

Extension worksheet – Chapter 10

1 In a plant, two genes were shown to control flower colour as follows:

- plants with the genotype A_B_ have blue flowers
- plants with the genotype A_bb have red flowers
- plants with the genotype aa_ _ have white flowers.

In each case, _ represents any allele.

A homozygous blue-flowered plant (AABB) is crossed with a homozygous white-flowered plant (aabb).

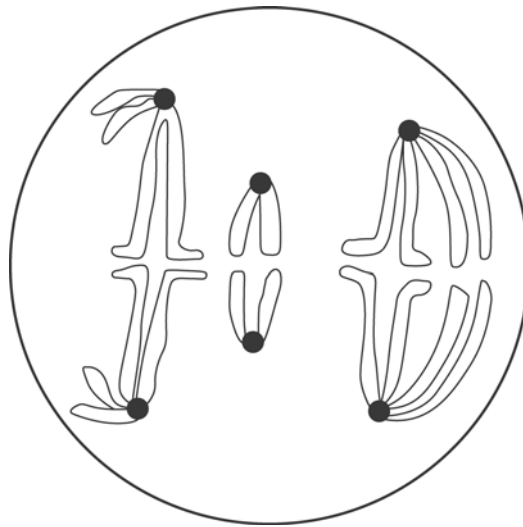
a State the genotype and phenotype of the F₁ offspring. (1)

b The F₁ plants are allowed to interbreed. Use the Punnett grid below to show the genotypes of the gametes, and the genotypes and phenotypes of the F₂ offspring. (4)

		Gametes			
Gametes					

c What is the expected ratio of flower colours in the F₂ offspring? (1)

- 2 The diagram below shows a cell at the end of metaphase I of meiosis. The diploid number of the cell is 6 ($2n = 6$).



- a Draw a diagram to show the cell:
- in metaphase of mitosis (2)
 - in anaphase I of meiosis. (2)
- b Name **two** structures that are only visible when a cell is dividing either by meiosis or mitosis. (2)
- c State the ways in which meiosis gives rise to genetic variation. (3)
- 3 In rabbits, the allele (L) for long ears is dominant over the allele (l) for short ears, and the allele (B) for black fur is dominant over the allele (b) for brown fur.
- In a cross between two rabbits with the genotypes Llbb and llBb, which phenotypic ratio would be expected? (1)
- 9 long-eared black : 3 long-eared brown : 3 short-eared black : 1 short-eared brown
 - 6 long-eared black : 3 long-eared brown : 3 short-eared black : 3 short-eared brown
 - 1 long-eared black : 1 long-eared brown : 1 short-eared black : 1 short-eared brown
 - 1 long-eared black : 3 long-eared brown : 3 short-eared black : 9 short-eared brown
- 4 a Define 'recombination'. (1)
- b When grey-bodied, long-winged *Drosophila* were test-crossed with black-bodied, vestigial-winged flies, the F₁ generation contained:
- 407 grey-bodied, long-winged flies
 396 black-bodied, vestigial-winged flies
 75 black-bodied, long-winged flies
 69 grey-bodied, vestigial-winged flies.
- Which of these flies were recombinants? (2)
- c This F₁ generation does not follow Mendel's second law of independent assortment. Explain how the ratios above could have arisen. (3)