

**GCSE**

**SCIENCE B**

Science B Unit 1 Modules B1, C1, P1

**Specimen Paper**

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

**H**

**B621/02**

60 mins

Candidate  
Name

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Centre  
Number

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Candidate  
Number

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**TIME** 60 mins

**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.**

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.

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**This specimen paper consists of 26 printed pages.**

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**Answer all questions.**

**Section 1**

1. Roy goes to basketball training.

He finds that many changes take place inside his body.

Pulse rate increases

Breathes more deeply



Breathing rate increases

Produces sweat

(a) Roy's breathing rate increases during the training session.

Explain why.

.....  
.....[2]

(b) Roy is also breathing more deeply.

Complete these sentences.

When Roy breathes in the volume of his lungs ..... This means that the air pressure in the lungs ..... so that the air rushes into the lungs.

[2]

(c) In Roy's muscle cells, glucose is converted into lactic acid, releasing a small amount of energy.

(i) Why is only a small amount of energy released?

.....[1]

(ii) Describe what happens to the lactic acid when Roy stops exercising hard.

.....  
.....[2]

[Total: 7]

2. Evie smokes cigarettes.



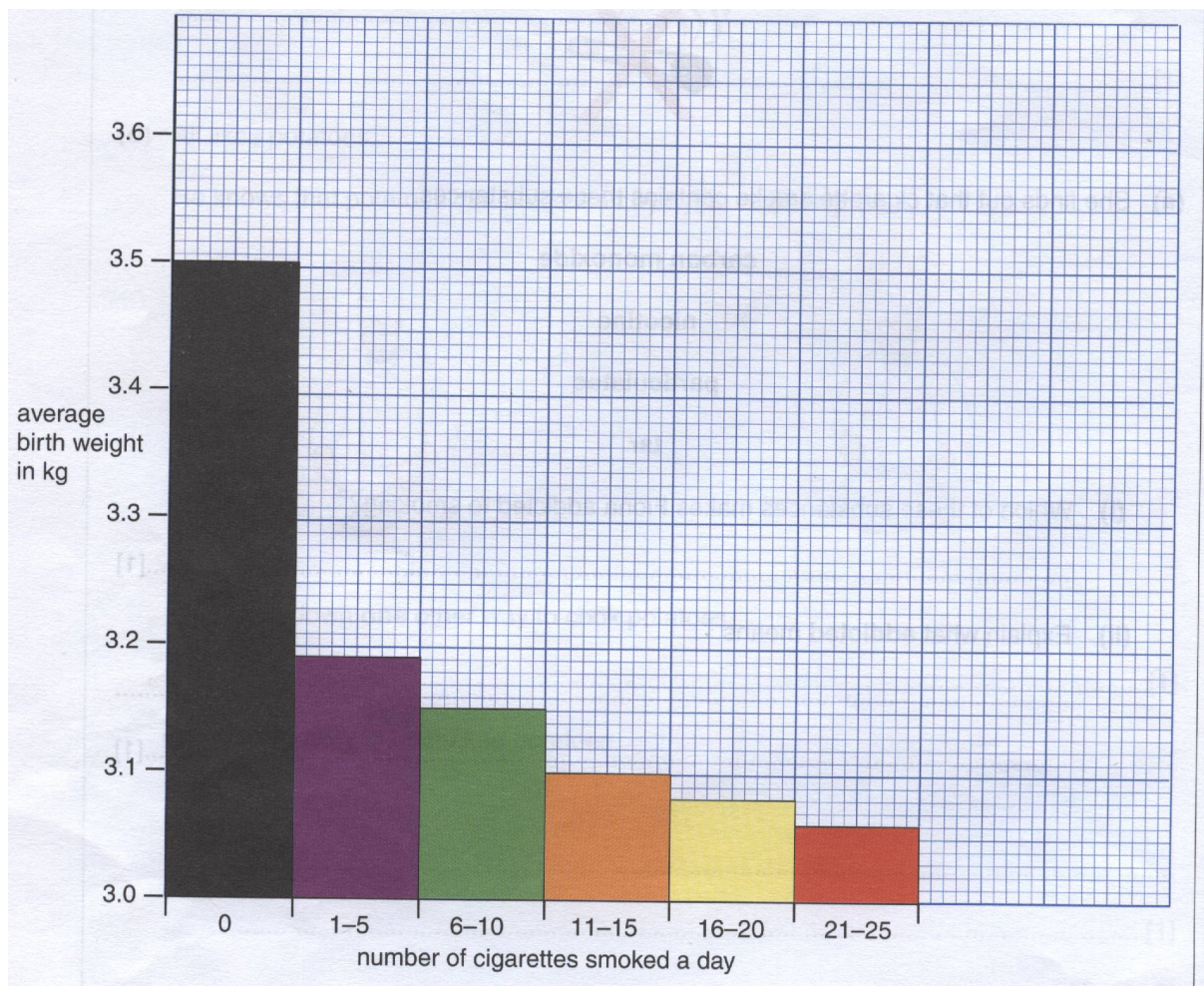
- (a) She is **addicted** to smoking cigarettes.

