

GCSE

ADDITIONAL SCIENCE B

H B623/02

Additional Science B Unit 1 Modules B3, C3, P3

Specimen Paper

60 mins

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

Candidate
Name

--

Centre
Number

--	--	--	--	--

Candidate
Number

--	--	--	--

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**.

This specimen paper consists of 28 printed pages.

BLANK PAGE

Answer all questions

Section 1

1. (a) Many of the tomatoes we eat are imported from other countries.

They are often picked while they are still green and unripe.

Later they are ripened before they are sold.

(i) Suggest why tomatoes are transported while they are unripe.

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

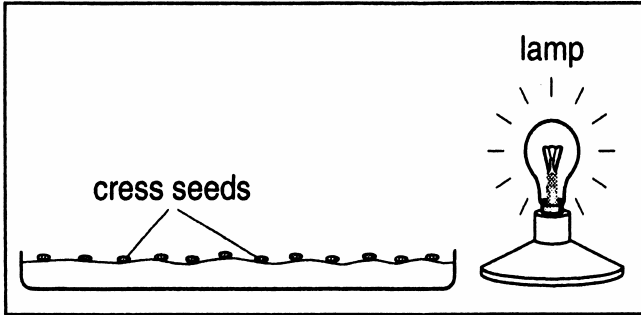
(ii) How can tomatoes be ripened quickly before they are sold?

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

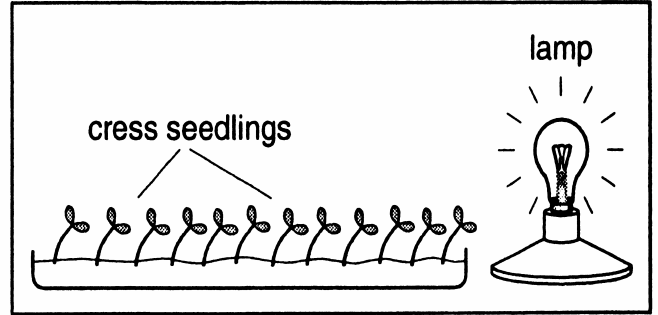
(b) Pat and Janet did an experiment with cress.

They grew cress seeds next to a lamp.

Look at their results.



at the start



after 5 days

The seedlings grew towards the light.

Explain why.

Answer as fully as you can.

.....

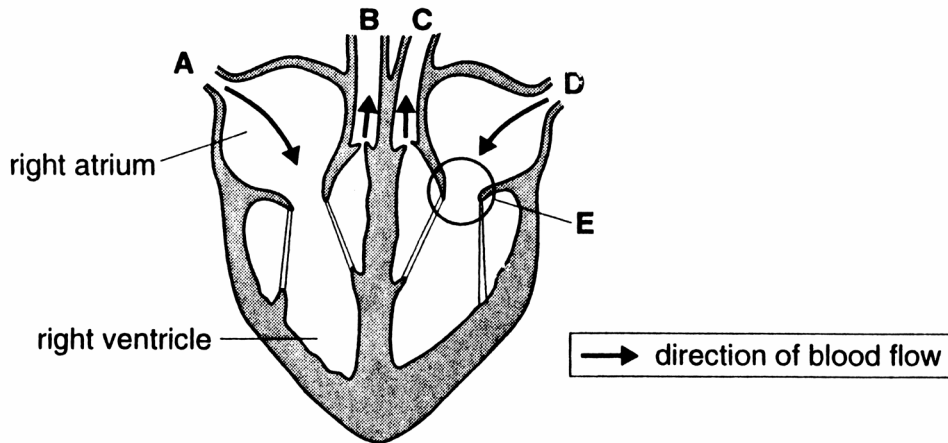
.....

.....

.....[4]

Total: [6]

2. The diagram shows a human heart.



(a) Explain why vessels **B** and **C** are arteries.

.....[1]

(b) Look at the diagram.

Why does the right ventricle have a thicker muscle wall than the right atrium?

.....
[1]

(c) It is important that part **E** works properly.

Explain what will happen if it does **not** work properly.

.....

[2]

(d) Some animal hearts do not have **two** ventricles

Fish have only one ventricle.

Explain the advantage of having **two** ventricles.

.....

.....

