

**Additional Science B**

General Certificate of Secondary Education

Unit **B624/01**: Modules B4, C4, P4

**Mark Scheme for June 2011**

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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The **Abbreviations, annotations and conventions** used in the detailed Mark Scheme are:

/	=	alternative and acceptable answers for the same marking point
<b>(1)</b>	=	separates marking points
<b>not</b>	=	answers which are not worthy of credit
<b>reject</b>	=	answers which are not worthy of credit
<b>ignore</b>	=	statements which are irrelevant
<b>allow</b>	=	answers that can be accepted
( )	=	words which are not essential to gain credit
—	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

Question			Expected Answers	Marks	Additional Guidance
1	a	i	roots (1)	1	<b>allow</b> root hairs <b>not</b> just hairs
	a	ii	wilted (1)	1	<b>allow</b> floppy / collapsed / drooped / limp / flaccid / AW <b>ignore</b> reference to cells <b>ignore</b> look dehydrated / brown / dead / dry / shrivelled / withered
	a	iii	light / air movement / humidity (1)	1	<b>allow</b> sunlight / brightness / how sunny it is / wind / number of leaves / number of stomata / water availability / how close plants are / other plants around them / SA of leaves / under cover <b>ignore</b> insects / pests <b>ignore</b> weather
	b		chloroplasts (1)	1	<b>allow</b> chlorophyll <b>allow</b> phonetic spellings
	c	i	trifluralin / chemical spray / kills weeds (1)	1	if answer line is blank <b>allow</b> correct answer indicated in table
	c	ii	2 (1)	1	
	c	iii	eat / consume pests or them (1)	1	<b>allow</b> kills things on the plant / kills pests / kills them <b>ignore</b> microbes <b>ignore</b> get rid of
	d	i	idea of to stop it rotting / stops or reduces or slows down decaying (1)	1	<b>allow</b> idea of stopping or reducing action of bacteria or fungi or speed of going mouldy <b>ignore</b> stop it going off / stop it going bad / to keep it fresh / so it keeps or lasts longer <b>ignore</b> references to oxidation or stops oxygen <b>not</b> kills bacteria
	d	ii	canning or put in tins / cooling / chilling / refrigeration / drying / adding salt / curing / smoking / vinegar / pickling / sugar (1)	1	<b>allow</b> vacuum packing or put in air-tight container / irradiation / adding chemicals <b>allow</b> freeze drying <b>ignore</b> putting it in foil / clingfilm / containers <b>ignore</b> heating or cooking
			<b>Total</b>	<b>9</b>	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	tick in last box (1)	1	if boxes are blank <b>allow</b> last statement indicated
	a	ii	hydroponics (1)	1	<b>allow</b> hydroponics <b>allow</b> phonetic spellings
	a	iii	<b>any two from:</b> no microorganisms (1)  too or very cold / AW (1)  no oxygen / O <sub>2</sub> / O (1)  lack of moisture or water / low humidity (1)	2	<b>allow</b> no bacteria or microbes or decomposers or fungi <b>ignore</b> organisms <b>ignore</b> not enough bacteria or microbes or decomposers or fungi  <b>allow</b> its cold / no heat or not enough heat  <b>allow</b> idea of needing oxygen to rot <b>ignore</b> not enough oxygen or O <sub>2</sub> or O <b>ignore</b> air
	a	iv	nitrates / phosphates / potassium / magnesium (1)	1	<b>not</b> nitrogen / phosphorus <b>allow</b> sulphates <b>allow</b> correct chemical symbol

