

NAME:	SCIENCE TEACHER: (circle code)	9C
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SCIENCE

Year 9 Examination 2011

9C – 40 marks

**Make sure that you have answered all the questions in paper 9B before
you start this paper**

Time allowed for both examinations: 2 hours

Answer all questions in the spaces provided on the paper.

You may use a calculator.

Show all your working in calculations; marks are awarded for it.

Give units for all answers (eg kg or m) unless they are already provided.

For Teacher Use

<i>Question</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>Total</i>
<i>Marks gained</i>								
<i>Marks available</i>	<i>8</i>	<i>5</i>	<i>4</i>	<i>9</i>	<i>4</i>	<i>4</i>	<i>6</i>	<i>40</i>

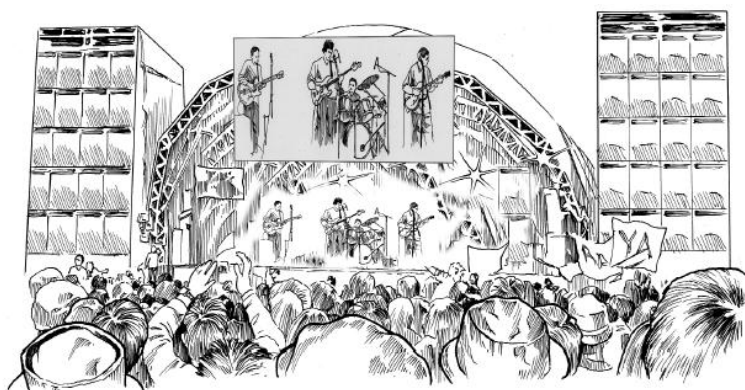
Question One: Waves. [10 marks]

(a) Part of the index of a book is shown below.

Absorption	11	Radiation	- gamma	19
Aerial	3		- infrared	4
Burglar Alarm	6		- ultraviolet	8
Computer	- desktop 15	Radiowaves		9
	- laptop 18	Reflection		5
Cooking	13	Remote Control		3
Heat Loss	- conduction 2	Security Light		7
	- convection 2	Sunbeds		9
Light	1	Television		10
Medical Images	21	Transmitter		14
Microwaves	12	Wavelength		1
Mobile Phone	12	Wireless Network		23
Optical Fibre	17	X-Rays		20

Lindsey looked up pages 4 and 7. What was she trying to find out about?

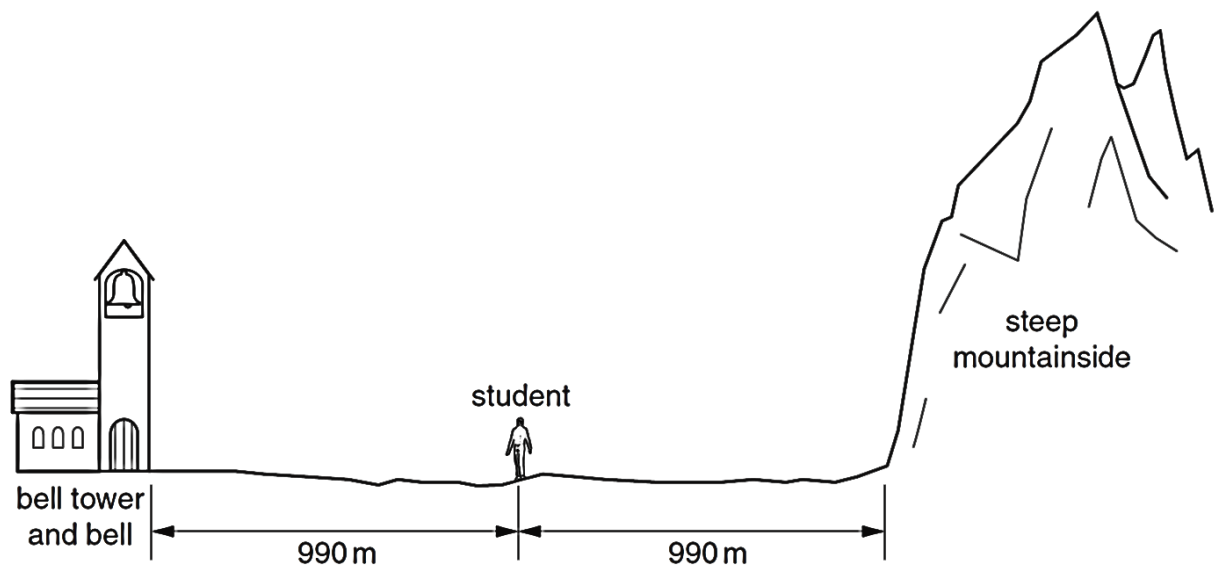
(b) A rock concert is being held in a large stadium. The concert is being filmed and is displayed on a large screen above the stage. This allows the band to be seen clearly by people at the back of the stadium.



