OCR
RECOGNISING ACHIEVEMENT

GCSE

Science B

General Certificate of Secondary Education

Unit **B622/02:** Modules B2, C2, P2 (Higher Tier)

Mark Scheme for January 2012

Oxford Cambridge and RSA Examinations

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

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

Subject-specific Marking Instructions

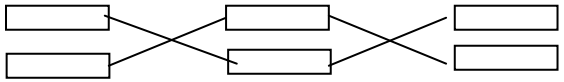
Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/ = 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)	(i)	128 (2) **BUT** $\frac{4+1+7}{3}$ **or** $\frac{12}{3}$ **or** (average per quadrat =) 4 **or** 8 ÷ 0.25 **or** 32 (quadrats in pond) (1)	2	correct answer, no working = 2 **allow** $\frac{12}{0.75}$ or 16 for 1 mark (the average per m^2)
		(ii)	more samples / place quadrats randomly (1)	1	**allow** sample at different times / take care to avoid disturbing larvae **allow** more quadrats **allow** use bigger quadrats / larger samples / sample more places **ignore** sample same quadrat several times and take mean **ignore** comments about marking or recapturing
	(b)	(i)	see if offspring are fertile (shows they are same species) / ora (2) **OR** breed them (together) / produce offspring / mate (1) use DNA (1)	2	 **allow** genes or chromosomes for DNA
		(ii)	**any one from:** live in same or similar habitat (1) closely related (species) (1) (recent) common ancestor (1) mimicry / convergent evolution (1)	1	 **allow** environment / ecosystem for habitat **allow** shared habitat **allow** share the same genus or family **ignore** reference to same breed **allow** have the same ancestor **allow** similar genes / similar DNA **allow** same or similar selection pressures / same or similar adaptations
	(c)		ice / frozen / peat / bogs / tar (pits) (1)	1	**allow** desiccation / dehydration / mummification in a cold place is **not** sufficient
			Total	**7**	

Question			Answer	Marks	Guidance
2	(a)		**any two from**: white (fur) – camouflage (1) thick fur - keep warm / insulation / reduce heat loss (1) fat / blubber – keep warm / insulation / reduce heat loss (1) large feet – (spread load when) walking on snow / AW (1) fur on **soles** of feet – for insulation / grip large claws / long claws / sharp claws - to grip the ground (1) large size - reduce surface area (to volume ratio) / to keep warm / reduce heat loss (1) small ears - reduce surface area (to volume ratio) / to keep warm / reduce heat loss (1) short legs – reduce surface area (to volume ratio) / to keep warm / reduce heat loss (1)	2	need **feature** and **explanation** for mark **allow** white so cannot be seen by prey or predators / white so they blend in **just** fur is insufficient stop getting cold is insufficient for idea of keeping warm **allow** feet have large surface area to walk on snow **ignore** claws or teeth for hunting
	(b)		decrease / go down (1) less food / fewer lemmings **to eat** (1)	2	**ignore** die out / become extinct **ignore** just 'fewer lemmings' **allow** less prey / no food / no lemmings to eat / foxes will starve
	(c)		diets not identical / habitats don't completely overlap (1)	1	**allow** different breeding seasons / active at different times (of day / year) / wolves (hunt) in packs / foxes are solitary / different hunting styles / different methods to catch prey / have different prey / wolves hunt larger prey
	(d)		organism that benefits to host's detriment / AW (1)	1	**allow** parasite gains while other organism loses idea that it lives or feeds off another animal is not sufficient
			Total	**6**	

Question			Answer	Marks	Guidance
3	(a)	(i)	research / meat / food / oil / blubber / cosmetics (1)	1	**allow** shoe cream / alcohol / crayons / candles / fertiliser / soap / lipstick / ointment / perfume / ambergris / sinews / tennis rackets / leather / belts / shoes / handbags / luggage / buttons / piano keys / jewellery / stays or corsets **ignore** make money / provide jobs / medicines / zoos
		(ii)	**any two from:** difficult to get international agreement (1) (because) different countries have different views / AW (1) difficult to police / difficult to monitor / difficult to enforce (1) (because) in international waters / oceans are vast (1)	2	 **allow** cultural reasons e.g. it is their way of life / named country that traditionally eats whale meat **allow** cannot watch everywhere **allow** whales migrate / whales move to different parts of the ocean **allow** scientific research (1)
	(b)		**any two from:** (lower) carbon dioxide (concentration) (1) (lower) temperature (1) (lower) light (intensity) (1)	2	 **allow** warmth **but ignore** heat **allow** it is cold **allow** sunlight
	(c)		idea of competition / survival of the fittest / those with more flipper-like legs more likely to survive (1) idea of inheritance / that more flipper-like legs are passed on (1)	2	both answers may come from the same box
			Total	**7**	

