OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science B

General Certificate of Secondary Education

Unit **B721/01:** Modules B3, C3, P3 (Foundation Tier)

Mark Scheme for June 2012

Oxford Cambridge and RSA Examinations

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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.

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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

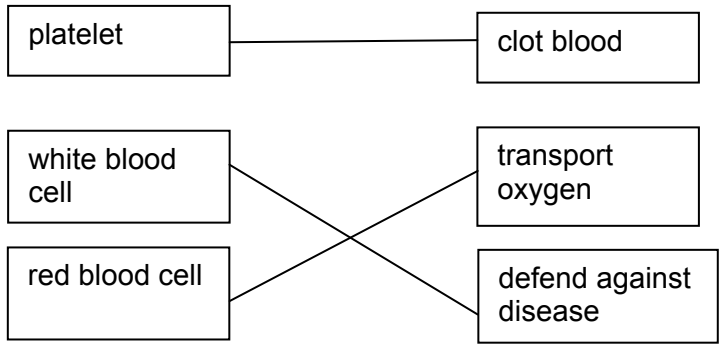
Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject
	contradiction
	Level 1
	Level 2
	Level 3

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)		fertilisation (1)	1	
	(b)		replacement of worn out cells (1) repair (of damaged tissue) (1)	2	**allow** asexual reproduction / cloning (1) **ignore** growth / replication
	(c)		**any two from:** there are no flowers / fruit (1) so only one parent (1) with the plantlets growing on extensions / AW (1) idea of extensions being runners (1)	2	 **allow** with the young plants / offspring growing on extensions (1) **allow** offspring growing on runners (2)
			Total	**5**	

Question			Answer	Marks	Guidance
2	(a)		50 (1)	1	If answer line is blank look for answer in table
	(b)		bar drawn at 38, 52 and 50 (2)	2	all three bars correct (2) one or two bars correct (1) **allow** error carried forward / if a not answered assume step ups are 50
	(c)		star jumps changes his pulse rate the most (1)	1	**allow** highest pulse rate (1)
	(d)	(i)	This is because my muscles need more carbon dioxide (1)	1	
		(ii)	This is because my muscles need more **oxygen** (1)	1	**allow** This is because my muscles produce **more** carbon dioxide (1) **ignore** more glucose **ignore** reference to lactic acid
			Total	**6**	

Question			Answer	Marks	Guidance
3	(a)		**any three from :** Sara used the whole leaf **or** not just the lower surface used or / AW (1) (this made) leaf too thick (1) (so that) light could not get through (1) she used too much stain **or** the wrong stain (which made it dark) (1) idea of not **enough** light source **or** light setting is wrong **or** mirror is pointing the wrong way (1)	3	**allow** she did not use **only** the lower surface (1) **but not** just no light source **ignore** dirty lens **ignore** reference to incorrect focus **or** incorrect microscope
	(b)			2	all correct (2) one or two correct (1)
			Total	**5**	

Question			Answer	Marks	Guidance
4	(a)		**[Level 3]** Describes the structure of DNA in detail and relates this to function. Includes ideas about DNA contains a **base sequence** coding enzymes **or** attempts higher level e.g. ideas of complementary base pairs. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Describes more than one structure of DNA **and** links the idea that DNA codes for proteins **or** states that that enzymes are proteins. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Describes more than one simple structural feature **or** mentions **double helix or** one function in simple terms. 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 at Level 3 may include:** • contains 4 different bases • bases sequence codes for a protein • each gene has a different sequence of bases • each gene codes for a different enzyme • higher level ideas e.g. bases are T A G C **or** complementary base pairs / 3 bases code for each amino acid **Indicative scientific points at Level 2 may include:** • descriptions of structures from level 1 • idea of cross links • double helix • DNA codes for proteins • enzymes are proteins • DNA codes for enzymes **Indicative scientific points at Level 1 may include:** • section of DNA is called a gene • chromosomes are made from DNA • contains bases • ladder like structure / twisted ladder / helix • has two strands • **allow** higher level structural ideas e.g. reference to • number of different bases / correct idea of ATCG • DNA is a code

Question			Answer	Marks	Guidance
	(b)	(i)	idea that **resistance** is caused by a gene / DNA (1) DNA / gene is moved from the wild plant to the crop plant (1)	2	**not** immune **ignore** chromosomes **allow** the resistance gene is moved from wild to crop plant (2)
		(ii)	**any one from:** potato might be poisonous / might change taste / might not get as high a yield (1)	1	**ignore** may have side / harmful effects **allow** some people may have allergies / makes people ill (1) **allow** might spread to weeds etc (1) **allow** might be less nutritious (1)
			Total	**9**	

