OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science B

General Certificate of Secondary Education

Unit **B623/02:** Modules B3, C3, P3

Mark Scheme for January 2011

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1 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

Question			Expected Answers	Marks	Additional Guidance
1	(a)		alveoli (1)	1	**allow** alveolus (1) **allow** phonetic spellings
	(b)		**any one from:** permeable (1) moist (1) large surface area (1) good blood supply (1) (wall) one cell thick (1)	1	**ignore** thin membrane **allow** thin walls (1) but **not** thin cell walls
	(c)		they are cells that have not differentiated / become specialised / they still have the ability to differentiate / specialise / can become different types of cells or tissues / become windpipe cells (1)	1	**answer requires a concept of change into a new type of cell** **allow** does not have a purpose **yet** for undifferentiated (1) **allow** can form / change into any cell (1) **ignore** can grow / repair / copy wind pipe **ignore** can mutate to form new cells **ignore** can make cells but **allow** can make different cells (1)
			Total	3	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	site of exchange (with the tissues or air) / allow heat loss (1)	1	**allow** diffusion (of substances into or out of blood e.g. oxygen/nutrients) (1) but **not** diffusion of blood
		(ii)	average thickness of walls only 0.001mm (1)	2	max one mark if no correct link between adaptation and explanation award marks for correct answers anywhere on answer lines **not** thin cell walls **allow** thin walls / one cell thick (1) **not** just thin / thin membrane
			means they are more/very permeable /AW/ short(er) diffusion distance (1)		**allow** faster / more / easier diffusion (1) **allow** easier / more efficient gas exchange (1) **not** faster diffusion of blood
			OR		
			small diameter (of 0.01mm) (1)		**allow** diameter only 0.01mm (1) **not** just thin **allow** narrow/small lumen (1)
			means they can form a network inside organs (1)		**allow** dense collection of capillaries (1)
	(b)	(i)	23 (%) (1)	1	
		(ii)	aorta (1)	1	**allow** aortic (arch / artery) (1)
			Total	5	

