Mark Scheme (SAM)

Pearson Edexcel International Advanced Subsidiary in Biology

Unit 3: Practical Biology and Research Skills

General marking guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed-out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of Quality of Written Communication, are being assessed. The strands are as follows:
    i. ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
    ii. select and use a form and style of writing appropriate to purpose and to complex subject matter
    iii. organise information clearly and coherently, using specialist vocabulary when appropriate.

Using the Mark Scheme

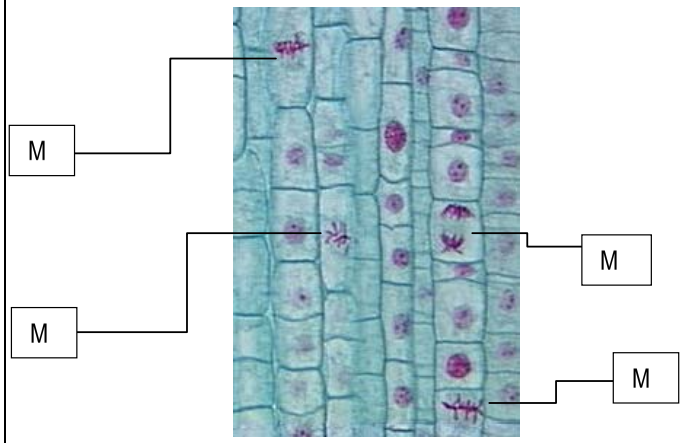
Examiners should NOT give credit for incorrect or inadequate answers, but allow candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected, it may still be creditworthy.

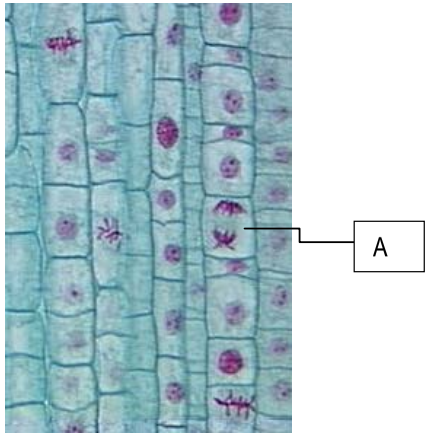
The mark scheme gives examiners:
- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/	Means that the responses are alternatives and either answer should receive full credit.
()	Means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Bold	Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.
ecf/TE/cq	(error carried forward)(transfer erro)(consequential) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Question Number	Answer	Mark
1(a)	C	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	 All 4 for 2 marks 2 or 3 for 1 mark 0 or 1 zero marks	If all four labelled correctly but one extra M = 1 mark. Two extra M = 0 marks.	(2)

Question Number	Answer	Mark
1(b)(ii)		(1)

Question Number	Answer	Additional Guidance	Mark
1(b)(iii)	Chromosomes separated/chromosomes V shape/eq	At the opposite ends/poles pulled apart/split to two sides. ACCEPT chromatids. IGNORE centromeres.	(1)

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	(Ethanoic/acetic) orcein/toluidine (blue)/methylene blue/Schiff's reagent/Giemsa/Feulgen stain/acetocarmine	ACCEPT phonetic spelling.	(1)

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	Correct answer gets all three marks. 1. Number of mitotic cells = 6 2. 6 ÷ 84 3. = 7.14/7.1 (%)	 1. ACCEPT 4 or 5 2. 4/5 ÷ 84 3. (for 4) = 4.76/4.8 (for 5) = 5.95/6.0 ACCEPT Mp2 and 3 if number other than 4/5/6 divided by 84 to get correct percentage, e.g. 78 to give 92.86/92.9.	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(d)(i)	A axes correct orientation and appropriate scale (x –distance from tip, y – mitotic index) L axes correctly labeled, and with units (mm and %) P correct plotting S line of best fit E SDs plotted correctly	If bar graph accept Mp A, L, P and E. A. ACCEPT identified interrupted scale but this stops candidates from answering (d)(ii) correctly S. NOT if extrapolation towards Y-axis Must have at least one point but no more than 3 points on either side of the line.	**(5)**

