D3.2 Inheritance

What the Cell · DP Biology · worksheet · SL statements D3.2.1–15

Name _____ **Date** _____ **Total** _____ / 52

About 55 minutes, or one section at a time. A calculator is allowed. The number of marks shows how many separate points to make.

Section A: Recall

9 marks

1 **Define** allele. D3.2.3 **[1]**

2 **Distinguish** between genotype and phenotype. D3.2.3, D3.2.4 **[2]**

3 **State** the name of the enzyme that is affected in phenylketonuria. D3.2.7 **[1]**

4 **State** the genotype or genotypes for blood groups A and O. D3.2.9 **[2]**

5 **State** which gamete determines the sex of a zygote, and why. D3.2.11 **[2]**

6 **State** the term for many genes affecting one characteristic. D3.2.14 **[1]**

Section B: Understanding

14 marks

7 **Explain** why a homozygous dominant and a heterozygous organism can have the same phenotype. D3.2.5 **[2]**

8 **Explain** what is meant by phenotypic plasticity, using an example. D3.2.6 **[3]**

9 **Explain** how a gene pool can contain many alleles of a gene, while each individual has only two. D3.2.8 **[3]**

10 **Explain** why haemophilia is more common in males. D3.2.12 **[3]**

11 **Explain** the genetic basis for rules against marriage between close relatives. D3.2.13 **[3]**

Section C: Crosses and data

21 marks

All data in this section are invented for practice.

12 D3.2.2, D3.2.5

In a pea plant, tall (T) is dominant to short (t). A pure-breeding tall plant was crossed with a short plant, and the F1 plants were self-fertilized.

a **State** the genotype of the F1 plants. **[1]**

b **Draw** a Punnett grid, and **state** the expected phenotype ratio in F2. **[3]**

c There were 312 tall and 96 short F2 plants. **Calculate** the ratio of tall to short, to one decimal place. **[1]**

13 D3.2.9, D3.2.10

A mother has blood group A and a father has blood group B. Their first child has blood group O.

a **Deduce** the genotypes of the parents. **[2]**

b **Deduce** the probability that their next child has group AB. **[2]**

c Pink Mirabilis jalapa plants are crossed together. **State** the expected ratio of flower colours. **[1]**

14 D3.2.12, D3.2.13

A woman with normal clotting has a father with haemophilia. She has children with an unaffected man.

a **Deduce** the woman's genotype, giving a reason. **[2]**

b **Deduce** the probability that a son of this couple is affected. **[1]**

15 D3.2.14, D3.2.15

The heights of 11 students, in cm, were: 152, 158, 160, 162, 163, 165, 166, 168, 170, 172, 190.

a **State** the median. **[1]**

b Q1 is 160 and Q3 is 170. **Calculate** the interquartile range, and **determine** whether 190 cm is an outlier. **[3]**

c **Draw** a box-and-whisker plot for these data. **[3]**

d **Suggest** one genetic and one environmental reason for this variation. **[1]**

Section D: Longer answer

8 marks

16 **Explain** three different patterns of inheritance in which the phenotype ratio differs from a simple 3 : 1 ratio. D3.2.10–14 **[8]**