

**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

**F** **B621/01**

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 30 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  
.....

Breathes more  
deeply



Breathing rate  
increases

Produces sweat

(a) Complete the box to show what happens to his pulse rate. [1]

(b) Roy's breathing rate increases during the training session. Explain why.  
.....  
.....[2]

(c) Give **two** ways in which the air Roy breathes in is different from the air he breathes out.  
1 .....  
.....  
2 .....  
.....[2]

**(d)** When Roy exercises very hard his muscle cells convert glucose into lactic acid, releasing a small amount of energy.

**(i)** What type of respiration is happening?

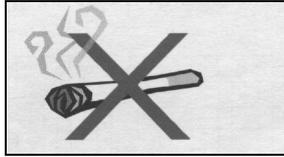
.....[1]

**(ii)** Why does this type of respiration only happen when Roy is exercising hard?

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

[Total: 7]

2. Evie smokes cigarettes.



(a) She finds out that cigarette smoke contains these substances

**carbon monoxide**

**nicotine**

**particulates**

**tar**

(i) Which one of these substances makes Evie addicted to smoking?

.....[1]

(ii) Explain what **addicted** means.

.....[1]

(b) The tobacco in cigarettes acts as a drug.

Which type of drug is found in tobacco?

Draw a ring round the correct answer.

**Depressant**

**Hallucinogen**

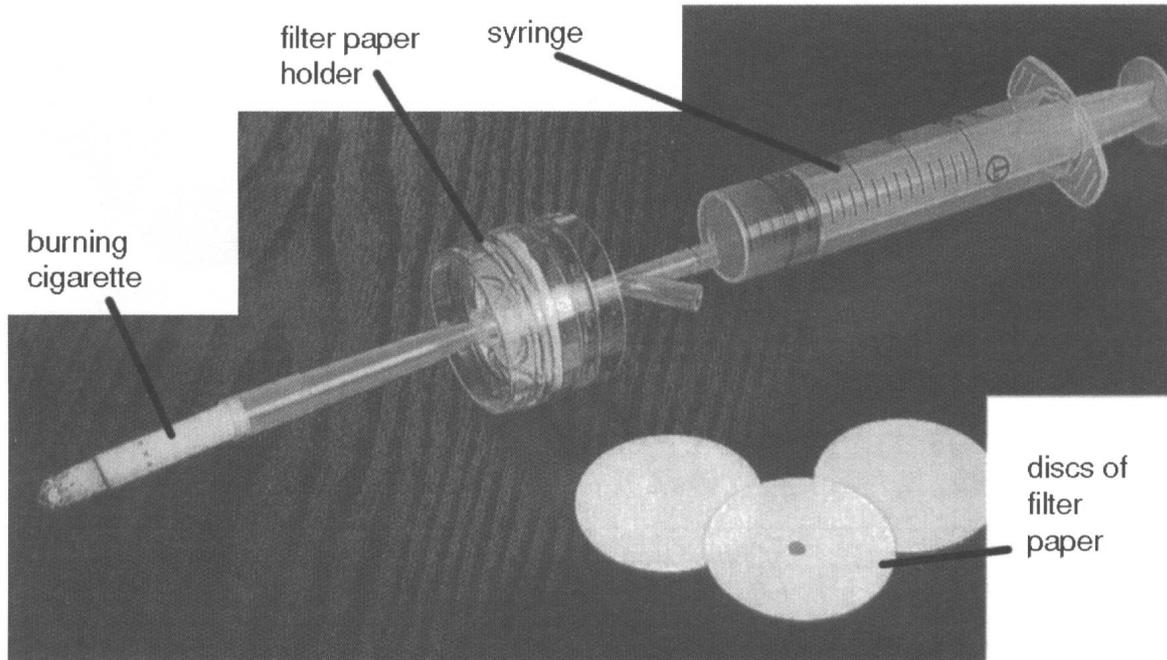
**Pain killer**

**Stimulant**

**Performance enhancer**

[1]

- (c) Cigarette packets show information about the tar content and whether they have a filter. Evie sets up a “smoking machine”.



- (i) Name the chemical that will cause the marks on the filter paper.

.....[1]

- (ii) She uses the “smoking machine” to compare different types of cigarettes.

