QUESTION 5

Some people (tasters) are able to taste a chemical called phenylthiourea, while others (non-tasters) cannot. This ability to taste is determined by an allele **T** which is dominant to **t**. An analysis of a sample of people shows that 9% were non-tasters.

For this population calculate, showing your working:

(a)The frequency of the **t** allele

To be non-taster : tt => 9% of population

(b)The frequency of the **T** allele

To be taster : TT = 91%

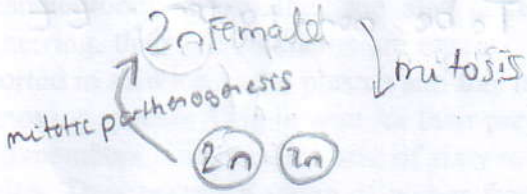
or Tt

$\frac{3}{4} \times 91\% = 68.25\%$

(c)The proportion of this population that is heterozygous for this gene

(5 marks)

For the hoverfly population mentioned above, 35 were caught, marked and released. Three days later, 35 were caught and 7 were found to be marked. Calculate the approximate size of the population. Show your working.

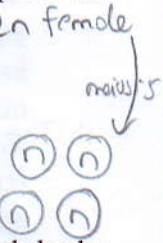


(6 marks)

QUESTION 3

A queen honey bee can lay both fertilized and unfertilized eggs. Fertilized eggs develop into diploid females and unfertilized eggs develop into haploid males.

The table below shows some features which contribute to variation in the offspring of bees. Complete the table with a tick if the feature may contribute and with a cross if it does not:



	Female offspring	Male offspring
Crossing over	✓	✓
Independent segregation	✓	✓
Random fusion	✓	✗

Body colour is determined by a single gene, with the allele **B** for yellow body dominant to **b** for black body. Explain why, in the offspring of a mating between a pure-breeding black female and a yellow male,

All females will be yellow

All males will be black

(5 marks)

QUESTION 4

Indicate by a tick in the columns on the right of the table, which of the following statements is or are true of mitosis, meiosis I or meiosis II:

Statement	Mitosis	Meiosis I	Meiosis II
DNA replication occurs between the previous division and this division			
Homologous chromosomes lie together in pairs at the equator of the spindle			
The centromere splits and the products move to opposite poles of the spindle			
Two chromatids involved in a crossover are separated			

(4 marks)