OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

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

SCORE	PERCENTAGE
/45	%

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1(a). Ali and Mary do not have cystic fibrosis, but their baby does.

Ali and Mary consider whether or not to have another child.
These are some of the questions that they could consider before making their decision.

A	How much will it cost to have another child with cystic fibrosis?
B	What is the chance of another child of ours having cystic fibrosis?
C	If we find that the foetus has cystic fibrosis should we have a termination?
D	Do we want to have a boy or a girl?
E	What will other people think?
F	Should we discuss this with the grandparents?

(i) Which question, **A**, **B**, **C**, **D**, **E** or **F**, is an **ethical** issue?

question = _____ **[1]**

(ii) Which question, **A**, **B**, **C**, **D**, **E** or **F**, can be answered by **science**?

question = _____ **[1]**

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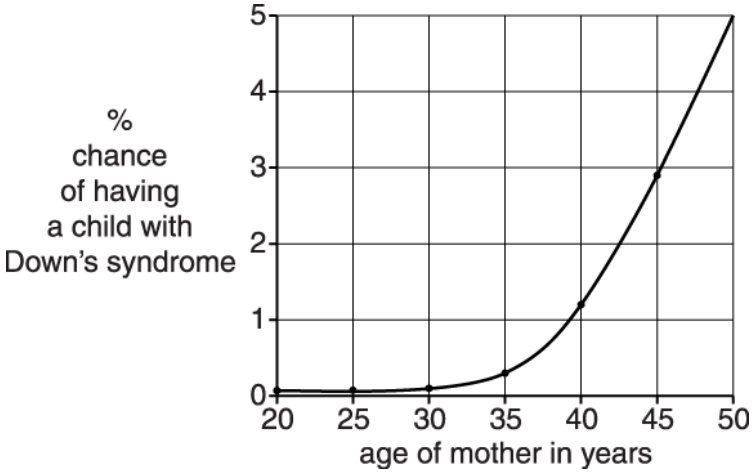
(b). Another couple, Rajesh and Sangeeta, are thinking of having a baby.

They talk to a genetic counsellor.

They are told that because of Sangeeta's age they have a 1% chance of having a child with Down's syndrome.

This would mean that the child could have some physical and mental issues.

Look at the graph.



(i) What is Sangeeta's age?

_____ years **[1]**

(ii) Describe the **trend** shown by the graph.

_____

_____

_____ **[2]**

(iii) It is possible to increase confidence in the trend shown by the graph.

Put ticks (✓) in the boxes next to the **two** best methods.

ask patients how they feel	☐	collect data for other ages	☐
use a larger sample size	☐	use smaller graph paper	☐
collect data for other genetic conditions	☐	collect data from just one hospital	☐

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[2]

(iv) Explain how the information supplied by the graph and the genetic counsellor could affect any decision taken by Rajesh and Sangeeta about whether or not to have a baby.

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[2]

(c). Rajesh and Sangeeta decide to have a baby.
They decide that if Sangeeta becomes pregnant, the foetus will be tested for genetic disorders.

Describe the implications that need to be considered of having the foetus tested.



The quality of written communication will be assessed in your answer.

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[6]

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2(a). Bacteria can be grown on a large scale in fermenters to produce medicines.

A single bacterium can reproduce in the fermenter by dividing into two every twenty minutes.

(i) Starting with **ten** bacteria, how long will it take for the fermenter to contain **640** bacteria?
Show your working.

_____ min **[1]**

(ii) Suggest **one** reason why it is not possible to calculate accurately the number of bacteria in the fermenter after 48 hours.

_____

_____ **[1]**

(iii) Some medicines can be made by growing plants and then extracting the medicine.
Scientists often prefer to use bacteria to make medicines.
Use your answer from **(i)** to suggest why bacteria are used instead of plants.

[1]

_____

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(b). Bacteria can be genetically modified to produce different medicines.

(i) Explain what is meant by genetic modification.

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[2]

(ii) Some crop plants can grow only in hot conditions.
Scientists want to genetically modify some crops so that they can also growin colder conditions.

Suggest why this might be a useful application of genetic modification.

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[1]

