

Additional Science B J641

Gateway Science Suite

General Certificate of Secondary Education

Mark Schemes for the Units

June 2009

J641/MS/R/09

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, GCSEs, OCR Nationals, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2009

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

CONTENTS

GCSE Gateway Additional Science B J641

MARK SCHEMES FOR THE UNITS

Unit/Content	Page
Mark Scheme Guidance	1
B623/01 Unit 1: Modules B3, C3 and P3 Foundation Tier	2
B623/02 Unit 1: Modules B3, C3 and P3 Higher Tier	14
B624/01 Unit 2: Modules B4, C4 and P4 Foundation Tier	28
B624/02 Unit 2: Modules B4, C4 and P4 Higher Tier	39
Grade Thresholds	51

Mark Scheme Guidance

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/ = alternative and acceptable answers for the same marking point

(1) = separates marking points

not = answers which are not worthy of credit

reject = answers which are not worthy of credit

ignore = statements which are irrelevant

allow = 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**

B623/01 Unit 1: Modules B3, C3 and P3 Foundation Tier

Question			Expected Answers	Marks	Additional Guidance
1	a	i	vacuole (1)	1	
		ii	support (1)	1	allow stores water / stores dissolved salts / stores nutrients ignore maintains structure
	b		(movement of substances or molecules from region of high concentration to low concentration (1)	1	idea of movement not needed in definition because it is given in the stem allow mixing of substances without external help / mixing substances without stirring allow (movement of molecules) down a concentration gradient / down a pressure gradient allow along a concentration gradient / along a pressure gradient not up a concentration gradient
	c		geotropic (1) gravity (1)	2	allow geotropic ignore geotropism
			Total	5	

Question		Expected Answers	Marks	Additional Guidance
2	a	<p>egg - large size as contains food (store) / large cytoplasm as it contains food (store) (1)</p> <p>sperm - small size so it can move easier / tail for swimming / tail to help it move / large numbers more chance of fertilisation / streamlined so it can move easily / pointed head so it can enter the egg (1)</p>	2	<p>need both adaptation and why it is useful for a mark</p> <p>allow high level answers for example</p> <ul style="list-style-type: none"> • acrosome so it can enter the egg (1) • enzymes so it can enter the egg (1) • mitochondria to provide energy (1)
	b	meiosis (1)	1	<p>allow any phonetic spelling for example miosis or meosis</p> <p>allow reduction division</p> <p>not if the word includes a 't'</p>
	c	i	1	
		ii	1	
		Total	5	

Question		Expected Answers	Marks	Additional Guidance	
3	a	increases / goes up / goes faster (1)	1		
	b	i	90 (1)	1	allow correct answer in table but answer line takes precedence
		ii	less than previous result / does not fit pattern (1)	1	allow it decreases / it is smaller allow ecf from answer in b (i) <ul style="list-style-type: none"> • if answer 95 or less allow the answers - does not fit pattern / it decreases / it is smaller / aw • if answer 96 or 110 allow the answers - does not fit pattern / no change from result before or result after as appropriate • if answer between 97 and 109 allow the answers - fits pattern / nothing unusual / AW • if answer above 110 allow the answers - does not fit pattern / it is too high / it increases / aw
	c	heart pumps blood (1) left side sends blood to body and right side to lungs / left side has more muscle / right side has less muscle / left side moves oxygenated blood and right side deoxygenated blood / pressure left side greater than right side (1)	2	allow heart forces blood around body / heart pushes blood around body (1) second mark needs a correct comment about right side of heart and another about the left side	
		Total	5		

Question		Expected Answers	Marks	Additional Guidance
4	a	large tap root (1)	1	more than one box ticked scores zero
	b	<p>any two from</p> <p>select big carrots (1)</p> <p>cross breed / breed some of the selected carrots together / cross pollinate (1)</p> <p>select best offspring to use for further crosses / carry on selecting and cross breeding (1)</p>	2	<p>use of an asexual technique such as cloning, cuttings or tissue cultures limited to one mark which can only be the mark for selecting the big carrots</p> <p>allow select characteristic she wants or select best carrots if large tap root given in part (a)</p> <p>ignore reference to shape or colour of carrot</p> <p>if cross not mentioned make sure answer refers to sexual reproduction between selected carrots</p>
	c	nucleus (1) genetic engineering (1)	2	
Total			5	

Question		Expected Answers	Marks	Additional Guidance
5	a	sodium (1)	1	allow correct symbol, Na
	b	any two from nitrogen, oxygen, neon (1)	1	allow correct symbols, N, O, Ne ignore N ₂ and O ₂
	c	oxygen (1)	1	allow correct symbol, O ignore O ₂
	d	potassium (1)	1	allow correct symbol K
Total			4	

Question		Expected Answers	Marks	Additional Guidance
6	a	copper carbonate → copper oxide + carbon dioxide (1)	1	allow CuCO ₃ → CuO + CO ₂ allow correct formulae and mixture of words and correct formulae ignore balancing if formulae used allow = or ⇌ instead of → not + heat in equation but allow heat over arrow
	b	substance is broken down / (one) substance into (at least) 2 other substances (1)	1	allow substance breaks down / breaking up of a substance ignore rots not substance separates not element breaks down
	c	goes milky / goes cloudy / goes white / makes a white solid / makes a white precipitate (1)	1	ignore murky / foggy / misty
Total			3	