.....[2]

Total: [6]

3. This question is about **growth**.

(a) Describe **two** differences between animal and plant growth.

Difference One

.....

Difference Two

.....[2]

(b) The table shows some information about the growth of a bean plant.

A bean seed was given water and allowed to germinate.

Time in weeks from planting bean seed	Weight in grams
0	3.1
0.5	4.9
1.0	2.6
1.5	5.1
2.0	10.0
2.5	20.6
3.0	41.5
4.0	64.7
5.0	86.1
6.0	101.3
7.0	110.0
8.0	128.4
9.0	131.1
10	134.9
11	135.1
12	136.5
13	137.6
14	138.4
15	139.8

Look at the table.

(i) During what period did the seed **lose** dry weight?

Between week

and week[1]

(ii) Suggest **one** reason why this happened.

.....[1]

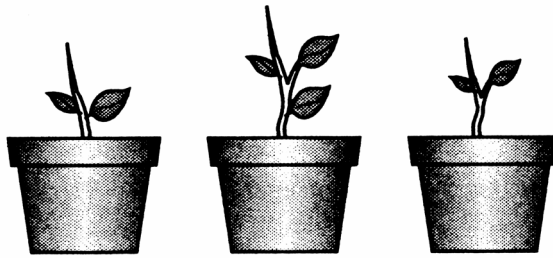
(iii) Explain what is happening in the plant between weeks 10 and 15?

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

(c) New plants can also be grown by taking cuttings.



original plant



plants grown from cuttings

The new plants are clones.

(i) What is a **clone**?

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

(ii) Explain why cloning plants is easier than cloning animals.

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

Total: [8]

Section 2

4. This question is about the structure of atoms.

An atom of aluminium can be represented by



The **atomic number** of aluminium is 13.

- (a) What does atomic number mean?

.....[1]

- (b) The table shows some information about an aluminium atom.

Complete the table.

Number of protons	
Number of neutrons	
Number of electrons	13

[2]

- (c) Aluminium has 13 electrons.

Write down the electronic structure of an aluminium atom.

.....[1]

(d) Calcium, Ca, reacts with oxygen, O₂, to make calcium oxide, CaO.

Write a **balanced symbol equation** for this reaction.

.....[2]

[Total: 6]

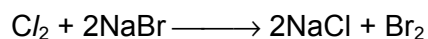
5. Look at the table. It shows some properties of Group 7 elements.

element	molecular formula	state at room temperature	colour	radius of an atom (nm)	order of reactivity
fluorine	F ₂	pale yellow	0.072	most reactive ↑ ↓ least reactive
chlorine	Cl ₂	gas	pale green	0.099	
bromine	Br ₂	liquid	red/brown	0.114	
iodine	I ₂	solid	grey	0.150	
astatine	At ₂	solid	black	

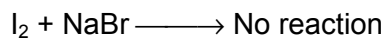
- (a) Complete the table. Use ideas about trends down a group. [2]

- (b) In the table, the group 7 elements are listed in order of their reactivity.

Look at the equations. They show two displacement reactions of the halogens.



Chlorine + sodium bromide → sodium chloride + bromine



Iodine + sodium bromide → No reaction

- (i) Complete this word equation.

bromine + sodium iodide →[1]

- (ii) There is no reaction between iodine and sodium bromide.

Explain why.

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

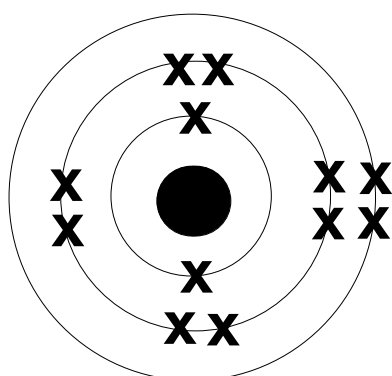
- (iii) Chlorine reacts with sodium iodide to make sodium chloride and iodine.

Write a **balanced symbol equation** for this reaction.

