

Mark Scheme for January 2012

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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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Mark Scheme

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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

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Question			Answer	Marks	Guidance
1	(a)		128 (2) BUT $\frac{4+1+7}{3}$ or $\frac{12}{3}$ or (average per quadrat =) 4 or $8 \div 0.25$ 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)
	(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)	invertebrate (1)	1	more than 1 answer = 0
	(c)		A = damselfly (1) C = mayfly (1)	2	
			Total	7	

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Question		Answer	Marks	Guidance
2	(a)	<p>any two from: eyes at front of head / binocular vision (1)</p> <p>sharp teeth / sharp claws (1)</p> <p>built for speed / AW (1)</p>	2	<p>ignore camouflage</p> <p>ignore references to hearing</p> <p>ignore large teeth</p> <p>allow claws help it run faster</p> <p>allow powerful muscles</p> <p>ignore long legs</p> <p>can run fast is insufficient</p>
	(b)	<p>any two from: white (fur) – camouflage (1)</p> <p>thick fur - keep warm / insulation / reduce heat loss (1)</p> <p>fat / blubber – keep warm / insulation / reduce heat loss (1)</p> <p>large feet – (spread load when) walking on snow / AW (1)</p> <p>fur on soles of feet – for insulation / grip</p> <p>large claws / long claws / sharp claws - to grip the ground (1)</p> <p>large size - reduce surface area (to volume ratio) / to keep warm / reduce heat loss (1)</p> <p>small ears - reduce surface area (to volume ratio) / to keep warm / reduce heat loss (1)</p> <p>short legs – reduce surface area (to volume ratio) / to keep warm / reduce heat loss (1)</p>	2	<p>need feature and explanation for mark</p> <p>allow white so cannot be seen by prey or predators / white so they blend in</p> <p>just fur is insufficient</p> <p>stop getting cold is insufficient for idea of keeping warm</p> <p>allow feet have large surface area to walk on snow</p> <p>ignore claws or teeth for hunting</p>
	(c)	less food (1)	1	<p>allow less prey</p> <p>allow more competition for food / harder to find food</p> <p>ignore too cold</p> <p>ignore unqualified references to environmental change</p>
	(d)	in danger of becoming extinct / in danger of dying out / AW (1)	1	<p>allow dying out / not many left but ignore just reference to fewer / less of them</p> <p>not they are extinct</p>
		Total	6	

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Question			Answer	Marks	Guidance
3	(a)	(i)	(absorbed) carbon dioxide (1) photosynthesis (1)	2	allow correct formula allow through leaves / through stomata / into chloroplasts / by diffusion not incorrect description of photosynthesis e.g. plant release carbon dioxide or takes in oxygen
		(ii)	human population is increasing / AW (1)	1	must be comparative allow specific consequences e.g. more cars / more factories / more energy / more electricity needed
		(iii)	sulfur dioxide (1)	1	allow correct formula allow carbon monoxide / water vapour / methane
		(iv)	no (no mark) can not be replaced / takes a long time to form (1)	1	if say yes then no mark allow non-renewable allow it will run out / not much left but ignore it is used up ignore it's a fossil fuel unless qualified
	(b)		D (1) at the bottom / lowest layers formed first (1)	2	
			Total	7	

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Question			Answer	Marks	Guidance
4	(a)		igneous (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	(b)		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
	(c)		soil is (very) fertile / crops grow better / AW (1)	1	allow soil has many nutrients present ignore soil is good unless qualified eg can grow bigger crops or soil good for crops would be sufficient to gain a mark allow provide geothermal energy / used to heat water / cheap source of heat / because people may want to study the volcano / want to live in same place (as rest of family) / housing may be cheap / take advantage of tourists ignore because there is nowhere else to go / for warmth
			Total	3	

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Question			Answer	Marks	Guidance
5	(a)		nitrogen (1)	1	
	(b)		top two arrows – respiration and combustion (either order) bottom arrow – photosynthesis	1	all 3 correct – 1 mark
	(c)	(i)	carbon monoxide – poisonous / toxic gas sulfur dioxide - acid rain	2	allow carbon monoxide kills you allow sulfur dioxide – poisonous gas / damages lungs / an effect of acid rain e.g. destroys trees / aquatic life ignore unqualified pollution ignore references to ozone layer
		(ii)	any time or range between 11 (am) and 12 (pm) inclusive (1)	1	allow midday / noon
			Total	5	

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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 $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$ 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)	any two from: increase concentration (of acid) (1) make the zinc smaller particles (1) increase temperature (1) stir / shake (1)	2	allow less water / stronger acid ignore use more acid allow add copper sulfate allow higher level explanations in terms of particles e.g. more crowded particles / particles move faster / particles have more energy / more (frequent) collisions (1)
		(iii)	6 (1)	1	
			Total	6	

