OCR
RECOGNISING ACHIEVEMENT

GCSE

Science B

General Certificate of Secondary Education

Unit **B711/01:** Modules B1, C1, P1 (Foundation Tier)

Mark Scheme for June 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

For answers marked by levels of response:

a. **Read through the whole answer from start to finish**
b. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
c. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

d. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Annotations

Annotation	Meaning
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt **not** given
ECF	error carried forward
^	information omitted
I	ignore
R	reject
CON	contradiction
L1	Level 1
L2	Level 2
L3	Level 3

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

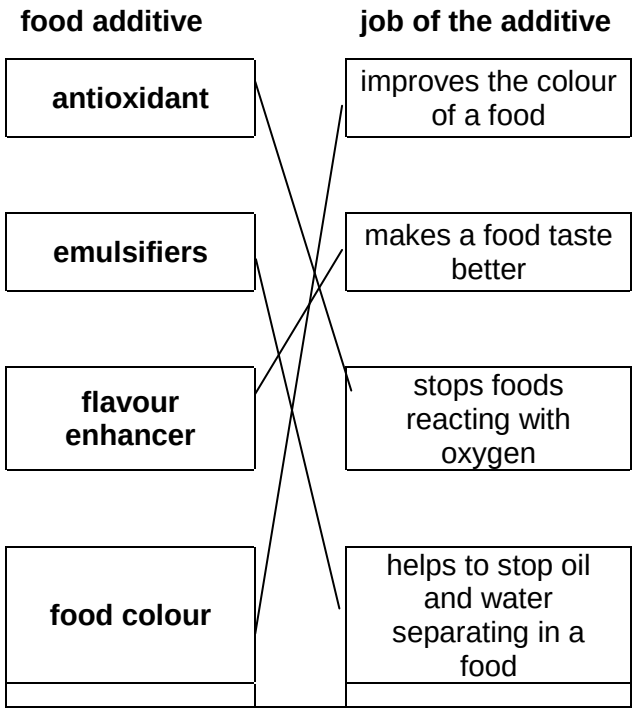
Question			Answer	Marks	Guidance
1	(a)		35 (1)	1	
	(b)		(DNA testing) helps them to identify the sex of the birds (1) so you can make sure correct birds are **put** together (1) **BUT** **put** male and female (pair) together / **put** male and female to breed (2)	2	**allow** cannot tell if they are **putting** a male and female to breed (2) **allow** higher level responses such as: look for hereditary disorders / faulty genes / **harmful** mutation (1) check for pedigree (1) avoid inbreeding (1) check that birds are not stolen (1) not captured from the wild (1)
	(c)		the macaw would have a wider field of view (1) because of monocular vision (1)	2	**allow** can see **all** round (easily without moving head) **allow** wider range of area **not** binocular **allow** would help it spot predators (1) **ignore** prey
			Total	**5**	

Question			Answer	Marks	Guidance
2	(a)		pancreas (1)	1	mark answer line first but **allow** correct ringed underlined answer from list
	(b)		**[Level 3]** Explanation of the usefulness of the food pyramid. AND Control for Type 1 and Type 2 diabetes. AND Some other information about diabetes. Quality of written communication does not impede communication of the science at this level. **(5–6 marks)** **[Level 2]** Explanation of the usefulness of the food pyramid. AND Information about diabetes. Quality of written communication partly impedes communication of the science at this level. **(3–4 marks)** **[Level 1]** Knows idea that insulin is involved in diabetes. OR (blood) sugar levels are not controlled. OR suggests control of diet will help control the amount of sugar taken into body. OR should select foods mainly from bottom of pyramid / shows how much of each food is best. Quality of written communication impedes communication of the science at this level. **(1–2 marks)** **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. **(0 marks)**	6	**This question is targeted at grades up to C.** **Indicative scientific points may include:** **At level 2 and 3** **Explanation of the usefulness of the food pyramid may include:** • diabetics should eat more from bottom / named food(s) to prevent over-eating of sugary foods • diabetics should eat less from top / named food(s) prevent over-eating of sugary foods **allow** sugary foods /glucose as alternative for sweets **Information about diabetes may include:** • **blood** sugar level not controlled or too high • none or too little insulin produced by body • insulin controls **blood** sugar levels / stops hypo(glycaemic) or hyper(glycaemic) effects • Type 1 diabetes needs injections of insulin • Type 2 diabetes can usually be controlled using diet. **Use the L1, L2, L3 annotations in scoris, do not use ticks.**

