

Genetics

1. Genetics is the study of _____
2. In a woman the sex chromosomes are XX; in a man they are _____
3. Explain briefly what is meant by a gene.
4. True or false. Human chromosomes are found in the nucleus.
5. Where in the nucleus would you find genes?
6. What is the significance of the fact that the two allele pairs are located on different chromosome pairs?
7. The genetic code is contained within the DNA of chromosomes. Briefly describe the nature of this code.
8. What is meant by non-coding DNA?
9. What is a chromosome?
10. What is meant by sex-linked?
11. What is meant by the term segregation as used in genetics?
12. State the products of segregation when an organism is heterozygous in respect of the dominant allele A.
13. State the Law of Independent Assortment.
14. Define the following terms as used in genetics: linkage, sex linkage.
15. True or false. Chromosomes are made of DNA and lipid
16. What is meant by the term DNA profiling?
17. State **two** uses of DNA profiling.
18. Explain each of the following terms in relation to DNA: replication, transcription.
19. Name the four bases that are found in DNA.
20. What is meant by a triplet code?
21. The triplet code is transcribed into mRNA. What does this statement mean?
22. The DNA molecule is composed of two strands held together by paired bases.
Which base can link only to thymine?
Which base can link only to cytosine?
23. "The same amount of DNA is present in nuclei of cells taken from the liver, heart, pancreas and muscle of a rat." Use your knowledge of DNA and mitosis to explain this statement.
24. Explain what is meant by the term DNA profiling.
25. Name the type of bonding which occurs between members of a base pair in DNA.

26. What are the stages involved in DNA profiling.
27. Give **two** applications of DNA profiling.
28. In order to make proteins, DNA is first transcribed as _____
29. Give one structural difference between DNA and RNA.
30. Name the nitrogenous bases whose first letters are A and C.
31. DNA contains the instructions needed to make protein. These instructions are called the _____ code.
32. In relation to protein synthesis
 1. what is transcription.
 2. what is a triplet and state the role of a triplet.
 3. describe the role of tRNA.
33. What term is used to describe an individual's genetic makeup?
34. What term is used by biologists to describe differences within a population with respect to features such as height?
35. Explain the following terms that are used in genetics: dominance, genotype, phenotype.
36. Explain each of the terms: alleles, recessive.
37. Explain the following terms, which are used in genetics: allele, homozygous, genotype.
38. The allele for brown eye (B) is dominant to the allele for blue eye (b).
Explain each of the underlined terms.
39. Explain the following terms which are used in genetics: homozygous, recessive, phenotype
40. For hair colour black (B) is dominant over brown (b). Seán is heterozygous (Bb) and Máire is homozygous (bb).
 1. What colour is Seán's hair?
 2. What colour is Máire's hair?
41. What is a mutation?
42. State one cause of mutation.
43. Give an example of a condition, found in the human population, that results from a mutation.
44. When the normal control of mitosis in a cell is lost, cancer may result. Suggest two possible causes of cancer.
45. A change in the genetic material of an organism is called _____
46. Give a brief account of the Theory of Natural Selection.
47. Name a scientist responsible for the Theory of Natural Selection
48. What is meant by the term evolution?
49. Describe the process of natural selection.

50. Give an account of the evidence for evolution from a named source.
51. True or false. Organisms of the same species can usually produce fertile offspring.
52. What is evolution?
53. Name one of the scientists who developed the Theory of Natural Selection.
54. What is Natural Selection?
55. Explain the following terms as used in genetics: species, variation.
56. Name the scientists who are associated with the Theory of Natural Selection and refer to any one observation that prompted its development.
57. What is meant by evolution?
58. Outline the evidence for evolution from any one named source.
59. What is meant by genetic engineering?
60. State two applications of genetic engineering, one involving a micro-organism and one involving a plant.
61. What is meant by genetic screening?
62. Parents who are suspected of being carriers of disease-causing alleles may be advised to consider a genetic test. Suggest a role for such a test after in-vitro fertilisation.
63. What is genetic engineering?
64. Give one example of genetic engineering involving an animal and one example involving a plant.
65. What is genetic screening?
66. Give two biological advantages of breastfeeding.
67. Explain the terms: allele and dominant.
68. Name **one** of the scientists associated with the Theory of Natural Selection.
69. What is *genetic engineering*?
70. Name **three** processes involved in genetic engineering.
71. Give an example of an application of genetic engineering in each of the following cases:
 1. A micro-organism,
 2. An animal,
 3. A plant.
72. State Mendel's Law of Segregation.
73. Name two cell organelles, other than the nucleus, that contain DNA.
74. Explain the terms *alleles* and *dominant*.
75. What term is used to describe alleles that lie on the same chromosome?
76. Explain the term *species*.
77. What is meant by *variation*? State **two** causes of variation.
78. What is the significance of inherited variation in the evolution of species?
79. State **two** types of evidence used to support the theory of evolution.

