Mark scheme – Cell Structure (F)

Question			Answer/Indicative content	Marks	Guidance
1			D ✓	1 (AO2.2)	
			Total	**1**	
2			A ✓	1 (AO1.2)	
			Total	**1**	
3			B	1 (AO 2.2)	
			Total	**1**	
4			A	1 (AO 1.1)	**Examiner's Comments** **AfL** There were occasionally some candidates who had 'No Response' answers which could be easily overcome through developing examination technique. Candidates should also be discouraged from choosing numbers from the set of alternatives and entering this in their answer box, rather than the letter of the alternative they think is correct.
			Total	**1**	
5			C ✓	**1** (**AO** 2.2)	**Examiner's Comments** The question assessed AO2.2 practical skills needed for using a microscope. Candidates did not demonstrate an awareness of skills in using a microscope. Few candidates identified the correct response. All distractors were seen in significant numbers. This is clearly an area where candidates could develop application of skills in a practical situation.
			Total	**1**	

6			B ✓	**1** (**AO** 2.2)	**Examiner's Comments** The question assessed AO2.2 mathematical and practical skills needed for using a microscope. Most candidates were able to calculate the correct magnification for the objective lens. The most common distractor chosen by candidates was 200x. This indicates these candidates seemed unaware of the combined magnification power of the eyepiece and objective lenses to the overall magnification which the question was assessing.
			Total	**1**	

<table>
<tr>
<td>7</td>
<td>a</td>
<td></td>
<td>
<table>
<tr><th>Feature</th><th>Structure</th></tr>
<tr><td>chlorophyll for photosynthesis</td><td>chloroplast ✓</td></tr>
<tr><td>enzymes for respiration</td><td>mitochondria ✓</td></tr>
<tr><td>receptor molecules for communication</td><td>cell membrane ✓</td></tr>
</table>
</td>
<td>3
(AO1.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>i</td>
<td>FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = (×) 2000 award 2 marks

60(mm) ÷ 0.03(mm) ✓
= (×) 2000 ✓</td>
<td>2
(AO2.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii</td>
<td>(use of a) stain ✓</td>
<td>1
(AO1.2)</td>
<td>ALLOW named stain e.g. iodine / methylene blue / eosin
ALLOW dye
IGNORE colouring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>6</td>
<td></td>
</tr>
</table>

8	a		**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.04 (mm) award 2 marks**	2 (AO 2.2)	**ALLOW** 0.038 – 0.042

			20 ÷ 500 ✓ = 0.04 (mm) ✓		**ALLOW** 19 ÷ 500 **OR** 21 ÷ 500 **ALLOW** 40 **µm/micrometres** **ALLOW** 0.004 for 1 mark due to incorrect units for measurement **Examiner's Comments** This AO2.2 question often resulted in candidates only scoring 1 mark, with relatively few candidates answering this correctly. Common mistakes were inaccurate measurement of the line, not converting the measurement into mm and not applying the formula correctly. Quite a few candidates wrote 2/500 = 250.
	b		(yes) smallest (size of cell) 8 µm/0.8 thousands of a millimetre ✓ (size is) greater than 0.02 thousands of a millimetre / 0.2 µm ✓	2 (AO 2.2)	If answer is no award zero marks **Examiner's Comments** This AO2.2 question was testing candidates' ability to work scientifically and interconvert units. It proved challenging. The vast majority of candidates concluded that the cells could not be seen so did not gain credit. Those that thought the cells could be seen often did not explain why adequately e.g. 'it has a better magnification', and did not use the measurements in the stem. Some did attempt to convert but were unsuccessful.
	c		(sub-cellular) structures were not clearly visible until electron microscopy ✓	1 (AO 1.1)	**ALLOW** idea that smaller organelles/structures can now be seen by electron microscope **ALLOW** electron microscopes have a higher resolution / magnification **ALLOW** (sub-cellular) structures/organelles shown in more detail/easier to see **Examiner's Comments** The question was testing AO1 recall of the use of EM. Many candidates simply said 'it allows us to see cells in more detail' or similar without linking this to subcellular structures.
			Total	**5**	
9		i	**First check answer on answer line** **If answer = 1000 (x) award 2 marks** $\frac{10}{0.01}$ ✓ 1000 (x) ✓	**2** **(AO 1.2)**	**Examiner's Comments** This question assessed their AO1.2 mathematical and AO2.2 practical skills.

				(AO 2.2)	Some candidates correctly gave 1000 and scored 2 marks. However, the working out of nearly all candidates indicated that there was little understanding of the calculation required, as single marks were very rare. The most common incorrect response was 100.
		ii	5(μm)	**1** **(AO 2.2)**	**ALLOW** +/− 1 μm tolerance **Examiner's Comments** The question assesses AO2.2. A significant number of candidates were able to get the correct answer within tolerance. The most common error was to just measure the length of the chloroplast to 7.5 and fail to use the scale measurement to adjust the estimate.
			Total	**3**	
10		i	structure X is too big to be a virus	1	**allow** viruses cannot be seen with a light microscope
		ii	use an electron microscope (1)	1	
			Total	**2**	
11			A	1	
			Total	**1**	
12			A	1	
			Total	**1**	
13	a		4 1 2 5 3 all correct = 2 one out of sequence = 1	2	
	b		as a stain (1)	1	
			so can see organelles (1)	1	**allow** to increase contrast
	c	i	contains genes / genetic material / DNA (1)	1	
		i	controls cell (functions) (1)	1	**allow** protein synthesis
		ii	(onion cells) do not photosynthesize (1)	1	
		ii	(because) they are underground / in the dark (1)	1	
	d		0.25 (mm) (2)	2	**allow** 1.5 ÷ 6
	e		more difficult to focus (1)	1	

			smaller field of view (1)	1	
			Total	**12**	
14			D	1	
			Total	**1**	