Explain what **addicted** means.

.....  
.....[1]

- (b) Evie is pregnant.

She finds this information about cigarette smoking and birth weight.



(i) Evie smokes 13 cigarettes a day.

Use the information from the graph to predict her baby's birth weight.

Predicted baby's birth weight ..... kg [1]

(ii) What link is shown between cigarette smoking and birth weight?

.....[1]

(c) Cigarette smoke contains thousands of chemicals.

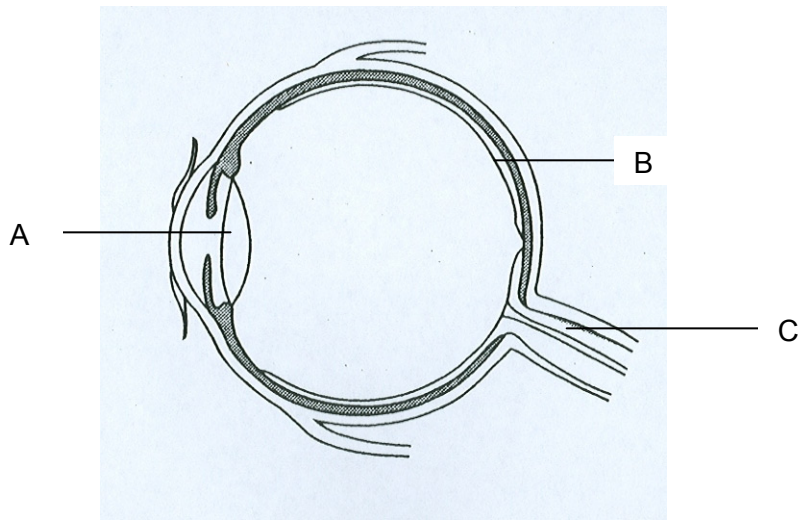
Two of these chemicals are carbon monoxide and particulates.

Describe their effects on the body.

.....  
.....  
.....  
.....[3]

[Total: 6]

3. (a) Look at the diagram of the structure of the eye.



Draw a line from each **label** and to its correct **job**.

label	job
<b>A</b>	react to light
<b>B</b>	carry nerve impulses
<b>C</b>	focus light rays

[1]

(b) The eye can adjust to different light conditions.



Explain why it is important for the eye to adjust to bright light.

.....  
.....[2]

(c) John is 80 years old.  
He has problems with eye accommodation.

(i) Describe how the eye accommodates.

.....  
.....  
.....  
.....[2]

(ii) Explain why John's poor eye accommodation could be a problem.

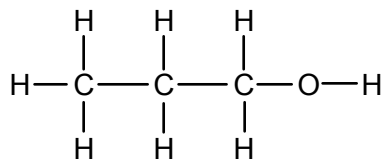
.....  
.....  
.....  
.....[2]

[Total: 7]





(b) Look at the diagram. It shows the displayed formula of propanol.



(i) Write down the molecular formula for propanol.

.....[1]

(ii) Propanol is **not** a hydrocarbon.

Explain why.

.....  
.....[1]

(c) Many fuels, such as petrol and diesel, are obtained from crude oil.

There are environmental and political issues concerned with the extraction and use of crude oil.

Briefly discuss some of these issues.

.....  
.....  
.....  
.....  
.....[2]

[Total: 7]

5. This question is about cooking chemistry.

(a) We do not eat uncooked potatoes.

This is because cooking improves the texture, taste and flavour.

Write down **one** other reason.

.....  
.....[1]

(b) Cooking a potato is an example of a chemical change.

Write down **two** reasons why.

