OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science B J641

Gateway Science Suite

General Certificate of Secondary Education

Mark Schemes for the Units

June 2009

J641/MS/R/09

Oxford Cambridge and RSA Examinations

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GCSE Gateway Additional Science B J641

MARK SCHEMES FOR THE UNITS

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** geotrophic **ignore** geotropism
			Total	**5**	

Question			Expected Answers	Marks	Additional Guidance
2	a		egg - large size as contains food (store) / large cytoplasm as it contains food (store) (1) 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)	2	need both adaptation **and** why it is useful for a mark **allow** high level answers for example • 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	**allow** any phonetic spelling for example miosis or meosis **allow** reduction division **not** if the word includes a 't'
	c	i	oxygen (1)	1	
		ii	carbon dioxide (1)	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) • 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		**any two from** select big carrots (1) cross breed / breed some of the selected carrots together / cross pollinate (1) select best offspring to use for further crosses / carry on selecting and cross breeding (1)	2	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 **allow** select characteristic she wants or select best carrots if large tap root given in part (a) **ignore** reference to shape or colour of carrot if cross not mentioned make sure answer refers to **sexual** reproduction between **selected** carrots
	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** $CuCO_3 \rightarrow CuO + CO_2$ **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**	

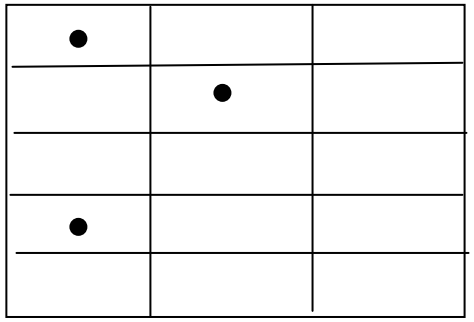
Question			Expected Answers	Marks	Additional Guidance
7	a		it's strong (1)	1	**allow** it can take a lot of weight / malleable **ignore** hard / conducts heat / conducts electricity / rusts **not** strong and does not rust
	b		good conductor of electricity (1)	1	**allow** other ways of indicating answer eg ringed but answer line takes precedence
	c	i	at very low temperature (1)	1	**allow** other ways of indicating answer eg ringed but answer line takes precedence
		ii	(powerful) electromagnet (1)	1	**allow** electric (magnet) / electrical (magnet)
		iii	loss free power **transmission** / superfast circuits (1)	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 • **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		 any **one** or **two** correct (1) **all three** correct (2)	2	
	b		lubrication / oil / grease (1)	1	**allow** high level answers in terms of engineering eg smoother surfaces
			Total	**3**	

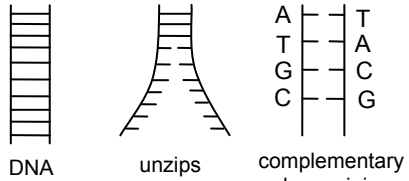
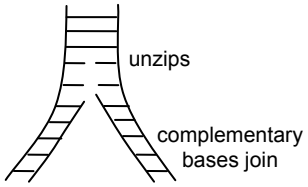
Question			Expected Answers	Marks	Additional Guidance
13	a	i	4 × 7000 (1)	1	**do not** mark 28000 on its own the mark is for the working out not the answer if **wrong** equation stated in words or symbols then mark **cannot** be awarded **allow** 28000/7000 = 4 or 28000/4 = 7000
		ii	3500 (2) **but**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

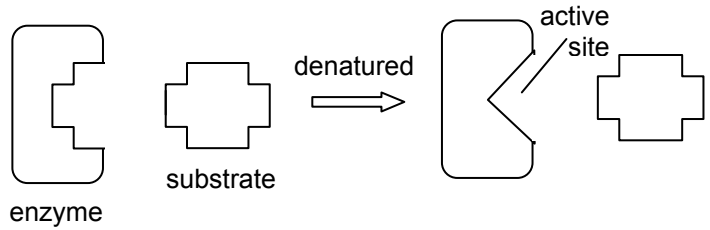
B623/02 Unit 1: Modules B3, C3 and P3 Higher Tier