The people at the back of the stadium, watching the screen, notice that there is a time delay between seeing the drummer hitting the drums and hearing the sound.

Explain why there is a time delay.

- (c) The diagram shows a student standing midway between a bell tower and a steep mountainside.



The bell rings once, but the student hears two rings separated by a short time interval.

- (i) Explain why the student hears two rings.

- (ii) State which of the sounds is loudest, and why.

- (iii) Sound in that region travels at 330 m/s (metres per second). Calculate the time interval between **the bell ringing** and the **student hearing it for the second time**. Show your working.

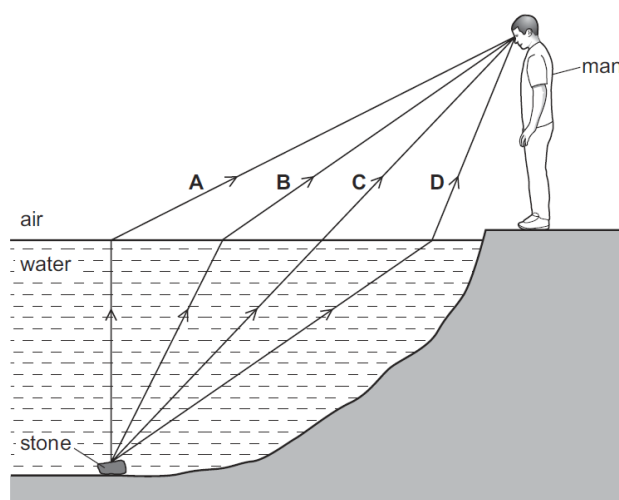
- (d) In an experiment on hearing, different frequencies were played to 20 teenagers and 20 people aged 65. The number who could hear each frequency was recorded. The results are below.

Frequency (kHz)	Number who could hear each frequency	
	Teenagers	65 year old people
12	20	20
14	20	18
16	20	15
18	20	12
20	20	0
22	0	0

Describe fully what the information tells us about hearing in teenagers and older people.

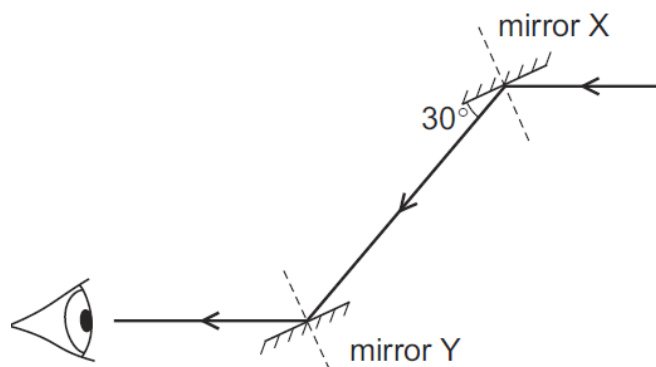
- (e) A man sees a stone at the bottom of a pool of water. Which path could be taken by light from the stone to the man? Circle your answer.

A B C D



- (f) A ray of light is reflected by two parallel plane mirrors X and Y. Which statement is correct? Circle your answer.

- A The angle of incidence at mirror X is 30° .
 B The angle of incidence at mirror Y is 60° .
 C The angle of reflection at mirror X is 120° .
 D The angle of reflection at mirror Y is 0° .