Question			Answer	Marks	Guidance
4	(a)		magma is **less** dense (than crust) (1)	1	assume answer refers to the density of the magma **allow** ora **ignore** reference to pressure / lighter low density is insufficient needs comparative such as lower
	(b)		explosive – silica-rich – rhyolite (1) runny – iron-rich – basalt (1) **OR** explosive – silica rich AND runny – iron-rich (1) silica-rich – rhyolite AND iron-rich – basalt (1)	2	
	(c)		**any one mark from** predict future eruptions / warn people when volcano will erupt / AW (1) to see if volcano is active or dormant / find out why eruptions happen / find out how eruptions happen / research the structure of the volcano / AW (1) gain information about the Earth's structure / study plate tectonics / study rocks under the Earth's surface / AW (1)	1	**ignore** to find out about volcanoes because they are unpredictable is **not** sufficient **allow** which are dangerous and which are not **ignore** reference to earthquakes **ignore** reference to the core but **allow** reference to mantle or crust
			Total	**4**	

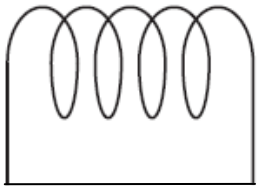
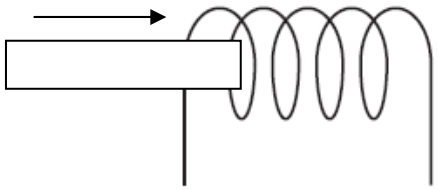
Question			Answer	Marks	Guidance
5	(a)		Nitrogen / N / N_2 - (78%) Oxygen / O / O_2 - (21%) (carbon dioxide) – 0.035% **all three** correct (2) **but** **one** or **two** correct (1)	2	 **allow** any value or range from 0.03 to 0.04%
	(b)	(i)	incomplete combustion (of petrol or diesel in a car engine) (1)	1	**allow** burning in a limited amount of air or oxygen
		(ii)	any time or range between 11 (am) and 12 (pm) inclusive (1)	1	**allow** midday / noon
	(c)		**(F) C (A) E D (B)** all **three** correct (2) but **C** / **E and D** correct (1)	2	Check the sentences for an order if boxes are empty F **C** A **E** **D** B
			Total	**6**	

Question			Answer	Marks	Guidance
6	(a)		zinc + sulfuric acid → zinc sulfate + hydrogen (1)	1	**allow** reactants and products in either order **allow** correct formulae or mix of formulae and words $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ **ignore** incorrect balancing **allow** = instead of → **not** and / & instead of +
	(b)	(i)	(both) speed up reaction / AW (1) (both are) unchanged at the end of the reaction / not used up in the reaction / AW (1)	2	**must be comparative** **allow** (both) have a shorter reaction time than no catalyst **ignore** faster / quicker reaction time **allow** no colour change / AW **allow** (both) stay red-brown **but** both are red-brown at the end is insufficient **ignore** changes state **ignore** they don't change the amount of product made
		(ii)	more surface / more area / more surface area (1) more frequent collisions / more chance of collisions / more collisions per second (1)	2	 **allow** more collisions per unit time / collisions more often more collisions unqualified is **not** sufficient **ignore** references to successful / effective / energetic collisions **allow** more collisions for one mark if no other mark awarded
		(iii)	5 (s) (1)	1	**allow** less than 10 (seconds) / any stated value less than 10 (s)
			Total	**6**	

Question			Answer	Marks	Guidance
7	(a)		granite is harder (than marble) / ora (1)	1	assume answer refers to granite **must** be a comparative e.g. very hard is insufficient **allow** implications of hardness e.g. it is more difficult to scratch / dents less **allow** marble is softer / marble is less hard **ignore** stronger / tougher / more hardwearing
	(b)		(steel is) less likely to corrode (than iron) (1)	1	**allow** (steel) will not rust **/** (steel is) harder (than iron) / (steel is) stronger (than iron) / steel rusts more slowly / steel rusts less assume answer refers to steel
	(c)	(i)	anode – **impure** copper **and** cathode – (pure) copper (1)	1	**both** needed for one mark **allow** waste copper / boulder copper / copper not purified for the anode **not** impure copper for cathode
		(ii)	anode – (copper) goes into solution / (copper) dissolves / (copper) loses electrons **and** cathode – copper forms / copper is deposited / copper ions gains electrons (1)	1	**both** needed for one mark **allow** (at anode) gets thinner / copper ions are formed / (anode) loses mass / (anode) loses electrons / (anode) loses copper **allow** (at cathode) gets thicker / copper ions are discharged / (cathode) gains mass / (cathode) supplies electrons **allow** correct ionic equations anode: $Cu - 2e^- \rightarrow Cu^{2+}$ cathode: $Cu^{2+} + 2e^- \rightarrow Cu$
			Total	**4**	