Question			Answer	Marks	Guidance
	(c)		**any two from:** (contains) receptors (1) to detect light / to see light (1) to detect colours / to see colours (1) changes light (energy) into electrical (energy) / AW	2	 **allow** (contains) rods / (contains) cones (1) **allow** light sensitive / photosensitive / absorb light (1) **allow** photoreceptors (2) **allow** colour receptors (2) **allow** light sensitive cells (2) **ignore** reflects light / refracts light **ignore** allows light into the eye / focuses light **ignore** controls light / controls colour (that enters the eye)
			Total	**9**	

Question			Answer	Marks	Guidance
3	(a)		(diet) B	1	mark answer line first but **allow** correct ringed underlined answer from list
	(b)	(i)	194 (1)	1	
		(ii)	75% (2) **but** 146 x 100 (1) 194	2	**allow** ecf allow answer 75.2 to 75.3
		(iii)	idea that exercise needs to be intensified / keeps current training within 70 to 75% range (1) because his training regime gives a range between 65% and 75% but he needs to be 70% and 80% / some of his training is below 70% (1)	2	**allow** ecf
			Total	**6**	

Question			Answer	Marks	Guidance
4	(a)		fungus (1)	1	**allow** fungi **not** bacteria/virus/protozoa
	(b)		**any two from:** drugs can be very toxic / harmful (to body) (1) need to monitor their use carefully (1) drugs can be addictive (1) (doctors are) needed to assess dosage for treatment (1)	2	**allow** potentially allergenic **ignore** dangerous unless qualified **allow** avoids misuse / AW **allow** can have bad reactions with other drugs **ignore** some drugs are stronger **allow** can cause overdose
	(c)		idea that the skin is a barrier / broken skin allows entry (of new pathogen) (1) idea of (further/secondary) infection (1)	2	**allow** stops pathogens entering the body **allow** disease **ignore** germs
			Total	**5**	

Question			Answer	Marks	Guidance
5	(a)			2	two or three correct (1) **but** all four correct (2)
	(b)		process is irreversible / AW (1) new substance / gas is made (1) **but** carbon dioxide (gas) is made (2)	2	**allow** large heat change / large energy change / change needs heat **allow** CO_2
			Total	**4**	

Question			Answer	Marks	Guidance
6	(a)		**any two from:** hydrogen sulfide, sulfur dioxide or nitrogen dioxide (1)	1	if any **other** gas included then award 0 marks **allow** H_2S, SO_2, NO_2
	(b)	(i)	(major source of carbon monoxide is from) cars or motor vehicles (1)	1	**allow** factories **allow** there are no cars or motor vehicles near volcanoes **allow** burning of fossil fuels **allow** volcanoes do not give out carbon monoxide
		(ii)	**any two from:** less hydrogen sulfide in city centre (1) less sulfur dioxide in city centre (1) more CFCs in city centre (1) more nitrogen dioxide in city centre (1)	2	**allow** ora with clear reference to volcano eg more hydrogen sulfide near volcano **ignore** references to carbon monoxide
	(c)		sulfur dioxide (causes acid rain) (1) **but** (idea of) more sulfur dioxide near volcano / ORA (2)	2	**not** if more than one gas named e.g. sulfur dioxide and hydrogen sulfide (0) **for second marking point there needs to be a clear comparison e.g.** near a volcano it is 1500 and in city it is **only** 200 (1)
	(d)		$2NO + O_2 \rightarrow 2NO_2$ (1)	1	**allow** any correct multiple including fractions **allow** = instead of → **allow** balanced equation on the line or on the original equation. If there is a **contradiction** take the answer on the answer line. **not** & or and instead of + **ignore** poor use of case or subscript
			Total	**7**	

