**1.** What is the locus of a gene?

A. The proportion of the population that have the gene

B. The part of the phenotype that is affected by the gene

C. The position of a gene on a chromosome

D. The predicted effect of natural selection on the frequency of the gene

(Total 1 mark)

**2.** Two genes A and B are linked together as shown below.



If the genes are far enough apart such that crossing over between the alleles occurs occasionally, which statement is true of the gametes?

A. All of the gametes will be Ab and aB.

B. There will be 25% Ab, 25% aB, 25% ab and 25% AB.

C. There will be approximately equal numbers of Ab and ab gametes.

D. The number of Ab gametes will be greater than the number of ab gametes.

(Total 1 mark)

**3.** In *Zea mays*, the allele for coloured seed (C) is dominant over the allele for colourless seed (c). The allele for starchy endosperm (W) is dominant over the allele for waxy endosperm (w). Pure breeding plants with coloured seeds and starchy endosperm were crossed with pure breeding plants with colourless seeds and waxy endosperm.

(a) State the genotype and the phenotype of the F1 individuals produced as a result of this cross.

genotype .............................................................................................................................

phenotype .............................................................................................................................

(2)

(b) The F1 plants were crossed with plants that had the genotype c c w w. Calculate the expected ratio of phenotypes in the F2 generation, assuming that there is independent assortment. Use the space below to show your working.

Expected ratio .....................................................................................................

(3)

The observed percentages of phenotypes in the F2 generation are shown below.

coloured starchy 37% colourless starchy 14%

coloured waxy 16% colourless waxy 33%

The observed results differ significantly from the results expected on the basis of independent assortment.

(c) State the name of a statistical test that could be used to show that the observed and the expected results are significantly different.

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(1)

(d) Explain the reasons for the observed results of the cross differing significantly from the expected results.

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(2)

(Total 8 marks)

**4.** Using an example you have studied, explain a cross between two linked genes, including the way in which recombinants are produced.

(Total 9 marks)