

DNA Genetics Inheritance

GCSE Biology · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Define genotype and phenotype, with an example. (2 marks)

Step 1 · Genotype

The combination of alleles an organism has, e.g. Bb.

Step 2 · Phenotype

The characteristic that is expressed, e.g. brown eyes.

Answer: Genotype = alleles (Bb); phenotype = feature (brown eyes)

Check: Phenotype can also be affected by the environment.

2. Now try one with the steps

Two heterozygous pea plants (Tt) are crossed; T = tall, t = short. Find the ratio of tall to short offspring. (3 marks)

Step 1 · Gametes

Step 2 · Punnett square

Step 3 · Phenotypes

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. What is an allele? [1]

2. What does homozygous mean? [1]

3. What does heterozygous mean? [1]

4. Explain when a recessive allele is expressed. [1]

5. State the sex chromosomes of a human male and female. [2]

6. What is the probability that a baby will be a girl? Give your answer percentage. [1]

7. Cross $BB \times bb$. What percentage of offspring will have brown eyes (B dominant)? [2]

8. Cross $Tt \times tt$ (T = tall). Give the ratio of tall to short. [2]

9. Cross $Rr \times Rr$. What fraction of offspring are heterozygous? [2]

10. Explain why most characteristics are not controlled by a single gene. [1]

11. Explain why the father's gamete determines the sex of a baby. [2]

12. From $Aa \times Aa$ crosses, 400 seedlings grew. How many would you expect to be homozygous dominant? [2]

13. A black mouse could be BB or Bb (B = black, b = white). Describe a cross to find out, and the expected results. [3]

14. Two parents have three girls. What is the probability their fourth child is a boy? Explain. [2]

4. Before you hand it in

"3 : 1 means 3 out of 3 children."

3 : 1 means 3 out of every 4, i.e. 75% and 25%.

"If they have had three blue-eyed children, the next must be brown."

Each child is an independent event with the same probability.

Writing gametes as 'Bb'

Separate each parent's alleles: Bb → B and b.

"Dominant alleles are more common."

A dominant allele is expressed with one copy; it can still be rare in a population.