1. In fruit flies, the allele for grey body, **G**, is dominant to the allele for ebony body, **g**. Flies heterozygous for grey body colour, were crossed with ebony-bodied flies. Complete the genetic diagram to show the genotypes and phenotypes in this cross. Calculate the probability of the offspring having ebony body. (3)

Parents genotype

Parents phenotype

Gametes

Cross

F1 genotype

F1 phenotype

Probability

2. In cats, the allele for ginger fur, $\mathbf{X^B}$**,** is dominant to that for black fur, $\mathbf{X^b}$

All the cells in the body of a female mammal carry two X chromosomes. During an early stage of development one of these becomes inactive and is not expressed. Therefore female mammals have patches of cells with one X chromosome expressed and patches of cells with the other X chromosome expressed. Tortoiseshell cats have coats with patches of ginger and patches of black fur.

A cat breeder who wished to produce tortoiseshell cats crossed a black female cat with a ginger male. Complete the genetic diagram and predict the percentage of tortoiseshell kittens expected from this cross.

Parents genotype

Parents phenotype

Gametes

Cross

F1 genotype

F1 phenotype

Probability

3. In a species of fruitfly, females have two X chromosomes, and males have an X and a Y chromosome. A gene controlling eye shape in fruitflies is sex-linked, and found only on the X chromosome. This gene has two alleles, **R** for round eyes and **B** for bar eyes.

A homozygous, round-eyed female ($\mathbf{X^R X^R}$) was crossed with a bar-eyed male. In the offspring (Offspring 1), all the female offspring had wide bar eyes (intermediate in size) and all the males had round eyes.

Offspring 1 were allowed to interbreed. Complete the genetic diagram to show the phenotypic ratio you would expect in the resulting Offspring 2.