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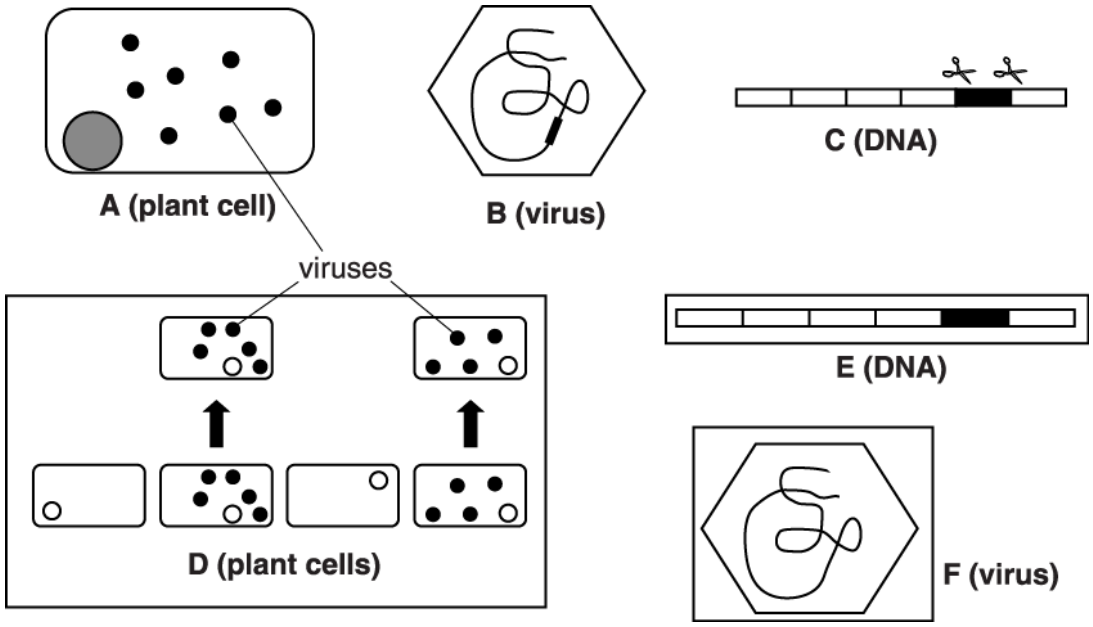
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3(a). Genetic modification is where a gene from one organism is transferred to another organism.
The gene continues to work.
Genetic modification can be used to make crop plants resistant to herbicides.

The stages in this process are listed in the correct order.

1	Find the herbicide resistant gene.
2	Isolate and remove the gene from the original DNA.
3	Find a suitable virus vector.
4	Insert the gene into the vector.
5	Replicate the vector in a plant cell.
6	Select cells with the herbicide resistant gene.

The diagrams show the stages in this process. **They are not drawn to scale**.
They are not in the correct order.



Write down the correct order of the diagrams.
The first one has been done for you.

E _____ _____ _____ _____ _____

[4]

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(b). Suggest why scientists would want to make a crop plant resistant to a herbicide.

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[3]

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4.

(i) A doctor can prescribe drugs to treat heart disease.

It is now possible to genetically test people before prescribing drugs.

What are the benefits of this type of genetic testing?

Put ticks (✓) in the boxes next to the **three** correct answers.

Each drug works in the same way in every person. ☐

Less money is wasted prescribing drugs that don't work. ☐

Doctors don't have to learn about so many drugs. ☐

People won't have to visit the doctor any more. ☐

The drugs will always cure the patient from the disease. ☐

It may reduce the number of people who suffer dangerous side effects. ☐

The doctor can adjust the dose of the drug to suit the patient. ☐

[3]

(ii) Some people believe that this type of genetic testing should be compulsory for everyone.

Which of the following are **ethical** reasons why people might object to compulsory testing?

Put ticks (✓) in the boxes next to the **two** best **ethical** reasons.

Some people might be discriminated against when the test result is known. ☐

Some people might find the test painful. ☐

☐

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It will cost too much money to test everyone.

The results of the test might be inaccurate. ☐

Everyone should have the right to choose whether they are tested or not. ☐

[2]

5. Some people do not agree with fetal testing.

Suggest why.

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[1]

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6. People with haemophilia lack the gene to make the protein Factor 8 (Factor VIII).
As a result their blood cannot clot if they cut themselves.

Suggest how the process of genetic modification could be carried out to treat people with haemophilia.



The quality of written communication will be assessed in your answer.

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[6]

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7. Genetic testing can be used for screening adults, children and embryos for genetic disorders.

There are different reasons for genetic testing and the results can lead to different decisions.

Draw a straight line from each **result of the test** to a **possible decision** the person makes.

result of the test	possible decision
embryos are tested and one has a single allele for cystic fibrosis	to tell her children as soon as possible
a fetus has two alleles for cystic fibrosis	which embryo to implant
a fifty-year-old woman has one copy of the allele for Huntington's disorder	to have a termination
a twenty-year-old woman has one allele for Huntington's disorder	not to have any children

[3]

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8. Two different sets of parents get the results of a genetic test.

Steve and Val are told their fetus has a type of genetic disease that causes brain damage and death during early childhood.

Mel and Jo are told their fetus has polydactyly.

Polydactyly is when a person has an extra finger or toe.

One consequence of genetic testing is to decide whether or not to have the pregnancy terminated.

Based on this information, each set of parents may make a different decision about terminating the pregnancy.

Suggest why.

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[2]

END OF QUESTION PAPER

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