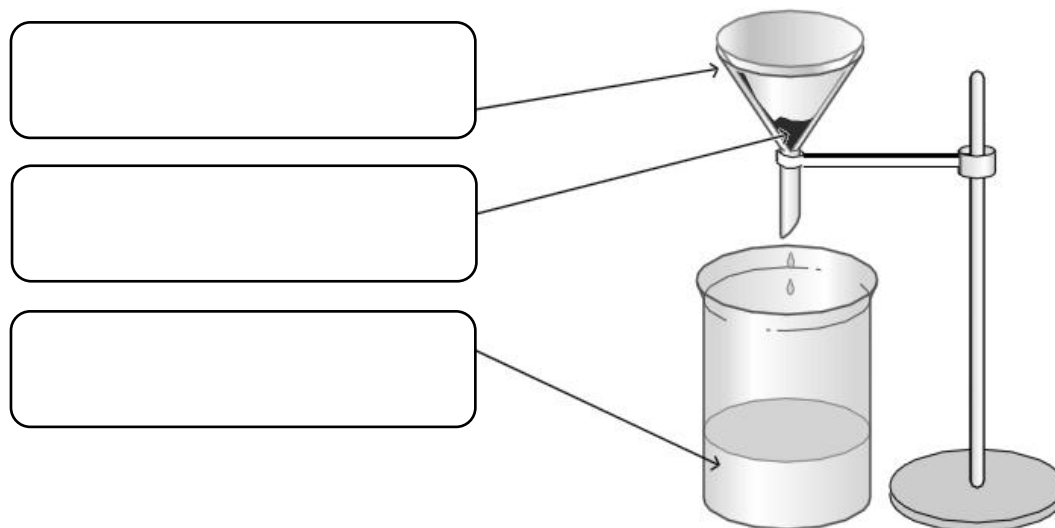
Question Two: Salt [5 marks]

Salt can be removed from sea (salty) water by following a simple laboratory procedure.

- (a) Number the boxes below to show the correct order for each of the steps involved. One has been done for you.

Evaporate off the liquid over a Bunsen burner	
Scrape the salt from the dish onto a filter paper	
Filter the sample to remove any insoluble impurities	1
Pour the filtrate into an evaporating dish	
Light the Bunsen burner	
Place the evaporating dish onto a wire gauze over a Bunsen burner	
Allow the dish to cool	

- (b) Label the diagram of the experiment used to filter off any insoluble impurities

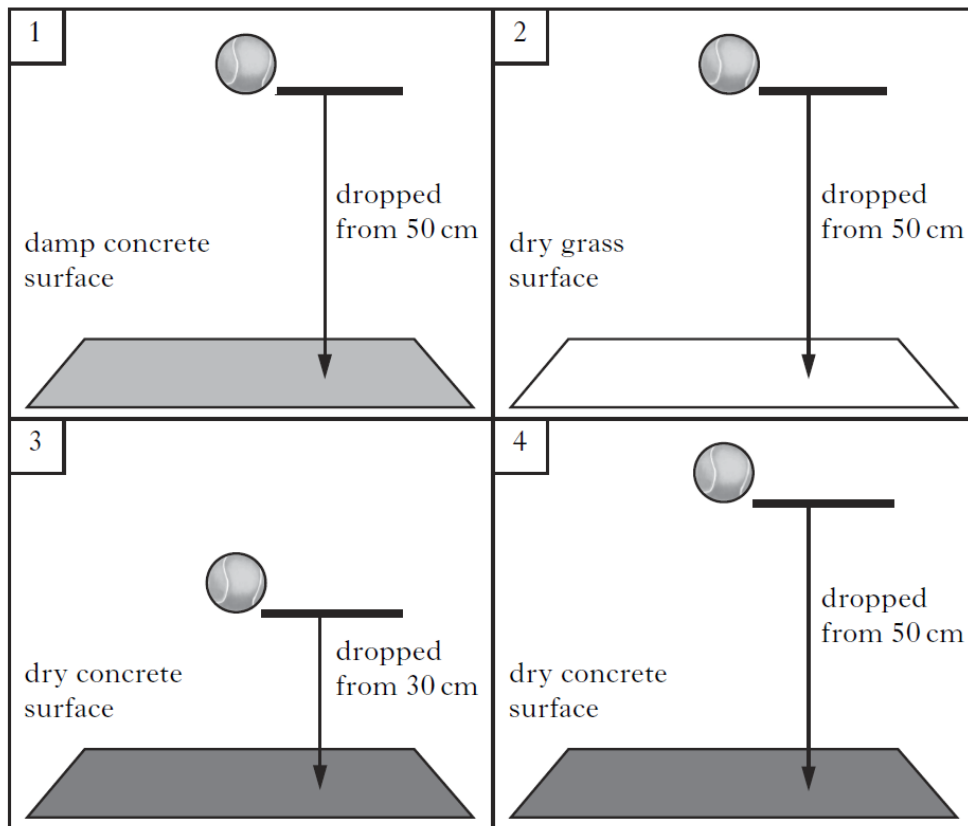


- (c) Draw a ring around the **best** container to use when evaporating the water from the salt solution.