Question		Expected Answers	Marks	Additional Guidance
7	a	it's strong (1)	1	allow it can take a lot of weight / malleable ignore hard / conducts heat / conducts electricity / rusts not strong and does not rust
	b	good conductor of electricity (1)	1	allow other ways of indicating answer eg ringed but answer line takes precedence
	c	i	1	allow other ways of indicating answer eg ringed but answer line takes precedence
		ii	1	allow electric (magnet) / electrical (magnet)
		iii	1	allow (make powerful) electromagnet if not used as answer to c(ii) allow superfast computers / superfast electronic circuits allow does not lose power during transmission / more efficient power transmission ie this marking point must include idea of power transmission not faster electricity
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
8	a	negative (1)	1	allow other ways of indicating answer eg ringed but answer line takes precedence
	b	have 7 <u>electrons</u> in outer shell/ same number of <u>electrons</u> in outer shell (1)	1	allow both need to gain 1 <u>electron</u> allow e or e ⁻ for electron similar outer electronic structure is not sufficient for a mark
	c	i chlorine any one from to sterilise water / water purification / water treatment (plants) (1) to kill microbes / kill bacteria (1) to make pesticides / used in pesticides (1) to make plastics / to make pvc / used in plastics / used in pvc (1) make hydrochloric acid / used in hydrochloric acid (1) bleach (1) make weed killer / used in weedkiller (1)	1	allow (cleaning) swimming pools ignore cleaning water ignore to kill germs allow to make HCl allow to make NaOCl allow to make NaClO ₃
		ii iodine any one from to sterilise wounds / cleaning cuts / antiseptic / disinfectant / sterilise water / kills bacteria / kills microbes (1)	1	allow to test for starch allow painting on body before operation but used in hospitals not sufficient for a mark ignore helps to heal wounds ignore kills germs
Total			4	

Question		Expected Answers	Marks	Additional Guidance
9	a	H ⁺ / Na ⁺ (1)	1	allow other ways of indicating answers eg ringed but answer line takes precedence allow H ⁺ / NA ⁺ etc.
	b	1 / one (1)	1	
	c	lighted splint (1) pops (1)	2	allow light gas / put flame to gas(1) allow gas goes bang one mark for test and one mark for the result <ul style="list-style-type: none"> • wrong test scores no marks eg moist litmus goes pop or glowing splint goes pop • correct test with wrong result scores one mark eg lighted splint goes out • but use a splint which gives a pop would score one mark since this is just a minor slip • pop test scores one mark
		Total	4	

Question		Expected Answers	Marks	Additional Guidance
10	a	seat belts / crumple zones / collapsible steering column / padded fascia / safety cages / roll bar (1)	1	allow any other sensible safety feature eg bumpers ignore reference to air bags
	b	adjustable seating / cruise control / paddle shift controls for gears, radio or stereo / power steering / sun-visors (1)	1	allow automatic gears / automatic windscreen wipers ignore any reference to mobile phones or sat nav
Total			2	

Question		Expected Answers	Marks	Additional Guidance
11	a	Jupiter (1)	1	allow other ways of indicating answers eg ringed but answer line takes precedence
	b	lift the weight / straighten arms / straighten legs / AW (1)	1	allow increase the size of the bar
	c	A to B KE increases B to C PE increase and KE decreases all three correct (2) two correct (1)	2	one correct scores no mark
Total			4	

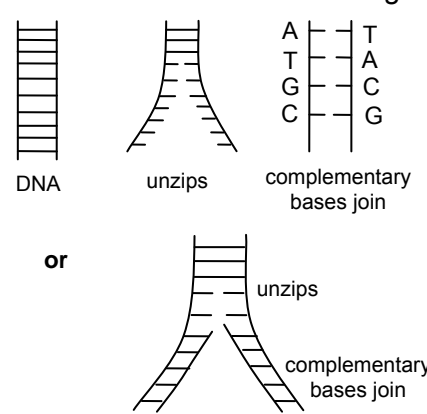
Question		Expected Answers	Marks	Additional Guidance															
12	a	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">●</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">●</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">●</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <p>any one or two correct (1) all three correct (2)</p>	●				●					●						2	
●																			
	●																		
●																			
	b	lubrication / oil / grease (1)	1	allow high level answers in terms of engineering eg smoother surfaces															
Total			3																

Question			Expected Answers	Marks	Additional Guidance
13	a	i	4×7000 (1)	1	<p>do not mark 28000 on its own the mark is for the working out not the answer if wrong equation stated in words or symbols then mark cannot be awarded</p> <p>allow $28000/7000 = 4$ or $28000/4 = 7000$</p>
		ii	3500 (2) but $28000/8$ (1)	2	<p>mark answer first of all correct answer scores two marks do not award mark for correct equation in words or symbols</p>
	b	i	to measure distance / AW (1)	1	<p>speed = distance/time can be used to credit both distance and time allow how long it takes (between lines)</p> <p>allow time if not given in (b) (ii) but credit in (b) (ii)</p>
		ii	time (1)	1	<p>speed = distance/time can be used to credit both distance and time</p> <p>allow distance if not given in (b) (i) but credit in (b) (i)</p> <p>allow how long it takes but this statement cannot be awarded in both parts (b) (i) and (b) (ii)</p> <p>ignore how quick it is</p>
Total				5	

Question			Expected Answers	Marks	Additional Guidance
14	a	i	A (1) C (1)	2	any order
		ii	D (1)	1	
		iii	B (1)	1	
	b		distance (1) travelled after brakes applied / AW (1)	2	the marks are independent and give benefit of doubt for use of how long unless it is clearly referring to time allow how long / how far allow how many metres (1) it takes to stop car once brakes applied (1) not how long in seconds
			Total	6	
			Paper Total	60	

