

Candidate forename						Candidate surname					
Centre number						Candidate number					

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**GCSE**  
**B622/02**  
**GATEWAY SCIENCE**  
**SCIENCE B**

**Unit 2 Modules B2 C2 P2 (Higher Tier)**

**THURSDAY 24 MAY 2012: Morning**  
**DURATION: 1 hour**  
**plus your additional time allowance**

**MODIFIED ENLARGED**

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

**OCR SUPPLIED MATERIALS:**

**Insert 1 Question 1**  
**Insert 2 Question 3**  
**Insert 3 Question 6**  
**Insert 4 Question 7**

**OTHER MATERIALS REQUIRED:**

**Pencil**  
**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **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. 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).

## **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.
- An enlarged copy of the Periodic Table will be provided.
- The total number of marks for this paper is 60.

## **EQUATIONS**

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

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

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

$$\text{fuel energy input} = \text{waste energy output} + \text{electrical energy output}$$

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

$$\text{energy supplied} = \text{power} \times \text{time}$$

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

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

**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) In which class of vertebrates is the fox classified?**

**How can you tell this from the photograph?**

**class** \_\_\_\_\_

**reason** \_\_\_\_\_ **[2]**

**(b) Read this information about the island fox.**

**The island fox lives on six small islands.  
The foxes on each island are all slightly different.  
For example, on one island they have more bones  
in their tail than the foxes on other islands.  
However, all the foxes are part of the same  
species.**

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

**At first, biologists could not find the reason for  
the deaths.**

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

**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.**

**Without the bald eagles, golden eagles were  
attracted to the northern islands. The golden  
eagles found the island fox easy to catch.**

**Finish the following sentence.**

**Choose the correct word from this list.**

**CLASS**

**COMMUNITY**

**ECOSYSTEM**

**POPULATION**

**SPECIES**

**The foxes on each island form a separate**

**\_\_\_\_\_ . [1]**

- (c) The graph opposite 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.**