Question Three: Bouncy Balls [4 marks]

Mark investigated how high tennis balls bounce. For each experiment, he measured how high the tennis ball bounced after it hit the surface. (The ruler is not shown).



Mark wanted to find out if the dampness of the surface affected how high the tennis ball bounced.

- (a) Which two boxes show the experiments he should compare for a fair test?

- (b) Mark compared the experiments in boxes 3 and 4. What was he trying to find out?

- (c) Why is it hard to make this experiment accurate even if you do as carefully as you can?

- (d) How could the results be made more reliable?

Question Four: Animals. [9 marks]

- (a) Read the passage and then answer the questions below.

Ladybirds are small, brightly-coloured insects. They are often seen on green plants eating aphids, which are their main prey. Aphids are slow-moving and have no defences so they are easily caught by ladybirds. There are eighty-eight species of ladybird found in Europe.



aphid



ladybird

A ladybird's brightly coloured body acts as a warning to animals which might eat it. If attacked, a ladybird defends itself by "reflex bleeding". This means that blood containing an unpleasant substance called coccinelline oozes from its leg joints. This substance tastes so bad that predators soon learn not to eat ladybirds.

Aphids damage plants, so gardeners use ladybirds as a natural way of controlling the number of aphids. An advantage of using ladybirds to kill aphids is that gardeners do not have to use toxic pesticides.

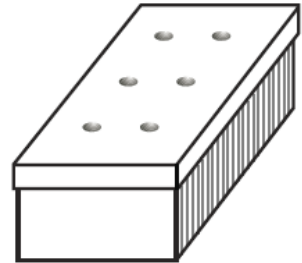
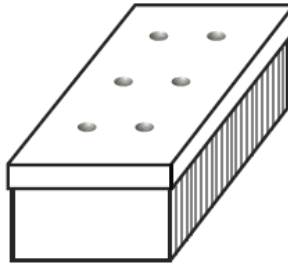
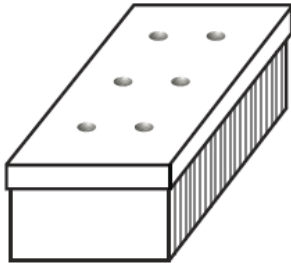
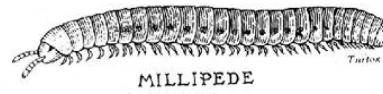
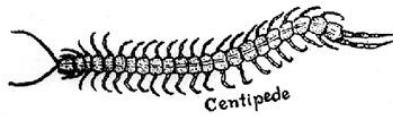
- (i) Give
- two**
- reasons why aphids are easily caught by ladybirds.

- (ii) Why does coccinelline stop predators eating ladybirds?

- (iii) Is coccinelline a structural, behavioural or functional (physiological) adaptation?

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- (b) In an investigation, different organisms were put into three boxes with air holes. The boxes were left for five days. (Diagrams are not to scale)