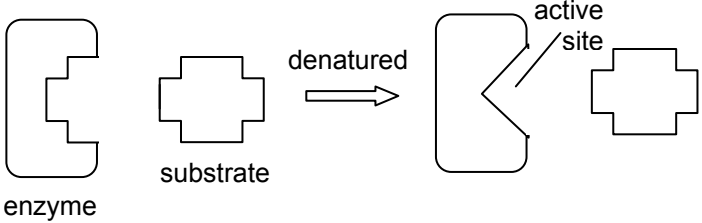
B623/02 Unit 1: Modules B3, C3 and P3 Higher Tier

Question		Expected Answers	Marks	Additional Guidance
1	a	cell wall / (large) vacuole (1)	1	allow starch grains not chloroplasts not just wall
	b	(movement of substances or molecules from region of high concentration to low concentration (1)	1	idea of movement not needed in definition because it is given in the stem allow mixing of substances without external help / mixing substances without stirring allow (movement of molecules) down a concentration gradient / down a pressure gradient allow along a concentration gradient / along a pressure gradient not up a concentration gradient
	c	geotropic (1) gravity (1) auxin / IAA / indolyl acetic acid (1)	3	allow geotropic ignore geotropism allow indol acetic acid
Total			5	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	meiosis (1)	1	allow any phonetic spelling for example miosis or meosis allow reduction division not if the word includes a 't'
		ii	any one from chromosome number is halved / haploid / 23 (1) pairs of chromosomes separate (1) involves second / double division (1) four daughter cells (not two) / divides into 4 (1) daughter cells not identical / produces genetically different cells (1)	1	assume answer refers to meiosis unless stated not just different number of chromosomes not faster not just makes sex cells / gametes allow higher level answers eg independent assortment (1) crossing over (1) bivalents form (1)
	b		unzipping / splits to form single strands (1) complementary bases join / A-T / G-C (1)	2	ignore unravelling not chromosomes split not amino acids matching allow marks from a labelled diagram  <p>DNA unzips complementary bases join</p> <p>or</p> <p>unzips</p> <p>complementary bases join</p>
Total				4	(2)

Question			Expected Answers	Marks	Additional Guidance
3	a	i	<p>any two from</p> <p>select big carrots (1)</p> <p>cross breed / breed some of the selected carrots together / cross pollinate (1)</p> <p>select best offspring to use for further crosses / carry on selecting and cross breeding (1)</p>	2	<p>use of an asexual technique such as cloning, cuttings or tissue cultures limited to one mark which can only be the mark for selecting the big carrots</p> <p>allow select desired characteristic (1)</p> <p>allow named example of selected characteristic eg fat carrots but not just best carrot</p> <p>ignore reference to shape or colour of carrot</p> <p>if cross not mentioned make sure answer refers to sexual reproduction between selected carrots</p>
		ii	<p>any one from</p> <p>reduces gene pool (1)</p> <p>reduces variation (1)</p> <p>harmful recessive characteristics have more chance of showing / AW (1)</p>	1	<p>allow decrease in diversity / certain characteristics may be lost / named examples of characteristics lost eg colour / taste</p> <p>not no variation</p> <p>allow more susceptible to disease but not disease spreads quickly</p> <p>ignore inbreeding</p> <p>not mutation / abnormalities</p>
	b		<p>any one from</p> <p>rice plants will grow to produce rice containing beta carotene (1)</p> <p>beta-carotene can be changed into Vitamin A (1)</p> <p>can get Vitamin A from (eating) this rice (1)</p>	1	<p>allow beta carotene is needed to make vitamin A</p> <p>not beta carotene contains vitamin A / is vitamin A</p> <p>not rice contains vitamin A</p>
Total				4	

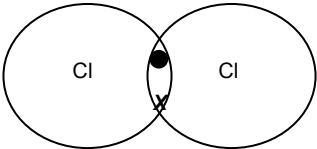
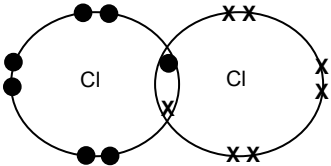
Question		Expected Answers	Marks	Additional Guidance
4	a	to cope with / maintain high pressure (1)	1	allow stop it bursting allow blood pressure in arteries is high allow to cope with the pressure of blood when heart beats not to pump / contract /squeeze blood round body
	b	to help blood flow at low pressure (1)	1	allow so blood can flow easier at low pressure allow so blood can flow with less resistance allow veins work under low pressure ignore to carry more blood / reference to valves
		Total	2	

Question	Expected Answers	Marks	Additional Guidance
5 a	time decreases (with increase in pH) then rises (from pH6 to pH8) / AW (1)	1	<p>complete pattern needed for mark eg time / it / results goes down and then up (1) rate / speed goes up and then down (1) reaction / it speeds up then slows down (1) it goes faster then slower (1)</p> <p>time goes down / time goes up on own (0) rate goes up / rate goes down on own (0) the time goes faster then slower (0)</p> <p>if numbers (pH and / or time) are used they must be correct</p>
	pH 6 (1)	1	
c	<p>any three from enzyme / catalase denatured (1) enzyme / catalase changes shape (1) substrate / hydrogen peroxide no longer fits into enzyme / catalase (1) idea of change of shape of <u>active site</u> (1)</p>	3	<p>not just key does not fit lock as answer must be in terms of enzyme and substrate</p> <p><u>active site of enzyme</u> changes shape (2)</p> <p>allow marking points from a diagram but active site must be labelled to gain full marks</p>  <p style="text-align: right;">(3)</p>
	Total	5	

