GCSE

Additional Science B

General Certificate of Secondary Education

Unit **B623/02:** Modules B3, C3, P3 (Higher Tier)

Mark Scheme for June 2012

Oxford Cambridge and RSA Examinations

Annotations used in Scoris

Annotation	Meaning
✔	Correct response
✘	Incorrect response
BOD	Benefit of the doubt
BOD	Benefit of the doubt **not** given
ECF	Error carried forward
∧	Information omitted
I	Ignore
R	Reject
CON	Contradiction

Subject-specific Marking Instructions

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

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

Question			Answer	Marks	Guidance
1	(a)		diploid ✓ haploid meiosis mitosis ✓ multiplication	2	each incorrect tick loses 1 mark down to zero
	(b)		idea that humans tend to grow to a finite size but (many) plants can grow continuously / plants have meristems and grow at the tips (1)	1	**allow** humans stop growing (at adulthood) but plants don't **allow** humans have proportional growth **allow** plant growth is seasonal
	(c)		larger animals have to have longer period (for cell division to produce functional organs) / ora (1)	1	**ignore** it depends on the size of the animal **ignore** references to complexity or numbers of cells
	(d)		able to take on new roles / AW / able to become specialised / able to develop into different kinds of cells (1)	1	**allow** not specialised **allow** can turn into any cell
	(e)		(multi-cellular microorganisms are small and) have larger surface area to volume ratio / ora (1)	1	**allow** surface area / volume ratio but **ignore** surface area unqualified **ignore** organism can be larger **ignore** so cells can differentiate **ignore** so organism can be more complex
			Total	**6**	

Question			Answer	Marks	Guidance
2	(a)			2	**not** veins / capillaries (penalise only once)
			build up to form a plaque (1)		**allow** cholesterol sticks to walls or lining or inside of arteries **allow** cholesterol builds up or collect in arteries or (blood) vessels **allow** fat for cholesterol **not** cell walls
			idea that blood flow is restricted or blocked (in arteries) (1)		**allow** slow down blood flow / restrict circulation of blood **allow** blocks or clogs up arteries or (blood) vessels / makes arteries narrower / AW
	(b)		$\dfrac{(40 \times 8.5 =)}{(100}$ 3.4 (mmol) (1) **but** (8.5 – 3.4 =) 5.1 (mmol) (2) **but** (5.7 – 5.1 =) 0.6 (mmol) (3) **but** 0.6 (mmol per litre of blood) on its own (3)	3	**allow** ecf over the 3 steps **allow** $\dfrac{60 \times 8.5}{100}$ = 5.1 (2)
	(c)		idea of movement (of a substance or solute) from a high to a low concentration (1)	1	**allow** goes from a high concentration to a low concentration (1) **ignore** breaking down from a high to a low concentration **ignore** references to membranes **not** movement of cells
	(d)		**any two from:** long / large surface area (1) villi / microvilli (1) permeable or thin cell surface or cell membrane or lining (1) good blood supply / many capillaries (1)	2	 **allow** lining one cell thick **allow** (intestine) walls are thin **but not** cell walls are thin **ignore** close to the blood
			Total	8	
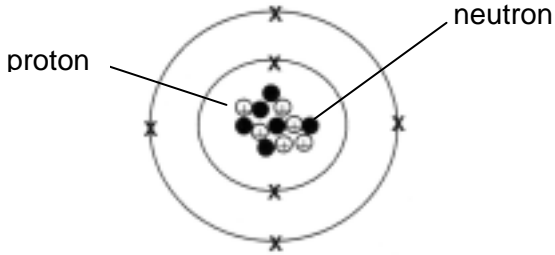
Question			Answer	Marks	Guidance
3	(a)	(i)	<u>insert</u> (1) <u>resistance</u> (1)	2	
		(ii)	plant cells retain ability to differentiate (1) animal cells usually lose this ability (at an early stage) (1)	2	**allow** plant cells can turn into different cells throughout their life **allow** stem cells found in developed animals have limited differentiation
	(b)		**any two from:** base sequence or base code determines amino acid sequence (1) each amino acid is coded for by (a sequence of) 3 bases (1) **sequence** of amino acids makes up a protein (1)	2	
			Total	**6**	

