OCR
RECOGNISING ACHIEVEMENT

GCSE

Science A

General Certificate of Secondary Education

Unit **A142/02:** Unit 2: Modules B2, C2, P2 (Higher 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.

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Annotations

Used in the detailed Mark Scheme:

Annotation	**Meaning**
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
	incorrect response
ECF	error carried forward
	draw attention to particular part of candidate's response
NBOD	no benefit of doubt
R	reject
	correct response
L1 , L2 , L3	draw attention to particular part of candidate's response
^	information omitted

Subject-specific Marking Instructions

a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).

b. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

e.g. for a one-mark question where ticks in the third and fourth boxes are required for the mark:

This would be worth 1 mark.

This would be worth 0 marks.

This would be worth 1 mark.

c. The list principle:
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

d. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.
If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify cities in England:

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

e. For answers marked by levels of response:

i. **Read through the whole answer from start to finish**

ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor

iii. **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

iv. 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.

Question			Answer	Mark	Guidance
1	(a)	(i)	Manila ropes are stronger in tension and absorb less water than jute and sisal. (1) ✓	1	tick in any other box = 0
		(ii)	*any two from:* need to know the min tensile strength; (1) rope could break at the minimum; (1) break before the mean value; (1) dangerous if you don't know the range; (1)	2	 know when the rope will break mean does not show when it will break
	(b)	(i)	(62+66+75+79+73)/5 (1) 71 (1)	2	correct answer with no working gets 2 marks
		(ii)	there is a real difference between nylon and jute because: the ranges do not overlap; (1) the means are (very) different; (1) the mean / best estimate of true value of jute is outside the range of nylon ;(2) the mean / best estimate of true value of nylon is outside the range of jute; (2) maximum is 2 marks	2	ecf from mean calculated in **b** **allow** nylon is stronger if the mean value is given

Question			Answer	Mark	Guidance
		(iii)	*any two from:* nylon is less dense ; (1) nylon is lighter (to carry); (1) nylon is stronger; (1) nylon won't break (and let you fall); (1) nylon stretches more; (1) nylon gives a little (to help break your fall) (1) nylon absorbs less water / moisture; (1) nylon does not rot; (1) nylon does not get slimy / slippery; (1)	2	
			Total	**9**	

Question			Answer	Mark	Guidance
2	(a)	(i)	Dave	1	more than one name = 0
		(ii)	Tanya	1	more than one name = 0
		(iii)	Scott	1	more than one name = 0
	(b)		6	1	any other number = 0
	(c)		crystallinity	1	ring around any other word = 0

Question			Answer	Mark	Guidance
	(d)		**(Level 3)** Statement of two correct modifications. Clear linking of both modifications with the forces between polymer molecules. Correct links between forces and properties of the polymers. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Statement of two correct modifications with some attempt to link one modification with forces between molecules or energy required to melt the polymer. Or one correct modification with clear linking to forces and a property. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** An attempt to link correct modification with a property or linking intermolecular forces with a property. 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 A/A*** **Relevant points include:** Modifications are: • changing chain / molecule length • adding a plasticizer • changing crystallinity These change intermolecular forces: • decreasing chain length decreases intermolecular forces between molecules • adding a plasticizer pushes chains apart meaning smaller intermolecular forces • decreasing crystallinity means chains are further apart which decreases intermolecular forces Change in force changes properties: • smaller intermolecular forces mean less energy required to break them out of their solid state so melting point is lower • smaller intermolecular forces mean molecules can slide over each other so more flexible **ignore** details about forces within molecules **ignore** 'bonds' unless specified as intermolecular **ignore** references to cross linking
			Total	**11**	

Question			Answer	Mark	Guidance
3			**(Level 3)** Consequences and benefits are discussed with scientific detail. Risk reduction may also be included. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Any two of consequences, risk reduction and benefits are discussed, but with some scientific detail. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Writes about a consequence or risk reduction or benefits. Answer may lack scientific detail. 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 points at level 3:** • produces vitamin D • ionising nature of radiation • uncontrolled cell division • change in DNA/mutation • prevents SAD • sun lotions absorb UV • causes cataracts so wear sunglasses **Indicative points at level 2:** • causes skin cancer • improves your mood • don't assess the risks carefully/ perception of risk is wrong • use sun lotion frequently • recognise particular risks of certain activities e.g. bathing, high altitudes • wear a hat / other clothing / sunglasses • delayed outcome • ages the skin / wrinkles **Indicative points at level 1:** • outdoor activities are nice • like a sun tan • makes you feel better • gives you sun burn and cancer • people don't think it will happen to them • put on sun lotion
			Total	**6**	