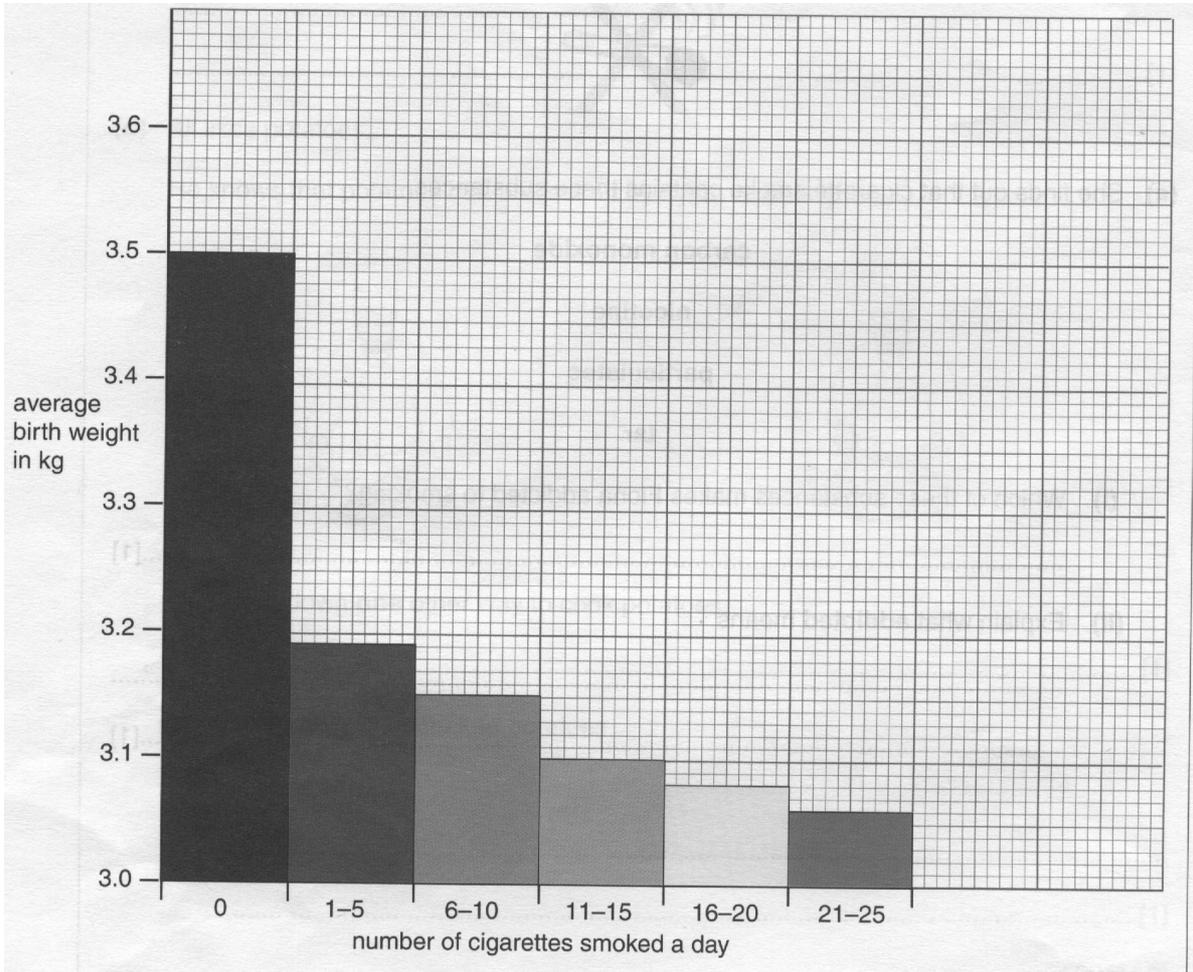
Type	Description
A	low tar cigarette with a filter
B	low tar cigarette without a filter
C	high tar cigarette with a filter
D	high tar cigarette without a filter

Which type of cigarette **A**, **B**, **C** or **D** will produce the **darkest** colour on the filter paper?

Type .....[1]

(d) 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.