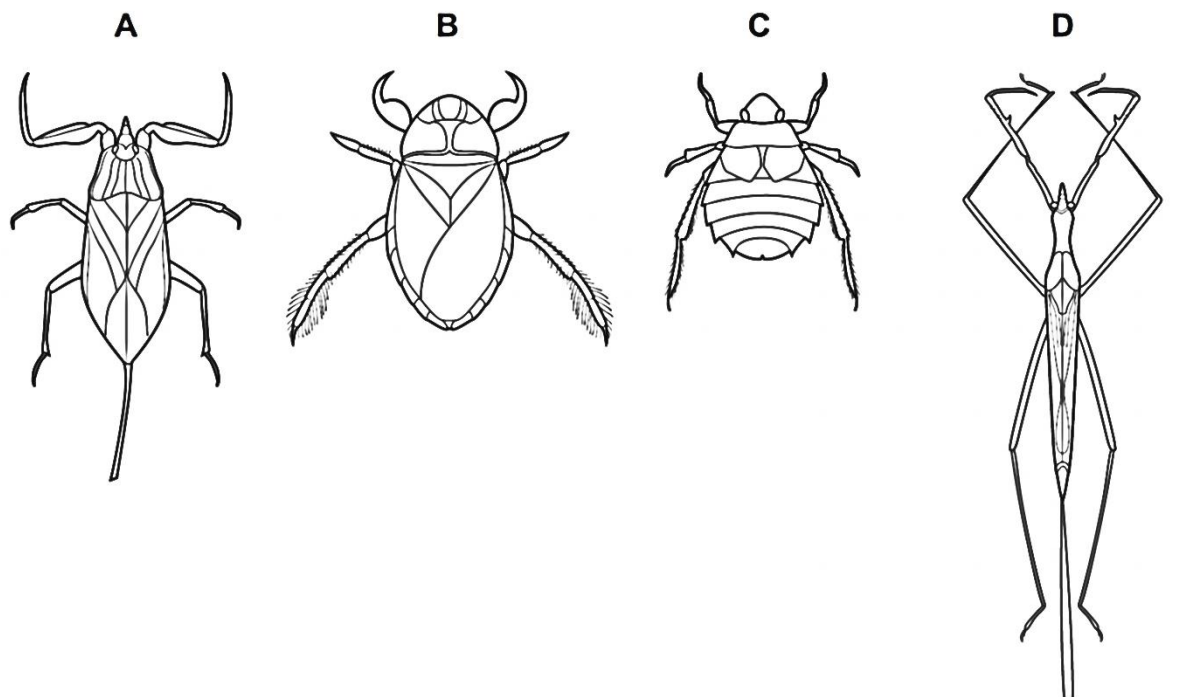
Box 1	Box 2	Box 3
<u>Day 1</u> 3 grass roots 3 centipedes	<u>Day 1</u> 3 millipedes 3 centipedes	<u>Day 1</u> 3 grass roots 3 millipedes
<u>Day 5</u> 3 grass roots 3 dead centipedes	<u>Day 5</u> 0 millipedes 3 centipedes	<u>Day 5</u> 0 grass roots 3 millipedes

- (i) What do millipedes eat?

- (ii) Explain why there were no millipedes in Box 2 after five days.

- (iii) If a box was set up with 3 grass roots, 1 centipede and 3 millipedes, predict what you might find after 5 days. Explain your prediction.

- (c) Some students were investigating a river ecosystem. They used nets to sweep through the water. They emptied the contents into a shallow container of water, examined the animals present and recorded what they saw. The diagram shows a student's record.



The student uses this key to identify the animals **A** and **C**.

Fill in the correct names.

- 1 The animal has one or more breathing tubes extending from the end of its abdomen.

go to 2

The animal does not have a long breathing tube extending from the end of its abdomen.

go to 3

- 2 The animal has a long, thin, stick-like body.

Ranatra linearis

The animal has an oval-shaped body.

Nepa cinerea

- 3 The front legs are muscular and claw-like.

Ilyocoris cimicoides

The front legs are not muscular or claw-like.