1. ....

2. ....[2]

(c) Sodium hydrogencarbonate,  $\text{NaHCO}_3$ , is used in baking.

When heated it decomposes to form sodium carbonate,  $\text{Na}_2\text{CO}_3$ , water and carbon dioxide.

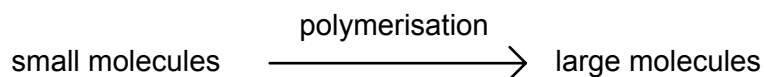
Write a balanced symbol equation for this reaction.

.....[2]

[Total: 5]

6. This question is about polymerisation.

Polymerisation changes many small molecules into large molecules.

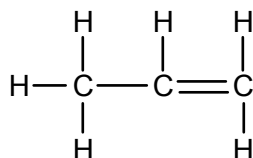


(a) What conditions are needed for polymerisation?

.....  
.....[2]

(b) Look at the diagram.

It shows the displayed formula of a monomer named propene.



Propene is an alkene. It is **unsaturated**.

Why is propene unsaturated?

.....  
.....[1]

- (c) Look at this table. It shows the displayed formula of some monomers and polymers.  
Complete the table.

name of monomer	displayed formula of monomer	displayed formula of polymer
ethene	$  \begin{array}{c}  \text{H} & & \text{H} \\  & \diagdown & / \\  & \text{C} = \text{C} & \\  & / & \diagdown \\  \text{H} & & \text{H}  \end{array}  $	$  \left[ \begin{array}{cc}  \text{H} & \text{H} \\    &   \\  -\text{C} & -\text{C}- \\    &   \\  \text{H} & \text{H}  \end{array} \right]_n  $
propene	$  \begin{array}{c}  & & \text{H} & & \text{H} \\  & & & \diagdown & / \\  & & & \text{C} & \\  & & & / & \diagdown \\  \text{H} & & \text{C} = \text{C} & & \text{H} \\  & \diagdown & / & & \\  & \text{H} & & &   \end{array}  $	
chloroethene		$  \left[ \begin{array}{cc}  \text{H} & \text{Cl} \\    &   \\  -\text{C} & -\text{C}- \\    &   \\  \text{H} & \text{H}  \end{array} \right]_n  $

[2]

[Total: 5]

7. Feshna makes a perfume.



The perfume she makes is an ester.

She uses an acid in her experiment.

- (a) Which other chemical must she use?

Put a tick (✓) in the correct box.

an alcohol

an alkali

an emulsifier

a polymer

[1]

**(b)** One property that a perfume should have is that it easily evaporates.

Write about the ease of evaporation of perfumes.

In your answer you should write about

- energy of particles
- attractive forces.

.....

.....

.....

.....

.....[2]

[Total: 3]

**Section 3**

7. Danni is sunbathing.

She makes sure that she has sunscreen rubbed onto her back.



(a) Danni is using a sunscreen with a sun protection factor number SPF 15.

**Without** sunscreen, Danni can stay in the sun for 20 minutes without burning.

What is the longest time she can safely stay in the sun whilst using the sunscreen?

longest time = ..... hours [2]



**(b)** Danni's friend, Joshua, has a darker coloured skin.

Explain why he can stay in the sun for longer without getting burnt.

.....  
.....[1]

**(c)** A layer of a gas in the Earth's atmosphere reduces the amount of ultraviolet radiation which reaches the Earth's surface.

**(i)** Write down the name of this gas.

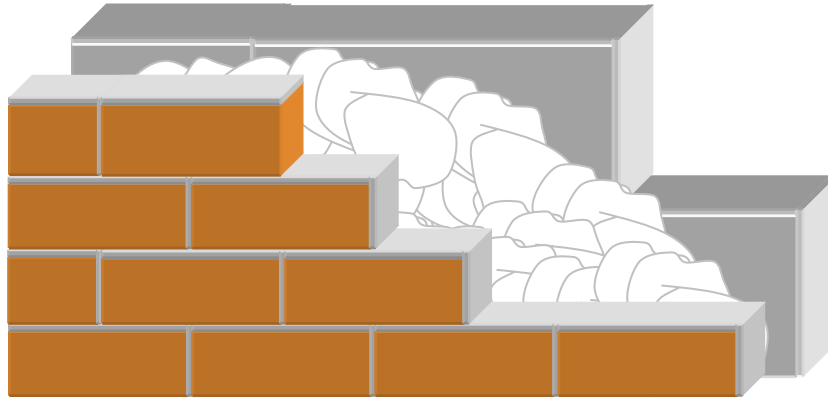
.....[1]

**(ii)** Why is this layer becoming thinner?

.....  
.....[1]

[Total: 5]

9. Tina has bought a house with little insulation.  
She decides to have cavity wall insulation put in.  
Cavity wall insulation is made from foam.