Question			Answer	Marks	Guidance
4	(a)	(i)		1	both required for mark **ignore** positive and neutral
		(ii)	12 / twelve (1)	1	
	(b)	(i)	**C** (1)	1	**allow** correct answer ticked, circled or underlined in list if answer line is blank
		(ii)	covalent (1)	1	**ignore** strong
	(c)		(low melting point) because it has weak intermolecular forces (1)	2	**allow** forces / bonds / attraction between molecules for intermolecular forces **not** weak metallic bonding **not** forces between atoms / intramolecular forces must be clear that forces are between molecules e.g. forces holding molecule together scores 0
			(does not conduct electricity) because it does not have any free electrons / no delocalised electrons (1)		**ignore** because it is not a metal **not** reference to ions
			Total	**6**	

| Question			Answer	Marks	Guidance
5	(a)		all have one electron in their outer shell (1)	1	**allow** all lose one electron **allow** they will have the same number of electrons in the outer shell
	(b)		$2Na + 2H_2O \rightarrow 2NaOH + H_2$ correct reactants and products (1) correct balancing (1)	2	**allow** any correct multiple, including fractions **allow** $=$ / $\rightleftharpoons$ instead of $\rightarrow$ **not** and / & instead of + balancing mark is dependent on the correct formulae but **allow** 1 mark for a balanced equation with a minor error in subscripts / formulae e.g. $2Na + 2H2O \rightarrow 2NaOH + H2$
	(c)		(potassium) loses outer electron more easily (than sodium) (1)	1	**allow** reverse argument for sodium **allow** potassium has more (shielding) shells / outer shell is further from the nucleus / outer electron is further from the nucleus **but** potassium has a bigger atom is not sufficient **allow** potassium has a weaker force between the nucleus and the outer electron **ignore** (potassium) loses outer electron more quickly **ignore** potassium has more electrons assume unqualified answer refers to potassium
			Total	**4**	

6

Question			Answer	Marks	Guidance
6	(a)		state of chlorine – gas (1) colour of bromine – red / brown / orange / yellow (1) radius of astatine – any value between 0.160 and 0.200 (1)	3	**allow** any combination of red, brown, orange and yellow (1) e.g. orange-red or red-brown **allow** rusty red or foxy red (1) **not** combinations where one of the colours is incorrect e.g. black-brown **ignore** references to pale or dark
	(b)	(i)	bromine + sodium iodide $\rightarrow$ iodine + sodium bromide (1)	1	**allow** = instead of $\rightarrow$ **not** and / & / instead of + **allow** correct formulae (i.e. case and subscripts must be correct) but equation does not need to balance e.g. $Br_2 + NaI \rightarrow I_2 + NaBr$ (1) **allow** mix of correct formulae and words **not** $Br + NaI \rightarrow I + NaBr$
		(ii)	$Cl_2 + 2e^- \rightarrow 2Cl^-$ correct reactants and products (1) correct balancing (1)	2	**allow** $Cl_2 \rightarrow 2Cl^- - 2e^-$ **allow** any correct multiple, including fractions **allow** = / $\rightleftharpoons$ instead of $\rightarrow$ **not** and / & instead of + balancing mark is dependent on the correct formulae but **allow** 1 mark for a balanced equation with a minor error in subscripts / formulae e.g. $Cl2 + 2e^- \rightarrow 2Cl^-$ **allow** $Cl + e^- \rightarrow Cl^-$ or $Cl \rightarrow Cl^- - e^-$ (1)
			Total	6	

Question			Answer	Marks	Guidance
7	(a)		idea that copper (still) has a high (electrical) conductivity / idea that (electrical) conductivity of copper is similar to silver(1) idea that copper is cheaper / ora (1)	2	**allow** density of copper is less than silver (1) **ignore** any comments about corrosion **ignore** wires are heavy **allow** because of density and cost (1) if no other mark scored
	(b)		(good) conductor of heat / (good) thermal conductor (1)	1	**allow** malleable **allow** does not corrode / does not rust **allow** it is lustrous **ignore** properties from the table
	(c)		metals have strong metallic bonds (1)	1	☐ ☐ ☑ ☐
			Total	**4**	