Question	Expected Answers	Marks	Additional Guidance
b	<p><b>use ✓'s in this question</b></p> <p><b>advantages:</b></p> <p><b>up to two from</b></p> <p>idea of largest yield when grown in water (compared to other <b>plants</b>) (1)</p> <p>idea of (largest) increased yield compared to growing in <b>soil</b> (1)</p> <p>uses data to support idea of higher yield (1)</p> <p><b>disadvantages:</b></p> <p><b>up to two from</b></p> <p>low(est) percentage of the plant that can be eaten (1)</p> <p>leads to problem of disposing of remains as will not rot (1)</p>	3	<p><b>allow</b> cucumbers have the highest yield / grow the most (of all the plants) (1)</p> <p>e.g. you get more when grown in water than in soil / grows better in water than soil (1)</p> <p>e.g. 65.7(%) in water and (only) 5.4(%) in soil (1)</p> <p>e.g. you get 60.3(%) more yield in water (2)</p> <p>e.g. 65.7(%) is the highest (in the table) (1)</p> <p><b>if no other advantage marks scored allow higher yield (1)</b></p> <p><b>allow</b> only 20(%) can be eaten</p> <p><b>allow</b> a lot of cucumber(s) can't be eaten / a big percentage can't be eaten / ora (1)</p> <p><b>allow in disadvantages:</b> beans contain more protein / cucumbers more difficult to digest / cucumbers have less dry mass</p>
	<b>Total</b>	<b>8</b>	

Question		Expected Answers	Marks	Additional Guidance
3	a	biogas and wood (1)	1	<b>both needed</b> if answer line is blank <b>allow</b> correct answers shown in list
	b	i	1	<b>allow</b> lets small molecules through <b>allow</b> lets water through but not other substances <b>allow only</b> lets water through <b>allow</b> idea of <b>only</b> some things or substances can go through <b>allow</b> idea of things or substances can go through but not others <b>ignore</b> stops salt getting through <b>ignore</b> lets water through <b>but</b> stops salt getting through lets water through scores (1) <b>not</b> lets salt getting through but not water <b>ignore</b> reference to holes <b>ignore</b> references to direction
	b	ii	1	more than one box ticked no mark
<b>Total</b>			<b>3</b>	

Question			Expected Answers	Marks	Additional Guidance
4	a	i	burette (1)	1	<b>allow</b> phonetic spelling
	a	ii	11 – alkali 7 – neutral 1 – acid	2	all three correct scores 2, 1 or 2 correct scores 1 if table has no numbers an table <b>allow</b> correct numbers written beside choices in list
	b		salt (1)	1	
	c	i	87.5 (%) (2)  <b>but</b> if answer incorrect then  $\frac{4.2}{4.8} \times 100$  OR  $\frac{\text{actual mass}}{\text{predicted mass}} \times 100 \quad / \quad \frac{\text{am}}{\text{pm}} \times 100$  (1)	2	<b>allow</b> 88 (2)
	c	ii	loss in evaporation / loss in transferring liquids / loss in heating (1)	1	<b>allow</b> idea of material left in equipment <b>ignore</b> gas loss
	d		get bigger crops / plants grow faster / grow more / increase yield (1)	1	<b>ignore</b> to get better crops / to grow better <b>ignore</b> help them grow / grow stronger <b>allow</b> give them (essential) minerals but <b>ignore</b> more nutrients
			<b>Total</b>	<b>8</b>	



Question		Expected Answers	Marks	Additional Guidance
5	a	A – batch (1) B – continuous (1)	2	<b>no</b> mark if the two processes are reversed <b>allow</b> phonetic spelling eg continues
	b	<b>any three from</b> energy / gas / electricity / water costs (1)  labour costs / workers to pay / workers time / paying named worker eg salary of scientists (1)  equipment / machinery / plant or building costs (1)  cost of catalyst (1)  research costs or cost of testing (1)  rent / rates / taxes (1)  legal costs / idea of cost of litigation (1)  packaging or examples eg bottles / containers / plastic (wrap) (1)	3	<b>ignore</b> transport / storage throughout answer <b>allow</b> running machines  <b>allow</b> explanation of a cost eg maintenance (1) eg cost of ensuring safe disposal of waste (1) eg cost of ensuring no pollution of environment <b>but</b> ignore vague references to 'environmental cost'  <b>allow</b> enzyme
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance		
6	a	detergent – cleans the grease off dishes (1) rinse agent – helps water drain off dishes (1) water – thins out the detergent (1)	3	<b>use SCORIS marking overlay</b> two lines from any 'ingredient' box does not gain the mark for a correct line		
	b	(run off from) fertilisers (1)			1	<b>allow</b> sewage / NPK
	c	i B (1)			1	
	c	ii A (1)	1			
	c	iii silver nitrate – (pale) yellow / precipitate <b>and</b> barium chloride – white precipitate	1	<b>both</b> required for the mark		
<b>Total</b>			<b>7</b>			

