

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Q1.

- (a) In fruit flies, a gene for body colour has a dominant allele for grey body, **G**, and a recessive allele for black body, **g**.

Explain how you would determine if the genotype of a grey fly is homozygous or heterozygous for body colour.

(2)

- (b) In fruit flies, males are **XY** and females are **XX**.

A cross between a grey-bodied male fly and a black-bodied female fly produced some black-bodied females. Explain how this shows that the gene for body colour is **not** sex-linked.

(1)

- (c) A population of fruit flies contained 19% grey-bodied flies.

Use the Hardy–Weinberg equation to calculate the percentage of flies heterozygous for gene **G**.

Show your working.

Answer _____ %

- (d) In fruit flies, a gene for wing shape has a dominant allele for curly wings, **R**, and a recessive allele for normal wings, **r**. The alleles for this gene are on a different pair of chromosomes from the gene for body colour.

Fruit flies that are homozygous dominant for curly wings do not survive beyond the embryo stage.

A curly-winged fly, homozygous for grey body colour was crossed with a curly-winged, black-bodied fly.

Complete the genetic diagram to show all the possible genotypes and the ratio of phenotypes expected to develop into adults from this cross.

Phenotypes of parents Curly-winged, grey-bodied, × Curly-winged, black-bodied

Genotypes of parents _____ × _____

Genotypes of offspring _____

Phenotypes of offspring _____

Ratio of offspring _____

(3)

(Total 8 marks)

Q2.

- (a) A weed is a plant growing where it is not wanted. Fat hen is a weed which grows in some crop fields.

Describe how you could estimate the **number** of fat hen plants in a field.

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(5)

- (b) In potato plant fields, fat hen plants can grow up to a height of 2 m and absorb large quantities of nutrients from the soil.

Fat hen has a negative effect on the growth of potato plants.

Use the information provided to explain why.

In your answer, name the type of competition occurring between fat hen plants and potato plants.

- (c) The table below gives some features of fat hen seeds.

Feature of seed	
Mean mass / mg	0.77
Maximum number produced per fat hen plant during a growing season	20 000
Percentage viable (able to develop) after a growing season	79

During a growing season, it was estimated that a total number of 550 fat hen plants grew on the fields of a farm.

Calculate the maximum mass, in kg, of viable fat hen seeds on this farm after a growing season.

Show your working.

Assume that all the seeds produced during the growing season remain on the farm.

Answer _____ kg

(2)

(Total 10 marks)