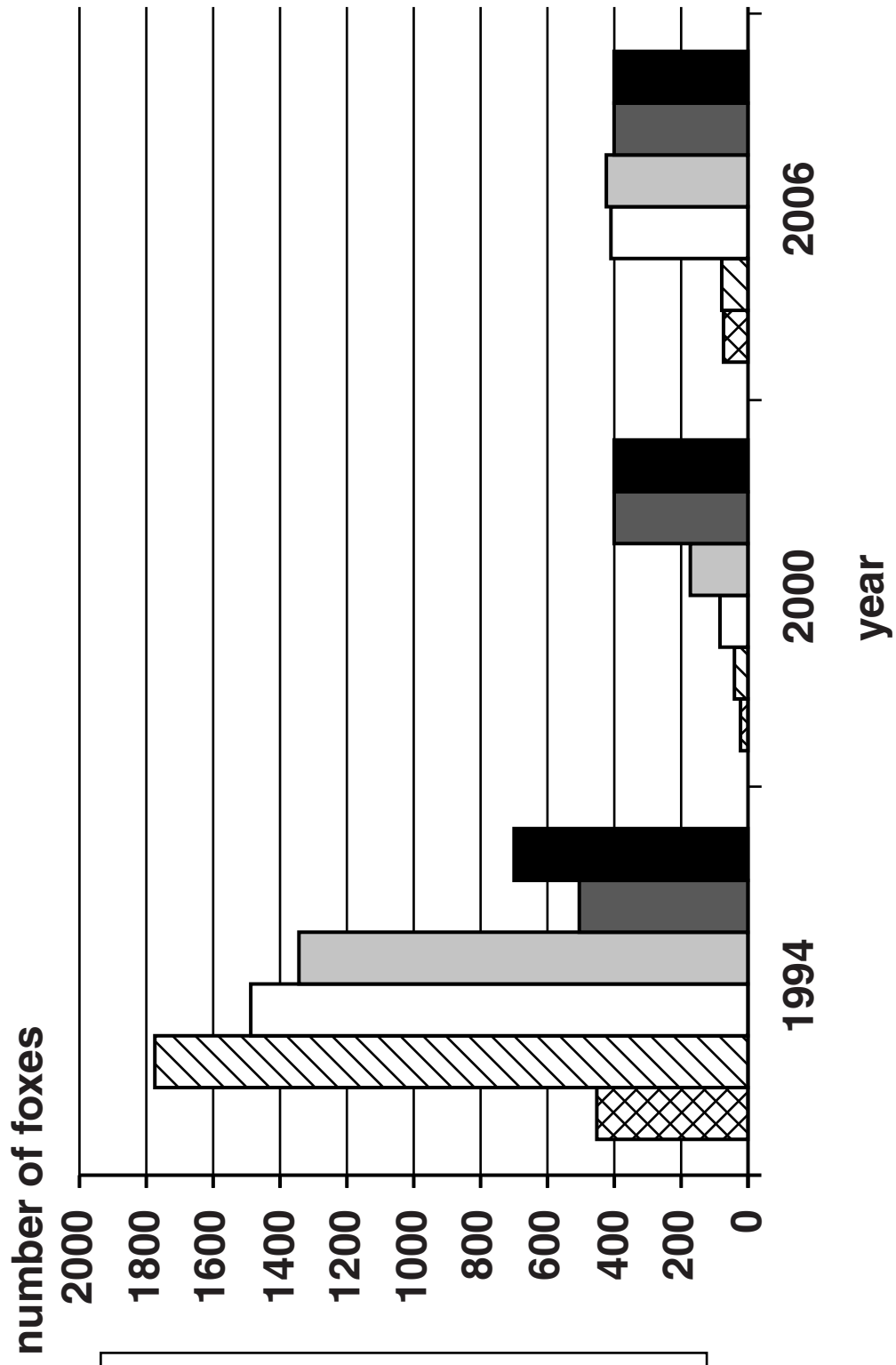
**captive breeding of foxes** ☐

**shooting bald eagles** ☐

**captive breeding of golden eagles** ☐

**capturing golden eagles and releasing them a long distance away** ☐

**[1]**



- (d) Scientists have found that some of the foxes on the southern islands have died from a virus spread from a dog.**

**However, they think that fairly soon all the foxes on the southern islands will be resistant to this virus.**

**Use ideas about natural selection to explain how an entire group of foxes can become resistant to a virus.**

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**[3]**

**[Total: 9]**

**2 The picture below shows part of a mistletoe plant.**



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

**(a) Mistletoe plants can photosynthesise.**

**Write the word equation for photosynthesis.**

\_\_\_\_\_ [2]

**(b) 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 is fed on by a parasite?**

\_\_\_\_\_ [1]

- (c) Some scientists investigate two different species of mistletoe growing on a tree.

They provide THE TREE with carbon dioxide that contains radioactive carbon.

They then measure how much of the sugar that the tree produces stays in the tree and how much sugar is passed into the mistletoe.

They also measure the chlorophyll content of the mistletoe.

The results are shown in the table.

		SUGAR CONTAINING RADIOACTIVE CARBON CONTENT IN mg/g OF TISSUE	
SPECIES OF MISTLETOE	CHLOROPHYLL CONTENT IN mg/g OF TISSUE	IN TREE	IN MISTLETOE
dwarf mistletoe	0.4	306	120
eastern mistletoe	0.9	420	2

- (i) Which species of mistletoe is likely to cause most damage to the tree that it grows on?

Explain your answer.

species \_\_\_\_\_

reason \_\_\_\_\_

\_\_\_\_\_ [1]

- (ii) Suggest an explanation for the difference in the chlorophyll content of the two types of mistletoe.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

[Total: 6]