Question		Expected Answers	Marks	Additional Guidance
7	a	B (1)	1	if answer line is blank <b>allow</b> correct answer ticked circled or underlined or correct choice indicated in the question <b>allow</b> Hazel
	b	attracted / move to(wards) comb (1)		
	c	<b>electron</b> (1)	1	
<b>Total</b>			<b>3</b>	

Question	Expected Answers	Marks	Additional Guidance
8	<p><b>use ✓'s in this question any three from</b> defibrillator / defib. / AW</p> <p>paddles charged or at high voltage (1)</p> <p>good electrical contact with chest (1)</p> <p>charge passed through patient / (patient given) shock / shock to heart / patient or heart given charge (1)</p> <p>heart contracts (1)</p> <p>idea of not shocking (other) staff (1)</p>	3	<p><b>allow</b> phonetic spellings</p> <p><b>allow</b> defibrillator charged (2)</p> <p><b>allow</b> shaved or dry or bare chest or lubricant on chest (1) <b>ignore</b> just pads on skin or chest or body or either side of heart</p> <p><b>allow</b> (electric) current or electrons runs through body <b>but ignore</b> electricity runs through body <b>ignore</b> shots of electricity / charge</p> <p><b>ignore</b> restart heart / starts heart beating</p> <p><b>allow</b> stand back / insulating mat / insulating handles / insulating gloves / insulating shoes</p>
	<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
9	a	Idea of changing or using the (variable) resistance (1)	1	<b>allow</b> change power supply <b>allow</b> adjust variable <b>allow</b> adjust or change voltage or p.d. / add a power supply or battery <b>allow</b> remove a resistor <b>but not</b> turn resistor off
	b	3.75 (2)  <b>but</b> if answer is incorrect  $\frac{15}{4} = (1)$	2	<b>allow</b> 3.8 (2)
<b>Total</b>			<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
10		body scans (1)  idea of <b>locating</b> or <b>breaking</b> (down) or <b>removing</b> kidney stones or gall stones (1)  measuring or checking blood flow (1)	2	<b>allow</b> checking unborn baby / foetus or baby in womb or pregnancy scans <b>allow</b> check or hear the baby's heart (beat) / brain scan (on baby) <b>ignore</b> just checking the baby or looking at the baby or when you are pregnant or testing for pregnancy <b>ignore</b> measuring heart rate as <b>extra</b> marking points: <b>allow</b> muscle / ligament / dental / eye / cataract treatment <b>allow</b> example of cleaning eg dental treatment eg (medical) instruments / equipment <b>allow</b> treatment or diagnosis of cancer or HIFU <b>not</b> CT / CAT scan or X-rays <b>not</b> see through or into bodies
<b>Total</b>			<b>2</b>	

Question		Expected Answers	Marks	Additional Guidance
11	a	treating cancer / sterilising equipment (1)	1	<b>allow</b> tracer / PET scan / diagnosing cancer / gamma camera / security scanning <b>allow</b> radiotherapy <b>ignore</b> cleaning equipment
	b	<u>nucleus</u> (1)	1	<b>allow</b> phonetic spelling <b>ignore</b> middle / centre / core
	c	i	1	<b>allow</b> smoke alarms <b>allow</b> treatment (some types) of cancer / TAT <b>ignore</b> fire alarm
		ii	1	<b>allow</b> bombarding with or absorbing neutrons <b>ignore</b> nuclear power plant
<b>Total</b>			<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
12	a	uranium (1) steam (1) electricity (1)	3	<b>allow</b> plutonium <b>ignore</b> water vapour <b>allow</b> electric
	b	i	1	if answer line is blank <b>allow</b> correct answer ticked circled or underlined
	b	ii	1	if answer line is blank <b>allow</b> correct answer in both lists above answer line ticked circled or underlined
<b>Total</b>			<b>5</b>	

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