Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1		i	Spores / fungi / powdery mildew more likely to be splashed by the rain (on to plants) / transported by splashes of rain ✓ Spores / fungi / powdery mildew grow better in moist weather ✓	2 (2 x AO 2.1)	**IGNORE** references to wind **ALLOW** moist weather / rain helps spores / fungi / powdery mildew to grow **Examiner's Comments** Where candidates scored 1 mark on this question, it was usually for identifying that the spores got splashed and therefore transported to the plants in the spring. The second mark proved harder to obtain, with candidates not recognising that **more** spores would be produced due to the cool, moist weather.
		ii	Sexual (reproduction) ✓	1 (AO 2.1)	**Examiner's Comments** This question proved challenging for the majority of candidates. Many candidates incorrectly wrote asexual. Other incorrect responses included mitosis, heterozygous and homozygous.
		iii	Fungi on the pieces of dead barley ✓ Stops spores / fungi / powdery mildew spreading (to the new plants) ✓	2 (AO 2.1) (AO 3.1b)	**ALLOW** contaminating / infecting / moving as **AW** for spreading **Examiner's Comments** About half of all candidates scored 1 mark on this question, either for recognising that the dead barley would still contain spores, or for the idea that clearing the dead plants would stop the new plants getting infected.

			Total	**5**	
2		i	Female without SMA ✓	1 (AO 2.1)	**Examiner's Comments** Less than half of the candidates were able to use the information given to identify the correct phenotype. Incorrect responses typically selected one of the options given in the following question (e.g. heterozygous, homozygous dominant, or homozygous recessive). Other candidates attempted to write the genotype rather than state the phenotype.
		ii	Homozygous recessive ✓	1 (AO 3.1b)	**Examiner's Comments** This was answered correctly by around half of all candidates. There didn't appear to be a common distractor. Where there was an incorrect response, it was evenly spread between the other options.
		iii	Person **C** has SMA ✓ Their motor neurones cannot pass impulses to their muscles ✓ Their muscles cannot contract ✓	3 (AO 2.1 x 3)	**ALLOW** signals as AW for impulses **ALLOW** muscles cannot move **Examiner's Comments** Less than half of all candidates gained a mark on this question. Where 1 mark was given, it was usually for identifying that person C had SMA. Candidates were unable to then develop their response, tending just to repeat the information given in the question.
			Total	**5**	
3			A	1 (AO 1.1)	**Examiner's Comments** This question proved to be quite challenging for the majority of candidates. The most commonly seen incorrect response was D.
			Total	**1**	
4			D	1 (AO 2.1)	**Examiner's Comments**

					About half of all candidates answered this correctly. The most commonly seen incorrect response was B.
			Total	**1**	
5			D	1 (AO 1.1)	**Examiner's Comments** This was answered correctly by over half of candidates. There didn't appear to be a common distractor. Where there was an incorrect response, it was evenly spread across the other options.
			Total	**1**	
6			B	1 (AO 2.1)	**Examiner's Comments** The majority of candidates answered this correctly. The most commonly seen incorrect response was A.
			Total	**1**	
7			It is a quicker process. A It introduces variation into the population. S ✓	1 (1 xAO 1.1)	**Examiner's Comments** The majority of candidates answered this correctly.
			Total	**1**	
8	a		Gene ✓ Mutation ✓	2 (AO 2 x 1.1)	**Examiner's Comments** The majority of candidates answered this question correctly. Candidates that scored 1 mark on this question tended to get the mark for mutation.
	b		Selective breeding ✓	1 (AO 1.1)	**ALLOW** artificial selection **Examiner's Comments** There was considerable confusion between selective breeding and genetic engineering in these responses.
	c	i	West ✓	1 (AO 2.1)	**Examiner's Comments** Approximately half of all candidates answered this correctly.
		ii	A lower ✓	1 (AO 2.1)	**Examiner's Comments**

					Half of all candidates answered this correctly.
		iii	Because there are fewer birds to eat the sorghum / so less bitter sorghum needed ✓	1 (AO 3.2b)	**ALLOW** less bitter sorghum needed as less likely to get eaten **Examiner's Comments** Candidates who were credited a mark showed the link between there being fewer birds, so less sorghum would get eaten. Other candidates showed confusion and talked about it 'tasting less bitter, so the farmers could sell more crops'.
			Total	**6**	
9			**C**	1 (AO 2.1)	**ALLOW** 56 **Examiner's Comments** Around half of all candidates answered this question correctly. A and B were the most common distractors for candidates.
			Total	**1**	
10			**C**	1 (AO 1.1)	**Examiner's Comments** Answered correctly by majority of candidates.
			Total	**1**	
11			**A**	1 (AO 2.1)	**Examiner's Comments** The most common incorrect response was B.
			Total	**1**	
12			**C**	1 (AO 2.1)	**Examiner's Comments** Half of all candidates answered this correctly.
			Total	**1**	
13			**B**	1 (AO 1.1)	**Examiner's Comments**

