OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



MARK SCHEME

B1.3 HOW CAN AND SHOULD GENE TECHNOLOGY BE USED? (FOUNDATION)

SCORE	PERCENTAGE
/45	%

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Question			Answer/Indicative content	Marks	Guidance
1	a	i	C;	1	**Examiner's Comments** Was often well answered, but an appreciable number of responses gave a list of letters rather than choosing one option.
		ii	B;	1	**Examiner's Comments** Was much better answered than 2bi, suggesting that candidates were clearer on the idea of what was a scientific question than they were on what was an ethical question.
	b	i	38 or 39;	1	accept 38 – 39 / 38 to 39 **Examiner's Comments** Looked for candidates to read an age of 38 or 39 from the graph. A majority of candidates were able to do this. The most frequent incorrect response was 40, which suggests that some need more practice in this skill in data handling.
		ii iii	*any two from:* the older the mother; the more likely to have a child with Down's; Or the rate of risk increases with little or no risk at 20–25 years of age; there is a higher risk after 35;	2	accept a positive correlation between age and risk **Examiner's Comments** Was well answered; it was encouraging to see so many candidates link both factors in the correlation.
			ask patients how they feel ☐ use a larger sample size ✓ collect data for other genetic conditions ☐ collect data for other ages ✓ use smaller graph paper ☐ collect data from just one hospital ☐	2	Deduct 1 mark for each additional incorrect response if more than 2 boxes are ticked. Minimum mark = 0 **Examiner's Comments** More commonly yielded one mark rather than two. A notably frequent wrong answer was “collect data for other genetic conditions”. It was pleasing to see virtually all candidates place the correct number of ticks in the boxes even when they were selecting wrong options.

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Question			Answer/Indicative content	Marks	Guidance
		iv	there is only a small chance of having Down's syndrome; but consequence is large / any qualification of consequence;	2	accept “there is a 1% chance” for the first marking point consequences include cost, stress, challenging to parent, affects other family members, is a long term commitment. Examiner's Comments Asked for a comment about the small chance of having a Down's syndrome and also a comment about the large consequence of having such a child. Very few candidates seemed to realise that this was a question about risk and consequence.

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Question			Answer/Indicative content	Marks	Guidance
	c		**Level 3 (5–6 marks)** Includes several indicative scientific points from at least two or three areas. Quality of written communication does not impede communication of science at this level **Level 2 (3–4 marks)** Includes an indicative scientific point or points from at least two areas. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Includes an indicative scientific point or points from at least one area. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C.** **Indicative scientific points about implications of test may include:** • risk of miscarriage as a result of having the test • results may not be accurate • false positives and false negatives • risk of infection or harm to the foetus **Indicative scientific points about decisions may include:** • whether or not to have children • whether or not they would terminate a pregnancy • who to inform of their decision **Indicative scientific points about implications of not or after testing may include:** • financial implications of having a disabled child • stress on family if they have a disabled child • care issues / quality of life • test result could reveal other information eg paternity issues and other disorders • problems re employment • problems re insurance **Use the L1, L2, L3 annotations in SCORIS; do not use ticks.** **Examiner's Comments** Was common to the higher tier paper. Many responses were limited to references to risks of the procedure such as the chances of miscarriage. The most common route to Level 2 was mention of a decision to terminate. Level 3 responses were few, and were again characterised by being clear and detailed.
			Total	**15**	

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Question			Answer/Indicative content	Marks	Guidance
2	a	i	120 mins	1	**Accept** 2 hours
		ii	Any one from… Some will die idea of availability of resources idea that conditions throughout will vary	1	
		iii	(Bacteria) Quicker / cheaper	1	ORA
	b	i	A gene / genetic material / DNA Is transferred from one organism to another	2	**Accept** ref to 'vector' for transfer
		ii	Idea of providing more food / growing in a wider range of conditions / places / can grow all year round	1	**Ignore** ref to being able to grow in cold conditions (in stem) **Examiner's Comments** The calculation caused problems for many candidates, however, the parts concerning genetic modification were much answered more successfully.
			Total	**6**	
3	a		C before F; F before B; B before A; A before D;	4	(Correct order C F B A D) **Examiner's Comments** This was well answered indicating that many candidates knowledge of genetic modification was good.
	b		Can use herbicide on crop; to kill weeds; Crop not damaged;	3	**Examiner's Comments** There was a large problem in this question with candidates not knowing what a herbicide does. A number knew that it killed something but many were under the misapprehension that it killed insects.
			Total	**7**	

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<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4</td><td></td><td>i</td><td>
<table>
<tr><td>Each drug works in the same way in every person.</td><td></td></tr>
<tr><td>Less money is wasted prescribing drugs that don't work.</td><td>✓</td></tr>
<tr><td>Doctors don't have to learn about so many drugs.</td><td></td></tr>
<tr><td>People won't have to visit the doctor anymore.</td><td></td></tr>
<tr><td>The drugs will always cure the patient from the disease.</td><td></td></tr>
<tr><td>It may reduce the number of people who suffer dangerous side effects.</td><td>✓</td></tr>
<tr><td>The doctor can adjust the dose of the drug to suit the patient.</td><td>✓</td></tr>
</table>
</td><td>3</td><td>All three correct for three marks
Two correct for two marks
One correct for one mark

More than 3 boxes ticked, negate 1 mark for each additional tick.

