OCR
RECOGNISING ACHIEVEMENT

GCSE

Science B

General Certificate of Secondary Education **B622/02**

Unit 2: Modules B2, C2, P2

Mark Scheme for June 2010

Oxford Cambridge and RSA Examinations

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Question			Expected Answers	Marks	Additional Guidance
1	(a)		$6H_2O + 6CO_2 = C_6H_{12}O_6 + 6O_2$ (2) correct formulae for H_2O and $C_6H_{12}O_6$ (1) correctly balanced (1)	2	balancing mark is conditional on correct formulae **allow** multiples **allow** 1 mark for correctly balanced equation with minor errors in subscript or case e.g. 6H2O + 6Co2 → $C_6H_{12}O_6$ + 6O2
	(b)		oxygen taken in is essential to ensure the plant has a constant supply of energy (1) the oxygen taken in is used for respiration (1)	2	4th and 7th box any more than two ticks negates a mark e.g. two correct and three ticks (1) e.g. one correct and three ticks (0)
	(c)		**more** carbon dioxide or CO_2 / higher temperature (1)	1	**allow more** water or H_2O **ignore** more rain **allow** more heat or more warmth **ignore** more temperature or just 'warmth' or more chlorophyll or more surface area
	(d)		starch / oil / fat / lipids (1) for storage (1) **or** cellulose (1) make cell walls (1) **or** proteins / amino acids (1) growth / repair (1)	2	to gain second mark use must match the substance they name to its use **allow** one mark for any use if they do not name a substance **allow** other possible products e.g. lignin for support **allow** sucrose for transport (2) **allow** wax for waterproofing (2) **allow** chlorophyll (1) for **photosynthesis** (1) **but** chlorophyll for food scores (1) **ignore** chloroplasts but chloroplasts for photosynthesis scores (1)
			Total	7	

Question			Expected Answers	Marks	Additional Guidance
2	(a)		invertebrates do not have a backbone or spine / vertebrates have a backbone or spine (1)	1	**USE TICKS IN THIS QUESTION** assume answer refers to invertebrates **ignore** no skeleton / bones **allow** invertebrates have no spinal cord
	(b)	(i)	(the number of) different **species** (stream B has 5 the rest have less than 5) (1)	1	**allow** different **types / range** of organisms **allow** different **types** / **range** of animals (and plants)
		(ii)	D **any two from:** lower biodiversity / fewer species (1) no caddis fly lava or dragon fly nymph (1) **more** rat-tailed maggot (1) bloodworm present (1) ora	2	no marks for D but D must be correct for any marks to be awarded **allow** no animals that need clean water (1) **allow more** animals that live in polluted water (1) **ignore** fewer organisms / fewer leech / no flatworms must be **more** rat-tailed maggot not just fact they are present e.g. rat tailed maggots only live in polluted water scores 0 **allow** stream D has no other species other than the ones that live in polluted water (2) **allow** rat-tailed maggots **and** blood worms can survive in polluted water and all other animals cannot live in the water because of the pollution (2)
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
3	(a)		more kangaroos more eagles (1) link more **food** to increase in eagle population (1) **or** fewer kangaroos fewer eagles (1) link less **food** to decrease in eagle population (1)	**2**	**USE TICKS IN THIS QUESTION** **allow** higher level answers e.g. eagle numbers can go up because they can raise more young when there are more kangaroos (2) 'lack of food' on its own scores 0 must show link between food and population for second mark e.g. more kangaroos means more eagles but fewer kangaroos fewer eagles (1) **but** more kangaroos means more eagles because eagles have more food (2) **allow** the numbers go up because they have more food or prey (1)
	(b)		spread load (on sand) / stop them sinking (into sand) (1)	**1**	**allow** so kangaroo can hop or spring or jump **ignore** so they can walk on sand / so they can move **ignore** references to balance or surface area **ignore** for better grip
			Total	**3**	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		produce milk (1)	1	**allow** suckle young / have **mammary glands** **allow** have hair **but ignore** fur **allow** give birth (to live young) **allow** idea of young developing in womb **ignore** have babies or warm blooded **ignore** reference to breathing air / oxygen / gills **ignore** don't lay eggs'
	(b)	(i)	**any two from:** **idea** of variation or mutation (1) **idea** of being better adapted to survive (1) **idea** of inheritance of named adaptation or inheritance of genes / **OR** gene frequency changes / **OR** slow change of adaptation over generations (1)	2	**USE TICKS IN THIS QUESTION** e.g. smaller back legs / e.g. some are born with no legs e.g. some are (more) streamlined e.g. so some catch more fish e.g. are better / faster swimmers e.g. are better at escaping predators e.g. are more successful **allow** 'survival of the fittest' e.g. genes passed on to next generation e.g. shorter legs passed onto the next generation e.g. more animals have the feature each generation **allow** allele for gene e.g. legs got smaller and smaller each generation until they disappeared
		(ii)	idea of genes or DNA not being involved (1)	1	e.g. losing legs in accident does not change their genetics (1) e.g. still have genes for legs **allow** chromosomes for genes