Question			Answer	Marks	Guidance
7			**[Level 3]** One word equation or symbol equation for complete **and** one for incomplete combustion are written. **AND** Appreciation that the type of combustion is determined by the amount of oxygen/air present. **OR** Two correctly balanced equations, one for each type of combustion. Quality of written communication does not impede communication of the science at this level. **(5–6 marks)** **[Level 2]** Identifies **more than one** aspect of complete combustion. **AND** Identifies **more than one** aspect of incomplete combustion. Quality of written communication partly impedes communication of the science at this level. **(3–4 marks)** **[Level 1]** Identifies **one** aspect of complete combustion. **AND** Identifies **one** aspect of incomplete combustion. Quality of written communication impedes communication of the science at this level. **(1–2 marks)** **[Level 0]** Insufficient or irrelevant science such as repeating the question. Answer not worthy of credit. **(0 marks)**	6	**This question is targeted at grades up to C.** **Complete combustion** • makes carbon dioxide (and water) (may be shown from incomplete equations eg butane → carbon dioxide) • needs excess oxygen or air • gives more energy than incomplete • burns with a blue flame **Equations** • butane + oxygen → carbon dioxide + water • $C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$ (does not need to be balanced) **Incomplete combustion** • makes carbon monoxide, (carbon and water) (may be shown by incomplete equations eg butane + air → carbon • happens with a shortage of oxygen or air • makes soot or poisonous gas • gives less energy than complete combustion • burns with a yellow flame **Equations** • butane + oxygen → carbon monoxide + water • butane + oxygen → carbon + water • $C_4H_{10} + O_2 \rightarrow CO + H_2O$ (does not need to be balanced) • $C_4H_{10} + O_2 \rightarrow C + H_2O$ (does not need to be balanced) **Use the L1, L2, L3 annotations in scoris. Do not use ticks.**
			Total	**6**	

Question			Answer	Marks	Guidance
8	(a)		**any two from:** polymers will rot / polymers will decay / polymers will decompose / AW (1) the amount of litter will be reduced (1) the need for land-fill sites will decrease (1)	2	 **allow** polymers will break down **ignore** they can be recycled
	(b)		**any two from:** results can be checked (1) so that further evidence can be collected (1) to provide information to other scientists or public or other organisations / AW (1) so he can get recognition for his work (1)	2	 **allow** peer-review / results can be evaluated (1) **allow** work can be developed further (1) **allow** so other scientists cannot take credit (1)
	(c)		polychloroethene / 'poly(chloroethene)' (1)	1	**allow** pvc **not** polychloroeth**a**ne
	(d)		**C** (1)	1	
			Total	**6**	

Question			Answer	Marks	Guidance
9			**any two from:** evaporates easily / volatile (1) non-toxic / not poisonous (1) does not react with water (1) does not irritate (the skin) (1)	2	 **allow** has a low boiling point **allow** smell (1) **ignore** harmful unless qualified **allow** one property with a qualification for 2 marks eg must evaporate easily (1) so the perfume can diffuse quickly (1) **allow** doesn't stain (1) **ignore** flammability
			Total	**2**	