- (a) Why does cavity wall insulation reduce energy loss by conduction?

.....  
.....[1]

- (b) Explain why it is important to have foam instead of just an air gap.

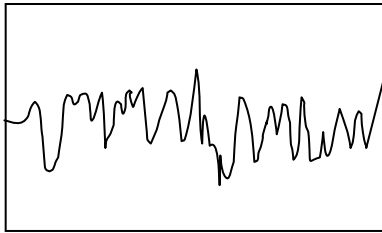
.....  
.....  
.....[2]

- (c) Tina decides to have cavity wall insulation because there is a short **payback time**.  
Explain what is meant by **payback time**.

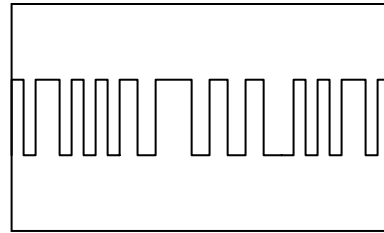
.....  
.....  
.....[1]

[Total: 4]

10. (a) The diagrams show two signals.



**Analogue**



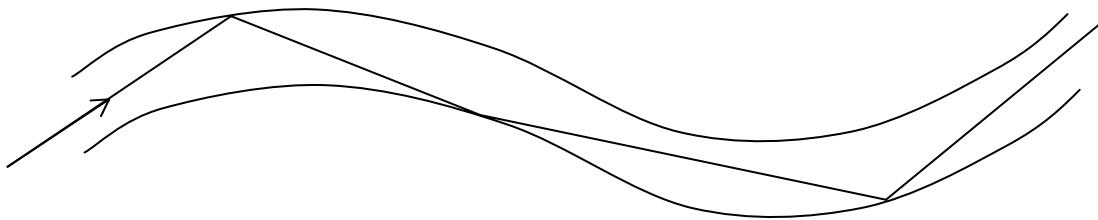
**Digital**

Other than cost, what are the advantages of using digital signals for transmission of data?

.....  
.....[2]

(b) Signals can be sent along an optical fibre.

The diagram shows the path of a ray of light along an optical fibre.



(i) Finish this sentence.

Total internal reflection occurs when the angle of incidence is larger than the ..... angle.

[1]

(ii) Explain the advantages of using optical fibres instead of copper wires for communication over long distances.

.....  
.....  
.....  
.....[3]

[Total: 6]

11. Fred adds 15 g of ice to 200 g of drink to cool it down.  
The ice cubes melt.



- (a) The specific latent heat of ice is 330 J/g.  
Calculate the energy transferred from the drink to the ice as it melts.  
You are advised to show how you work out your answer.

energy transferred = ..... J [3]

- (b) When Fred heats 200 g of his drink, he finds that it needs 452 kJ of energy to evaporate the drink **at its boiling point**.

Calculate the specific latent heat of evaporation of the drink.

You are advised to show how you work out your answer.

specific latent heat = .....J/g [2]

[Total: 5]

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**GCSE**

**SCIENCE B**

Science B Unit 1 Modules B1, C1, P1

**Specimen Mark Scheme**

Maximum mark for this paper is 60

**H** **B621/02**

60 mins

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**This specimen mark scheme consists of 4 printed pages.**