Parents genotype

Parents phenotype

Gametes

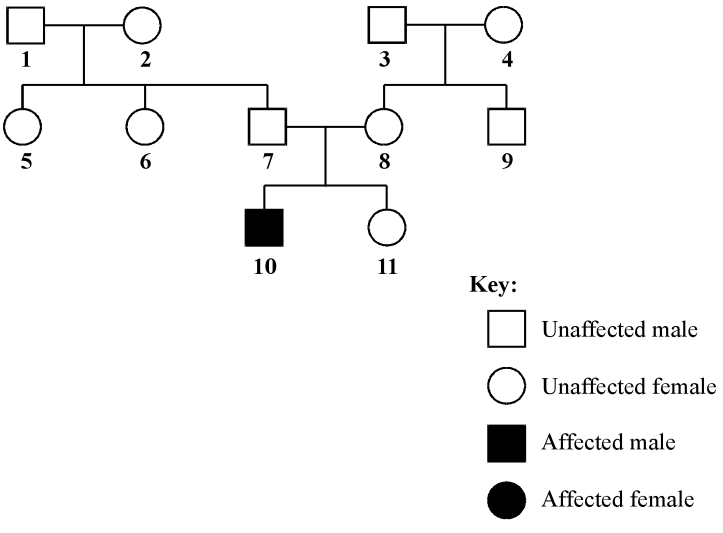
Cross

F1 genotype

F1 phenotype

Probability

4. The diagram shows three generations of a family.

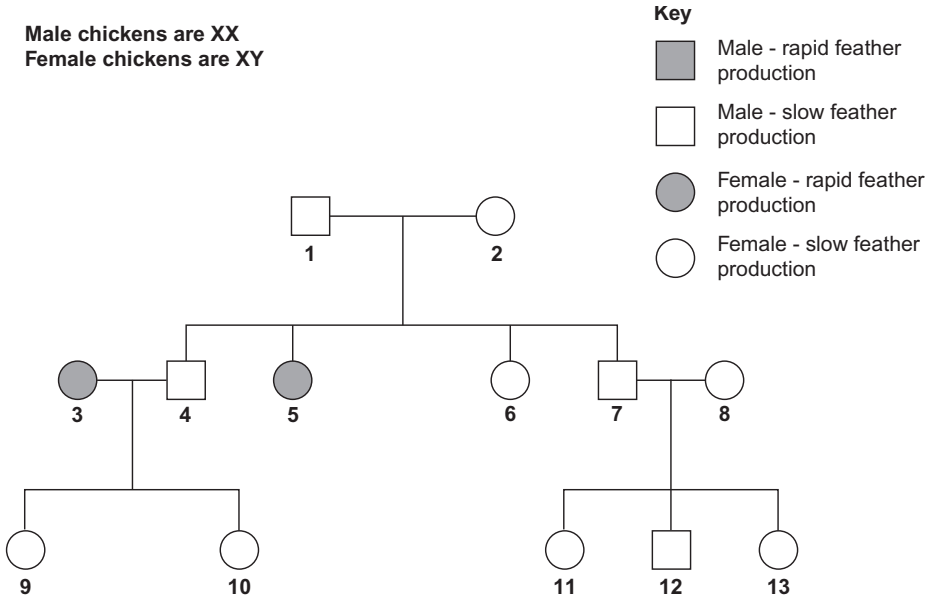


(a) Give the possible genotype or genotypes of: individual**7** and individual **11.** (2)

(b) Give the probability that the next child of parents **7** and **8** will be a girl with cystic fibrosis. Show how you arrived at your answer. (2)

5. In birds, males are XX and females are XY.

In chickens, a gene on the X chromosome controls the rate of feather production. The allele for slow feather production, F, is dominant to the allele for rapid feather production, f. Figure 1 shows the results produced from crosses carried out by a farmer.



(i) Explain one piece of evidence from Figure 3 which shows that the allele for rapid feather production is recessive. (2)

(ii) Give all the possible genotypes of chicken 5 and 7 from Figure 1. (2)

(iii) A cross between two chickens produced four offspring. Two of these were males with rapid feather production and two were females with slow feather production. Give the genotypes of the parents. (2)

6. A female heterozygous for blood group A had a child with a male homozygous for blood group B. Calculate the probability that the next child of this couple will be a girl with blood group B.

Parents genotype

Parents phenotype

Gametes

Cross

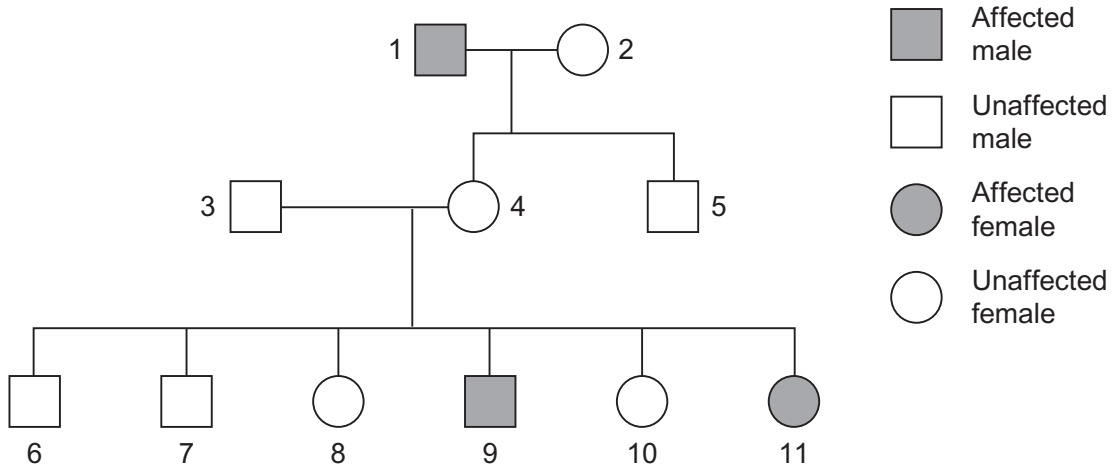
F1 genotype

F1 phenotype

Probability

9.

Tay-Sachs disease is a human inherited disorder. Sufferers of this disease often die during childhood. The allele for Tay-Sachs disease **t**, is recessive to allele **T**, present in unaffected individuals. The diagram shows the inheritance of Tay-Sachs in one family.



(i) Explain **one** piece of evidence from the diagram which proves that the allele for Tay-Sachs disease is recessive.

(2)

(ii) Explain **one** piece of evidence from the diagram which proves that the allele for Tay-Sachs disease is **not** on the X chromosome.

(2)