Aphelocheirus aestivalis

Animal A is
Animal C is

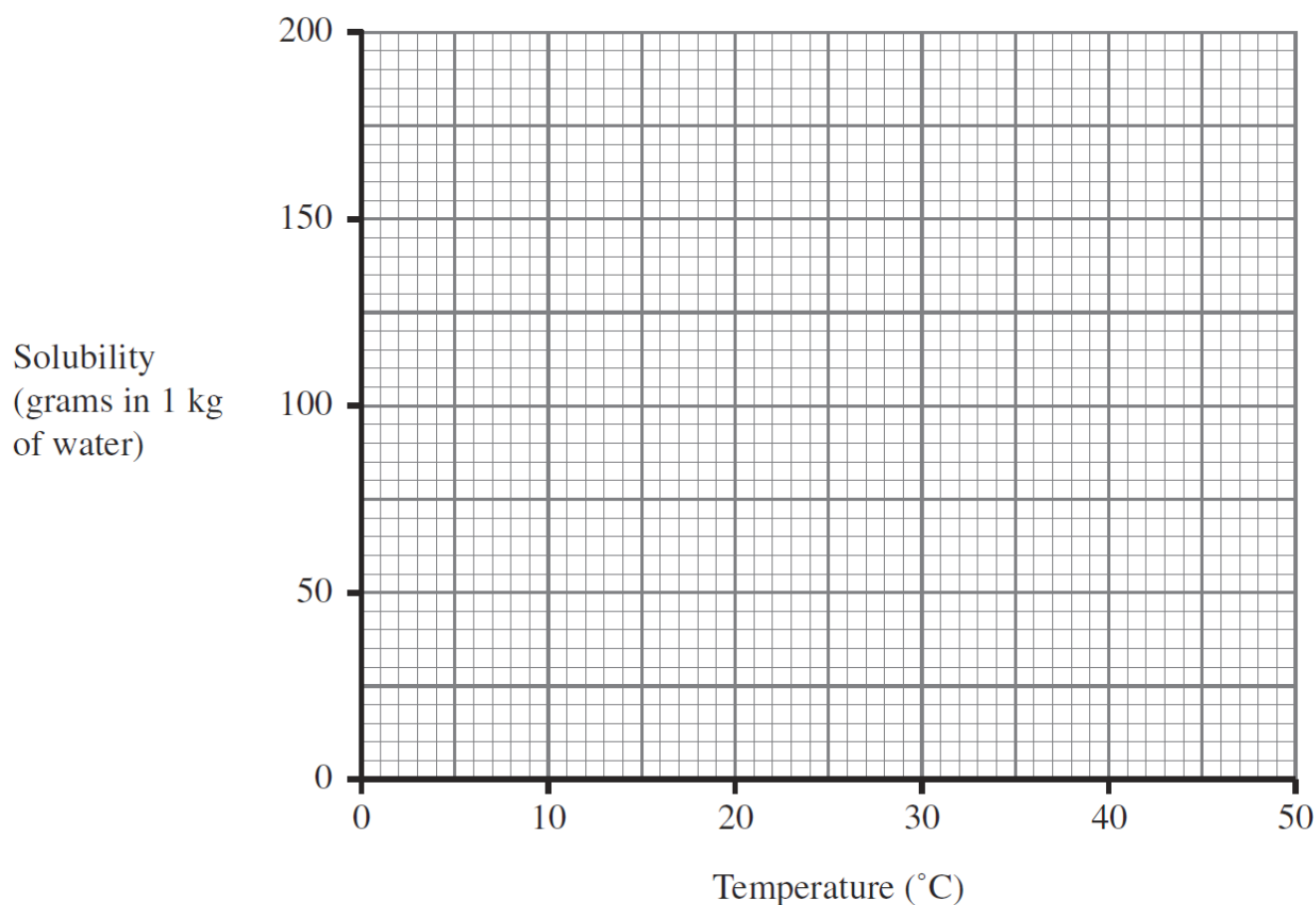
Question Five: Solubility. [4 marks]

A laboratory technician was investigating how temperature affects solubility. She measures the solubility of the fertiliser in water at six different temperatures. She measures the mass of the fertiliser that dissolves in 1 kg of water. Her results are recorded below.

Temperature (°C)	0	10	20	30	40	50
Solubility (grams in 1 kg of water)	35	50	70	110	145	195

Note: water containing dissolved substances is still a liquid @ 0°C

(a) Plot the results on the grid below.



(b) Join the points with a smooth (freehand) curve.

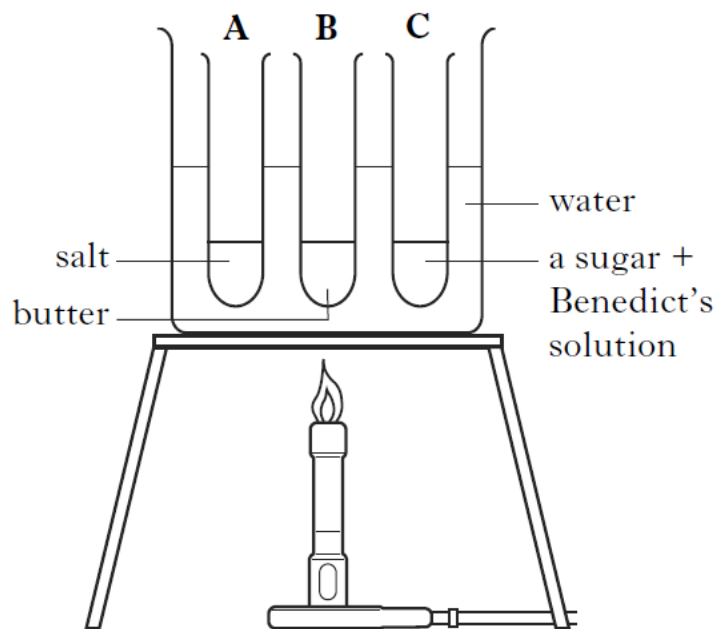
(c) Use your graph to estimate the solubility of the fertiliser at 15 °C.

_____ g
in 1 kg of water

(d) From her results, what effect does increasing temperature have on the solubility of the fertiliser?