Question			Answer	Mark	Guidance
4	(a)		180 + 350 = 530; (1) 490 + 40 = 530; (1)	2	**allow** 180 + D = 530 **allow** E + F = 530 putting the two equations together as 180 + 350 = 490 + 40 gets 2 marks
	(b)		**A**	1	letter may be indicated in the stem of the question
	(c)		**B** and **E**	1	letters in either order letters may be indicated in the stem of the question
			Total	**4**	

Question			Answer	Mark	Guidance
5	(a)		1 0 1 0 0 1 0 0 1 0 1	2	all correct = (2) one error = (1) credit on/off, true / false (e.g. TFTFFTFFTFT) in correct sequence for one mark only
	(b)		signal has noise (1); because it has picked up (electromagnetic)interference; (1) signal amplitude/signal strength is less / weaker /has less energy (1); because it is further from the emitter / spreads out from the source / is absorbed (by the medium) (1)	4	 **allow** 'unwanted signals' **allow** 'disturbance' **ignore** 'interruption' if type of signal (emitted or received) is not specified the response refers to the received signal
			Total	**6**	

Question			Answer	Mark	Guidance
6	(a)		Infrared is an… ☐ The frequency of the… ☐ Microwaves are reflected… ✓ X-ray photons have enough… ✓ If a red light and… ✓ The energy of two ultraviolet… ☐ Radio waves and microwaves… ✓	3	4 correct ticks = 3 marks 3 correct ticks = 2 marks 2 correct ticks = 1 mark 1 or 0 correct ticks = 0 marks if 5 ticks made: mark and deduct 1 mark if 6 ticks made: mark and deduct 2 marks
	(b)		**A** (photon energy × number of photons)	1	letter may be indicated in the stem of the question
			Total	**4**	

Question			Answer	Mark	Guidance
7	(a)		different body mass / ref to different stages of development at puberty / different genes / different fitness levels / stress /health / do more exercise	1	**do not accept** idea that there is variation in resting pulse rate **ignore** 'lifestyle' unless qualified **ignore** 'bigger' or 'taller'
	(b)	(i)	all points correctly plotted (1) correct line of best fit drawn (1)	2	**ignore** feathering **ignore** curve drawn after 5 min curve drawn, without ruler, through the points missing no more than 1 point if points incorrectly plotted give mark for a line of best fit
		(ii)	Liam: 5 minutes (1) Ryan: any answer between 6 min and 7 min (1)	2	
		(iii)	*Liam is fitter than Ryan because:* *any one from:* Liam's pulse rate returns to resting quicker than Ryan's (1) Liam's recovery line is steeper (1)	1	**accept** Liam recovers quicker
			Total	**6**	

Question			Answer	Mark	Guidance
8	(a)	(i)	pituitary gland (1)	1	
		(ii)	hormone (1)	1	**accept** protein/polypeptide/peptide
	(b)		more increases less	1	all three needed for 1 mark
	(c)		*study not likely to successfully test whether drinking alcohol increases the amount of urine produced because: any three from:* sample is too small / not randomly selected / all participants are from same age group / all students / all males (1) no idea of time taken for test / number of repeats (1) frequency of toilet visits does not take into account volume of urine produced / poor method of measuring urine production (1) no other aspect of fluid / diet intake is recorded / other fluids/diet would affect urine production (1)	3	**accept** idea that no other data is collected, e.g. amount of exercise carried out, temperature
			Total	**6**	

Question			Answer	Mark	Guidance
9	(a)		*any two from:* vaccine contains weakened / dead / safe form of disease; (1) establish memory cells; (1) make immune; (1) produce antibodies quickly (on reinfection); (1)	2	**allow** micro-organism / virus / bacteria

Question			Answer	Mark	Guidance
	(b)		**(Level 3)** Answer gives a well balanced argument and describes at least two advantages and two disadvantages. Answer includes ethical arguments as well as the practical arguments. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Answer attempts to give a balanced argument and describes at least two advantages and one disadvantage or one advantage and at least two disadvantages. Answer may include ethical arguments. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Answer describes an advantage and/ or a disadvantage but the argument is poorly balanced. 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 A/A*** **Indicative Content:** *Arguments For:* • reduces number of people with influenza / epidemics • because influenza is common virus and highly infectious • could help to eradicate influenza • reduces cost of care / treatment • reduces burden on medical profession • reduces number of work days lost / sick days taken *Arguments Against:* • very expensive to vaccinate everyone • very difficult to administer / manage • very time consuming to vaccinate everyone • vaccination could be dangerous for some people / can have side effects • people react in different ways to vaccination • people do not want to be vaccinated • people should be able to choose whether or not they are vaccinated • infringement of human rights to make it compulsory • vaccination is against some people's religious beliefs the last three points are the ethical arguments not wanting to be vaccinated is insufficient for an ethical argument **ignore** ethical / unethical unless qualified
			Total	**8**	

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