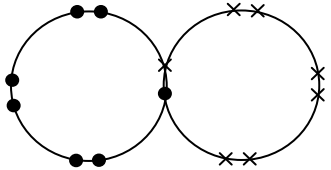
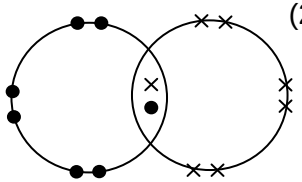
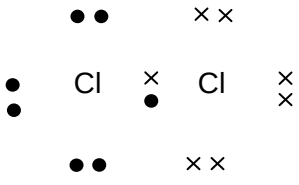
Question			Expected Answers	Marks	Additional Guidance
3	(a)		bases (1) protein (1)	2	**allow** nucleotides / base codes / base pairs / ATGC (any order) (1) **allow** enzymes / polypeptides (1)
	(b)		**any three from:** take nucleus from (body) cell (of adult animal) OR take nucleus from egg (cell) (1) nucleus transferred into 'empty' egg cell (1) shocked to start division (1) (embryo) then implanted/placed into uterus/womb (1)	3	USE TICKS FOR THIS QUESTION **allow** nucleus taken from any named body cell e.g. brain cell (1) but **not** sperm cell **ignore** DNA **not** egg cell nucleus transferred into 'empty' egg cell **allow** remove nucleus from egg cell and replace with nucleus from body cell (2) **allow** stimulated to divide (1) **allow** 'surrogate' (1) but **not** just a description of surrogate
	(c)		tick in second box (the technique took years to develop) (1)	1	more than one answer 0 marks **allow** answer correctly indicated e.g. ringed
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		tips of root and shoot / tips of roots / tips of shoots (1)	1	**allow** end of root / end of shoot (1) **not** just tips **ignore** tip of plant unless qualified **ignore** stem tips
	(b)	(i)	(positive) phototropism (1)	1	**allow** phototropic(response) (1)
		(ii)	auxin (1)	1	**allow** IAA (1) **ignore** ethene / ethylene
	(c)	(i)	can kill the weeds (using weedkiller / herbicide) on the fields without killing/damaging the soya plants (1)	1	**allow** idea of soya plant not being harmed/killed by the weedkiller (1)
		(ii)	idea that (in some areas) GM crops are more important for food production (1) idea that (in some areas) ethical/health/(religious) beliefs are more important (1)	2	**allow** in LEDC (less economically developed countries) there are food shortages so food is more important (1) **allow** specific nutrient (shortages) e.g. vitamin A linked to GM or golden rice (1) **allow** arguments about extinction/environmental issues (1) **ignore** (economical) costs
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
5	(a)		chlorine (1)	1	**allow** Cl / Cl_2 (1)
	(b)		bromine (1)	1	**allow** Br / Br_2 (1)
	(c)		oxygen (1)	1	**allow** O / O_2 (1)
	(d)		iron (1)	1	**allow** Fe (1)
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
6	(a)		flexibility / ductile (1)	1	**allow** ora e.g. not brittle (so it does not snap) (1) **allow** easy to bend/pliable/can be twisted (1) **ignore** malleable **ignore** high melting point/strength
	(b)	(i)	electrons can move / has free electrons / has delocalised electrons (1)	1	**allow** has 'sea of electrons' (1)
		(ii)	strong attraction between (positive) ions and electrons (1) which needs lots of energy to break / needs lots of heat to overcome (1)	2	**allow** strong force for strong attraction (1) **allow** has a giant structure / (strong) metallic bonds / strong attraction between particles / strong electrostatic forces (1) **not** intermolecular forces **ignore** strong force/bonds between atoms unless qualified **ignore** needs lots of force to break **ignore** needs a high temperature
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
7	(a)		4 (1)	1	
	(b)		has two (occupied) shells (1)	1	**allow** rings / orbits / for shells (1) **allow** two energy levels (1) **ignore** outer/ level on its own / layers
	(c)		It is the number of / there are 12 / particles in the nucleus / there are 6 protons and 6 neutrons / it is the number of protons and neutrons (1)	1	the limit of acceptability is there are 12 particles in the middle **allow** 12 protons and / plus neutrons (1) **ignore** 6 protons and neutrons **not** 'there are 12 protons / neutrons' reference to electrons = 0
	(d)		electron is -1 (1) neutron is 1 (1)	2	 **ignore** 0.9995 **allow** +1 (1) **not** -1
	(e)		same number of electrons and protons (1)	1	**allow** charges balance as protons are positive **and** electrons are negative (1) **not** neutrons / same number of protons, neutrons and electrons
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
8	(a)		electron(s) (1)	1	**allow** negative charge(s) (1)
	(b)		2K + F_2 --> 2KF correct formulae of reactants and products (1) balancing (1)	2	**allow** correct multiples including fractions **allow** = instead of arrow **not** and or & for + balancing mark is dependent on correct formulae
	(c)		(fluorine) gains electrons more easily (1)	1	**allow** (fluorine) atom has fewer **shielding** shells (1) **allow** (fluorine's) outer shell/electrons closer to nucleus (1) **allow** (fluorine) has a stronger force between nucleus and outer electrons (1) **allow** ora for bromine (1) **not** fluorine gains more or fewer electrons (than bromine) **ignore** fluorine gains electrons more quickly/faster
	(d)		one shared pair of electrons between atoms shown (1) outer shells correct after bonding (1)	2	**ignore** incorrect inner shells electrons can be drawn as all ● , all **X** or all other symbol e.g. **e**  (2)  (2)  (2) if charge put on diagram 1 mark maximum
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
9	(a)	(i)	20 000 (J) scores (2) But if answer incorrect 20 x 1 000 scores (1)	2	
		(ii)	1000 (N) (1)	1	
	(b)		(gravitational) potential (energy) (1)	1	**allow** PE or GPE (1) **allow** gravitational (1) **ignore** gravity
	(c)		(KE) increases scores (1) But (KE) quadruples / AW scores (2)	2	**allow** doubles (1) **not** merely 'changes' **ignore** speed increases award the marking points for correct calculations **allow** ideas of proportionality to v^2
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
10	(a)	(i)	**any two from:** drugs (1) alcohol (1) distraction / lack of concentration (1)	2	**ignore** 'speed' / speeding / going faster **allow** 'drink' (1) **allow** examples of distractions e.g. using mobile phone/smoking/radio (1) **allow** old (1) **allow** tiredness (1)
		(ii)	**any one from:** wet / icy / slippy road / AW (1) bald tyres / low tread / worn brakes / AW (1)	1	**ignore** 'speed' / speeding / going faster **allow** increased weight / load (1) **allow** going downhill (1) **ignore** poor road conditions **ignore** poor weather conditions **allow** poor condition of tyres/brakes (1) **not** just condition of tyres/brakes
	(b)		96 (m) scores (2) But if answer incorrect then evidence of correct working scores (1)	2	 eg ½ x 32 x 6 / AW (1) **ignore** just 'the area under the graph' or merely shading
			Total	5	

Question			Expected Answers	Marks	Additional Guidance
11	(a)		115 (km) (1)	1	
	(b)		more km per litre for each passenger /ORA/ AW (1)	1	**allow** 'less fuel per passenger' (1) **not** merely 'more efficient' / better for environment **but** more efficient per person / AW (1) **allow** more people in proportion to the fuel consumption (1)
	(c)		**any two from:** (different) driving styles / drivers (1) (different) road/car conditions (1) (different) loads (1)	2	**must be clear the answer implies the same car** **allow** speed / how fast / faster or slower / idea of more or less revving or braking (1) **allow** surface of road or named examples e.g. wet/snow/muddy (1) **allow** effect of traffic e.g. stop-start at lights / queuing / length of journey / going up and down hills (1) **allow** flat tyres / windows open / roof down / named electrical devices e.g. windscreen wipers / air conditioning (1) **allow** weight **in** car /number of passengers / roof box (1) **ignore** mass of car
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
12			**any three from:**	3	USE TICKS FOR THIS QUESTION if answer refers to stopping time and stopping distance of car it must be clear it is during the crash not prior to it
			increased stopping time (1)		
			increased stopping distance (1)		
			decreased acceleration (1)		**allow** decreased deceleration (1)
			decreased force (on the driver) (1)		
					allow F = m x a (1) **allow** the idea of rate of change of momentum (1) **allow** idea of energy used to change shape of car / metal (1)
			Total	3	

Question			Expected Answers	Marks	Additional Guidance
13			increases because of larger area / AW (1) forces balance at a **lower** (maximum) speed / AW (1)	2	award marks for correct answers anywhere on answer lines **allow** larger cross section (area) (1) **ignore** streamline (shape) **allow** same drag force at lower speed / AW (1) **allow** correct reasoned explanations e.g. “more drag means more force to go at same speed but as driving force is limited the top speed will be lower” (1) **ignore** references to time / mass
			Total	2	

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