Question			Expected Answers	Marks	Additional Guidance
6	a	i	oxygen (1)	1	allow correct symbol, O ignore O ₂
		ii	potassium (1)	1	allow correct symbol, K
	b		(relative mass) = 1 (1) (relative charge) = 0 (1)	2	allow no charge, zero, neutral
Total				4	

Question			Expected Answers	Marks	Additional Guidance
7	a		copper carbonate → copper oxide + carbon dioxide (1)	1	allow CuCO ₃ → CuO + CO ₂ allow correct formulae and mixture of words and correct formulae ignore balancing if formulae used allow = or ⇌ instead of → not + heat in equation but allow heat over arrow
	b		is coloured / catalyst / compounds give coloured precipitates (1)	1	allow any colour except white eg it is blue allow forms complexes ignore reference to melting points / boiling points not conducts electricity
Total				2	

Question		Expected Answers	Marks	Additional Guidance
8	a	little/no resistance (1)	1	
	b	i	1	allow electric (magnet) / electrical (magnet)
		ii	2	<p>one mark for an advantage and one mark for a disadvantage</p> <p>allow (make powerful) electromagnet if not used as answer to b(i) allow superfast computers / superfast electronic circuits allow does not lose power during transmission / more efficient power transmission ie this marking point must include idea of power transmission / conduction not faster electricity</p> <p>not ora eg will not work when hot ignore cost</p>
		Total	4	

Question	Expected Answers	Marks	Additional Guidance
9 a	have 7 <u>electrons</u> in outer shell/ same number of <u>electrons</u> in outer shell (1)	1	allow both need to gain 1 <u>electron</u> allow e or e ⁻ for electron similar outer electronic structure is not sufficient for a mark
b	 <p>two chlorine atoms with electron pair shared between them (1)</p> <p>but</p>  <p>two chlorine atoms with electron pair shared between them and rest of diagram correct (2)</p>	2	second mark can only be awarded if first mark given allow electrons as all dots or all crosses note diagram does not need the orbit circles to be shown electron pair shared (1) ignore inner electrons even if wrong electron pair shared and total of 14 electrons with 7 on each atom (2)
c	(different) mass numbers (1)	1	allow (atoms have different) numbers of neutrons / have 2 more neutrons / have 18 and 20 neutrons not incorrect number of neutrons eg 19 and 21 allow have mass numbers 35 and 37 allow have different (relative) atomic mass not just different mass
	Total	4	

Question		Expected Answers	Marks	Additional Guidance
10	a	ions move (1)	1	<p>if ion movement to an electrode given then it must be correct</p> <p>allow positive ions go to negative electrode allow negative ions go to positive electrode not positive ions go to positive electrode not negative ions go to negative electrode</p> <p>allow named ions move from list ie $H^+ / OH^- / Cl^- / Na^+$ allow cations move (positive ions) / anions move (negative ions) allow charged atoms move</p> <p>not electrons move / charged particles move</p>
	b	1 / one (1)	1	
	c	$2H^+ + 2e^- \rightarrow H_2$ Correct formulae of reactants and products including electrons (1) Correct balancing dependant on correct formulae (1)	2	<p>allow $H^+ + e^- \rightarrow H_2$ (1) not balanced but giving hydrogen gas allow $H^+ + 2e^- \rightarrow H_2$ (1) not balanced but giving hydrogen gas allow $2H^+ + e^- \rightarrow H_2$ (1) not balanced but giving hydrogen gas not $H^+ + 2e^- \rightarrow H$ (0) not balanced and not giving hydrogen gas not $2H^+ + e^- \rightarrow H$ (0) not balanced and not giving hydrogen gas</p> <p>but allow because it shows some understanding of the process $H^+ + e^- \rightarrow H$ (1) If followed by $H + H = H_2$ second mark can be awarded</p> <p>allow correct multiples</p>
		Total	4	

Question		Expected Answers	Marks	Additional Guidance
11	a	D (1)	1	allow answer ticked circled or underlined in the choose list if answer line blank
	b	C (1)	1	allow answer ticked circled or underlined in the choose list if answer line blank
Total			2	

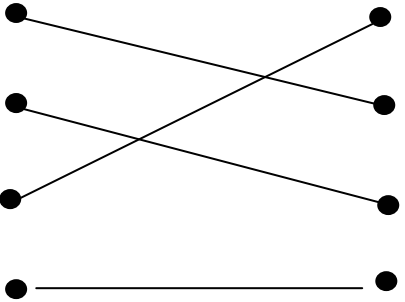
Question		Expected Answers	Marks	Additional Guidance
12	a	Jupiter (1)	1	allow other ways of indicating answers eg ringed but answer line takes precedence
	b	A to B KE increases B to C PE increase and KE decreases all three correct (2) two correct (1)	2	one correct scores no mark
	c	i air resistance / drag increases with speed (1) idea of forces are balanced (at terminal speed) / AW (1)	2	allow weight / gravity = drag allow forces are equal / evened out (but opposite) ignore upthrust / references to energy / names of forces
		ii work done against air resistance / friction / drag (1)	1	allow changed to heat / sound (in air) allow changed into <u>kinetic energy of air</u> particles / <u>KE of air</u> particles not changed to kinetic energy eg changed to heat , sound and kinetic energy then treat as CON = 0 not just changed into other forms
Total			6	