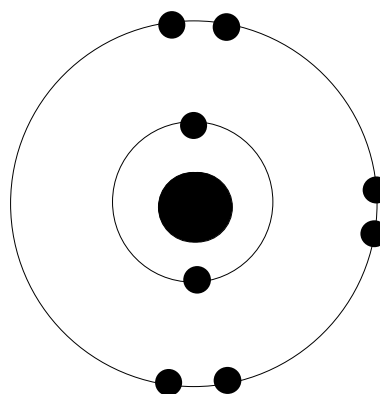
.....[2]

[Total: 6]

6. Look at the diagrams. They show the electronic structures of magnesium and oxygen.



magnesium atom



oxygen atom

When magnesium reacts with oxygen, magnesium ions and oxide ions are made.

- (a) Draw the electronic structures of a magnesium ion and an oxide ion.

magnesium ion

oxide ion

[2]

- (b) Magnesium is a metal. It conducts electricity.

What type of particle moves when magnesium conducts electricity?

.....[1]

- (c) Copper is also a metal. It is used to make saucepan bases.

Suggest a property of copper that makes it suitable to make saucepan bases.

.....[1]

[Total: 4]

Section 3

8. Look at the information in the table.

It shows the stopping distances for an average driver.

Speed of car in m/s	Thinking distance in m	Braking distance in m	Stopping distance in m
10	5	5	10
20	10	20	30
40	20	80	100

- (a) Calculate the **thinking time** for the driver.

.....

answer.....s [3]

- (b) Higher speed makes the **braking distance** longer.

- (i) Write down 2 **other** factors that make the braking distance longer.

1st factor

2nd factor.....[2]

(ii) How does speed affect the braking distance?

In your answer write about

- The **detailed** connection between **speed and braking** distance
- **Kinetic** energy

.....

.....

.....

.....

.....[3]

(c) Higher speed is one factor that increases **thinking distance**.

Write down two other factors that increase thinking distance.

1st factor.....

2nd factor.....[2]

Total: [10]

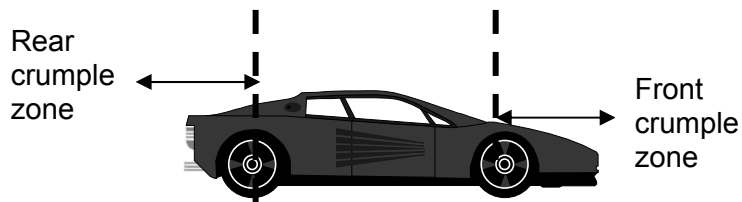
9. Cars have **safety features**.

These safety features help reduce injuries in a crash.

One safety feature in cars is **crumple zones**.

They absorb energy in a crash.

Look at the diagram.



How do **crumple zones** help reduce injuries in a crash?

In your answer use ideas about

- Acceleration
- Force

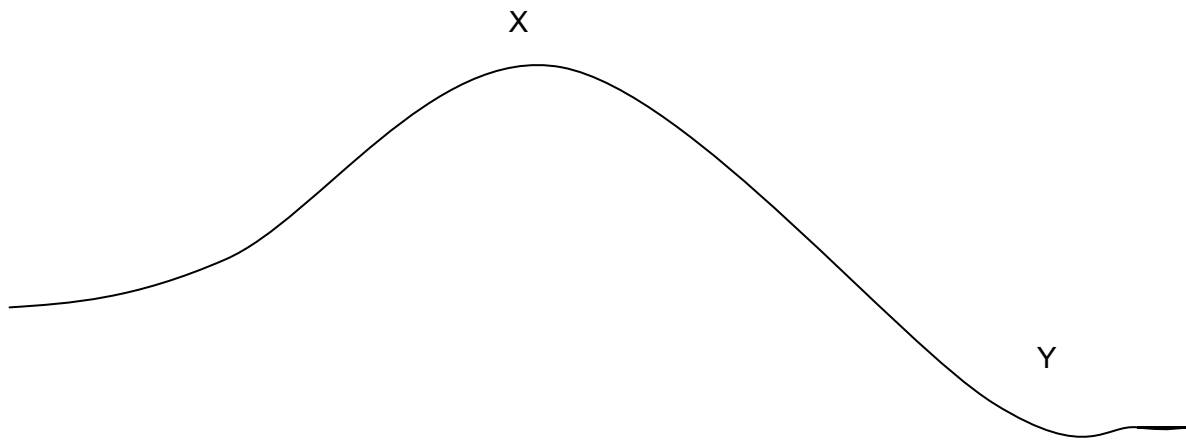
.....