Question Six: Chemistry [4 marks]

- (a) The experiment below was carried out to investigate what happens when different substances are heated for 5 minute and then allowed to cool. The results are shown.






Test tube	Contents	Observation on heating	Observation on cooling
A	salt solution	no change	a little less water; a few white crystals
B	butter	yellow solid to yellow liquid	yellow liquid to yellow solid
C	sugar and Benedict's solution	blue liquid to orange solid	orange solid remains

In which test tube, A, B or C, did a chemical reaction take place? Explain your choice of answer.

(b) The use of a metal depends on its properties.

- (i) Complete the table to show the property of the metal which makes it **most** suitable for each use. Choose your answer(s) from the following. One won't be needed.

conducts heat ● shiny ● low density ● conducts electricity

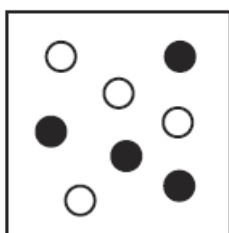
Use of metal			
Property of metal			

- (ii) An alloy of aluminium is used in the manufacture of this plane

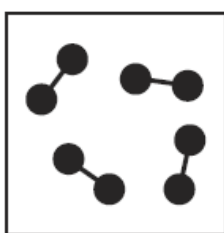


The elements present in the alloy are: aluminium, copper, magnesium, silicon and iron.
Name the element present in the alloy which is **not** a metal.

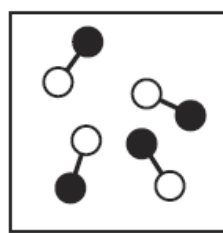
- (c) "Di" means two in Science. Which of the following diagrams represents a **compound** made up of **diatomic** molecules? Circle your answer.



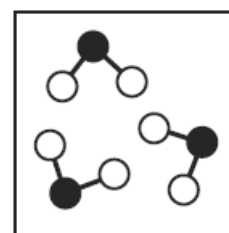
A



B



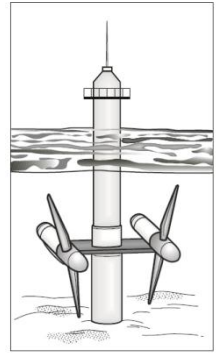
C



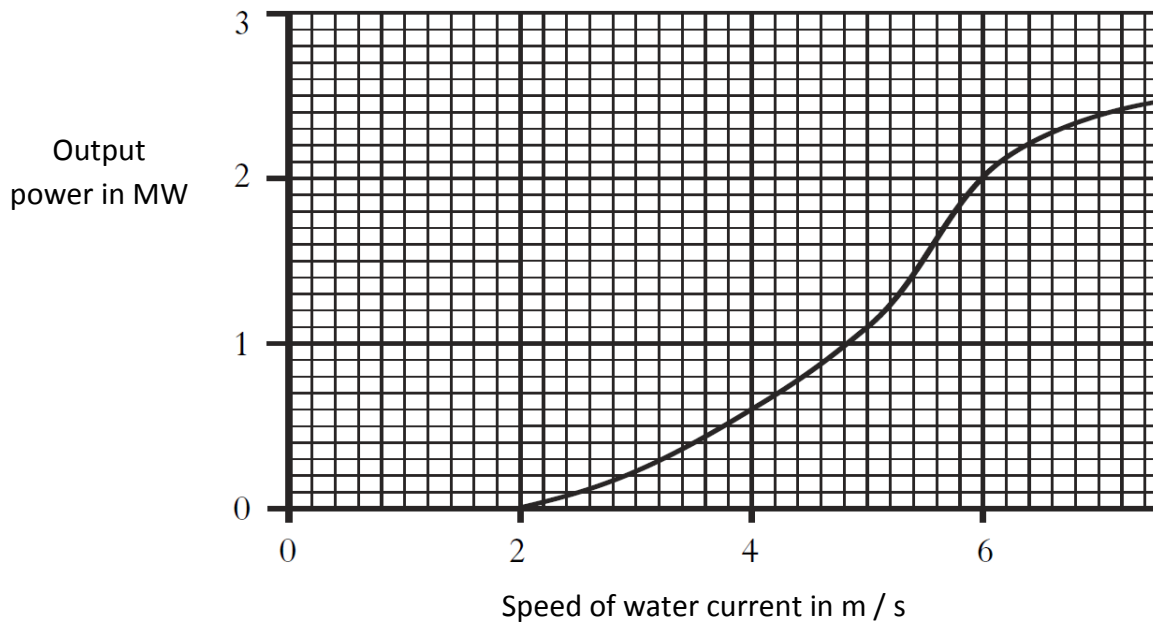
D

Question Seven: Renewable energy [6 marks]

- (a) An underwater generator is designed to produce electricity from water currents in the sea. The **output power** of the generator depends on the speed of the water current as shown in Graph 1.