Question		Expected Answers	Marks	Additional Guidance
13	a	<p>any two from increase the stopping time (of the person) / AW (1)</p> <p>decrease the acceleration / deceleration (of the person) (1) but decreases the acceleration and use of force = mass X acceleration (2)</p> <p>increases the stopping distance / collision distance (1) but increases the stopping distance and description of work = force x distance (2)</p>	2	<p>allow takes longer for the driver to stop moving / stop at a slower speed (1) not increase stopping time of car</p> <p>allow slows down the acceleration / slows down slower (1) not decrease the acceleration of the car</p> <p>ignore absorbs energy / reduces force</p>
	b	<p>idea that makes the driver more comfortable / allows driver to concentrate on driving / reduces tiredness / AW (1)</p>	1	<p>allow descriptions of comfort allow suitable distance from steering wheel / can reach pedals easily / can reach pedals without stretching / can see over the steering wheel / can see the front of the car / sitting at correct height (for safety reasons)</p>

Question		Expected Answers	Marks	Additional Guidance
	c	drugs / (driver) tiredness / illness / distraction / lack of concentration (1)	1	<p>allow older driver not just age</p> <p>allow specific distraction examples - mobile phone use / changing CD / adjusting radio / using sat nav</p> <p>allow increase speed but not just speed</p> <p>if more than one reason then any incorrect reason negates the mark eg taking drugs and bald tyres = (0)</p>
	d	bald tyres / bad brakes / slippery road (conditions) / higher speed / poor suspension / increased load (1)	1	<p>allow correct description of road conditions eg wet / icy</p> <p>not just bad road conditions / foggy / raining</p> <p>answer must be qualified not just speed / quality of brakes / quality of tyres</p> <p>if more than one reason then any incorrect reason negates the mark eg taking drugs and bald tyres = (0)</p>
		Total	5	

Question			Expected Answers	Marks	Additional Guidance
14	a	i	4 X 7000 (1)	1	<p>do not mark 28000 on its own the mark is for the working out not the answer if wrong equation stated in words or symbols then mark cannot be awarded</p> <p>allow 28000/7000 = 4 or 28000/4 = 7000</p>
		ii	3500 (2) but 28000/8 (1)	2	<p>mark answer first of all correct answer scores two marks do not award mark for correct equation in words or symbols</p>
	b	i	<p>any one idea that force does not increase proportionally with speed / AW (1) force increases rapidly (with speed) (1) bigger force means more work (for the same useful work) (1) extra force is due to air resistance (as extra work is wasted energy) (1) larger air resistance at higher speed (1)</p>	1	<p>allow if you double the speed you more than double the force allow driving force increases exponentially allow force increases in proportion to speed²</p>
		ii	driving style / type of journey / distance / number of passengers / added load / roof rack (1)	1	<p>allow examples of driving styles eg amount of acceleration / amount of deceleration / amount of braking etc allow amount of use of equipment eg air con / lights allow windows open allow type of road surface / examples of different road surface allow tyre pressure / air in tyres</p> <p>not engine size not mass / size / shape of car on own (as the car is fixed)</p>

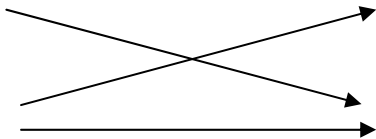
Question		Expected Answers	Marks	Additional Guidance
	c	<p>any two from</p> <p>idea that car itself does not pollute (1)</p> <p>car needs recharging (1)</p> <p>idea that electricity to recharge causes pollution (at power station) (1)</p>	2	<p>no mark for yes / no</p> <p>allow explanation of no pollution if renewable energy eg wind power is used to recharge battery</p> <p>allow power station gives out CO₂ / SO₂</p> <p>ignore pollution during manufacture of car / disposal of battery</p>
Total			7	

Question		Expected Answers	Marks	Additional Guidance
15		 <p>(2)</p>	2	<p>all correct 2 marks</p> <p>any two / three correct 1 mark</p> <p>any one correct 0 marks</p>
Total			2	

Paper Total			60	
--------------------	--	--	-----------	--

B624/01 Unit 2: Modules B4, C4 and P4 Foundation Tier

Question			Expected Answers	Marks	Additional Guidance
1	a	i	fungi (1)	1	allow named example of fungi – eg mould / mushrooms / toadstools (1) allow saprophytes (1)
		ii	not enough oxygen / decomposers need oxygen / too cold (1)	1	allow no oxygen allow too salty / presence of salt (1) ignore respiration cannot occur unless qualified allow not enough heat / warmth (1) not 'not enough temperature'
	b	i	leaves (1)	1	allow palisade cell
		ii	photosynthesis (1)	1	allow makes food / starch / glucose / carbohydrate (1) allow absorbs light energy not just light or light energy
		iii	(the) sun / light / sunlight (1)	1	
Total				5	

Question		Expected Answers	Marks	Additional Guidance	
2	a	correct links (2) 	2	three or two correct (2) one correct (1) if more than one mark from a box then this negates that mark	
	b	phloem (1)	1	More than one answer scores (0)	
	c	warmer / can increase carbon dioxide / can exclude (some) pests (1)	1	allow reference to protect from frost or cold / easier to control temperature / minerals /humidity (1) allow more even temperature / keeps heat in (1) allow protection from wind (1) allow control light not just 'lighter' ignore growth	
	d	i	pyramid of numbers (1)	1	not just food pyramid
		ii	biological control (1)	1	More than one answer indicated scores (0)
Total			6		

