

Inheritance: practice questions

7 questions • 20 marks • mark scheme at the back

For Pearson Edexcel International GCSE Biology 4BI1 and Science (Double Award) 4SD0. **Biology only** is not in the Double Award and is only examined on Paper 2.

Name

Total / 20

1 A pea plant has the genotype Tt. Which word describes this genotype? [1 mark]

- A. ☐ Homozygous dominant
- B. ☐ Homozygous recessive
- C. ☐ Heterozygous
- D. ☐ Codominant

2 Explain the difference between a dominant allele and a recessive allele. [3 marks]

3 **Biology only** [3 marks]

Cattle with one allele for red hair (R) and one allele for white hair (W) have a mixture of red and white hairs, called roan. (a) Name this type of inheritance and explain what it means. (2) (b) Two roan cattle (RW) are crossed. Give the expected ratio of phenotypes in the offspring. (1)

4 Human height shows a wide range of values. Explain why this is not a characteristic that can be explained by a simple monohybrid cross. [2 marks]

- 5** In rabbits, black fur (B) is dominant to brown fur (b). Two heterozygous black rabbits are crossed. (a) Draw a genetic diagram to show the genotypes of the possible offspring. (3) [4 marks]
(b) Give the probability that an offspring has brown fur. (1)

Answer =

- 6** In a family, parents 1 and 2 do not have a genetic disorder. They have three children: child 3 (a daughter) has the disorder, child 4 (a son) does not and child 5 (a daughter) does not. [4 marks]
(a) State whether the disorder is caused by a dominant or a recessive allele. Give a reason. (2) (b) Using the letters D and d, give the genotypes of parents 1 and 2 and explain your answer. (2)

- 7** Describe how the sex of a baby is determined at fertilisation. Use a genetic diagram or describe the gametes in your answer. [3 marks]

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

C C (1)

2. [3]

- a dominant allele is expressed (in the phenotype) when one copy is present / in the heterozygous state (1)
- a recessive allele is only expressed when two copies are present / no dominant allele present (1)
- so a heterozygous individual shows the dominant characteristic (1)
- allow homozygous recessive for two copies

3. [3] **Biology only**

- codominance (1)
- both alleles are expressed in the phenotype (of the heterozygous animal) (1)
- reject blending / mixing of the alleles for the second marking point
- 1 red : 2 roan : 1 white (1)
- allow 1 RR : 2 RW : 1 WW if phenotypes are clearly linked

4. [2]

- it is controlled by many genes / polygenic inheritance (1)
- so there is a range of values rather than two clear categories / not one gene with a dominant and a recessive allele (1)

5. [4]

- gametes B or b from each parent (1)
- offspring BB, Bb, Bb, bb (1)
- phenotypes: 3 black : 1 brown (1)
- probability = $\frac{1}{4}$ / 0.25 / 25% (1)

6. [4]

- recessive (1)
- two parents without the disorder have a child with it (1)
- both parents are Dd / heterozygous (1)
- each parent must have passed on one recessive allele (d) to child 3, but they do not have the disorder themselves (1)

7. [3]

- females are XX and males are XY (1)
- all eggs carry an X chromosome (1)
- half the sperm carry X and half carry Y; whether an X or Y sperm fertilises the egg decides the sex (1)
- allow correct Punnett square for full credit