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** geotrophic **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  **or**  (2)
			Total	**4**	

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

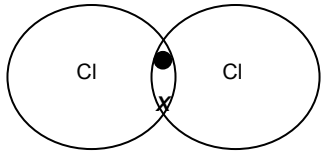
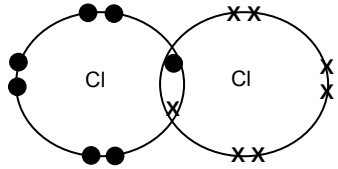
Question			Expected Answers	Marks	Additional Guidance
4	a		to cope with / maintain high pressure (1)	1	**allow** stop it bursting **allow** blood pressure in arteries is high **allow** to cope with the pressure of blood when heart beats **not** to pump / contract /squeeze blood round body
	b		to help 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	**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) 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) if numbers (pH and / or time) are used they must be correct
	b		pH 6 (1)	1	
	c		**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)	3	**not** just key does not fit lock as answer must be in terms of enzyme and substrate <u>active site</u> **of enzyme** changes shape (2) **allow** marking points from a diagram but active site must be labelled to gain full marks  (3)
			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** $CuCO_3 \rightarrow CuO + CO_2$ **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	(powerful) electromagnet (1)	1	**allow** electric (magnet) / electrical (magnet)
		ii	**advantages** loss free power **transmission** / superfast circuits (1) **disadvantages** only work at low temperatures / do not work at room temperatures / need refrigeration to keep cold (1)	2	**one mark for an advantage and one mark for a disadvantage** **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 **not** ora eg will not work when hot **ignore** cost
			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		 **two** chlorine atoms with electron pair **shared** between them (1) **but**  **two** chlorine atoms with electron pair **shared** between them **and** rest of diagram correct (2)	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	**if ion movement to an electrode given then it must be correct** **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 **allow** named ions move from list ie H^+ / OH^- / Cl^- / Na^+ **allow** cations move (positive ions) / anions move (negative ions) **allow** charged atoms move **not** electrons move / charged particles move
	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	**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 **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 **allow** correct multiples
			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**	

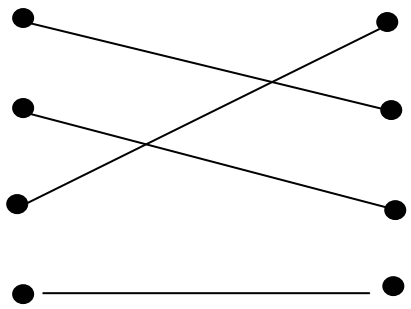
Question			Expected Answers	Marks	Additional Guidance
12	a		Jupiter (1)	1	**allow** other ways of indicating answers eg ringed but answer line takes precedence
	b		**A** to **B** KE increases **B** to **C** PE increase and KE decreases all **three** correct (2) **two** correct (1)	2	**one** correct scores **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		**any two from** increase the stopping time (of the person) / AW (1) decrease the acceleration / deceleration (of the person) (1) **but** decreases the acceleration **and** use of force = mass X acceleration (2) increases the stopping distance / collision distance (1) **but** increases the stopping distance **and** description of work = force x distance (2)	2	**allow** takes longer for the driver to stop moving / stop at a slower speed (1) **not** increase stopping time of car **allow** slows down the acceleration / slows down slower (1) **not** decrease the acceleration of the car **ignore** absorbs energy / reduces force
	b		**idea that** makes the driver more comfortable / allows driver to concentrate on driving / reduces tiredness / AW (1)	1	**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)

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

Question			Expected Answers	Marks	Additional Guidance
14	a	i	4 X 7000 (1)	1	**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 **allow** 28000/7000 = 4 or 28000/4 = 7000
		ii	3500 (2) **but** 28000/8 (1)	2	mark answer first of all correct answer scores two marks do **not** award mark for correct equation in words or symbols
	b	i	**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)	1	**allow** if you double the speed you more than double the force **allow** driving force increases exponentially **allow** force increases in proportion to speed^2
		ii	driving style / type of journey / distance / number of passengers / added load / roof rack (1)	1	**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 **not** engine size **not** mass / size / shape of car on own (as the car is fixed)