Question			Answer	Marks	Guidance
10	(a)	(i)	refraction (1)	1	**allow** refracting
		(ii)	(it is) reflected (1)	1	**allow** reflecting **ignore** idea of bouncing
	(b)		**any two from:** (idea that) different lasers (can be used to) produce different colours of light (1) (idea that) (narrow beams of light) can be pointed in different directions / different beams of light can be used at the same time / beams are separate from each other (1) (idea that) beams of light can be seen in the air when smoke (or other named particles) are present (1) (idea that) beams can be made to co-ordinate with music or fireworks (1) (idea that) lasers can be directed accurately to make a (moving) picture / can travel in straight lines (1) idea that beam is intense / seen at a great(er) distance (1)	2	**ignore** colourful **allow** beam is bright (and sharp)
	(c)	(i)	each letter or number has a particular code / correct example of a code being sent (1) idea of light is turned on and off (1) **but** (idea of) short and long flashes (of light) (2)	2	**example of a code** eg SOS is three short flashes of light, three long flashes of light, three short flashes of light (2) **ignore** dots and dashes
		(ii)	portable / convenient / can be used on the move (1)	1	**allow** signals can be sent without the use of wires **allow** wires can break **allow** examples e.g. can be sent with a torch
			Total	**7**	

Question			Answer	Marks	Guidance
11			**[Level 3]** **Estimated time with IR and reason given including mention of conduction** **AND** **Estimated time with microwaves and reason given including mention of more fat and/or water content or less conduction** Quality of written communication does not impede communication of the science at this level. **(5–6 marks)** **[Level 2]** **Estimated time quoted with IR and reason given** **AND** **Estimated time quoted with microwaves and reason given** Quality of written communication partly impedes communication of the science at this level. **(3–4 marks)** **[Level 1]** **Estimated time with IR and reason given** **OR** **Estimated time with microwaves and reason given** **OR** **Estimated time for IR and estimated time for microwave cooking quoted** **OR** **One reason each for IR and microwave time increasing** Quality of written communication impedes communication of the science at this level. **(1–2 marks)** **Level 0** Insufficient or irrelevant science. Answer not worthy of credit. **(0 marks)**	6	**This question is targeted at grades up to C.** **Indicative scientific points may include:** **IR/oven heating estimate** • suitable estimate of more than 5 minutes / 10 -15 minutes **reason** • surface of pizza approximately the same size or slightly larger because of increased depth • only surface(s) heated • energy must be **conducted** through the pizza • idea that water or fat content not important in this method of heating **microwave heating estimate** • suitable estimate of more than 1.5 minute • surface of pizza approximately the same size or slightly larger because of increased depth • idea that microwaves penetrate more than 7mm • so idea of less **conduction** needed (compared to IR) • idea of **more water and/or fat content** so time for cooking is reduced compared to IR • idea that water or fat content important in this method of heating **accept** higher level answers in terms of KE transfer between particles during conduction **Use the L1, L2, L3 annotations in scoris. Do not use ticks.**
			Total	**6**	

Question			Answer	Marks	Guidance
12	(a)		B (1)	1	more than one answer on answer line scores 0 marks if answer line blank allow B correctly indicated on the diagram
	(b)		2.84 (m/s) (2) **but if incorrect** 1.42 x 2.0 (1)	2	**allow** 2.8 (m/s) (2) **mark the answer line first but check table for correct answer if not given on answer line**
	(c)	(i)	**X** correctly plotted at 6 cm, 2.8(4) m/s (1)	1	**allow** + or – ½ square **allow** ecf from 12b
		(ii)	as diameter of spring increases the wave speed decreases / ORA (1)	1	**allow** negative correlation
		(iii)	1.7 (m/s) (1)	1	**allow** answer in the range 1.6–1.8 (m/s)
			Total	**6**	

Question			Answer	Marks	Guidance
13	(a)		ultraviolet (1)	1	**allow** UV more than one answer on answer line scores 0 if answer line blank allow ultraviolet correctly indicated on the list
	(b)		idea that tests all have results that increase the time you can safely stay in the sun (1) **but** idea that all the tests increase the length of time you can stay safely in the sun by a factor of 3 (2)	2	
	(c)		(detected by) seismometers (1) (recorded on a) seismograph (1) (idea of an early) warning system / detected under the sea / to allow humans to move away from the area / move away from buildings / move away from the sea (1)	3	**allow** phonetic spelling **ignore** sensor **allow** seismogram **allow** use Richter scale **allow** recorded graphically or on a computer
			Total	**6**	

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