**3 *Euglena* is a small single-celled organism.**

**(a) Write down why it is difficult to classify *Euglena*.**

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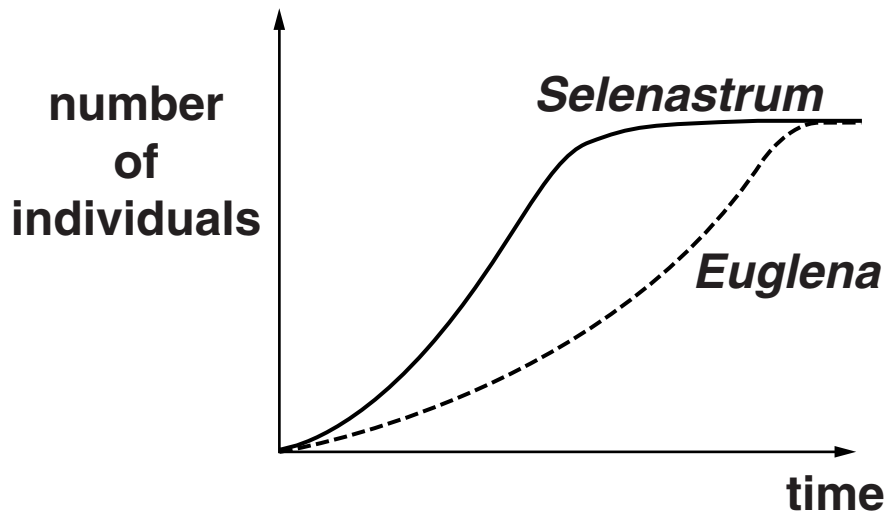
**[1]**

**(b) Scientists investigate the growth of *Euglena* and another single-celled organism called *Selenastrum*.**

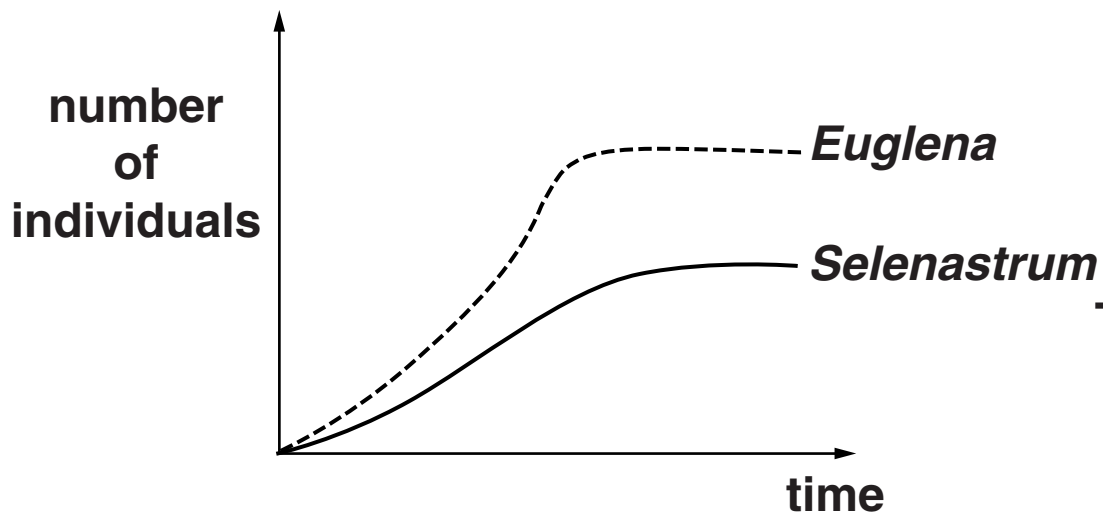
**They grow cultures of the two organisms separately and then together.**

**They count the number of organisms over several days.**

**The graphs opposite show the results.**



WHEN  
GROWN  
SEPARATELY



WHEN  
GROWN  
TOGETHER

- (i) Put ticks (✓) in the table to show the best description of the results of each experiment.

Only tick TWO boxes.

DESCRIPTION	WHEN GROWN SEPARATELY	WHEN GROWN TOGETHER
<i>Euglena</i> reproduces more slowly than <i>Selenastrum</i> but achieves the same number of individuals eventually.		
<i>Euglena</i> reproduces faster than <i>Selenastrum</i> but achieves the same number of individuals eventually.		
<i>Euglena</i> reproduces faster than <i>Selenastrum</i> and exists in larger numbers throughout the experiment.		
<i>Euglena</i> reproduces more slowly than <i>Selenastrum</i> and exists in smaller numbers throughout the experiment.		