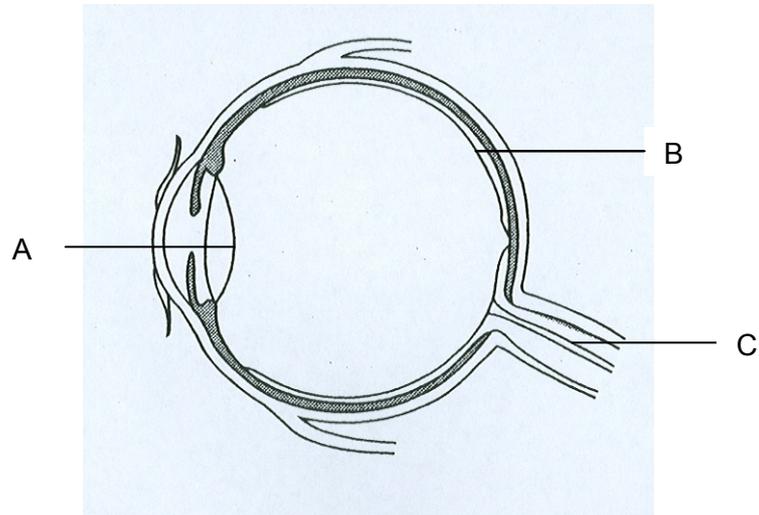
Predicted baby's birth weight .....[1]

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

.....[1]

[Total: 7]

3. Look at the diagram of the structure of the eye.

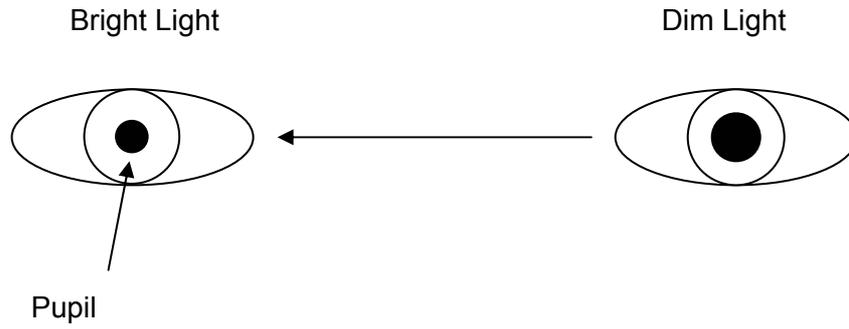


(a) Draw a line from each **part of the eye** to the correct **label** and to its correct **job**.  
One set of lines has been drawn for you.

label	part of the eye	job
<b>A</b>	optic nerve	react to light
<b>B</b>	lens	carry nerve impulses
<b>C</b>	retina	focus light rays

[2]

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



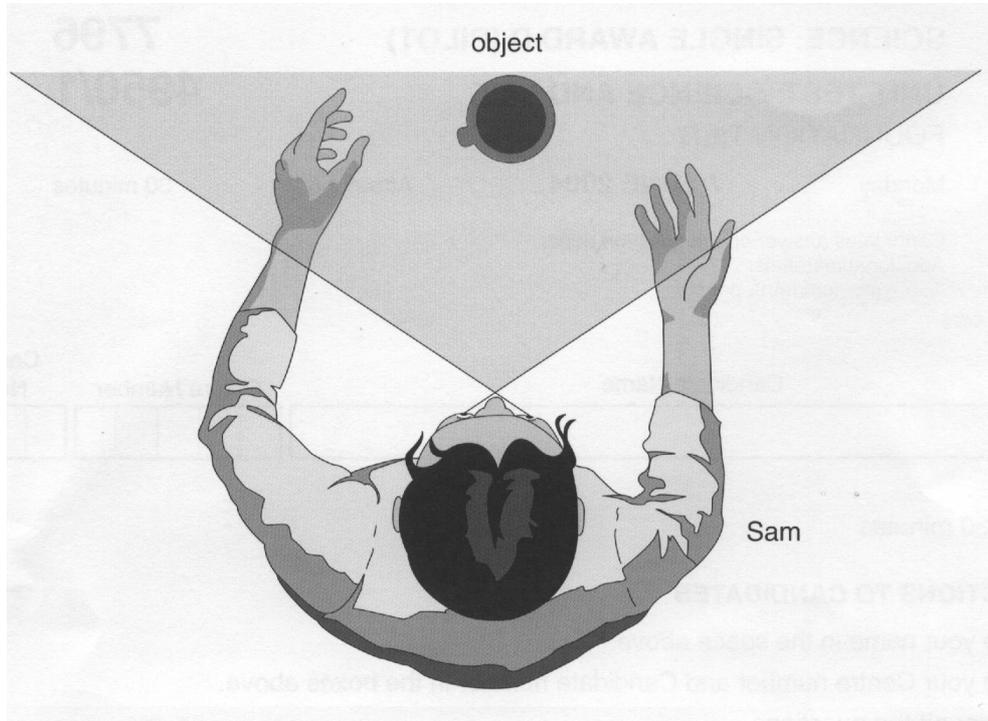
(i) Explain why it is important for the eye to adjust to bright light.

