

Candidate forename						Candidate surname					
Centre number						Candidate number					

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE
A221/02
TWENTY FIRST CENTURY SCIENCE
BIOLOGY A

Unit 1: Modules B1 B2 B3 (Higher Tier)

TUESDAY 15 MAY 2012: Morning
DURATION: 40 minutes
plus your additional time allowance
MODIFIED ENLARGED

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil
Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [] at the end of each question or part question.**
- **The total number of marks for this paper is 42.**

Answer ALL the questions.

1 Cells contain genes.

Genes control how an organism develops.

(a) Which of these substances are coded for by genes?

Put a ring around all of the correct answers.

ENZYMES

CARBOHYDRATES

FATS

PROTEINS

VITAMINS

MINERALS

[2]

(b) Sometimes these genes are faulty.

The family tree, opposite, shows the inheritance of a faulty gene that causes Huntington's disorder.

(i) Which word describes the allele that causes Huntington's disorder?

Put a ring around the correct answer.

MATERNAL

DOMINANT

INDEPENDENT

PATERNAL

RECESSIVE

[1]

(ii) Wendy's mother is expecting another baby.

What are the chances of this baby having Huntington's disorder?

Put a ring around the correct answer.

100%

75%

50%

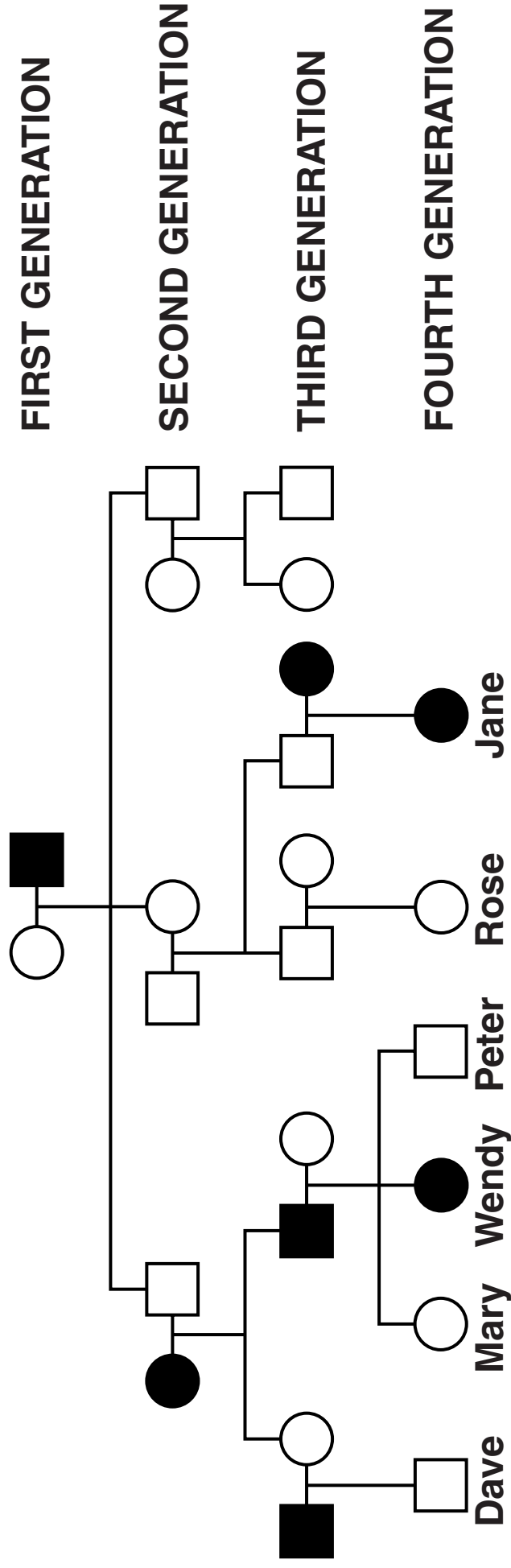
30%

33.3%

25%

0%

[1]



5

○ Female without Huntington's disorder

□ Male without Huntington's disorder

● Female with Huntington's disorder

■ Male with Huntington's disorder

- (c) A disorder caused by a faulty gene found on the Y chromosome would only occur in males.**

The faulty gene for Huntington's disorder is NOT found on the Y chromosome.

Which of the following explanations support this information?

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

Use the genetic diagram to help you answer.

The first generation only has males with Huntington's disorder. ☐

Males can inherit the disorder from their mother. ☐

Huntington's disorder is passed on through the genes. ☐

The symptoms of the disorder do not appear until a person is in their forties. ☐

Both males and females can have Huntington's disorder. ☐

Huntington's disorder affects nervous tissue. ☐

There are two alleles for the gene that can cause Huntington's disorder. ☐

Females can inherit the disorder from their father. ☐

[3]

(d) Look at the fourth generation.

(i) Jane marries and has a child.

The child does NOT have Huntington's disorder.

Explain why.

[2]

(ii) Write down the names of all the people in the FOURTH GENERATION who could pass on the disorder to their offspring.

[1]

[Total: 10]

2 Sunita discovers she is pregnant.

She is worried because she and her partner carry the allele for cystic fibrosis.

(a) State TWO symptoms of cystic fibrosis.

symptom 1 _____

symptom 2 _____ [1]

(b) Sunita is thinking about having a genetic test to see if her unborn baby has cystic fibrosis.