.....

.....[2]

Total: [2]

10. Look at the diagram.



(a) A ball is lifted to position X.

The height of the lift is 20m. The force used is 10 000N.

Calculate the work done on the ball when it is lifted to position X.

.....
.....

answerJ [3]

(b) The ball is at position X.

It is still.

At X it has the maximum potential energy.

The ball starts to roll down the hill. It passes part Y.

This is the **fastest** part of the journey.

Suggest why point Y is the **fastest** part of the journey.

In your answer use the idea of energy.

.....

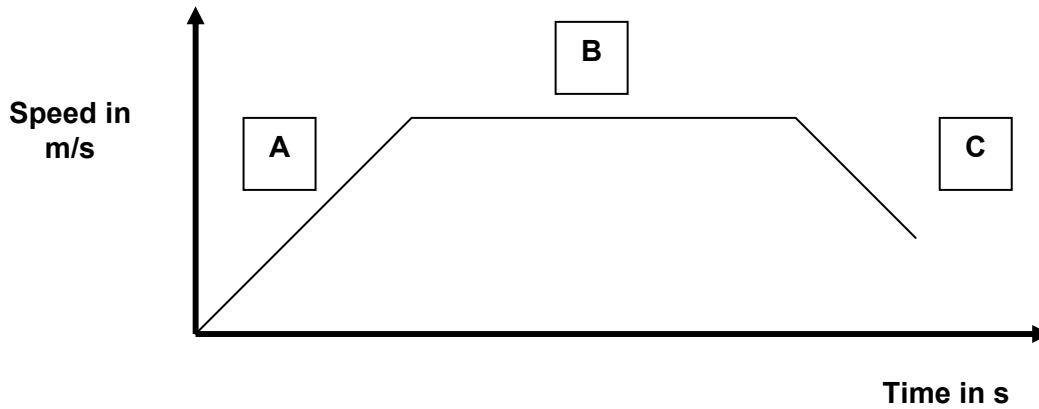
.....[1]

[Total: 4]

11. Ellie is a parachutist.

She jumps from an aeroplane.

Look at the simple graph of her speed as she falls.



(a) Look at **part A**.

Ellie accelerates.

Explain why. Use ideas about forces in your answer.

.....
[1]

(b) Look at **part B**.

Write down what happens to Ellie's speed in part B. Explain your answer.

.....
[2]

(c) Look at **part C**.

Ellie opens her parachute and slows down.

Explain why she slows down. Use ideas about forces in your answer.

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

[Total: 4]

BLANK PAGE

GCSE

ADDITIONAL SCIENCE B

Additional Science B Unit 1 Modules B3, C3, P3

Specimen Mark Scheme

Maximum mark for this paper is 60

H B623/02

60 mins

This specimen mark scheme consists of 4 printed pages.

Question Number	Answer	Max Mark
<p>Section 1</p> <p>1(a)i</p> <p>1(a)ii</p> <p>1(b)</p>	<p>Any one Prevent damage/last longer/delay aging/delay decay; Allow easier to pick when unripe so less damage caused before storage</p> <p>By using plant hormones;</p> <p>Any Four (positive) phototropism; auxins move through the plant in solution/by diffusion; auxin is made in the (shoot) tip; unequal distribution in response to light; auxin brings about curvature/cell elongation;</p> <p style="text-align: right;">Total marks</p>	<p>[1]</p> <p>[1]</p> <p>[4]</p> <p>[6]</p>
<p>2(a)</p> <p>2(b)</p> <p>2(c)</p> <p>2(d)</p>	<p>(Arteries) carry blood away from the heart</p> <p>Greater force needed/higher pressure Allow has to pump blood to the rest of the body and not just into the adjacent chamber</p> <p>Any two If faulty then the following cannot be achieved: opening and closing of valve; prevention of back flow of blood; maintenance of high pressure;</p> <p>Higher pressures possible; (therefore) greater rate of flow to the tissues;</p> <p style="text-align: right;">Total marks</p>	<p>[1]</p> <p>[1]</p> <p>[2]</p> <p>[2]</p> <p>[6]</p>
<p>3(a)</p> <p>3(b)i</p> <p>3(b)ii</p> <p>3(b)iii</p> <p>3(c)i</p> <p>3(c)ii</p>	<p>Any Two Animals tend to grow to a finite size but plants can grow continuously; Cell enlargement is the main method by which plants gain height; Cell division is mainly restricted to the tips of shoots and roots; Many plant cells retain the ability to differentiate but animal cells lose it at an early stage;</p> <p>0.5 and 1.0 (no units needed) Both needed for one mark</p> <p>Food stores (in the seed) being used up to provide energy for growth;</p> <p>(Plant) is (slowly) increasing in mass; (Plant) is photosynthesising/building up new cells;</p> <p>(clones) have the same genetic make up Allow same DNA</p> <p>Many plant cells retain ability to differentiate unlike animal cells which usually lose this ability at an early stage</p> <p style="text-align: right;">Total marks</p>	<p>[2]</p> <p>[1]</p> <p>[1]</p> <p>[2]</p> <p>[1]</p> <p>[1]</p> <p>[8]</p>