					Half of all candidates answered this correctly.
			Total	**1**	
14	a		Bulbs will grow much faster than seeds ✓ The gardener will know the colour of the flowers from bulbs ✓	2 (2 × AO 1.2)	More than **2** boxes ticked then each additional incorrect box negates a mark **ALLOW** numbers instead of ticks **Examiner's Comments** The majority of candidates gained at least one mark here for correctly choosing the correct a statement on asexual reproduction.
	b		Pathogen ✓ Mutation ✓ Gene ✓	3 (3 × AO 1.1)	More than 1 answer for each line negates the mark **Examiner's Comments** This question differentiated well between lower and higher ability candidates. Candidates had to correctly complete each sentence from the list of words about genetics. Most candidates gained at least one mark.
	c		Microscopes didn't have the magnification/resolution / could not see the virus which was very small ✓	1 (AO 2.2)	**ALLOW** microscopes were not developed enough to see viruses **ALLOW** need an electron microscope / cannot be seen with a light microscope **ALLOW** ORA for modern day microscopes **IGNORE** technology **Examiner's Comments** Candidates found this question challenging and were unable to identify that microscopes would not have had the resolution or magnification ability to see the virus. Most answers which did not gain any marks wrote about technology not advanced.
			Total	**6**	
15	a	i		2 (AO 2.1)	**Examiner's Comments** More than half the candidates gained

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<tr>
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<table>
<tr><th></th><th>Number in the family</th></tr>
<tr><td>Number of males</td><td>6</td></tr>
<tr><td>Number of people who are homozygous recessive for the gene</td><td>5 ✓</td></tr>
<tr><td>Number of people who have amyloidosis</td><td>6 ✓</td></tr>
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</td>
<td>(AO 3.1a)</td>
<td>full marks here applying knowledge and understanding of genetic family tress and drawing conclusions on number of people who have amyloidosis. This question did differentiate well between ability of candidates.</td>
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<td></td>
<td></td>
<td>ii</td>
<td>
<table>
<tr><td></td><td>Person 1</td><td></td></tr>
<tr><td></td><td>a</td><td>a</td></tr>
<tr><td>Person 2 A</td><td>Aa</td><td>Aa</td></tr>
<tr><td>a</td><td>aa</td><td>aa</td></tr>
</table>
✓

Probability =
0.5 / ½ / 50% /1 in 2 / 1:1 ✓
</td>
<td>2
(AO 2.1)
(AO 3.2b)</td>
<td>ALLOW 50:50, 2/4
ALLOW ecf for correct interpretation of probability from diagram drawn
DO NOT ALLOW correct probability from incorrect diagram

<u>Examiner’s Comments</u>

Again this question on genetic inheritance differentiated well between the candidates. Those who did not correctly complete the genetic diagram would gain the correct probability mark as an error carried forward.

Assessment for learning

Candidates who could not complete the genetic cross correctly could be easily overcome through developing examination technique and practice.</td>
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<td>b</td>
<td></td>
<td>(Person 2 has) the dominant allele (A) ✓

Unable to control their blood glucose levels / have diabetes ✓

Would not be able to feel stimuli / slower responses/reactions/reflexes ✓</td>
<td>3
(AO 3.1a)
(AO 2.1)
(AO 2.1)</td>
<td>ALLOW person 2 is heterozygous

ALLOW reference to a specific symptom of diabetes
IGNORE low blood sugar

ALLOW reference to a specific stimulus

<u>Examiner’s Comments</u>

This question had one of the highest no responses. The question tested the application of knowledge and understanding of scientific ideas and analysis of information to interpret. Over half of candidates scored here but very few gained full marks. The</td>
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					most common mark given was for symptoms of diabetes. Very few candidates identified the person had inherited the dominant allele.
			Total	**7**	
16			A ✓	1 (AO 1.1)	**Examiner's Comments** The majority of candidates could not identify A as the correct answer for the sex chromosome the sperm would carry to produce a female baby. The most common incorrect answers were B and D where both would result in a boy and D would have Klinefelter syndrome which the candidates wouldn't be expected to know but should be able to identify that gaining an Y chromosome from the sperm would not produce a female baby. **Assessment for learning** Centres could focus on sex inheritance to improve understanding of haploid and diploid cells and that sperm and egg sex cells carry one sex chromosome.
			Total	**1**	
17			C ✓	1 (AO 1.1)	
			Total	**1**	