Sunita could have an AMNIOCENTESIS TEST or CHORIONIC VILLUS SAMPLING.

Look at the statements numbered 1 to 6 about testing for cystic fibrosis.

1	Chorionic villus sampling can be performed earlier in pregnancy than amniocentesis.
2	Some people think genetic testing is wrong but others think it is good because it prevents suffering.
3	Cystic fibrosis is a genetic disorder.
4	Parents should discuss whether or not to have a test with as many different people as possible to get their different views.
5	There is a greater risk of miscarriage with chorionic villus sampling than with amniocentesis.
6	Sunita has to decide whether or not to have one of the tests and which test to have.

To answer the following questions you can use each statement once, more than once, or not at all.

- (i) Which statement, 1, 2, 3, 4, 5 or 6, states clearly what the issue is?**

statement_____ [1]

- (ii) Which statement, 1, 2, 3, 4, 5 or 6, summarises different views that might be held?**

statement_____ [1]

- (iii) Sunita decides to have a test.**

Which two statements from 1, 2, 3, 4, 5 and 6, will Sunita need to consider when she decides which test to have?

statements_____ and _____ [1]

- (iv) Which statement, 1, 2, 3, 4, 5 or 6, implies that some actions are difficult to justify?**

statement_____ [1]

- (c) Some people think that the right decision is the one that leads to the best outcome for the majority of people involved.**

Use the example of Sunita to explain what this means.

[2]

[Total: 7]

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3 This question is about diseases and vaccinations.

(a) Read the following facts about disease and vaccinations.

1	Although vaccines have side effects for a small number of people, the serious symptoms of the disease are prevented in a large proportion of the population.
2	It is never possible to vaccinate 100% of the population.
3	In the early 1900s, some religious groups refused vaccinations on religious grounds.
4	Some viruses change over a period of time.
5	Although vaccination programmes are expensive, they save money in the long run by preventing epidemics that are expensive to treat.
6	The more people that are vaccinated, the less chance there is of coming into contact with someone who has the disease.
7	Vaccines usually contain a safe form of the disease-causing microorganism.
8	Influenza is an example of a viral disease easily spread between people through coughing and sneezing.

- (i) Choose a statement from 1, 2, 3, 4, 5, 6, 7 and 8, which describes both an effect and its causal link?**

statement_____ [1]

- (ii) Which statement, 1, 2, 3, 4, 5, 6, 7 or 8, best describes a course of action taken on social grounds?**

statement_____ [1]

- (iii) Which statement, 1, 2, 3, 4, 5, 6, 7 or 8, best describes a course of action taken on economic grounds?**

statement_____ [1]

- (iv) Which statement, 1, 2, 3, 4, 5, 6, 7 or 8, best illustrates the view that the right decision is the one that leads to the best outcome for the majority of people involved?**

statement_____ [1]

- (v) Which statement, 1, 2, 3, 4, 5, 6, 7 or 8, describes something that is not technically feasible?**

statement_____ [1]

- (vi) Which statement, 1, 2, 3, 4, 5, 6, 7 or 8, explains why, to prevent epidemics, it is necessary to vaccinate a high percentage of the population?**

statement_____ [1]

(b) New vaccines have to be tested for safety and effectiveness.

Describe and explain the types of tests that are used.

[5]

[Total: 11]

4 Many bacteria have evolved to become resistant to penicillin.

(a) This is partly due to random and spontaneous changes that can occur in genes.

Write down the name given to these changes in genes.

_____ **[1]**

(b) Which of the statements about these changes in genes are true?

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

Changes to genes in body cells can be passed on to the next generation. ☐

Changes to genes are caused by natural selection. ☐

All environmental factors can change genes. ☐

Changes to genes may produce new characteristics. ☐

Sexual reproduction changes genes. ☐

Changes to genes are caused by artificial selection. ☐

Changes to genes in sex cells can be passed on to the next generation. ☐

[2]

(c) New species are produced by a combination of events.

Which three of the following could combine and lead to the formation of a new species?

Put rings around the three correct answers.

ASEXUAL REPRODUCTION

BIODIVERSITY

CLONING

ENVIRONMENTAL CHANGE

FORMATION OF FOSSILS

MUTATIONS

NATURAL SELECTION

SUSTAINABILITY

[3]

[Total: 6]

5 Variation and biodiversity are important.

(a) Variation occurs between organisms of the same species.

Which of these statements about variation are true?

Put ticks (✓) in the boxes next to the THREE correct statements.

Variation can be caused by the environment. ☐

Variation only occurs between organisms of the same species. ☐

Variation is caused by natural selection. ☐

Genetic variation can be passed from parent to offspring. ☐

Environmental variation is passed from parent to offspring. ☐

Variation is only caused by selective breeding. ☐

Variation does not occur between clones. ☐

Variation can be caused by genes. ☐

[3]

(b) Which two of the following statements depend upon biodiversity?

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

The transfer of information between different organisms. ☐

Showing how artificial selection took place. ☐

Transferring energy from the Sun into food. ☐

The extinction of a species. ☐

The future development of food crops. ☐

The production of new medicines. ☐

[2]

- (c) Maintaining biodiversity is an important part of using the environment in a sustainable way.**

Explain what is meant by sustainability.

[2]

- (d) Human activity can reduce biodiversity and even lead to extinction of a species.**

Name one example of an extinction caused by human activity.

[1]

[Total: 8]

END OF QUESTION PAPER

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