Question		Expected Answers	Marks	Additional Guidance
3	a	fertiliser (1)	1	More than one answer indicated scores (0)
	b	i	1	allow other trace minerals - eg sodium / iron / manganese / zinc / sulphate not phosphorus not water mark the 1 st answer if more than one response
		ii	1	ignore withered / dry ignore just discoloured / lose colour allow yellow / brown or brown / yellow or green yellow or yellow / green (1) allow small plant / AW
		iii	2	allow catch more light (1) not merely absorb light allow so light can penetrate all the way through (1) not merely flow of gas
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
4	a	wilted / drooped / AW (1)	1	allow flaccid / plasmolysed / shrivelled / limp (1) allow (looks) dehydrated (1) not weepy / drained
	b	any three from: water absorbed (1) by root (1) hairs (1) travels up stem (1) Maximum (3)	3	allow through the xylem (1) allow cells become turgid (1) take in water via root hairs (3) any correct reference to osmosis (1) any correct reference to transpiration (1)
		Total	4	

Question		Expected Answers	Marks	Additional Guidance
5	a	phosphorus (1) potassium (1)	2	ignore symbols
	b	i	1	allow HNO ₃ not nitrate acid
		ii	1	
		Total	4	

Question		Expected Answers	Marks	Additional Guidance
6	a	bleach → lifts dirt to clean clothes brightener → makes clothes look whiter detergent → removes coloured stains softens water	3	3 correct (3) 2 correct (2) 1 correct (1) if more than one mark from a box then this negates that mark
	b	saves energy / enzymes not denatured at 40 (1)	1	allow less electricity is used (1) allow reduces carbon footprint / less greenhouse gases / AW (1) allow can wash delicate clothing / less wear and tear / less shrinkage (1) allow stops colours running (1) ignore less pollution / damage to the environment allow biological powders work better at 40 / ora / AW (1)
	c	doesn't use water (1)	1	allow uses a named solvent other than water (1) ignore wet not merely 'no liquid' (0) but 'no liquid like water' (1)
Total			5	

Question		Expected Answers	Marks	Additional Guidance
7	a	<p>any two from</p> <p>lakes (1)</p> <p>aquifers (1)</p> <p>reservoirs (1)</p> <p>wells (1)</p> <p>springs (1)</p> <p>clouds / rain (1)</p> <p>ocean (1)</p> <p>sea (1)</p> <p>borehole (1)</p> <p>canal (1)</p> <p>pond (1)</p> <p>waterfall (1)</p>	2	not river
	b	<p>run off (from spraying) / leaching</p> <p>washed off by rain /</p> <p>blown by wind (during spraying) (1)</p>	1	<p>allow via ditches and drains</p> <p>allow by rain</p> <p>allow wind</p> <p>allow flooding</p>
	c	white (1)	1	<p>mark the answer on the line first.</p> <p>more than one answer scores (0)</p> <p>allow answer ringed or indicated if answer line is blank</p>
	d	<p>sodium chloride + silver nitrate</p> <p>→ sodium nitrate + silver chloride (1)</p>	1	<p>reactants either order products either order</p> <p>allow mix of words and correct formulae, if formulae ignore balancing</p>
		Total	5	

Question			Expected Answers	Marks	Additional Guidance
8	a	i	ammonia (1)	1	allow NH ₃ (1)
		ii	4 (1)	1	
		iii	reversible (1)	1	allow ' can go both ways (1) allow 'equilibrium (1)
	b		continuous (1)	1	mark the answer on the line first more than one answer scores (0) allow answer ringed or indicated if answer line is blank
	c		labour costs (1) raw materials / chemicals (1) machinery / equipment (1)	2	allow quality control point (1) ignore R+D, marketing, distribution, transport, packaging allow catalyst (1)
			Total	6	

Question		Expected Answers	Marks	Additional Guidance
9	a	longitudinal (1)	1	allow compression wave (1) not sound
	b	any two from idea of breaking up (kidney) stones / AW (1) (measure) blood flow / AW (1) baby / pregnancy scans (1) tumour / cancer / (dense) tissue(s) scan (1) tissue / muscle treatment or repair (1)	2	allow looking for kidney stones (1) allow blood flow measurements (1) allow looking for unborn babies (as alternative for scanning) (1) not merely 'looking at babies' (0) allow scanning organs (1) allow physio(therapy) (1) allow cleaning surgical instruments and teeth
Total			3	

Question		Expected Answers	Marks	Additional Guidance
10	a	uranium (1)	1	allow Plutonium
	b	faster / uncontrolled (reaction) / AW (1)	1	allow higher level answers eg: fewer neutrons absorbed (1) no use of control rods (1) greater rate of fission (1) credit reverse argument answers
		Total	2	

