SPECIMEN MATERIAL

GCSE
COMBINED SCIENCE: SYNERGY

PAPER 1H

Mark scheme

Specimen 2018

Version 1.0

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. The final mark scheme will include any amendments made at the standardisation events which all examiners participate in and is the scheme which is used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers that have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working.

Full marks can, however, be given for a correct numerical answer, without any working shown.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient are used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes. Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	$\text{magnification} = \frac{\text{image size}}{\text{real size}}$ = 29 ÷ 0.03 = 967	 allow 967 with no working shown for **2** marks	 1 1	 AO2/1 4.1.3.1
01.2	they are transverse		1	AO1/1 4.1.4.1
01.3	wave speed = frequency × wavelength	allow v = f λ	1	AO1/1 4.1.4.2
01.4	75 cm = 0.75 m 1.6 = f × 0.75 f = 1.6 ÷ 0.75 = 2.13 (Hz)	 allow 2.13 (Hz) with no working shown for **4** marks	1 1 1 1	AO2/1 4.1.4.2
Total			**8**	

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	(to) stop them falling in the solution **or** to stop them drowning (in the solution)		1	AO2/2 4.2.1.1
02.2	**Level 2:** A detailed and coherent explanation is given of how the droplet moves, clearly and logically linked to the process of respiration.		3–4	AO2/2
	Level 1: Simple statements are made about movement of the water droplet, but any attempts at explaining the reason or linking the movement to the process of respiration are unclear and poorly structured.		1–2	
	No relevant content		0	
	Indicative content • water droplet moves towards the maggots/boiling tube Explanation: • the oxygen in the boiling tube is used up in respiration • (and) the carbon dioxide released from respiration is absorbed by solution **A** • which causes a pressure difference • so air is drawn into the tube • bringing the water droplet with it.			4.2.1.1

Question 2 continues on the next page

Question 2 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	*x* axis: Temperature in °C *y* axis: Rate of respiration in units	both needed for the mark	1	AO2/2 4.2.1.1
02.4	repeat the experiment at 30 °C		1	AO3/1a 4.2.1.1
02.5	10.5	allow range 10.4–10.8	1	AO2/1 4.2.1.1
Total			**8**	

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	**Level 2:** A detailed and coherent explanation of how the water molecules transfer through the water cycle from one form/area to another. Logical links are made between the general details of the water cycle to the context of the iceberg.		3–4	AO1/1
	Level 1: Simple relevant facts stated about the water cycle. Details may be missing and any links made with the context of the iceberg may be inconsistent or vague.		1–2	
	No relevant content		0	
	Indicative content • water in the iceberg is in its solid state • when the iceberg melts water is in its liquid form • and the water molecules go into the sea • water evaporates from the surface of the sea • so the water molecules go into the air as vapour • as the air rises it cools • so water vapour condenses into droplets in clouds • clouds can be moved around the world by winds • droplets then fall as rain / snow / hail / precipitation • into a lake			4.4.1.7
03.2	solid materials		1	AO1/2
	removed by filtration **or** by passing through filter beds		1	4.4.1.8
	microbes		1	
	are killed by sterilisation		1	
		allow killed by chlorine / ozone / ultraviolet light		
Total			**8**	

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **two** from: • to work out the correct dose to be given • to check that the drug is working correctly • to check for toxic effects.		2	AO1/2 4.3.3.7
04.2	patients are randomly allocated to receive statin or a placebo so neither patient nor doctor knows who has received which	answer in terms of only the drug company knows who is taking the statin or the placebo gains **2** marks	1 1	AO1/2 4.3.3.7
04.3	To prevent false claims		1	AO1/2 4.3.3.7
04.4	drug **A** reduced the blood cholesterol level more than drug **B** drug) reduced the thickness of the artery **or** drug **B** increased the thickness of the artery	allow drug **A** made the artery thinner **or** drug **B** made the artery thicker ignore side effects	1 1	AO3/1a 4.3.3.7
04.5	differences in number of patients reporting side effects are very similar we don't know what the patients died of		1 1	AO3/2b 4.3.3.7
Total			**9**	

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	density = mass/volume		1	AO1/1 4.1.1.2
05.2	any **two** from: • no forces shown between spheres • atoms / molecules / ions are not solid spheres • not all the same size.		2	AO1/1 4.1.1.1
05.3	at higher temperatures particles have more kinetic energy (so) the (average) speed of the particles increases (so there are) more frequent collisions with the wall of the container which apply a greater force on wall of container (so pressure rises)		1 1 1 1	AO1/1 AO1/1 AO2/1 AO2/1 4.1.1.3
Total			**7**	