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

(ii) What name is given to this type of quick reaction?

.....[1]

- (c) The diagram shows a view of Sam's head seen from above. Anything in the shaded area is seen by both of his eyes at the same time.



Finish the sentence about Sam's vision.

Choose from these words.

**binocular      long      monocular      short**

When Sam uses both his eyes to see an object he is using

..... vision. [1]

[Total: 6]

**Section 2**

4. Ali is concerned about his diet.

(a) He looks at packets of four different cereals.

The information tells him what is in 100 g of each cereal.

<b>Squashy Flakes Content in 100 g</b>		<b>Cornabix Content in 100 g</b>		<b>Easy Go Content in 100 g</b>		<b>Ready now Content in 100 g</b>	
Energy (kJ)	1450	Energy (kJ)	1400	Energy (kJ)	1055	Energy (kJ)	1658
Protein(g)	7.9	Protein(g)	10.0	Protein(g)	15.1	Protein(g)	12.0
Fat(g)	5.0	Fat(g)	4.1	Fat(g)	0.1	Fat(g)	6.0
Sugar(g)	6.5	Sugar(g)	1.0	Sugar(g)	44.9	Sugar(g)	2.2
Fibre(g)	3.5	Fibre(g)	12.9	Fibre(g)	28.6	Fibre(g)	30.0

(i) Which cereal has the lowest fat content?

Choose from

**Squashy  
Flakes**

**Cornabix**

**Easy Go**

**Ready Now**

.....[1]

(ii) Ali knows that his daily average protein intake should be 60 g.

Look at the **Cornabix** cereal.

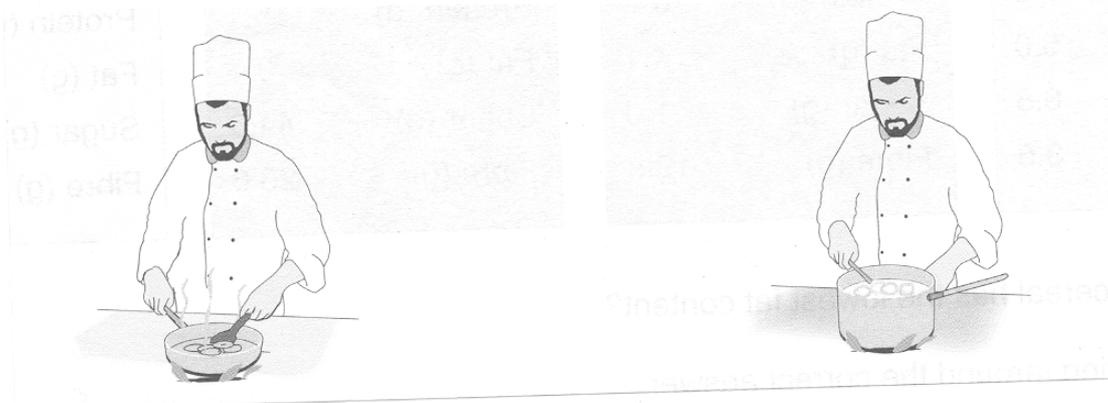
How many grams of **Cornabix** contain 60 g of protein?

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

.....[2]

(b) Ali likes potatoes.

He knows that potatoes can be cooked by frying or boiling them.



(i) Write down **one** other way to cook potatoes.

.....[1]

(ii) Finish the sentence about cooking potatoes.

Choose the best word from this list

**chemical**

**natural**

**reversible**

Cooking potatoes is an example of a

.....change. [1]

(iii) We do not eat uncooked potatoes.

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

Write down **one** other reason.

.....[1]

[Total: 6]

5. This question is about polymerisation.

Polymerisation changes many small molecules into large molecules.



Look at this list.