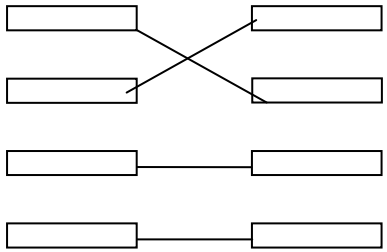
Question			Expected Answers	Marks	Additional Guidance
	(c)	(i)	fertile (1)	1	
		(ii)	share a recent / common ancestor (1)	1	**allow** they have the same ancestor **allow** ancestors come from the same family or same species **allow** they share **lots** of genes / similar DNA **ignore** ancestors are closely related **or** ancestors are similar
			Total	6	

Question			Expected Answers		Marks	Additional Guidance
5	(a)		water (1)		1	**allow** H_2O
	(b)		solvent evaporates (1) oxidation of the **oil** (by oxygen) (1)		2	**allow** named solvent evaporates e.g. water or white spirit or turps evaporates **ignore** binding medium or pigment or oil evaporates or solvent dries **allow** reaction between the oil and air (1) **allow** binding medium oxidised (1)
	(c)		**property** increased strength (1) increased flexibility (1) harder **to break** (1)	**explanation** due to steel (reinforcing) (1) due to steel (reinforcing) (1) because it combines the properties of steel with concrete (1)	2	marks can be scored for two correct properties or one correct property and an explanation **allow** steel rods stop the concrete stretching (2) **allow** steel increases the tensile strength of the concrete (2) **allow** steel makes it stronger (2) **allow** its stronger (1) but **ignore** just 'strong' **allow** 'because it contains steel' (1) **allow** iron instead of steel **ignore** just 'hard' or 'harder'
			Total		5	

Question			Expected Answers	Marks	Additional Guidance
6	(a)		continental (1)	1	
	(b)		less dense (than the mantle) (1)	1	**ignore** lighter **allow** lighter weight (than the mantle) / ora
			Total	2	

Question			Expected Answers	Marks	Additional Guidance
7	(a)		nitrogen (1)	1	**allow** N_2 / N **allow** other ways of indicating answer but answer on answer line takes precedence
	(b)		$2CO + 2NO \rightarrow N_2 + 2CO_2$ correct formulae (1) balancing (1)	2	balancing mark is conditional on correct formulae **allow** = or ⇆ instead of → **allow** multiples **not** 'and' or & in equation **allow** 1 mark for correctly balanced equation with minor errors in subscript or case e.g. 2Co + 2nO → N2 + $2CO_2$ (1)
			Total	3	