Question			Answer	Marks	Guidance
5	(a)		semiconductors (1)	1	
	(b)		strong (1)	1	
			Total	**2**	

Question			Answer	Marks	Guidance
6			**B** because it conducts electricity/ good conductor (1) has a melting point above 950°C (1)	2	no mark for **B** on its own **allow B** has a high melting point / will not melt in the liquid its melting point is 3652°C (1) **allow A** has a high melting point / will not melt in the liquid (1) **but A** has a high melting point and does not conduct (0) **allow C** is a good conductor (1) **but C** is a good conductor and has a low melting point (0) **ignore** reference to hardness
			Total	**2**	

Question			Answer	Marks	Guidance
7	(a)		**[Level 3]** Describes at least two costs **and** explain at least one of these costs involved **and** explains why drugs need to be tested before they are used. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Describes at least two costs involved **and** explains why drugs need to be tested before they are used **or** Describes at least two costs involved **and** explains one of them Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Describes at least two costs involved **or** begins to explain why drugs need to be tested before they are used. 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 E** <u>explanations that may be included</u> • raw materials can be expensive as harvests can fail **/** large amount have to be grown / difficult to find • secure conditions needed in factory as drugs can be used as an illegal drug • testing / development is time consuming therefore expensive • batch process used which is more expensive than continuous / labour intensive • extraction / production expensive as need to be pure • expensive transport as raw materials may be imported to UK / transport needs to be secure (if drugs are dangerous) • marketing expensive as you have to pay for advertising <u>reasons for testing that may be included</u> • drugs need to be tested to ensure they are safe • tested to make sure they work <u>descriptions that may be included</u> • labour costs • energy costs • cost of raw materials • cost of extraction of raw material • cost of manufacturing equipment / uses batch process • cost of transport • marketing • time needed to research **or** development • cost of testing

Question			Answer	Marks	Guidance
	(b)		**any two from:** so others can test to see if it works (1) so others can show it is safe (1) so others can develop the drug further / modify the drug (1) lets doctors / patients / pharmacists know about the drug (1)	2	 **ignore** let other people know about the drug
			Total	**8**	

Question			Answer	Marks	Guidance
8	(a)	(i)	15 (cm^3) (1)	1	**allow** 15 – 15.5
		(ii)	slows down then (reaction) stops (1) gradient of graph becomes less steep / AW (1)	2	**ignore** starts fast **not** rate increases rapidly / rate goes up **allow** by looking at the gradient (1) **allow** line levels off / line steeper at start (1)
	(b)		**any two from:** powder the zinc / make the zinc into smaller lumps (1) increase the temperature (of the reaction) (1) increase the concentration of the hydrochloric **acid** (1)	2	**allow** she can increase the surface area (1) **ignore** strength of acid **allow** stir the reaction (1) **ignore** changes in volumes or amounts **ignore** references to pressure
	(c)		A slow reaction producing a small volume of gas A slow reaction producing a large volume of gas A fast reaction producing a small volume of gas A fast reaction producing a large volume of gas ✓ (1)	1	more than one tick scores zero
			Total	**6**	

Question			Answer	Marks	Guidance
9	(a)		125 (1)	1	
	(b)	(i)	$ZnCO_3 \rightarrow ZnO + CO_2$ (1)	1	**allow** = instead of → **allow** multiples **not** and or & instead of + **not** $ZNCo_3$ **or** Zno **or** Co_2
		(ii)	1.32 (g) (1)	1	
		(iii)	3.24 (g) (1)	1	If no answer look in table
			Total	**4**	

Question			Answer	Marks	Guidance
10	(a)		7560(J) (2) 100 x 4.2 x 18 (1)	2	mark answer line first **allow** 151.2 (1)
	(b)		**C** because it releases or transfers the most energy (1)	1	no mark for **C** on its own **allow** ecf from (a) **allow** has the highest energy (1)
			Total	**3**	

Question			Answer	Marks	Guidance
11	(a)		**speed calculation** 32.1 (2) **but if answer is incorrect** 17.68 ÷ 0.55 (1)	2	if answer space is blank **allow** correct answer (2) or correct division (1) in the table **allow** 32 / 32.15 / 32.145455 / 32.145 (2) **but** 32.2 / 32.0 / 32.14(1)
	(b)		first ball is fastest delivery / AW (1) **reason** released with greatest force or acceleration (from hand) / AW (1)	2	**assume answer is referring to first ball unless stated differently** **allow** bowled the ball faster(1) **allow** bowled the ball harder **or** ran up faster **or** has greater thrust (1) **allow** ecf from 11(a) e.g. (28.0) is the slowest (1) so released with less force (1) **allow** reverse argument
			Total	**4**	