Question			Answer	Marks	Guidance
8	(a)		**any one from:** no wires needed (1) low maintenance (1) no need for fuel (1) long life (1) renewable (energy source) (1) idea of no polluting waste (1) electricity (bill) is cheaper (1)	1	**allow** rugged / robust **ignore** reusable **ignore** no pollution unless qualified e.g. **allow** does not produce carbon dioxide / greenhouse gas / does not pollute at the point of use **ignore** eco-friendly **allow** electricity is free or energy is free or cheaper in the long run **ignore** unqualified references to cost e.g. it is cheaper is insufficient
	(b)		no power at night / no power in bad weather (1)	1	**allow** low power output instead of no power **allow** does not work when the sun is not out / not always reliable because it is not always sunny **allow** take up a lot of area e.g. land **allow** visual pollution e.g. look ugly **allow** costly to produce / costly to set up / long pay-back time just costly or expensive is **not** sufficient
			Total	**2**	

Question			Answer	Marks	Guidance
9	(a)		10.5 (kWh) (1)	1	
	(b)		168 (pence) (1)	1	**allow** £1.68 but £ sign needed **allow** ecf from (i)
			Total	**2**	

Question			Answer	Marks	Guidance
10				3	**ANNOTATE WITH TICKS AND CROSSES**
			diagram showing complete circuit (with ammeter in series) connected to coil (1)		**allow** diagram showing ends of coil joined to form a complete circuit without using the ammeter **not** magnet connected into the circuit 
			idea of relative movement of magnet and coil e.g. spin / turn magnet to coil / move coil to magnet (1)		**allow** an arrow on diagram to show magnet moving e.g. this diagram would score one mark 
			stronger or more powerful magnet / more turns on coil / faster (relative) motion (1)		**allow** more coils **allow** moving magnet but now positioned closer to the coil **allow** (iron) core inside the coil **ignore** bigger magnet but **allow** more magnets
			Total	**3**	

Question			Answer	Marks	Guidance
11				3	**ANNOTATE WITH TICKS AND CROSSES** **Answers for the first two marking points should imply some use of the results in the question**
			any two from:		**allow** correct use of figures to explain effects
			not alpha as paper has no effect on the count rate (1)		**allow** not alpha because (this) radiation goes through paper **allow** alpha does not go through paper
			not gamma as count rate decreases with aluminium (1)		**allow** not gamma because (this) radiation does not pass through aluminium
			it is beta because count rate hardly changes as it passes through paper but decreases through aluminium (1)		**allow** it is beta because (this) radiation goes through paper but not aluminium
			AND		
			(does not go down to zero because of) (random) background radiation (1)		**allow** description of background radiation e.g. radiation that is always there / radiation that is in the rocks / air around us
			Total	**3**	

Question			Answer	Marks	Guidance
12	(a)		<table><tr><td>**E**</td><td>**B**</td><td>**(A)**</td><td>**D**</td><td>**C**</td></tr></table> all **four** correct (2) but any **two** correct (1)	2	**E B** A **D C** = 2 **E B** A C D = 1 B E A **D C** = 1 **E** D A B **C** = 1 C **B** A **D** E = 1 If the same letter is written twice just mark the other letters so E **B** A **D** E scores 1 mark but E B A E D scores 0 because you have to decide which E was correct
	(b)		the gravitational force of Jupiter (prevents planet forming) (1)	1	**allow** (because of) Jupiter's gravity / (because) Jupiter is pulling / there is a force from Jupiter **ignore** reference to other planets or the Sun
	(c)		use telescope to identify or monitor NEO / use satellite to identify or monitor NEO (1) deflect by explosion / destroy by explosion (1)	2	**allow** monitor distance from Earth / monitor trajectory of NEO / monitor time before impact **allow** monitor where the NEO is **allow** destroy using a bomb / deflect using a missile / blow it up to shoot it is **not** sufficient
			Total	**5**	

Question			Answer	Marks	Guidance
13	(a)		**A** (1)	1	**allow** other ways of indicating the answer providing the answer line is blank e.g. ticking or ringing **A**
	(b)		deflected / experience a force (1)	1	**allow** particles move or attracted towards the pole(s) **allow** spiral (towards the Earth) **ignore** particles are dragged **ignore** reference to the Aurora Borealis or Northern lights
			Total	**2**	

Question			Answer	Marks	Guidance
14	(a)	(i)	this galaxy is moving away (from Earth) (1)	1	**allow** the galaxy is receding
		(ii)	the faster it is moving (away) (1)	1	
	(b)		white dwarf (1)	1	if answer line is blank allow correct answer ticked, circled or underlined in list
			Total	**3**	

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