Section 2		
4(a)	number of protons in nucleus;	[1]
4(b)	protons – 13 (1); neutrons - 14 (1);	[2]
4(c)	2.8.3.;	[1]
4(d)	$2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$ accept multiples; formulae (1) balancing (1)	[2]
	Total marks	[6]
5(a)	state - gas (1); atomic radius - 0.165 to 0.186 (1);	[2]
5(b)i	→ sodium bromide + iodine;	[1]
5(b)ii	iodine less reactive than bromine or vice versa;	[1]
5(b)iii	$\text{C}/_2 + 2\text{NaI} \rightarrow 2\text{NaC}/ + \text{I}_2$ accept multiples; formulae (1) balancing (1)	[2]
	Total marks	[6]
6(a)	One mark for each correct drawing;	[2]
6(b)	Electrons(1);	[1]
6(c)	Good conductor of heat;	[1]
	Total marks	[4]
7	At least one from: (Flame) test wire / splint / rod / spatula moistened with HCl(aq) or water / AW (1); (Flame) test wire / splint / rod / spatula dipped in substance (1); Substance put into the Bunsen flame using an appropriate method (1); At least one from: Sodium (chloride) – orange / yellow flame (1); Lithium (chloride) – red / crimson flame (1); Potassium (chloride) – pink/ lilac/ mauve / purple / violet flame (1);	[4]
	Total marks	[4]

<p>Section 3</p> <p>8(a)</p> <p>8(b)i</p> <p>8(b)ii</p> <p>8(c)</p>	<p>t = distance / speed; t = 5/10 or 10/20 or 20/40; t = 0.5 (s);</p> <p>Any one road condition from: Icy / wet / muddy / oily road / AW; Accept slippery road</p> <p>Any one car condition from: Worn tyres / worn brakes / AW; Accept poor suspension / greater load / AW</p> <p>Maximum of two from: If speed doubles braking distance more than doubles [1] but if speed doubles braking distance quadruples [2] Maximum of two from: if speed doubles kinetic energy more than doubles [1] But if speed doubles kinetic energy quadruples [2]</p> <p>Maximum of 3 marks</p> <p>Any two from: Alcohol / drugs; Tiredness / distractions / lack of concentration;</p> <p style="text-align: right;">Total marks</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[3]</p> <p>[2]</p> <p>[10]</p>
<p>9</p>	<p>Any two from: Less acceleration; so less force (needed); Longer stopping time / longer stopping distance;</p> <p style="text-align: right;">Total marks</p>	<p>[2]</p> <p>[2]</p>
<p>10(a)</p> <p>10(b)</p>	<p>W = F X D; W = 10 000 X 20; W = 200 000 (J);</p> <p>At Y – Most KE / Least PE / all PE is converted / AW [1]</p> <p style="text-align: right;">Total marks</p>	<p>[3]</p> <p>[1]</p> <p>[4]</p>

11(a)	Unbalance force / weight is greater than drag;	[1]
11(b)	Terminal /steady / max. speed / aw; weight = drag / aw;	[2]
11(c)	Drag is greater than weight / aw;	[1]
	Total mark	[4]
	Overall total	[60]