

Inheritance: practice questions

8 questions • 28 marks • mark scheme at the back

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 28

1 **Triple only** [3 marks]

Describe the work of Gregor Mendel, and suggest why his work could not be explained at the time.

2 Explain the meaning of the terms allele, dominant and genotype. [3 marks]

3 In pea plants, the allele for tall (T) is dominant to the allele for short (t). Two heterozygous tall plants are crossed. Use a genetic diagram to work out the ratio of tall plants to short plants in the offspring. [3 marks]

Answer =

4 Use a genetic diagram to show that the probability of a baby being a girl is 50%. **[3 marks]**

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5 A genetic disorder is caused by a recessive allele. Two parents do not have the disorder, but they have a daughter who does. (a) Explain what this shows about the parents. (2) (b) The parents have another child. Calculate the probability that this child has the disorder. (1) **[3 marks]**

Answer =

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6 Triple only **[3 marks]**

A mother has blood group A and a father has blood group B. Their child has blood group O. Explain how this is possible.

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7 Triple only Higher tier **[4 marks]**

Haemophilia is caused by a recessive allele on the X chromosome. A woman who is a carrier has children with a man who does not have haemophilia. (a) Explain why haemophilia is more common in males than in females. (2) (b) State the probability that a son has haemophilia. (1) (c) State the probability that a daughter has haemophilia. (1)

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8 In pea plants, the allele for purple flowers (P) is dominant to the allele for white flowers (p). Two heterozygous plants with purple flowers are crossed. Explain how this cross can produce both purple-flowered and white-flowered offspring, and predict the proportion of each. Use a genetic diagram in your answer. **[6 marks]**

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Mark scheme

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

1. [3] Triple only

- bred pea plants and counted the characteristics of the offspring (1)
- showed characteristics are inherited as separate factors / some are dominant and some recessive (1)
- genes, chromosomes and DNA were not known, so there was no mechanism to explain the results (1)

2. [3]

- allele: a different version of the same gene (1)
- dominant: an allele that is expressed in the phenotype even when only one copy is present (1)
- genotype: the alleles an organism has (for a gene) (1)

3. [3]

- gametes from both parents T and t (1)
- offspring genotypes TT, Tt, Tt, tt (1)
- 3 tall : 1 short (1) allow 3:1

4. [3]

- mother's gametes X and X, father's gametes X and Y (1)
- offspring XX, XX, XY, XY (1)
- two out of four are XX / female so probability is 50% (1)

5. [3]

- (a) both parents are carriers / heterozygous (1)
- each has one recessive allele, which is masked by the dominant allele (1) allow: the daughter is homozygous recessive so must have inherited a recessive allele from each parent
- (b) 1/4 or 0.25 or 25% (1)

6. [3] Triple only

- the mother's genotype is IA IO and the father's is IB IO (1)
- each parent passes on the IO allele (1)
- the child is IO IO, which is blood group O (1)

7. [4] Triple only Higher tier

- (a) males have only one X chromosome (1)
- so one copy of the recessive allele causes the disorder / females need two copies (1)
- (b) 50% or 1/2 (1)
- (c) 0 / 0% / none (1) ignore reasons, e.g. the father passes on an X with the normal allele

8. [6]

Level 3 5-6	A clear, logical explanation using correct terms, a correct genetic diagram, and a correct prediction of the proportions with the idea of probability.
Level 2 3-4	Some explanation using some correct terms, a mostly correct genetic diagram, and a prediction with minor errors or omissions.
Level 1 1-2	Simple statements with limited use of terms. The diagram may be missing or incorrect.

Indicative content

- both parents have genotype Pp (heterozygous)
- each parent produces gametes P and p
- gametes combine at random at fertilisation
- offspring genotypes PP, Pp, Pp and pp
- P is dominant so PP and Pp have purple flowers
- pp is homozygous recessive so has white flowers
- ratio 3 purple : 1 white
- probability of purple 75%, of white 25%