Question			Answer	Marks	Guidance
8	(a)		**E** (1)	1	more than one letter scores zero. if answer line is blank allow correct answer indicated on list
	(b)		600 (m) (1)	1	
	(c)		4500 (N) (3) **but if answer incorrect** correct calculation of acceleration as 5(m/s^2) (2) **if incorrect** $\underline{20}$ (1) 4 **or** (force =) calculated acceleration x 900 (1)	3	**allow** ecf for incorrectly calculated acceleration e.g. a = 4/20 = 0.25 then F = 900 x 0.25 = 225 scores 1 **allow** (F =) ma or (force =) mass x acceleration (1) **not** 900 x 20 or 900 x 4
	(d)		area under graph (1)	1	**allow** correct area calculation ½ x 20 x 4 = 40 (1) **allow** multiply the speed by 4 and then half it (1)
			Total	6	

Question			Answer	Marks	Guidance
9	(a)		 		✓
	✓
✓	
✓		 (2)	2	all correct (2) any two horizontal lines correct (1)
	(b)		**any two from:** car **B** brakes after **A** / ora (1) idea that car **B** has not left or allowed enough braking distance / thinking distance (1) idea that distance between the cars is shorter than the stopping distance ora (1) braking (distance) starts when graph(s) curves **or** car(s) have stopped when lines are horizontal / flat (1) **B** overtakes or goes past **A** where the graphs cross (1) the graph for **B** should finish up under or below the graph for **A** (1)	2	 **allow** car **B** driving within the braking distance of **A** (1) **allow** car **B** does not start to break until it has nearly caught up with car **A** (1) **ignore** car **B** is driving too close to car **A** **allow** cars would collide where graphs cross (1) **allow** the **B** line finishes above the **A** line (1)
			Total	**4**	
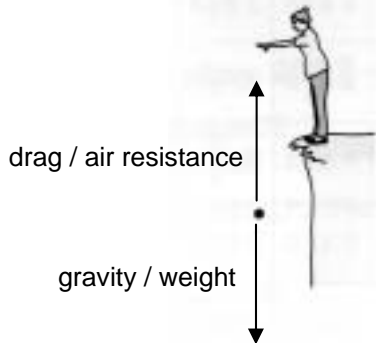
Question			Answer	Marks	Guidance
10	(a)		concrete barrier (no mark) because stopping distance is small / smaller / smallest or time (to stop) is short / shorter / shortest (1) (so) acceleration is large / larger / largest (1) (so) force is large / larger / largest (1) **but** idea that large / larger / largest acceleration **or** force happens (when hitting the concrete barrier as it is) when time or distance is small / smaller / smallest / ora (2)	3	**no marks if escape lane or metal crash barrier is chosen or no safety feature chosen** **allow** deceleration for acceleration
	(b)		(if force is less) so deceleration is less (1) (hence) time to stop or stopping distance increases (1)	2	**allow** deceleration takes longer (1) **allow** acceleration for deceleration (1) **allow** it takes longer for the car to stop (1) **allow** any of the following equations in any correct rearranged form f = ma (1) a = <u>change in speed</u> or speed = <u>distance</u> (1) time taken time taken
			Total	**5**	

Question			Answer	Marks	Guidance
11	(a)		arrow on ball pointing downwards **and** labelled gravity / weight (1) arrow on ball pointing upwards **and** labelled drag / **air** resistance / **air** friction / **wind** resistance (1)	2	 drag / air resistance gravity / weight **ignore** upthrust
	(b)	(i)	forces are balanced (1)	1	**allow** weight = drag **allow** equal and opposite **allow** equal if forces correctly drawn and labelled in part (a) **not** equal if forces incorrectly drawn and labelled in part (a) if named forces used **allow** ecf from Q11(a)
		(ii)	(gravitational potential energy) decreases (steadily) (1) (kinetic energy) increases (steadily) until terminal velocity **or** (kinetic energy) increases (steadily) and then remains constant (1)	2	**ignore** changes to gravitational potential energy once it hits the ground **ignore** changes to kinetic energy once it hits the ground
			Total	5	

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