1 Ayman’s breakfast drink is tea, coffee or hot chocolate with probabilities 0.65, 0.28, 0.07 respectively. When he drinks tea, the probability that he has milk in it is 0.8. When he drinks coffee, the probability that he has milk in it is 0.5. When he drinks hot chocolate he always has milk in it.

(i) Draw a fully labelled tree diagram to represent this information. [2]

(ii) Find the probability that Ayman’s breakfast drink is coffee, given that his drink has milk in it. [3]

2 When visiting the dentist the probability of waiting less than 5 minutes is 0.16, and the probability of waiting less than 10 minutes is 0.88.

(i) Find the probability of waiting between 5 and 10 minutes. [1]

A random sample of 180 people who visit the dentist is chosen.

(ii) Use a suitable approximation to find the probability that more than 115 of these people wait between 5 and 10 minutes. [5]

3 A particular type of bird lays 1, 2, 3 or 4 eggs in a nest each year. The probability of \( x \) eggs is equal to \( kx \), where \( k \) is a constant.

(i) Draw up a probability distribution table, in terms of \( k \), for the number of eggs laid in a year and find the value of \( k \). [3]

(ii) Find the mean and variance of the number of eggs laid in a year by this type of bird. [3]

4 When people visit a certain large shop, on average 34% of them do not buy anything, 53% spend less than $50 and 13% spend at least $50.

(i) 15 people visiting the shop are chosen at random. Calculate the probability that at least 14 of them buy something. [3]

(ii) \( n \) people visiting the shop are chosen at random. The probability that none of them spends at least $50 is less than 0.04. Find the smallest possible value of \( n \). [3]

5 The following are the maximum daily wind speeds in kilometres per hour for the first two weeks in April for two towns, Bronlea and Rogate.

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(i) Draw a back-to-back stem-and-leaf diagram to represent this information. [5]

(ii) Write down the median of the maximum wind speeds for Bronlea and find the interquartile range for Rogate. [3]

(iii) Use your diagram to make one comparison between the maximum wind speeds in the two towns. [1]
The time in minutes taken by Peter to walk to the shop and buy a newspaper is normally distributed with mean 9.5 and standard deviation 1.3.

(i) Find the probability that on a randomly chosen day Peter takes longer than 10.2 minutes. [3]

(ii) On 90% of days he takes longer than \( t \) minutes. Find the value of \( t \). [3]

(iii) Calculate an estimate of the number of days in a year (365 days) on which Peter takes less than 8.8 minutes to walk to the shop and buy a newspaper. [3]

7 (a) Find the number of different arrangements which can be made of all 10 letters of the word WALLFLOWER if

(i) there are no restrictions, [1]

(ii) there are exactly six letters between the two Ws. [4]

(b) A team of 6 people is to be chosen from 5 swimmers, 7 athletes and 4 cyclists. There must be at least 1 from each activity and there must be more athletes than cyclists. Find the number of different ways in which the team can be chosen. [4]