PART 2 Short answer questions.

Answer all questions in the booklet provided.

*This section is worth **50 marks**. Marks allocated for each question are indicated in () and parts of questions in [ ].*

Question 2.1 (25 marks)

Answer all parts (a), (b) and (c).

On a capsicum farm, red-fruited capsicums were crossed with cream fruited ones, and the F1 produced were all red. However, crossing two of these resulted in fruits of four phenotypes: red, 180; peach, 59; yellow, 62; and cream 27.

a) What genetic hypothesis would you propose to explain this result? Your hypothesis should propose genetic notation and refer to the number of genes and alleles, dominance and anything else you consider relevant. [5 marks]

b) Is the observed phenotypic ratio within the expected range for your hypothesis? Use a chi-square test to decide. Show the calculations you use to obtain your χ^2 value, and indicate the value *df* that applies. [10 marks]

The formula for calculating *chi*-square is:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

The **critical values** of X^2 for $p = 0.05$ are
1 degree of freedom = 3.841
2 degrees of freedom = 5.991
3 degrees of freedom = 7.815.

c) Given your hypothesis in (a), what phenotypic ratios would you expect to observe if two peach fruited plants are crossed? Show all workings to explain your answer. [5 marks]