[2]

- (ii) Complete these sentences to provide an explanation for the results of the experiment.

*Euglena* and *Selenastrum* are similar organisms and have similar requirements.

They occupy a similar ecological

\_\_\_\_\_ .

When grown together, *Euglena* will

\_\_\_\_\_ *Selenastrum* for the same  
resources. [2]

[Total: 5]

## 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) Write down one use for a paint made using pigment B.

\_\_\_\_\_ [1]

**(b) Pigments A and B are used to make an emulsion paint.**

**What is the SOLVENT used in an emulsion paint?**

\_\_\_\_\_ **[1]**

**(c) Pigment C is a PHOSPHORESCENT pigment.**

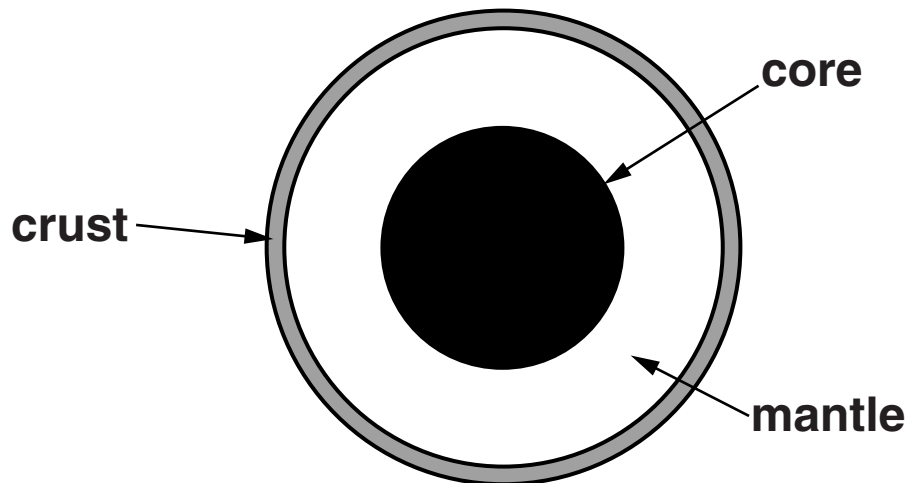
**Modern phosphorescent pigments are better than those used 50 years ago.**

**Explain why.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[2]**

**[Total: 4]**

**5 Look at the diagram of the Earth.**



- (a) The tectonic plates are found on top of the mantle.**

**Explain why.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

- (b) 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]

- (c) The outer part of the Earth is divided into tectonic plates.**

**What causes the tectonic plates to move?**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(d) Volcanoes happen at tectonic plate boundaries.**

