hardener.



Complete the table to show the number of atoms of each element in this displayed formula.

One has been done for you.

element	number of atoms
C	6
H
N

[1]

[Total: 5]

7 Look at the table. It gives information about some metals and alloys.

metal	appearance	melting point in °C	relative strength	relative conductivity of heat	observation after being left in moist air
copper	shiny red/ brown	1083	4.8	5.7	tarnishes very slowly
aluminium	dull light grey	660	2.6	10.5	has protective oxide layer
brass	shiny yellow	710	4.5	3.2	tarnishes
zinc	dull light grey	420	4.3	1.0	tarnishes
lead	dull dark grey	328	1.5	5.9	tarnishes
iron	dull dark grey	1535	8.2	0.3	rusts

(a) Which metal has the **highest** melting point?

answer [1]

(b) Which metal is an **alloy**?

answer [1]

(c) Which metal is best for making an attractive pan to heat water on an open fire?

.....

Explain your choice.

.....

.....

.....

..... [3]

[Total: 5]

Section C – Module P2

- 8 The picture shows two wind turbines on the island of Madeira.



- (a) Finish the sentences by choosing the **best** words from this list.

convection

electrical

kinetic

non-renewable

potential

radiation

renewable

sound

Solar energy is a source of energy.

When the Sun warms the air currents are produced.

This produces wind. The turbines transfer the energy
of the wind into electricity.

[3]

- (b) In sunny countries, solar panels are installed on the roofs of some houses to heat water.



Finish this sentence.

Energy from the Sun is by the black surface of the
panel and transferred into heat.

[1]

[Total: 4]

- 9 Coal and oil are fossil fuels. They can be burned to release energy as heat.

Biomass can also be burned to release energy as heat.

Fuel rods in a nuclear reactor release energy as heat.

- (a) (i) Write down the name of a **nuclear** fuel.

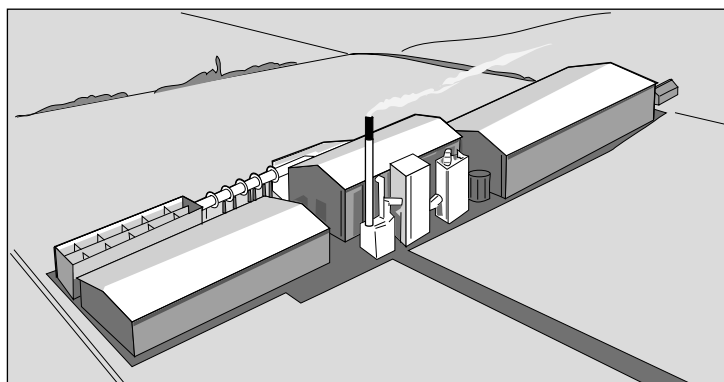
..... [1]

- (ii) Waste from a nuclear power station can be harmful.

Suggest one **advantage** of using nuclear power stations compared to fossil fuel power stations.

..... [1]

- (b) (i) The **38 000 kW** power station in Ely is the largest straw-burning power station in the world.



Explain what is meant by **38 000 kW**.

..... [1]

- (ii) Biomass can produce fuel for a power station **without being burned**.

Describe how.

.....

..... [1]

[Total: 4]

10 People have been exploring space for many years.

(a) Radio signals have been sent into space since 1895.

Some signals have been sent to see if living things reply.

We have not received any replies yet.

Use your ideas about space to suggest why.

.....
 [1]

(b) The first spacecraft was launched in 1957. It was **unmanned**.

(i) What are the **advantages** of using an unmanned spacecraft instead of one with astronauts?

.....

 [2]

(ii) Information can be sent back by an unmanned spacecraft orbiting a planet.

Write down **two different** examples of information that might be sent back.

.....

 [2]

(c) Space telescopes are exploring space and finding different objects.

Draw a straight line from each **object** to its correct **description**.

object	description
black hole	comet or asteroid on a possible collision course with Earth
moon	gives off its own light
Near Earth Object	orbits a planet
star	so massive that not even light can escape from it

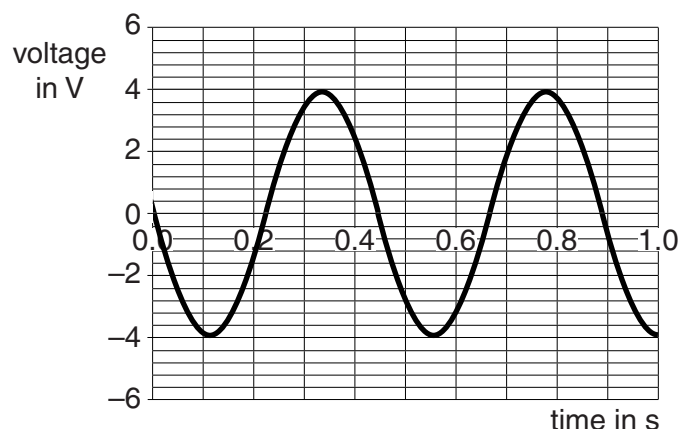
[2]

[Total: 7]

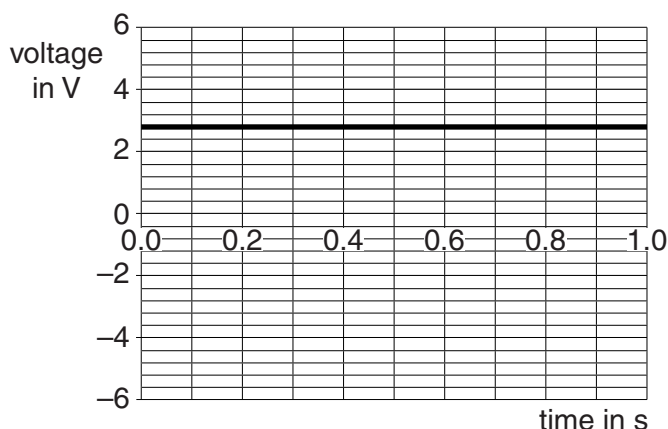
Turn over

11 Michael connects two different sources of electricity to a data-logger.

The data-logger prints out **voltage-time** graphs.



source A



source B

(a) How do you know that source **B** is a battery?

..... [1]

(b) What is the maximum voltage from the AC supply?

..... [1]

(c) Write down the **name** of the device that can increase or decrease AC voltage.

..... [1]

(d) The dynamo effect produces electricity.

Finish the sentence to describe how electricity is produced by the dynamo effect.

Electricity is produced when a is moved near to a

..... [1]

(e) Electricity is generated in a power station.

Some of the energy from the fuel is transferred into electricity.

What happens to the rest of the energy?

..... [1]

[Total: 5]

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>Key</div> <div>relative atomic mass atomic symbol name atomic (proton) number</div>					4 He helium 2
23 Na sodium 11	24 Mg magnesium 12	11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
39 K potassium 19	40 Ca calcium 20	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
85 Rb rubidium 37	88 Sr strontium 38	56 Fe iron 26	55 Mn manganese 25	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	84 Kr krypton 36
133 Cs caesium 55	137 Ba barium 56	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	54 Mn manganese 25	86 Xe xenon 54
[223] Fr francium 87	[226] Ra radium 88	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	98 Tc technetium 43	[222] Rn radon 86
<div>Elements with atomic numbers 112-116 have been reported but not fully authenticated</div>							
<div>Elements with atomic numbers 112-116 have been reported but not fully authenticated</div>							

* 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.