**Genetics**

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| Instructions to students  • You have 50 minutes to complete the test.  • Please answer all questions in the spaces provided.  • There is to be no talking during the test. | Marks  Section I: Multiple-choice questions: 10 marks  Section II: Short-answer questions: 34 marks  Section III: Extended-response questions: 6 marks  Total: 50 marks |

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| Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Score: /50  Grade: % |
| Comments: | |

Section I: Multiple-choice questions

For each question, circle the correct answer.

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| 1 How many different phenotypes are there in the punnet square? | | | |  |  |  | | --- | --- | --- | | P2 | *N* | *n* | | *N* | *NN* | *Nn* | | *n* | *Nn* | *nn* | |
| A | 4 | |
| B | 3 | |
| C | 2 | |
| D | 1 | |
| 2 A sex-linked trait is one that: | | | |
| A | affects the sex organs of the female. | | |
| B | only affects females. | | |
| C | is caused by a gene carried on the X chromosome. | | |
| D | only affects males. | | |
| 3 Which nucleotide will bond to adenine in DNA? | | | |
| A | Cytosine | | |
| B | Guanine | | |
| C | Uracil | | |
| D | Thymine | | |
| 4 Select the option that will complete the complementary pairs in the above strand of DNA: | | | |
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| A | G C,  T A | | |
| B | G T,  A C | | |
| C | C T,  T C | | |
| D | A T,  C G | | |
| 5 In a cross between two homozygous dominant individuals, the chance of a heterozygous child is: | | | |
| A | 0%. | | |
| B | 50%. | | |
| C | 75%. | | |
| D | 100%. | | |
| 6 In the above pedigree, the trait shown by the affected individuals would be: | | L:\1. Publishing and Editorial\1. Product\Oxford Science\Oxford Science VICTORIA\Oxford Science 10 VIC\2. Extras\16. Class tests\Artwork\Final jpegs\CT0103_07059.jpg | |
| A | dominant. |
| B | recessive. |
| C | either recessive or dominant. |
| D | neither recessive or dominant. |
| 7 Plants that have been modified in the laboratory to enhance desired traits are known as: | | | |
| A | transgenic organisms. | | |
| B | genetically modified organisms. | | |
| C | embryonic stem cells. | | |
| D | adult stem cells. | | |
| 8 A female with blood group AB and a male with blood group O have a child. | | | |
| The genotypes and phenotypes of the ABO blood group are as follows:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Genotype | IAIA | IAi | IAIB | IBIB | IBi | ii | | Phenotype | A | A | AB | B | B | O |   The child is: | | | |
| A | most likely to have blood group A. | | |
| B | most likely to have blood group O. | | |
| C | most likely to have blood group B. | | |
| D | equally likely to have blood group B or blood group A. | | |

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| 9 The type of cells that might be used in the future to treat diseases such as cancer and multiple sclerosis as well as spinal cord injuries, are: | |
| A | embryonic stem cells. |
| B | nerve cells. |
| C | sex cells. |
| D | adult stem cells. |
| 10 In rabbits, normal colour (C) is dominant to albino (c). A boy crossed a normal rabbit that has one albino gene with an albino rabbit. The offspring would be expected to be: | |
| A | all normal colour. |
| B | all albino. |
| C | 75% normal colour and 25% albino. |
| D | 50% normal colour and 50% albino. |

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|  | Section I  total marks:  /10 marks |

Section II: Short-answer questions

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| 11 Label the three parts of the nucleotide shown in the diagram below. | |
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|  | /3 marks |
| 12 Give three practical applications of genetic engineering. | |
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|  | /3 marks |
| 13 What are the two types of genetic mutation? What is the difference between them? | |
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|  | /4 marks |

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| 14 Identify the complementary base pairs of DNA and name type of bond joins these bases together. | |
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|  | /3 marks |
| 15 Write the complementary base sequence of: **A G C C G T A T A A**.  Is this a sequence of DNA or RNA? Justify your choice. | |
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|  | /3 marks |
| 16 What two factors affect the phenotype of an organism? | |
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|  | /2 marks |

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| 17 ‘A dominant trait is one that is expressed by a greater percentage of the population and a recessive trait is one that is expressed by a very small percentage of the population.’  Is this statement true or false? Give reasons for your answer. | |
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|  | /2 marks |
| 18 Describe the difference between a mutation and mutagen. | |
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|  | /2 marks |
| 19 How can privacy be an issue with regards to genetic screening? | |
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| 20 Identify the type of cell division shown in the diagram below. Give a reason for your choice. | |
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|  | /2 marks |
| 21 Describe the difference between a mutation and mutagen. | |
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| 22 Determine the pattern of inheritance shown in the pedigree diagram below. | |
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|  | /2 marks |
| 23 Mendel discovered that in pea plants the green pea pod is dominant over the yellow pea pod. Use *G* to represent the allele for green pea pods and *g* to represent the allele for yellow pea pods.  • Write the genotype for a homozygous plant with yellow pea pods.  • Write the phenotype for a heterozygous plant.  • Draw and complete a Punnett square to represent the cross of two heterozygous plants. | |
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|  | /4 marks |
|  | Section II total marks:  /34 marks |

Section III: Extended-response questions

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| 24 The karyotype below is of an individual that has a chromosomal mutation. Discuss how this type of chromosomal mutation occurs due to non-disjunction. In your answer:  • identify whether this individual is male or female  • identify the syndrome this individual has  • describe what non-disjunction is and how non-disjunction can lead syndromes, such as the one shown in the karyotype. | |
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|  | /6 marks |
|  | Section III total marks:  /6 marks |