Question			Answer	Marks	Guidance
12	(a)		0.13 (2) **but if answer is incorrect** 5.1 ÷ 40 (1) **unit** m/s^2 **or** m/metres per second ^{2} **or** m/metres per second squared	3	**allow** 0.1275 (2) **but** 0.12 / 0.127 (1) **allow** ms^{-2} **allow** metres per second per second **or** m per s per s
	(b)		**any two from:** **(X)** no acceleration (1) **(Y)** deceleration or negative acceleration (1) **(Z)** idea that here there is **greater** deceleration or negative acceleration (compared to Y) / AW (1) **AND** correctly links the shape of the graph to at least one description of X, Y or Z (1)	3	**assume it refers to acceleration** e.g. it stays the same in X (0) **allow** steady speed / constant speed(1) **not** acceleration stays the same **ignore** cruising speed **allow** slows down (1) **not** acceleration goes down **allow** same time as **Y** but bigger speed change (1) **allow** slows down if not mentioned for Y (1) e.g. no acceleration at X as line is horizontal (2) e.g. deceleration at y as line goes down (2) **ignore** just 'straight line' unless qualified **maximum of 2 marks if no mention of the gradient** e.g. X has no change in speed then they slow down then they slow down but with greater deceleration (2) e.g. X has no change in speed as the line is flat then they slow down then they slow down but with greater deceleration (3)
			Total	**6**	

Question			Answer	Marks	Guidance
13			**[Level 3]** Describes at least one advantage **and** one disadvantage with detailed explanation e.g. specific reference to effects of named pollutants **and** describes one way effect of cars can be monitored or tested Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Describes at least one advantage **and** one disadvantage with explanations **or** Describes at least one advantage **and** one disadvantage without explanation **and** describes one way cars can be monitored or tested Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Describes at least one advantage **and** one disadvantage. **or** Describes one way cars can be monitored or tested. 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** <u>advantages may include:</u> • lower noise levels / quieter cars • less pollution • less petrol or diesel / oil reserves / fossil fuels used • lower noise levels linked to benefit to society / environment • lower / less CO_2 emissions so less effect on global warming • could improve road safety due to generally lower speeds. • petrol or diesel / oil reserves / fossil fuels which are needed for other things or are fast running out • lower / CO_2 emissions / less greenhouse gases <u>disadvantages may include:</u> • pedestrians can't hear cars • power stations still need to produce electricity • cars can't travel as far / fast • quiet(er) cars could be a danger to pedestrians • electricity produced at a power station and power stations release greenhouse gases • construction of charging points / batteries could add to pollution • electricity production needs fossil fuels • not enough power points to recharge <u>monitoring point may include:</u> • monitoring CO_2 levels to look for a reduction • monitoring noise levels to look for a reduction • comparing results to assess any real benefit check / monitor accident figures for any change.
			Total	**6**	

Question			Answer	Marks	Guidance
14			Matthew (1) and Miriam (1)	2	any order if answer line is blank **allow** answers ticked, ringed beside the talking heads if more than two names reduce by (1) for each additional name to a minimum of zero
			Total	**2**	

Question			Answer	Marks	Guidance
15	(a)	(i)	18.0 56.0	1	**allow** 18 and 56 **all** have to be correct for the mark
		(ii)	idea that as speed increases stopping **distance** increases (rapidly) (1) increased stopping distance means more chance of collision / accident / harming a pedestrian (1)	2	**allow** the faster you are going the greater the breaking **/** thinking **distance** (1)
	(b)	(i)	all points correctly plotted **and** straight line drawn (1)	1	
		(ii)	idea that thinking distance shows a steady increase and braking distance increases more rapidly (1)	1	**allow** breaking distance becomes greater than thinking distance (as speed increases) /ora (1) **but not** breaking distance is always greater than thinking distance **allow** ecf if graph is plotted incorrectly
	(c)		<table><tr><th>safety</th><th>prevents accidents</th><th>protects car occupants</th></tr><tr><td>ABS..</td><td>✓</td><td></td></tr><tr><td>crumple…</td><td></td><td>✓</td></tr><tr><td>air..</td><td></td><td>✓</td></tr><tr><td>electric..</td><td>✓</td><td></td></tr><tr><td>traction …</td><td>(✓)</td><td></td></tr></table>	2	all four correct = (2) 2 or 3 correct = (1) 1 correct = (0)
			Total	**7**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Head office
Telephone: 01223 552552
Facsimile: 01223 552553