**alkane**  
**methane**  
**monomer**  
**polymer**

- (a) Write down the name of the small molecules used in polymerisation. Choose from the list.

.....[1]

- (b) Polymerisation is used to make plastics. Plastics are used to make many things. Draw a line to link each plastic to its use.

<b>plastic</b>	<b>use</b>
poly(ethene)	clothing
nylon	insulation
poly(styrene )	plastic bags

[1]

- (c) Poly(ethene) is made from a small molecule called ethene. Write down the name of the small molecule used to make poly(tetrafluoroethene).

.....[1]

(d) There are more than 60 000 different plastics.

Plastics are made from polymer molecules.

This table shows some information about five polymers.

polymer	density in kg/m <sup>3</sup>	maximum usable temperature in °C	solubility in oil
low density poly(ethene)	920	85	insoluble below 80 °C
high density poly(ethene)	960	120	insoluble below 80 °C
poly(styrene)	1050	65	soluble
poly(chloroethene)	1390	60	soluble
poly(propene)	900	150	insoluble

Look at the table.

(i) Which polymer has the **highest** density?

.....[1]

(ii) Which polymer would be best for making a pipe to carry oil at 100 °C?

Write down **two** reasons for your answer.

Name of polymer.....

1.....

.....

2.....

.....[3]

(e) Most polymers do not decay naturally. They are not biodegradable.

Chemists are trying to find polymers that are biodegradable.

Suggest **two** reasons why this research work is useful.

1.....

.....

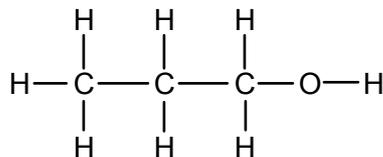
2.....

.....[2]

[Total: 9]



(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]

[Total: 5]

**Section 3**

7. Danni is sunbathing.

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



(a) What type of radiation causes sun tan?

Put a **ring** around the correct answer.

**gamma**

**infrared**

**ultraviolet**

**X-rays**

.....[1]

(b) Write down **two** possible effects of over-exposure to the sun.

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

(c) Danni is using a sunscreen with a high sun protection factor (SPF) number.  
How does this affect the length of time she can stay in the sun safely?

.....[1]

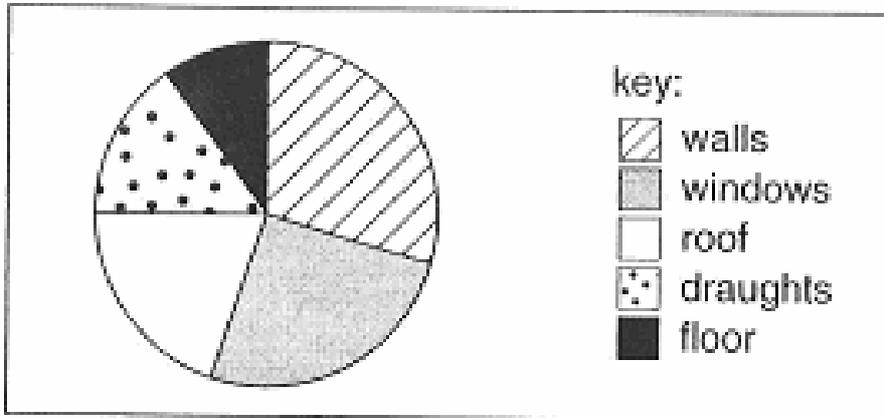
**(d)** Danni's friend, Joshua, has a darker coloured skin.

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

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

[Total: 5]

8. Tina is investigating how energy is lost from houses.  
She looks at a pie chart.



Look at the pie chart.

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

**fibreglass**

**lead**

**draughts**

**shiny foil**

**walls**

**floor**

Most energy is lost from the .....[1]

Least energy is lost from the .....[1]