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Question			Answer	Marks	Guidance
7	(a)		to decorate / to protect (1)	1	allow to make it look pretty / to give it colour / to look good / aesthetics / looks better / looks nice allow to stop the walls being damaged
	(b)		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
	(c)		any two from: habitats destroyed (1) landscape destroyed (1) so has to be reconstructed (1) takes up land space (1) (increased) noise / traffic (1) (increased) dust (1)	2	allow 'homes' for habitats allow damage look of area / appearance of area unsightly ignore leaves a big hole ignore pollution unless qualified
	(d)		electrolysis (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	(e)		a mixture containing a metal (1)	1	allow contains or made from two or more metals / mixture containing a metal(s) and a non-metal(s) not metals joined / metals combined / combination of metals / metals bonded not metal mixed with a compound
			Total	6	

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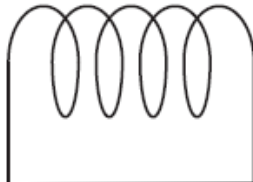
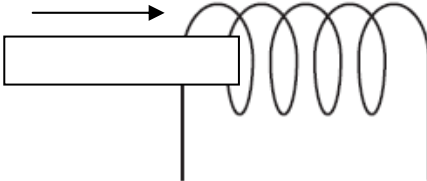
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Question			Answer	Marks	Guidance
8	(a)		heat or IR (and) light (1)	1	both needed any order ignore references to other electromagnetic waves e.g. UV / X-rays / radio ignore warmth allow sunlight
	(b)	(i)	<div><div><div>T</div><div>(✓)</div></div><div><div>F</div><div></div></div><div><div></div><div>✓</div></div><div><div>✓</div><div></div></div></div> <div>(1)</div>	1	both correct for mark
		(ii)	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 (1) 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
			Total	3	

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Question			Answer	Marks	Guidance
9	(a)		<p>diagram showing complete circuit (with ammeter in series) connected to coil (1)</p> <p>idea of relative movement of magnet and coil e.g. spin / turn magnet to coil / move coil to magnet (1)</p> <p>stronger or more powerful magnet / more turns on coil / faster (relative) motion (1)</p>	3	<p>ANNOTATE WITH TICKS AND CROSSES</p> <p>allow diagram showing ends of coil joined to form a complete circuit without using the ammeter (1)</p> <p>not magnet connected into the circuit</p>  <p>allow an arrow on diagram to show magnet moving (1) e.g. this diagram would score (1)</p>  <p>allow more coils (1)</p> <p>allow moving magnet but now positioned closer to the coil (1)</p> <p>allow (iron) core inside the coil (1)</p> <p>ignore bigger magnet but allow more magnets</p>
	(b)	(i)	oil / (natural) gas (1)	1	<p>ignore coal</p> <p>allow methane</p> <p>not crude oil / petrol</p>
		(ii)	wood / straw / biomass / manure (1)	1	<p>allow biofuel / methane</p> <p>ignore gas unless qualified</p>
			Total	5	

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Question			Answer	Marks	Guidance
10	(a)		beta / β gamma / γ (1)	1	both needed any order allow phonetic spelling
	(b)		any two from: remote handling (1) protective clothing (1) limit exposure (time) (1) (lead/concrete) shielding (1) labelled storage (1)	2	allow use tongs / hold at arms length / don't point it at anyone (1) allow gloves / goggles / face mask / radioactive suit / PPE(personal protective equipment) ignore just wear a lab coat ignore wear a film badge allow store in a lead box allow symbol drawn on storage 
			Total	3	

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Question			Answer	Marks	Guidance
11	(a)		radio (1)	1	allow 15W (1) if answer line blank allow tick or circle on picture of radio
	(b)	(i)	10.5 (kWh) (1)	1	
		(ii)	168 (pence) (1)	1	allow £1.68 but £ sign needed (1) allow ecf from (i)
			Total	3	

Question			Answer	Marks	Guidance
12	(a)		<p>The Earth is a star that orbits the Sun. <input type="checkbox"/></p> <p>The Earth is a planet that orbits the Moon. <input type="checkbox"/></p> <p>The Earth is a planet that orbits the Sun. <input checked="" type="checkbox"/></p> <p>The Sun is a star that orbits the Earth. <input type="checkbox"/></p>	1	more than one tick no mark
	(b)		stars (are called) galaxies (1)	1	both needed correct order
	(c)		rocks (1)	1	allow higher level answers e.g. heavy metal compounds ignore dust / ash ignore ice / gas
			Total	3	

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Question			Answer	Marks	Guidance
13	(a)		(big bang) / explosion (1)	1	allow rapid expansion
	(b)		(huge cloud of) gas (1)	1	allow (starts as) a singularity allow dust (clouds)
	(c)		light cannot escape (1)	1	allow light is pulled in
			Total	3	

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