80. What is meant by natural selection?
81. Name a scientist who is associated with the Theory of Natural Selection.
82. Variation is essential for natural selection. Mutation can give rise to variation. Give **two** causes of mutation.
83. Give **one** source of evidence for the occurrence of evolution.
84. What is meant by the term *species*?
85. Explain the following terms as used in genetics: (i) *heterozygous*, (ii) *incomplete dominance*, (iii) *phenotype*.
86. What is meant by DNA profiling?
87. In DNA profiling, what are used to cut DNA strands into fragments?
88. Give **two** applications (uses) of DNA profiling.
89. Name the plant from which you isolated DNA in your practical studies.
90. For what precise purpose did you use freezer-cold ethanol (alcohol) in your isolation of DNA?
91. Protein synthesis involves both transcription and translation.
 1. Where in a cell does **transcription** occur?
 2. What type of RNA is involved in transcription?
 3. In what organelle does **translation** occur?
 4. What must happen to the newly formed protein before it can begin to work?
92. When a pure-breeding black cat was mated with a pure-breeding white cat, all the kittens were black. Which fur colour, black or white, is **recessive** in these cats?
93. What are *alleles*?
94. Give **one** example of an **inherited** human characteristic.
95. Give **one** example of a **non-inherited** human characteristic.
96. Which structures in sperm and egg nuclei are responsible for biological inheritance?
97. What is meant by DNA profiling?
98. Where in plant cells is DNA found?
99. The genetic make up of an individual is called its _____
100. A sex cell is also known as a _____
101. A change in the structure of DNA is called a _____
102. A part of DNA with information to make one protein is called a _____
103. The allele expressed in the heterozygous condition are _____
104. The study of biological inheritance is known as _____
105. Distinguish between the terms
 1. *haploid* and *diploid*.

2. *homozygous* and *heterozygous*.
 3. *genotype* and *phenotype*.
 4. *segregation* and *independent assortment*.
106. Explain the terms *transcription* and *translation*.
1. In which structures in the cell does translation occur?
 2. How many bases in sequence make up a codon in mRNA?
 3. Each mRNA codon specifies one of three possible outcomes during protein synthesis. Name these **three** possible outcomes.
 4. What does the letter 't' stand for in tRNA?
 5. During translation one end of a tRNA molecule attaches to an mRNA codon. What is usually attached to the other end of the tRNA molecule?
107. What are the two main events in the replication of DNA?
108. Name the base in DNA that pairs with cytosine.
109. For which purpose did you use freezer-cold ethanol while extracting DNA from plant tissue?
110. For which purpose did you use washing-up liquid or other detergent while extracting DNA from plant tissue?
111. ***Red hair in humans is recessive to all other hair colours. A red-haired woman and a black-haired man, whose own father was red-haired, started a family.*** What is the % chance of obtaining offspring with **red** hair?
112. ***In Dalmatian dogs the allele for brown spots is recessive to the allele for black spots. The two parents were heterozygous in respect of spot colour.*** What is the % chance of obtaining offspring with **black** spots?
113. ***In roses there is incomplete dominance between the allele governing red petals and the allele governing white petals. Heterozygous individuals have pink petals. A plant with pink petals was crossed with a plant with white petals.*** What is the % chance of obtaining offspring with **white** petals?
114. ***In the fruit fly *Drosophila* the allele for full wing is dominant to the allele for vestigial wing. One parent was homozygous in respect of full wing and the other parent was heterozygous.*** What is the % chance of obtaining offspring with **full** wing?
115. For what purpose in an experiment did you use freezer cold alcohol?
116. Explain the following terms that are used in genetics:
- (i) Allele
 - (ii) Heterozygous
 - (iii) Phenotype.

117. In humans, brown eye (B) is dominant to blue eye (b). Two parents, one heterozygous for eye colour and the other with blue eyes, start a family.

- (i) What is the genotype of the blue-eyed parent?
- (ii) What are the possible gametes that **each** parent can produce?
- (iii) Using a Punnett Square or another method work out the possible genotypes **and** phenotypes of their children.

118. Explain, in terms of what happens to body cells, what is meant by the term cancer

119. Give **two** possible causes of cancer.

120. Some people choose to be screened to determine their risk of getting a particular type of cancer. What is meant by genetic screening?

121. Blood samples taken from a crime scene were put through a process called DNA profiling. During the process cells were broken down to release the DNA, which was then cut into fragments. The fragments were then separated.

1. What was used to cut the DNA?
2. On what basis were the DNA fragments separated?
3. Give an application of DNA profiling other than solving crime.

122. State two different uses of a water bath in biological investigations.

123. How are the two strands of a DNA molecule joined together?

124. What is 'junk' DNA?

125. Answer the following questions by referring to the procedures that you used to isolate DNA from a plant tissue:

- (i) Having obtained a plant tissue e.g. onion,
 1. What was the first procedure that you followed?
 2. What was the reason for that procedure?
- (ii) Washing-up liquid is then used in the isolation. Give a reason for its use.
- (iii) Salt (sodium chloride) is also used in the isolation. Give a reason for its use.
- (iv)
 1. What is a protease?
 2. Why is a protease necessary when isolating DNA?
- (v) The final stage of the isolation involves the use of freezer-cold ethanol.
 1. Describe how it is used.
 2. For what purpose is it used?

126. What is meant by the term evolution?

127. Name either of the scientists responsible for the Theory of Natural Selection.

128. In the *antirrhinum* (snapdragon) there is no dominance between the allele for red flower and the allele for white flower. Heterozygous individuals have pink flowers. The allele for tall stem is dominant to the allele for short stem. These pairs of alleles are located on different chromosome pairs.

(i) What is the significance of the fact that the two allele pairs are located on different chromosome pairs?

(ii) A plant which had pink flowers and was heterozygous in respect of stem height was crossed with one which had white flowers and a short stem.

1. Using suitable symbols determine the genotypes of all the possible offspring of this cross.

2. For each of your answers, state the phenotype that would result.

129. Distinguish between the members of each of the following pairs of terms, by writing a sentence about each member of each pair.

(i) Gene and allele.

(ii) Homozygous and heterozygous.

(iii) Genotype and phenotype.

(iv) Linkage and sex linkage.