**Geologists study volcanoes.**

**Write down TWO reasons why geologists study volcanoes.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_ **[2]**

**[Total: 5]**

**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.**

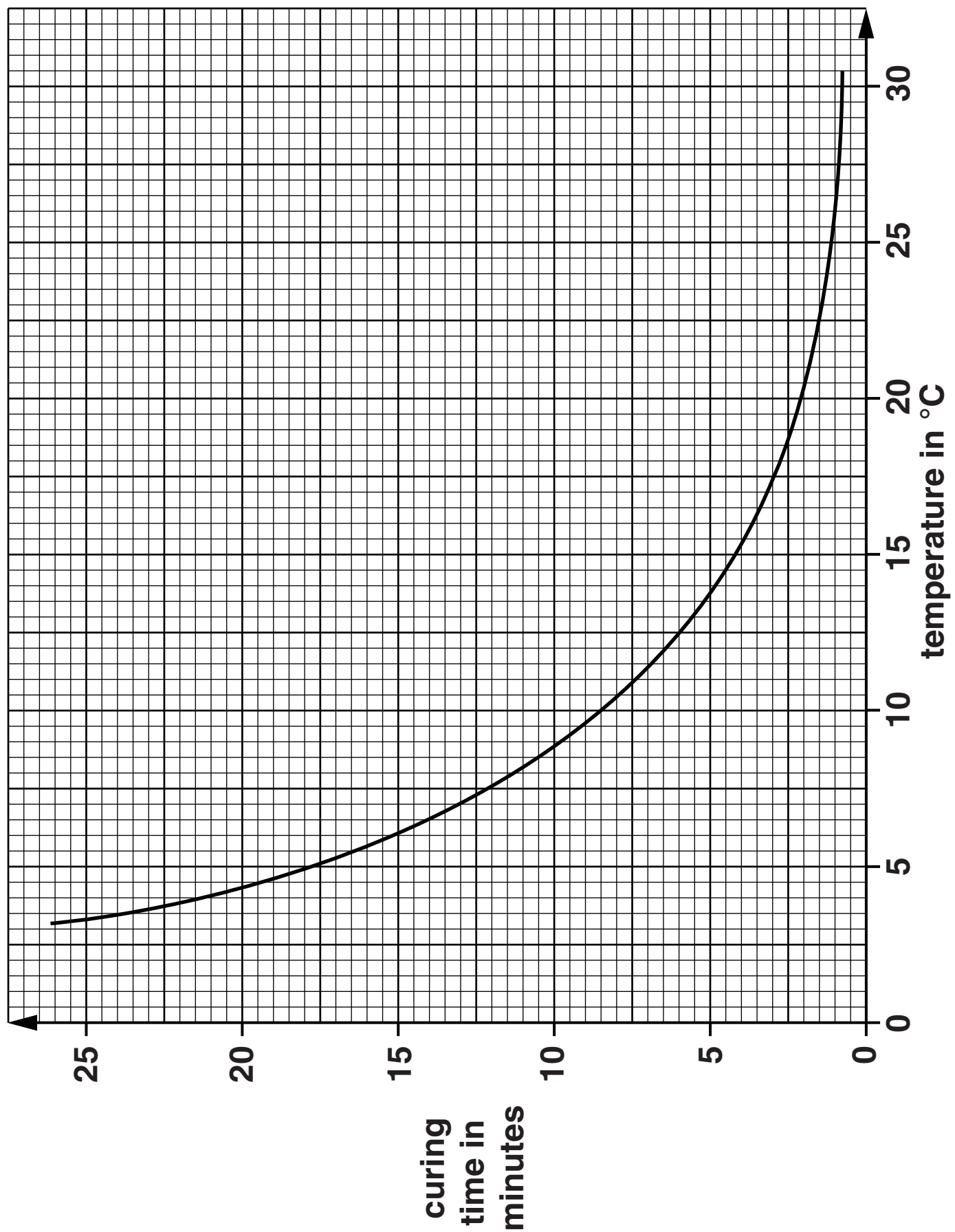
**Look at the graph opposite. It shows the effect of temperature on the curing time.**

**The mixture contains 5% hardener.**

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

\_\_\_\_\_ °C

**[1]**



- (b) The rate of the reaction increases as the temperature increases.**

**At a higher temperature the particles of resin and hardener have more energy and move faster.**

**Explain how this makes the reaction faster.**

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**[2]**

- (c) 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.**

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**[1]**

**[Total: 4]**

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

**(a) A decorative pan is used to heat water on an open fire.**

**Which metal is best for making the decorative pan?**

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**Explain your choice.**

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**[3]**

<b>METAL</b>	<b>APPEARANCE</b>	<b>MELTING POINT IN °C</b>	<b>RELATIVE STRENGTH</b>	<b>RELATIVE CONDUCTIVITY OF HEAT</b>	<b>OBSERVATION AFTER BEING LEFT IN MOIST AIR</b>
<b>copper</b>	shiny red/ brown	1083	4.8	5.7	tarnishes very slowly
<b>aluminium</b>	dull light grey	660	2.6	10.5	has protective oxide layer
<b>brass</b>	shiny yellow	710	4.5	3.2	tarnishes
<b>zinc</b>	dull light grey	420	4.3	1.0	tarnishes
<b>lead</b>	dull dark grey	328	1.5	5.9	tarnishes
<b>iron</b>	dull dark grey	1535	8.2	0.3	rusts

**(b) Car bodies can be made from aluminium or iron.**

**One advantage of using iron is that it is cheaper than aluminium so the car is cheaper to make.**

- (i) Write down one OTHER advantage of using IRON rather than aluminium to make car bodies.**