Question Number	Answer	Max Mark
<b>Section 1</b> <b>1(a)</b> <b>1(b)</b> <b>1(c)i</b> <b>1(c)ii</b>	He needs to get more oxygen into the blood; For quicker respiration / so more energy can be released by respiration Increases / gets larger; Decreases / drops; Because he is respiring anaerobically; Any <b>two</b> from: Carried away in blood; To the liver; To be broken down when oxygen is available;	[1] [1] [1] [1] [2] <b>Total marks</b> [7]
<b>2(a)</b> <b>2(b)i</b> <b>2(b)ii</b> <b>2(c)</b>	Cannot/difficult to give up 3.1 Birth weight decreases with increasing number of cigarettes smoked Any <b>three</b> from: carbon monoxide, less oxygen ; carried by red blood cells; to cells for respiration; less energy released particulates, accumulate; in air sacs/alveoli; block exchange of gases; irritate lining of bronchioles	[1] [1] [1] [3] <b>Total marks</b> [6]
<b>3(a)</b> <b>3(b)</b> <b>3(c)i</b> <b>3(c)ii</b>	A to focus light rays B to react to light C to carry nerve impulses prevent damage; To retina/light sensitive layer/B <b>any two from</b> lens changes shape; by circulatory muscles/suspensory ligaments; to focus on objects at different distances; alters focal distance; <b>any two from</b> cannot adjust focus quickly; from close to distant objects; because of weak muscles/stiff ligaments; danger aspect e.g. cannot adjust quickly from looking in window to looking to see oncoming traffic.	[1] [2] [2] [2] <b>Total marks</b> [7]



<p><b>Section 2</b></p> <p><b>4(a)</b></p> <p><b>4(b)i</b></p> <p><b>4(b)ii</b></p> <p><b>4(c)</b></p> <p style="text-align: right;"><b>Total marks</b></p>	<p>Water is in copper can; Same quantity of water in cans each time / same flame size each time / same height from can; Take readings of temperature before and after heating / measure temperature increase; C<sub>3</sub>H<sub>8</sub>O; Hydrocarbons <u>only</u> contain hydrogen and carbon atoms / propanol contains an oxygen atom; Idea of political dimension of pollution; e.g. related; to energy crisis Idea of war etc</p>	<p>[1] [1] [1] [1] [1] [1] [7]</p>
<p><b>5(a)</b></p> <p><b>5(b)</b></p> <p><b>5(c)</b></p> <p style="text-align: right;"><b>Total marks</b></p>	<p>Make them easier to digest / high temperature kills microbes; A new substance is formed; (<b>allow a large energy change involved</b>) The process cannot be reversed; 2 NaHCO<sub>3</sub> → Na<sub>2</sub>CO<sub>3</sub> + CO<sub>2</sub> + H<sub>2</sub>O(<b>allow any correct multiple of this equation</b>); Correct reactants and products; Balancing;</p>	<p>[1] [1] [1] [1] [1] [5]</p>
<p><b>6(a)</b></p> <p><b>6(b)</b></p> <p><b>6(c)</b></p> <p style="text-align: right;"><b>Total marks</b></p>	<p>High pressure; Catalyst; Contains a double bond; Correct displayed formula for poly(propene); Correct displayed formula for chloroethene;</p>	<p>[1] [1] [1] [1] [1] [5]</p>
<p><b>7(a)</b></p> <p style="text-align: right;"><b>Total marks</b></p>	<p>An alcohol / 1<sup>st</sup> box; Perfume particles with lots of energy can escape the attraction of other molecules in the liquid perfume / aw; There is only weak attraction between particles in the liquid perfume and so it is easy to overcome this attraction / aw;</p>	<p>[1] [1] [1] [3]</p>

<b>Section 3</b>		
<b>8(a)</b>		
<b>8(b)</b>	15 x 1/3 ; 5;	[2]
<b>8(c)i</b>	More radiation absorbed;	[1]
<b>8(c)ii</b>	Ozone; Pollution / CFC's;	[1] [1]
	<b>Total marks</b>	[5]
<b>9(a)</b>	Air is an insulator / poor conductor;	[1]
<b>9(b)</b>	Trapped air; reduces energy loss by convection;	[2]
<b>9(c)</b>	Time taken to recover installation cost in energy saving owtte;	[1]
	<b>Total marks</b>	[4]
<b>10(a)</b>	More information can be transmitted;	[1]
	Any interference to signal during transmission can be removed;	[1]
<b>10(b)i</b>	Critical;	[1]
<b>10(b)ii</b>	Does not corrode;	[1]
	Much less signal loss / Less frequent amplification;	[1]
	No heating effect / mention of current / resistance;	[1]
	<b>Total marks</b>	[6]
<b>11(a)</b>	energy = mass x specific latent heat;	[1]
<b>11(b)</b>	15 x 330;	[1]
	4950;	[1]
	452 000 ÷ 200;	[1]
	2260;	[1]
	<b>Total marks</b>	[5]
	<b>Overall marks</b>	[60]