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	(lack of) exercise	allow description of type or amount of exercise allow other risk factors not mentioned in table, eg high cholesterol levels, blood pressure, levels of obesity, diabetes	1	AO1/1 4.3.1.2
06.2	the second highest death rate has the highest fruit and vegetable consumption the lowest death rates don't have high fruit and vegetable consumption lowest death rates have a low percentage of the population that smokes.		3	AO3/1a 4.3.1.2
06.3	(it builds up) inside the coronary arteries		1	AO1/1 4.3.1.3
	(causing) them to narrow		1	AO1/1 4.3.1.3
	(this) reduces blood flow		1	AO1/1 4.3.1.3
	so less oxygen gets to the heart muscle		1	AO2/1 4.2.1.3
06.4	(statins) reduce cholesterol in the blood		1	AO1/1 4.3.1.3
	so there is less build up of fatty material (in coronary arteries)	allow slows the rate of fat deposit	1	
Total			**10**	

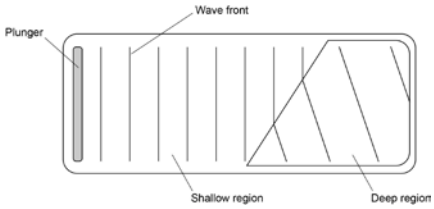
Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	Pituitary		1	AO1/1 4.2.1.7
07.2	$\frac{10-4}{4}$ **or** $\frac{6}{4}$ = 150 (%)		1 1	AO2/2 4.2.1.7
07.3	the level in the blood is already higher than it was before point **A** levels hadn't returned to normal yet (before the next scare)	 allow he had already been scared so he was expecting the second scare	1 1	AO2/1 4.2.1.7
07.4	increased oxygen to brain / muscles increased glucose to brain / muscles		1 1	AO1/1 4.2.1.7
Total			**7**	

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	xylem		1	AO1/1 4.2.2.3
08.2	**A** is phloem, **B** is xylem any **three** from: • phloem transports sugars • there are more sugars in fluid A • xylem transports mineral ions/potassium ions/nitrate ions • there are more mineral ions in fluid B.		1 3	AO3/2b AO2/1 4.2.2.2
08.3	correct conversion of 1.18 µg to mg/cm^3 $\frac{118}{0.00118} = 100\,000$	allow **1** mark for 100 (ie no conversion to mg) allow 100 000 with no working shown for **2** marks	1 1	AO2/1 4.2.2.3
08.4	potassium ions are transported into the root against a concentration gradient by active transport		1 1 1	AO1/1 AO2/1 AO1/1 4.2.2.3
Total			**10**	

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1		lines should be further apart with the bottom of the wave fronts further to the right than the top	1	AO2/1 RPA5
09.2	they will speed up so wave (fronts) move further apart		1 1	AO2/1 RPA5
09.3	longitudinal waves: • the oscillations are parallel to the direction of energy transfer • show areas of compression and rarefaction transverse waves: • the oscillations / movement are perpendicular to the direction of energy transfer.		 1 1 1	AO1/1 4.1.4.1
09.4	place a floating object / plastic duck on the surface of the water it will stay in the same place **or** only bob up and down if the water doesn't move		1 1	AO2/2 RPA5
09.5	0.42 = 1/f f = 2.38 v = 2.38 × 0.34 = 0.809 m/s	 allow 0.809 with no working shown for **4** marks incorrect sig. figs max **3** marks correct unit	1 1 1 1 1	AO2/1 AO2/1 AO2/1 AO2/1 AO1/1 4.1.4.2
Total			**13**	

Question 10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	**A** FSH	allow follicle stimulating hormone	1	AO1/1 4.3.1.6
	B Progesterone		1	
10.2	LH peaks	allow luteinising hormone	1	AO2/1
	which causes an egg to be released.		1	AO1/1 4.3.1.6

Question 10 continues on the next page

Question 10 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.3	**Level 3:** A detailed and coherent explanation is given, which logically links the role of different hormones to their use in IVF and a clear explanation of how IVF increases the chance of a successful pregnancy.		5–6	AO1/2
	Level 2: An attempt is made to link the role of hormones to their use in IVF. The logic used in explaining how IVF increases the chance of a successful pregnancy may not be clear or linked to the hormones.		3–4	
	Level 1: Discrete relevant points made. The logic may be unclear and links may not be made.		1–2	
	No relevant content		0	
	Indicative content Identification of hormones used in IVF: • FSH • LH. Role of hormones in IVF: • FSH causes eggs to mature • LH causes the eggs to be released. Effect on chance of successful pregnancy: • high levels of hormones cause many eggs to be matured and released • sperm and eggs are collected and eggs are fertilised (so increased probability of fertilisation) • fertilised eggs are given time to develop into a small ball of cells • some are transferred into the mother (uterus), to increase the probability of one successfully implanting.			4.3.1.8 4.3.1.6
Total			**10**	

Question 11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.1	half-life read from graph = 2 hours time to fall to 1.56 is six half lives = 6 × 2 = 12 (hours)		1 1	AO2/1 4.3.2.3
11.2	$^{210}_{82}Pb \longrightarrow {}^{206}_{80}Hg + {}^{4}_{2}He$	one mark for each correct element in the equation	3	AO2/1 4.3.2.2
11.3	ionising radiation turns atoms into ions which can break up molecules this can change DNA causing mutations to genes which can cause cancer		1 1 1 1 1	AO1/1 4.3.2.6
Total			**10**	

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21 April 2016