Question		Expected Answers	Marks	Additional Guidance
11	a	radiographer (1)	1	not radiologist
	b	cancer treatment / radiotherapy AW (1)	1	allow higher level answers, eg tracers, sterilisation (of bacteria) (1)
	c	nucleus (1)	1	allow nuclei (1)
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
12	a	1st answer - insulators (1) 2nd or 3rd answers in any order - positive (1) negative (1)	3	allow + and -, also allow +ve and -ve
	b	risk of sparks / explosions / fire / AW (1)	1	
	c	any two from idea of current / charge passed through patient (1) heart shocked / contracts (1) idea of precautions to avoid shocking / harming operator / assistants (1) maximum of 1 mark for precautions	2	ignore paddles on chest not just electricity / electric shock moves not just give patient a shock eg Keeping others clear allow earthing the trolley (1) allow limiting / controlling the current (1) allow insulated clothing / boots (1)
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
13	a	safety / reduce fire risk (1)	1	allow to stop shock (1) allow to protect appliance / circuit (1) allow higher level answers eg higher current / power blows fuse ignore completes circuit or carries current allow prevents too much current or power (1) not prevents too much electricity (0)
	b	i <u>brown</u> (1)	1	More than one answer scores (0)
		ii neutral (1)	1	More than one answer scores (0)
	c	case / hairdryer can't become live / AW (1)	1	allow no exposed / touchable metal parts / hairdryer cannot become live / plastic or insulating case allow less chance of shock (1) not merely hairdryer is plastic not merely safer
	d	46 (2) BUT 230/5 scores (1)	2	
		Total	6	
		Paper Total	60	

B624/02 Unit 2: Modules B4, C4 and P4 Higher Tier

Question		Expected Answers	Marks	Additional Guidance	
1	a	<p>any two from</p> <p>not enough oxygen/decomposers need oxygen (1)</p> <p>too cold (1)</p> <p>(too) salty / presence of salt (1)</p>	2	<p>allow no oxygen</p> <p>ignore respiration cannot occur unless qualified</p> <p>not 'not enough temperature'</p> <p>allow not enough heat/warmth</p> <p>allow salt is a preservative</p>	
	b	i	B (1)	1	mark answer line first but if blank allow indication on diagram
		ii	<p>(action of) nitrogen fixing bacteria (1)</p> <p>(action of) lightning (1)</p>	2	<p>not just bacteria / nitrifying bacteria / nitrogen fixation</p> <p>allow named bacteria eg <i>Rhizobium</i>, <i>Azotobacter</i>, <i>Clostridium</i> (1)</p> <p>not lighting</p>
	c		palisade (mesophyll cells) (1)	1	not mesophyll unless qualified by palisade
			Total	6	

Question		Expected Answers	Marks	Additional Guidance
2	a	phloem (1)	1	More than one answer scores (0)
	b	i	1	allow pyramid of population
		ii	2	<p>ignore references to cost unless linked to no need to reapply</p> <p>allow references to no toxic residues / no bioaccumulation (1)</p> <p>allow species specific (1)</p> <p>ignore no harmful chemicals unless harm is specified</p> <p>ignore not poisonous</p> <p>allow does not harm the plant (1)</p> <p>ignore does not affect other organisms</p> <p>ignore natural / better for the environment</p> <p>ignore long term solution</p>
		Total	4	

Question			Expected Answers	Marks	Additional Guidance
3	a	i	less growth / yellow (1)	1	ignore withered / dry ignore just discoloured / lose colour allow small plant / AW
		ii	chlorophyll (1)	1	ignore chloroplast
	b	i	4 (1)	1	allow 3.8 to 4.2
		ii	if too many then the plant uses too much energy / food / resources making/operating traps (so less left for growth) (1) if too few then plant does not obtain (enough) minerals / nutrients / chemicals (to enable it to grow) (1)	2	not does not trap enough energy / food from insects
		iii	large surface area / absorb more light (1) less distance for gases / sunlight to travel / (sun)light / gases can reach all cells / aids diffusion / easier gas exchange (1)	2	allow catch more light (1) not merely absorb light allow so light can penetrate all the way through (1) not merely flow of gases
Total				7	

Question		Expected Answers	Marks	Additional Guidance
4	a	<p>any two from</p> <p>cells become flaccid / not turgid (1)</p> <p>less turgor pressure (1)</p> <p>cell contents do not push against cell <u>wall</u> / less pressure against cell <u>wall</u> / cell membrane comes away from cell wall (1)</p>	2	<p>allow plasmolysed</p> <p>ignore reference to turgid or flaccid plants</p> <p>less turgor pressure against cell wall = 2</p>
	b	dry and windy (1)	1	more than one answer scores (0)
		Total	3	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	nitric (1)	1	allow HNO ₃ not nitrate acid
		ii	80 (1)	1	
	b		<p>any three from</p> <p>run off (from spraying) / leaching / washed off by rain / blown by wind (during spraying) (1)</p> <p>algal bloom / algae increase in numbers / algae grow / plant growth (1)</p> <p>blocks off (sun)light so plants die/cannot photosynthesise (1)</p> <p>bacteria use up oxygen (1)</p> <p>so animals/insects/creatures in water die due to lack of oxygen or respiration (1)</p>	3	<p>allow via ditches and drains</p> <p>allow by rain</p> <p>allow wind</p> <p>allow seepage</p>
Total				5	