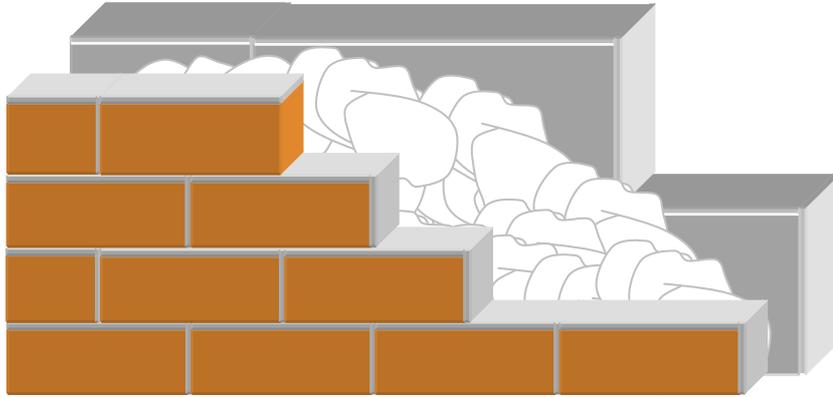
The amount of energy lost from the roof can be reduced by lining the loft with

.....[1]

Energy loss through walls can be reduced by placing .....[1]

behind radiators.

- (b) Houses are built with cavity walls, a gap between the outside and inside wall. This cavity is now often filled with insulation material. Cavity wall insulation is made from foam.



Why does cavity wall insulation reduce energy loss by conduction?

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

[Total: 5]

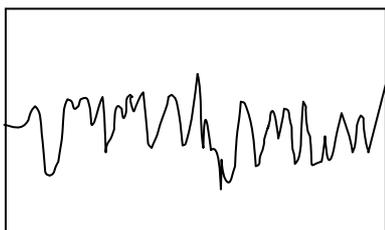
9. Infrared radiation is emitted by many household devices.

(a) Put ticks (✓) in the boxes next to the **two** devices which work by emitting infrared radiation.

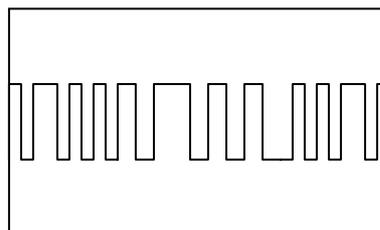
toaster	
microwave	
radio/CD player	
remote controller	
satellite aerial	

[2]

(b) The diagrams show two signals.



**Analogue**



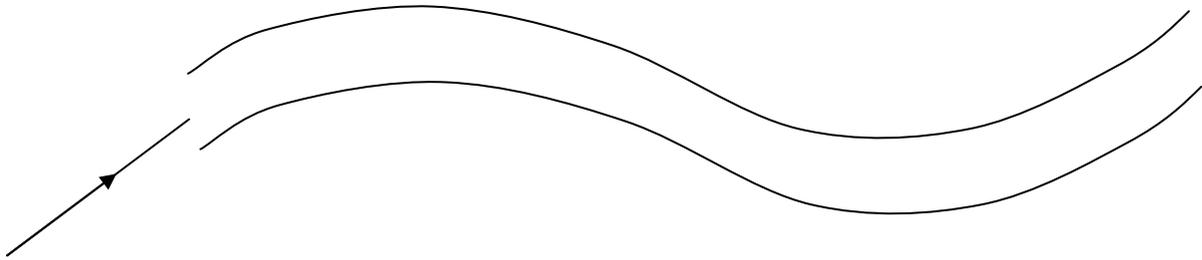
**Digital**

Use your ideas about analogue and digital signals to describe the difference between them.

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

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

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



(i) Continue the path of the ray through the optical fibre by total internal reflection. [1]

(ii) Finish this sentence.

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

.....angle. [1]

[Total: 6]

10. Fred puts ice cubes into his drink to cool it down.  
The ice cubes melt.



- (a) Why does the drink cool down? Put a tick (✓) in the box next to the correct answer.

The ice cools down as it melts.	<input type="checkbox"/>
---------------------------------	--------------------------

The ice is cooler than the drink so energy flows from the drink to the ice.	<input type="checkbox"/>
---	--------------------------

The ice is cooler than the drink so energy flows from the ice to the drink.	<input type="checkbox"/>
---	--------------------------

[1]

- (b)** The specific latent heat of ice is 330 J/g.  
Fred has added 15g of ice to the drink.  
Calculate the energy transferred from the drink to the ice as it melt.  
You are advised to show how you work out your answer.