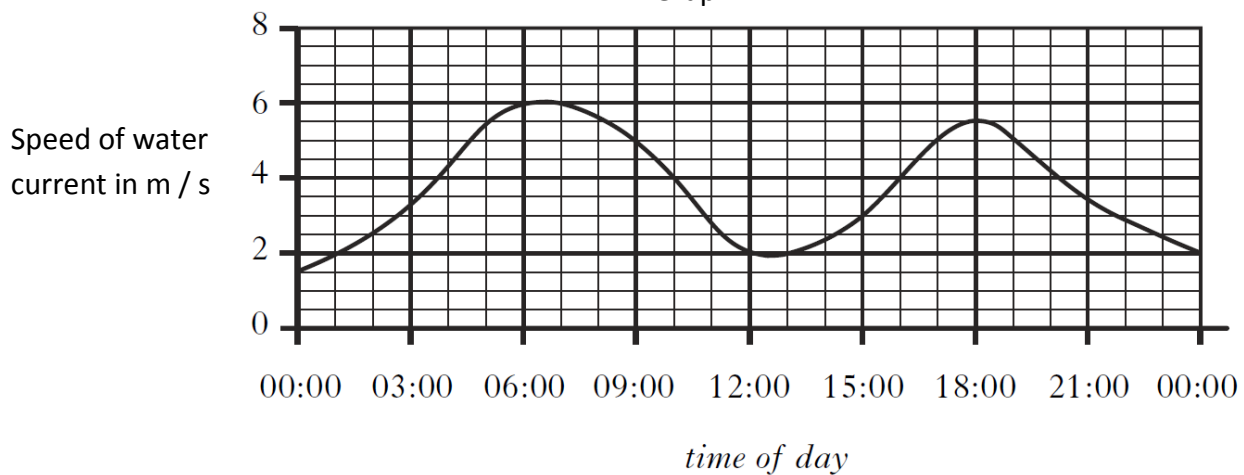


Graph 1



The speed of the water current is recorded at different times of the day shown in Graph 2.

Graph 2



- (i) What is the power output when the water current is 6 m/s .

- (ii) State the output power of the generator at 09:00.

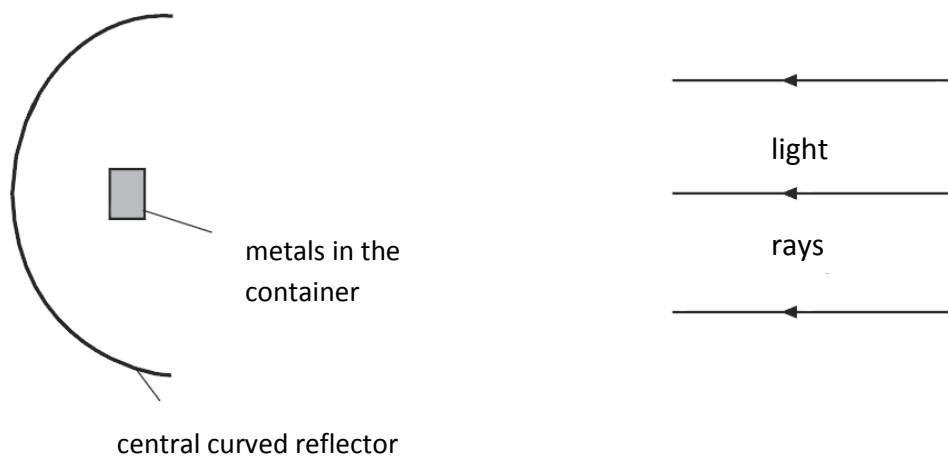
- (iii) Explain one disadvantage of using this type of generator.

- (b) A solar furnace consists of an array of mirrors which reflect light rays on to a central curved reflector.



A container is placed at the focus of the central curved reflector. Metals placed in the container get so hot that they melt. The diagram below shows the light rays after reflection by the mirrors on the hillside.

Using a ruler, complete the ray diagram to show the effect of the central curved reflector on the light rays.



End of Paper C