**Explain your answer. Use the table to help you.**

**advantage of iron** \_\_\_\_\_

**explanation** \_\_\_\_\_

\_\_\_\_\_ **[2]**

- (ii) Write down one advantage of using ALUMINIUM rather than iron to make car bodies.**

**Explain your answer. Use the table to help you.**

**advantage of aluminium** \_\_\_\_\_

**explanation** \_\_\_\_\_

\_\_\_\_\_ **[2]**

**[Total: 7]**

## SECTION C – MODULE P2

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



**Finish the sentence.**

**When the Sun warms the air, convection currents are produced. This produces wind.**

**Wind turbines transfer the \_\_\_\_\_ energy of the wind into electricity. [1]**

- (b) Describe one advantage and one disadvantage of using wind turbines to generate electricity.**

**advantage** \_\_\_\_\_

\_\_\_\_\_

**disadvantage** \_\_\_\_\_

\_\_\_\_\_ **[2]**

- (c) Solar energy can be harnessed in other ways.**

**Finish the sentences by choosing the best words from this list.**

**FIBRES**

**GLASS**

**IMAGES**

**LENSES**

**MIRRORS**

**PRISMS**

**SOUND**

**WOOD**

**Using \_\_\_\_\_ in a building allows passive solar heating to take place.**

**In a solar furnace, light from the Sun can be reflected to a focus by curved**

\_\_\_\_\_ .

**[2]**

**[Total: 5]**

- 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) Ionising radiation is emitted by the waste from a nuclear power station.**

**It can damage living cells in humans.**

**What can this damage cause?**

\_\_\_\_\_ **[1]**

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

The power station generates electricity continuously.

Calculate the ENERGY generated in kWh in one week.

The equations on page 3 may help you.

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answer \_\_\_\_\_ kWh [2]

- (ii) Biomass can produce fuel for a power station WITHOUT BEING BURNED.

Describe how.

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 [1]

[Total: 5]

**10 People have been exploring space for many years.**

- (a) Asteroids are rocks which orbit the Sun between Mars and Jupiter.**

**They are left over from the formation of the Solar System.**

**Why was the asteroid belt formed near Jupiter?**

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**[1]**

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

- (i) Explain two DISADVANTAGES of using unmanned spacecraft to explore distant parts of the Solar System.**

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**[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.

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[2]

- (c) Most of the scientific community think that the Universe began with a “Big Bang”.

Observations of light from stars support this theory.

Explain how.