Question		Expected Answers	Marks	Additional Guidance	
6	a	saves energy / enzymes not denatured at 40 (1)	1	allow less electricity is used (1) allow reduces carbon footprint / less greenhouse gases / AW (1) allow can wash delicate clothing / less damage to garment/fabric/colour / less shrinkage (1) allow stops colours running (1) ignore less pollution / damage to the environment allow biological powders work better at 40 / ora / AW (1)	
	b	i	forms bonds with water (1)	1	allow gets surrounded / attracted to / sticks to water (1) ignore absorbs / dissolves in / water loving
		ii	forms bonds with grease / dirt / stains (1)	1	allow gets surrounded / attracted to / sticks to grease / dirt (1) ignore absorbs / dissolves in grease / water hating
	c	i	doesn't use water (1)	1	allow uses a named solvent other than water (1) ignore wet not merely 'no liquid' (0) but 'no liquid like water' (1)
		ii	any one from stain does not dissolve in water/cannot be removed by water (1) to prevent damage to material / clothing (1)	1	ignore uses less energy ignore named stains unless qualified with reference to water eg water washes dyes out eg does not shrink clothes eg can be used on delicate clothes
Total			5		

Question			Expected Answers	Marks	Additional Guidance
7	a	i	particles / stones / solids settle out / fall to the bottom (1)	1	allow named larger particle not just particles removed not any reference to filtering allow chemicals added to cause clumping (1)
		ii	to kill microbes (1)	1	allow bacteria / organisms allow get rid of bacteria ignore germs allow to sterilise the water ignore to make it safe to drink
	b		run off (from spraying) / leaching washed off by rain / blown by wind (during spraying) (1)	1	allow via ditches and drains allow by rain allow wind allow flooding
	c		sodium chloride + silver nitrate → sodium nitrate + silver chloride (1)	1	reactants either order products either order allow mix of words and correct formulae, if formulae ignore balancing
	d		$\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$ (2)	2	reactants either order products either order species (1) balancing (1) must have species correct for balancing mark allow = or → ignore heat over arrow but nowhere else
Total				6	

Question		Expected Answers	Marks	Additional Guidance
8	a	sodium chloride (1)	1	allow NaCl
	b	i	3 (1)	
		ii	80% (2) if answer is incorrect $64/80 \times 100$ or actual mass/theoretical mass $\times 100$ (1) = 80% (1)	/ indicates a mathematical function, not alternative answer correct numeric answer without working scores 2
Total			4	

Question		Expected Answers	Marks	Additional Guidance
9	a	risk of sparks / explosions / fire / AW (1)	1	
	b	electrons move (1) from ruler (1)	2	any reference to positive electrons or protons moving = 0 has to be linked to movement of electrons electrons move to ruler scores = 1 ruler has lost electrons = 2 allow correct answers in terms of cloth eg electrons move to cloth scores = 2 electrons move from cloth scores = 1
	c	any two from idea of current / charge passed through patient (1) heart shocked / contracts (1) idea of precautions to avoid shocking / harming operator / assistants (1) maximum of 1 mark for precautions	2	ignore paddles on chest not just electricity / electric shock moves ignore reference to voltage eg keeping others clear allow earthing the trolley allow limiting / controlling the current/charge (1) ignore reference to voltage allow insulated clothing / boots (1)
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
10	a	case / hairdryer can't become live / AW (1)	1	allow no exposed / touchable metal parts / plastic or insulating/non-conducting case allow less chance of shock (1) not merely hairdryer is plastic not merely safer
	b	46 (2) If answer is incorrect then 230/5 scores (1)	2	
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
11	a	any two from (ultrasound) reflects/echoes from layers / tissues / baby (1) time taken for wave to return varies / is measured (1) time taken indicates depth /different parts of the baby (1)	2	ignore bounce off
	b	X-rays don't show soft tissue / AW (1)	1	allow X-rays only show up bone allow x-rays not reflected by/not absorbed by soft tissue allow x-rays pass through soft tissue ignore all health references
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
12	a	(high speed) electrons hitting metal (1)	1	allow any named metal
	b	i	1	allow gamma sources can't be switched off (1) allow higher level answers such as X rays can be made with different penetrating powers / energies ignore they are more concentrated
		ii	1	ignore tumour will receive the biggest dose ignore does not damage living cells
		Total	3	

Question		Expected Answers	Marks	Additional Guidance	
13	a	unstable (1)	1		
	b	electron (1)	1		
	c	any two from radon gas (1) soil / rocks / (1) cosmic rays / sun / space (1) from industry / hospitals / medical treatments / nuclear testing/ (nuclear) power stations (1) from living organisms / animals / plants (1)	2	allow air / atmosphere / carbon 14 (1) allow ground / bricks / concrete / earth / Earth (1) not microwaves from mobile phones not UV from Sun allow food	
	d	i	237 (1)	1	
		ii	93 (1)	1	
Total			6		
Paper Total			60		

Grade Thresholds

General Certificate of Secondary Education
Additional Science B (Specification Code J641)
June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B623/01	Raw	60	-	-	-	33	27	22	17	12	0
	UMS	69	-	-	-	60	50	40	30	20	0
B623/02	Raw	60	46	38	28	19	15	13	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B624/01	Raw	60	-	-	-	35	29	23	18	13	0
	UMS	69	-	-	-	60	50	40	30	20	0
B624/02	Raw	60	49	41	31	21	15	12	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B626/01	Raw	60	54	49	43	38	32	26	20	14	0
	UMS	100	90	80	70	60	50	40	30	20	0

B626 - The grade thresholds have been decided on the basis of the work that was presented for award in June 2009. The threshold marks will not necessarily be the same in subsequent awards.

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J641	300	270	240	210	180	150	120	90	60	0

The cumulative percentage of candidates awarded each grade was as follows:

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
J641	4.1	16.8	38.8	66.9	83.7	92.5	97.0	99.0	100.0	58845

59231 candidates were entered for aggregation this series

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity



OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

© OCR 2009