<u>Examiner's Comments</u>

Candidates were asked to apply their knowledge of genetic testing to identify three benefits of genetically testing people before prescribing drugs. This question was answered well with most candidates gaining at least one mark and over half of all candidates correctly identifying all three benefits.</td></tr>
<tr><td></td><td></td><td>ii</td><td>
<table>
<tr><td>Some people might be discriminated against the test result is known.</td><td>✓</td></tr>
<tr><td>Some people might find the test painful.</td><td></td></tr>
<tr><td>It will cost too much to test everyone.</td><td></td></tr>
<tr><td>The results of the test might be inaccurate.</td><td></td></tr>
<tr><td>We all have the right to choose whether they are tested or not.</td><td>✓</td></tr>
</table>
</td><td>2</td><td>More than 2 boxes ticked, negate 1 mark for each additional tick.

<u>Examiner's Comments</u>

This question asked candidates to consider the ethical reasons why people might object to compulsory testing. Again this question was answered well with very few candidates failing to gain any marks on this question. Candidates scoring one mark on this question often did so for the response 'everyone should have the right to choose whether they are tested or not'.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
<tr><td>5</td><td></td><td></td><td>unethical / fetus is a living things with rights
/
should not interfere with nature / may harm the fetus / baby / may cause a miscarriage
(1)</td><td>1</td><td>allow religious argument
do not allow vague references to harm
ignore harm to mother / ideas about results being unreliable

Examiner's Comments

Generally this question was answered well. Common incorrect answers made reference to potential harm to the mother or the inaccuracy of the test.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>1</td><td></td></tr>
</table>

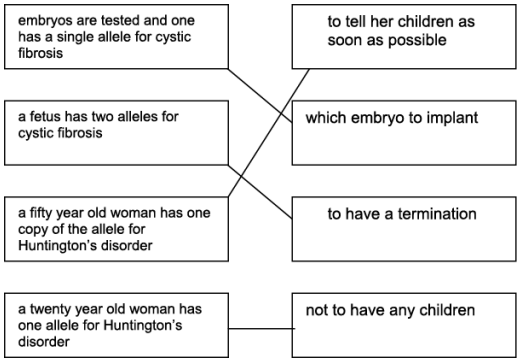
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Question			Answer/Indicative content	Marks	Guidance
6			**[Level 3]** Includes reference to **getting** the gene AND **transferring** the gene AND **expressing** the gene. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Includes reference to **getting** the gene AND **transferring** the gene OR **getting** the gene **AND expressing** the gene. OR **transferring** the gene AND **expressing** the gene. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Includes reference to **getting** the gene OR **transferring** the gene OR **expressing** the gene. 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 D to C** **Indicative scientific points may include:** • identify gene • isolate gene **Getting the gene** **Transferring the gene** • put gene into vector • example of vector eg virus / aerosol / plasmid / phage • explanation of how insertion occurs **Expressing the gene** • idea that DNA is common in all organisms *in humans* • transferred gene makes Factor 8 *in bacteria* • transferred gene makes Factor 8 • bacteria reproduce • isolate / purify Factor 8 / give people Factor 8 **If they inject bacteria into human, then max** **L2** **Use the L1, L2, L3 annotations in Scoris; do not use ticks.** **Examiner's Comments** This six-mark extended-writing question produced a very disappointing response from the majority of the candidates. The key indicative science points about how the gene is obtained, transferred or expressed were either missing totally or explained in a very confused way.

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Question			Answer/Indicative content	Marks	Guidance
			Total	6	
7				3	4 lines correct = 3 marks 2 or 3 lines correct = 2 marks 1 line correct = 1 mark 2 lines from one box negates that mark **Examiner's Comments** This question tested candidates' ability to link up different results of tests with possible decisions. It was encouraging to see that candidates were able to link most of these correctly.
			Total	3	
8			idea that genetic disease / Steve & Val is much more serious / dangerous than polydactyly / Mel & Jo (1) (Steve & Val) May be more likely to have termination (1)	2	**accept** more life-threatening O.R.A. **Examiner's Comments** In this question, candidates were asked to explain why parents may make different choices regarding the termination of a foetus. Few candidates were able to explain the general idea that polydactyly was not as serious as brain damage and to therefore explain which couple may terminate the pregnancy.
			Total	2	

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