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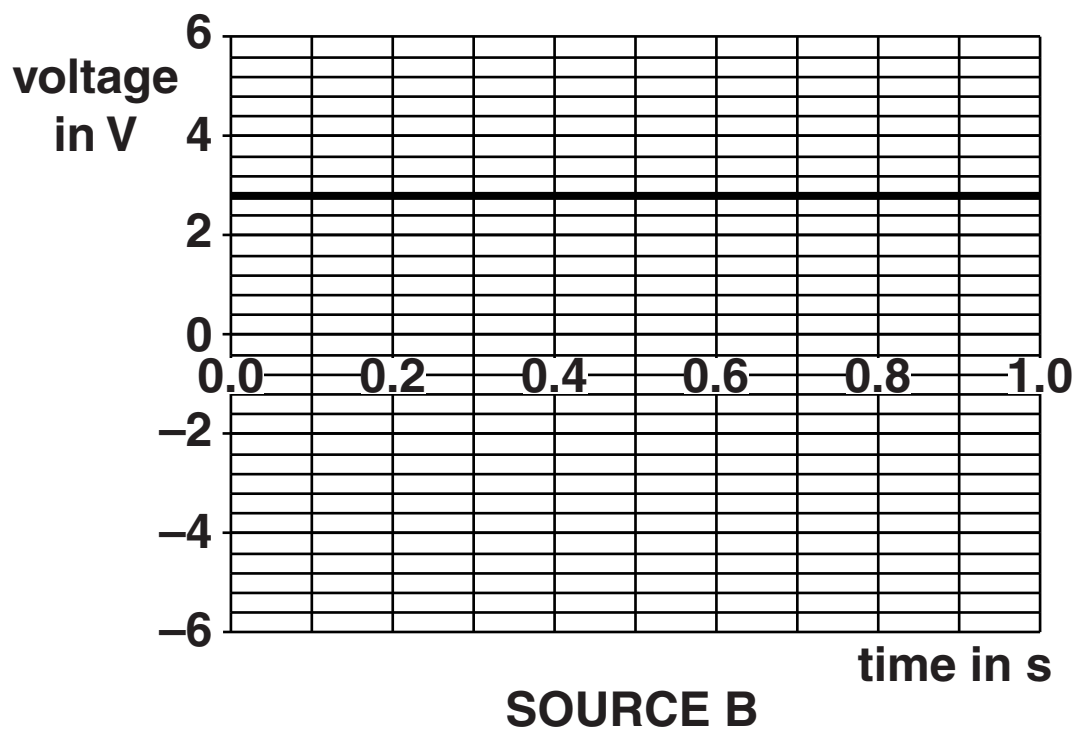
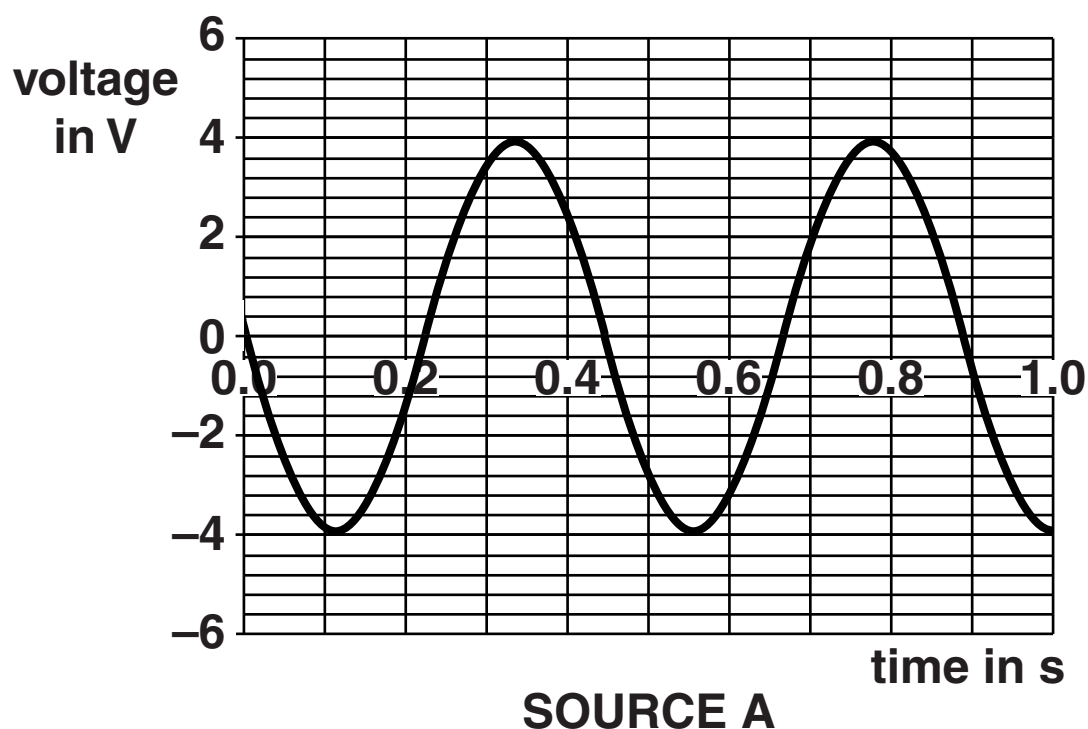
[2]

[Total: 7]

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

The data-logger prints out VOLTAGE-TIME graphs.



**(a) What is the maximum voltage from the AC supply?**

\_\_\_\_\_ [1]

**(b) Michael makes a simple AC generator in the laboratory.**

**Describe what he must do to produce AC from his generator.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

**[Total: 3]**

**END OF QUESTION PAPER**

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