Question			Expected Answers	Marks	Additional Guidance
8	(a)		magnesium + hydrochloric acid → magnesium chloride + hydrogen (1)	1	**allow** $Mg + HCl \rightarrow MgCl_2 + H_2$ **allow** mix of correct formulae and names but **ignore** any balancing **allow** = or ⇆ instead of → **not** 'and' or '&' for + **allow** reactants in either order **allow** products in either order
	(b)	(i)	80 (seconds) (1)	1	**allow** any value in the range 61 - 80
		(ii)	between 0 seconds and 20 seconds (1)	1	**allow** any time interval between 0 and 20 e.g. 19 - 20
		(iii)	2 (cm^3/s) (1)	1	
	(c)		particles move more quickly or particles move faster (1) more frequent collisions (1) **BUT** **collisions** are more effective or successful or energetic (2)	2	**ignore** particles have more (kinetic) energy / particles vibrate faster / particles move more **allow** more collisions per second / collisions more often / more chance of a collision (1) **ignore** faster collisions **ignore** just more collisions
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
9	(a)		**any one from:** **advantage** aluminium has lower density (1) car body of **same size** lighter with aluminium (1)	2	**ignore** aluminium is lighter or weighs less but **allow** aluminium is (more) lightweight **allow** car body of the (same size) car made with aluminium will use less fuel
			aluminium corrodes less (1)		**allow** aluminium does not corrode / aluminium does not rust **allow** car body made of aluminium will last longer **allow** o.r.a. if specified **allow** aluminium does not need painting
			any one from: **disadvantage** aluminium is (more) expensive (1) aluminium is not as strong (1)		**allow** aluminium is weaker
	(b)		brass - copper and zinc nitinol - nickel and titanium solder - lead and tin 	2	all **three** correct matches (2) **one** or **two** correct (1)
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
10	(a)		kinetic (1) electrical (1)	2	**allow** KE or ke **ignore** movement **allow** electricity
	(b)		ADVANTAGES **any one from:** renewable (1) rugged (1) no polluting (waste) (1) surrounding land can be used (1) DISADVANTAGES **any one from:** visual pollution (1) noisy (1) depends on wind speed / AW (1) wind farm needs **large** area (1)	2	 **allow** cheap to run or cheap to use' / not much maintenance **ignore** just 'cheap' or cheap to make or no cost to run **allow** no fuel needed / wind is free **ignore** clean or less harmful or it is free **ignore** it will never run out **ignore** sustainable or eco-friendly or environmentally friendly **allow** eyesore / ruins scenery **allow** takes up a lot of space but **ignore** takes up space **allow** expensive to set up **allow** relatively low output (per turbine) **allow** harms birds
	(c)		6 (2) **but if answer is incorrect** energy / time OR 60/10 (1)	2	 **ignore** energy = power x time
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
11	(a)		**any three from:** fuel burned (1) water heated / steam produced (1) steam drives turbine (1) turbine turns generator (1) generator produces electricity (1)	3	**USE TICKS IN THIS QUESTION** **allow** nuclear fuel producing energy **ignore** 'burning nuclear fuel' or 'fuel heated up' **ignore** references to water condenses **ignore** water vapour produced **ignore** steam turns generator **allow** steam turns propeller or fan or blades **allow** turbine powers or spins generator **allow** higher level answers e.g. coil moves (1) in magnetic field (1) voltage **induced** (1) or e.g. magnet moves (1) in a coil (1) voltage **induced** (1)
	(b)		reduce energy waste or power loss or reduce heat waste or reduce cost (1)	1	**allow** cheaper **allow** higher level answers e.g. less or low(er) current in the cables or thinner cables can be used **ignore** electricity or current or voltage lost or wasted **ignore** references to efficiency **not** stops energy loss
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
12	(a)		**any two from:** large quantity of fuel (1) long length of time to reach destination (1) effect on health (1) providing food or water (1) provide oxygen / maintaining stable atmosphere or pressure (1) warmth (1) shield from cosmic rays (1) idea of safety (1)	2	**ignore** cost unless qualified e.g. the crew might die before they reach their destination e.g. muscle wastage or mental health issues **allow** removing carbon dioxide **allow** there is a lot of radiation in space e.g. spacecraft needs to come back to Earth **ignore** 'it can be dangerous'
	(b)		can go to places which are hostile to humans or AW	1	**allow** lower payload / AW e.g. no need to take food / oxygen **allow** no restriction on time of mission **allow** do not have to bring craft back **allow** idea of no-one getting harmed **ignore** it is safer unless qualified **ignore** cost unless qualified
	(c)		temperature / magnetic field / gravity / atmosphere / radiation (1)	1	**allow** any scientific information that can be sent back electronically **allow** presence of water / life **allow** photograph or video (of surface) **allow** information about rocks / minerals / chemicals / substances it is made of but **ignore** rock samples / 'what it is made of' / what the surface is **ignore** any reference to bringing back physical objects
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
13	(a)		**light from galaxies** moving away shifted to red end (of spectrum) or shows red shift ***/*** galaxies moving away show **light** with a longer wavelength or lower frequency (1) furthest / fastest galaxies show more red shift or even longer wavelength or lower frequency (1)	**2**	**ignore** galaxies turn red or galaxies are red
	(b)	**(i)**	massive stars become black holes (1)	**1**	assume answer is about black holes if not otherwise stated e.g. they have more mass (1) **allow** high mass or heavy(weight) **allow** reverse argument **ignore** larger or larger density **ignore** it depends on mass
		(ii)	**gravity** pulls light in / AW (1)	**1**	**allow** pull of **gravity** is too strong
			Total	**4**	

Question			Expected Answers	Marks	Additional Guidance
14	(a)		X is gamma (γ) Y is alpha (α) Z is beta (β)	1	**all three needed**
	(b)		atomic / nuclear bombs	1	**not** merely bombs or weapons **allow** nuclear weapons **ignore** nuclear power stations
			Total	2	

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