Energy transferred = .....J [3]

[Total: 4]

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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

**F** **B621/01**

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)</b>  <b>1(d)i</b> <b>1(d)ii</b>	Increases / gets faster; He needs to get more oxygen into the blood; For quicker respiration / so more energy can be released by respiration; Any <b>two</b> from: Inhaled air contains more oxygen; Inhaled air contains less carbon dioxide; Inhaled air contains less moisture; Inhaled air is usually not as warm; <b>(This must be a comparative statement)</b> Anaerobic; Insufficient oxygen reaching his cells to meet energy demands;	[1] [1] [1]  [2] [1] [1] <b>Total marks</b> [7]
<b>2(a)i</b> <b>2(a)ii</b> <b>2(b)</b> <b>2(c)i</b> <b>2(c)ii</b> <b>2(d)i</b> <b>2(d)ii</b>	Nicotine; cannot/hard to give up; Stimulant; tar/particulates; D; 3.1; birth weight decreases as more cigarettes smoked;	[1] [1] [1] [1] [1] [1] <b>Total marks</b> [7]
<b>3(a)</b>  <b>3(b)i</b>  <b>3(b)ii</b> <b>3(c)</b>	B to retina; C to optic nerve; retina to react to light; optic nerve to carry nerve impulses; prevent damage; to retina/light sensitive layer/B; Reflex; Binocular;	[1]  [1]  [2] [1] [1] <b>Total marks</b> [6]

<b>Section 2</b>		
<b>4(a)i</b>	Easy-Go	[1]
<b>4(a)ii</b>	10 x 60; 600; <b>Allow two marks for Correct answer with no working</b>	
<b>4(b)i</b>	Roast / microwave / barbecue/ bake / jacket potatoes / in a grill / in an oven/steam;	[2] [1]
<b>4(b)ii</b>	Chemical;	[1]
<b>4(b)iii</b>	Make them easier to digest / high temperature kills microbes;	[1]
	<b>Total marks</b>	[6]
<b>5(a)</b>	Monomer;	[1]
<b>5(b)</b>	poly(ethene) = plastic bags nylon = clothing poly(styrene) = insulation All three correct, <b>No half marks</b>	[1] [1] [1]
<b>5(c)</b>	Tetrafluoroethene	[1]
<b>5(d)i</b>	poly(chloroethene)	[1]
<b>5(d)ii</b>	Poly(propene) Usable up to 150 °C / aw Insoluble in oil at 100 °C <b>Allow high density poly(ethane) with correct reason relating to maximum useable temperature of 120 °C for one mark</b>	[3]
<b>5(e)</b>	<b>Any two from</b> They will decay naturally; No need for them to fill land-fill sites; No need to burn them/no toxic waste gases; Less litter problem;	[2]
	<b>Total marks</b>	[9]
<b>6(a)</b>	Water is in copper can; Same quantity of water in cans each time / same flame size each time / same gap between burner and can; Take readings of temperature before and after heating / measure temperature increase;	[3]
<b>6(b)i</b>	$C_3H_8O$ <b>Allow any order of symbols;</b>	[1]
<b>6(b)ii</b>	Hydrocarbons <b>only</b> contain hydrogen and carbon atoms / propanol contains an oxygen atom;	[1]
	<b>Total marks</b>	[5]

<b>Section 3</b>		
<b>7(a)</b>	Ultraviolet;	[1]
<b>7(b)</b>	sunburn ; skin cancer ; eye damage; <b>ANY 2</b>	[1] [1]
<b>7(c)</b>	Can stay in the sun longer;	[1]
<b>7(d)</b>	more radiation absorbed by skin;	[1]
	<b>Total marks</b>	<b>[5]</b>
<b>8(a)</b>	walls; floor;	[1] [1]
	Fibreglass; shiny foil;	[1] [1]
<b>8(b)</b>	air is an insulator / poor conductor;	[1]
	<b>Total marks</b>	<b>[5]</b>
<b>9(a)</b>	toaster;	[1]
	remote controller;	[1]
<b>9(b)</b>	analogue – continually variable;	[1]
	digital – either on or off / 0 or 1;	[1]
<b>9(c)i</b>	correct path by eye;	[1]
<b>9(c)ii</b>	critical;	[1]
	<b>Total marks</b>	<b>[6]</b>
<b>10(a)</b>	The ice is cooler than the drink so energy flows from the drink to the ice;	[1]
<b>10(b)</b>	energy = mass x specific latent heat;	[1]
	15 x 330;	[1]
	4950;	[1]
	<b>Total marks</b>	<b>[4]</b>
	<b>Overall marks</b>	<b>[60]</b>