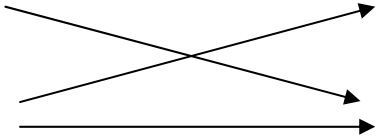
Question			Expected Answers	Marks	Additional Guidance
	c		**any two from** idea that car itself does not pollute (1) car needs recharging (1) idea that electricity to recharge causes pollution (at power station) (1)	2	**no mark for yes / no** **allow** explanation of no pollution if renewable energy eg wind power is used to recharge battery **allow** power station gives out CO_2 / SO_2 **ignore** pollution during manufacture of car / disposal of battery
			Total	**7**	

Question			Expected Answers	Marks	Additional Guidance
15			 (2)	2	all correct 2 marks any two / three correct 1 mark any one correct 0 marks
			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	phosphates / potassium / magnesium (1)	1	**allow** other trace minerals - eg sodium / iron / manganese / zinc / sulphate **not** phosphorus **not** water mark the 1st answer if more than one response
		ii	less growth / yellow (1)	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	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 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	nitric (1)	1	**allow** HNO_3 **not nitrate** acid
		ii	80 (1)	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		**any two from** lakes (1) aquifers (1) reservoirs (1) wells (1) springs (1) clouds / rain (1) ocean (1) sea (1) borehole (1) canal (1) pond (1) waterfall (1)	2	**not** river
	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		white (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
	d		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
			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	brown (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		**any two from** not enough oxygen/decomposers need oxygen (1) too cold (1) (too) salty / presence of salt (1)	2	 **allow** no oxygen **ignore** respiration cannot occur unless qualified **not** 'not enough temperature' **allow** not enough heat/warmth **allow** salt is a preservative
	b	i	B (1)	1	mark answer line first but if blank allow indication on diagram
		ii	(action of) nitrogen fixing bacteria (1) (action of) lightning (1)	2	**not** just bacteria / nitrifying bacteria / nitrogen fixation **allow** named bacteria eg *Rhizobium*, *Azotobacter*, *Clostridium* (1) **not** lighting
	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	pyramid of numbers (1)	1	**allow** pyramid of population
		ii	**any two from** greenfly do not develop resistance (1) does not kill / harm other organisms / humans (1) does not cause pollution (1) do not need to reapply (1) produces organic food (1)	2	**ignore** references to cost unless linked to no need to reapply **allow** references to no toxic residues / no bioaccumulation (1) **allow** species specific (1) **ignore** no harmful chemicals unless harm is specified **ignore** not poisonous **allow** does not harm the plant (1) **ignore** does not affect other organisms **ignore** natural / better for the environment **ignore** long term solution
			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		**any two from** cells become flaccid / not turgid (1) less turgor pressure (1) cell contents do not push against cell wall / less pressure against cell wall / cell membrane comes away from cell wall (1)	2	**allow** plasmolysed **ignore** reference to turgid or flaccid plants less turgor pressure against cell wall = 2
	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		**any three from** run off (from spraying) / leaching / washed off by rain / blown by wind (during spraying) (1) algal bloom / algae increase in numbers / algae grow / plant growth (1) blocks off (sun)light so plants die/cannot photosynthesise (1) bacteria use up oxygen (1) so animals/insects/creatures in water die due to lack of oxygen or respiration (1)	3	 **allow** via ditches and drains **allow** by rain **allow** wind **allow** seepage
			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		$BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$ (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)	1	
		ii	80% (2) if answer is incorrect 64/80 x100 or actual mass/theoretical mass x100 (1) = 80% (1)	2	/ 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	X-rays easier to control / easier to focus on cancer (1)	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	reduces damage to / exposure of healthy or other cells/tissue/parts of brain/head(1)	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.

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