Question Number	Answer	Mark
1(d)(ii)	Answer within range 1.3 to 1.5 (mm)	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(d)(iii)	Mitotic index decreases with increasing distance/eq	ACCEPT negative relationship/inversely proportional.	**(1)**

Question Number	Answer	Mark
1(d)(iv)	1. Idea that because there is a (large/small) difference in the means (linked to the relevant pair) **0.5 and 0.9** 2. Credit use of SD data and reference to no overlap **0.3 and 0.5** 3. Credit recognition of fact that some figures for 0.3 mm are the same as some for 0.5 mm (namely 8.9) or very close 4. Credit use of SD data and reference to – overlap **For either** credit manipulation of figures to calculate upper and lower limits, e.g. (0.5 mm lower limit 7.5, 0.9 mm upper limit 4.3, 0.3 mm lower limit 8.3, 0.5 mm upper limit 8.5/OR comment on 0.8 SD	**(4)**

Total for Question 1 = 20 Marks

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2(a)(i)</td><td>Each row correct for one mark.

<table>
<tr><th>Feature</th><th>HBOCs</th><th>RBCs</th></tr>
<tr><td>Onset of oxygen carriage action</td><td>less than a day/immediate/ eq</td><td></td></tr>
<tr><td>Risk of disease transmission</td><td>none(virtually) eliminates/sterile manufacture/eq</td><td></td></tr>
<tr><td>Duration of oxygen carriage action in body</td><td>3-4 days</td><td>(up to) 3 months/ eq</td></tr>
<tr><td>Viscosity</td><td>low(er)/less</td><td>high(er)/ more/eq</td></tr>
<tr><td>Shelf life</td><td></td><td></td></tr>
</table></td><td>ACCEPT {quicker/faster/less time} than RBC.</td><td>(4)</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	1. Risk of death from heart attack/eq 2. Risk of renal failure/eq 3. Cost/eq 4. Use in bloodless medicine/eq 5. Immune response/cross-matching/side effects/eq 6. Storage (temperature)/eq	 5. ACCEPT reference to antigens. 6. ACCEPT refrigeration.	**(2)**

Question Number	Answer	Mark
2(b)(i)	1. Line graph 2. X-axis pp oxygen, y-axis oxygen concentration 3. Identified (line/bar) for plasma lower than perflubron and increasing to the right	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	1. Paragraph {8/9} 2. Idea that perflubron is better than plasma for carrying oxygen 3. Highest is 4x, lowest is 2.6x 4. So supports '2-3 times as much' 5. Does not support 20 x in paragraph 8 6. Manipulation of data (e.g. division of oxygen concentration in perflubron by oxygen concentration in plasma)	2. IGNORE word for word quotes from the passage 3. When mp3 awarded also gets Mp6 4. This mp more likely to be awarded if paragraph 9 chosen Mp2, 4 and 5 the examiner needs an idea that data supports or does not support what the passage says.	(4)

Question Number	Answer	Additional Guidance	Mark
2(c)	1. Paragraph 1 2. Issue – talks about seeking less costly/more reliable sources/ORA 3. Additional information – idea that cost likely to rise because of donation supply shortfalls OR 4. Paragraph 7 5. Issue – idea that Hb is needed in huge amounts 6. Additional information - how much does it cost {to get this Hb/make the HBOCs}	Mp 3 and 6 could be awarded in the issue section. 3. ACCEPT any specific transfusion cost	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(d)(i)	1. All elements, including all authors for reference 1 present 2. Correct order, e.g. author, year in brackets, title, journal, volume, issue in brackets, page number	1. ACCEPT in any order and all authors without initials NOT if words: in the journal, issue, pages, volume or by included 2. IGNORE words listed above ALLOW single initial for author and using first names as family name 2 marks for: {Zou S, Musavi F, Notari E P. and Fang C T/Zou S et al} (2007) *Changing age distribution of the blood donor population in the United States. Transfusion* 48(2), 251-257.	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(d)(ii)	Reference 2 1. Missing items – pages, issue number, volume OR Reference 3 2. Missing items – article title, issue number OR Reference 4 3. Missing items – article title, volume, (end) page number	A mark for each of two missing items in context of reference chosen. Apply list rule to deal with the inclusion of items that are present.	**(2)**

Total for Question 2 = 20 Marks

Total for Paper = 40 Marks