Normal Distribution

Q1

Roisin is a keen gardener and has plants A and B in her garden.

The lengths of the leaves on plant A are normally distributed with mean 9.2 cm and standard deviation 1.4 cm.

(a) Within what range of lengths would you expect about two-thirds of the leaves on plant A to be?

Answer _____ cm and _____ cm [3]

(b) Find the probability that a leaf, selected at random from plant A, is between 9.2 cm and 12 cm long.

Answer _____ [3]

The lengths of the leaves on plant B are normally distributed with mean 10.6 cm and standard deviation 2.1 cm.

The standardised score for a leaf, selected at random from plant B, is -0.7

(c) Calculate the actual length of the leaf.

Answer _____ cm [3]

Roisin takes a leaf at random off the ground, but is unsure which plant it has come from.

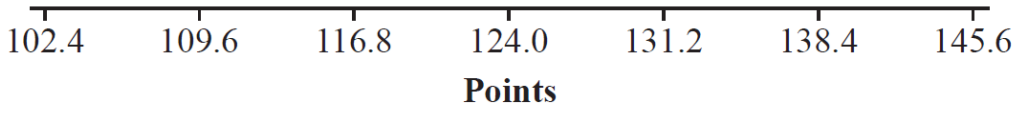
The leaf measures 10 cm.

(d) Using standardised scores, determine which plant this leaf is more likely to have come from, giving a reason for your choice.

Q2

In a senior sporting competition, the points scored by the 348 competitors were normally distributed with a mean of 124 and a standard deviation of 7.2

(c) (i) Use the axis below to sketch the distribution of the points in the senior sporting competition.



[1]

(ii) Calculate an estimate of the number of competitors who scored 116.8 points or less in the senior sporting competition.

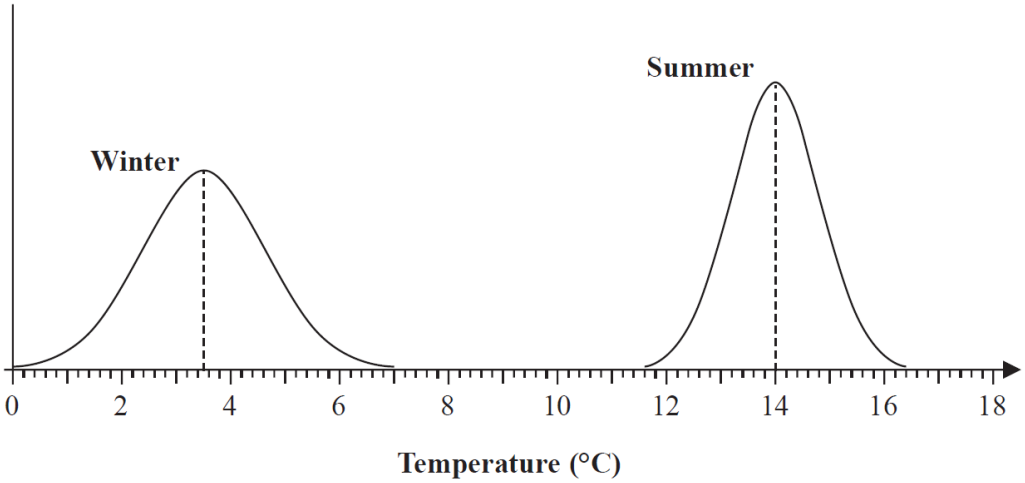
Answer _____ [2]

Q3

The mean of the daily winter temperatures and the mean of the daily summer temperatures in the UK have been recorded for each year from 1910 to 2018

This information has been used to model the two distributions of the mean temperatures.

The graphs below give information about these models.



(Source: *www.metoffice.gov.uk*)

(a) Write down the name of the distribution that is suggested by each of these graphs.

.....

(1)

(b) Comment on the difference between the means of these two distributions.

.....

.....

.....

(2)

The standard deviation for the distribution of the summer temperatures is 0.8 °C, correct to one decimal place.

(c) Using the graph for the winter temperatures, calculate an estimate for the standard deviation of the distribution of the winter temperatures, correct to one decimal place.

.....

(2)

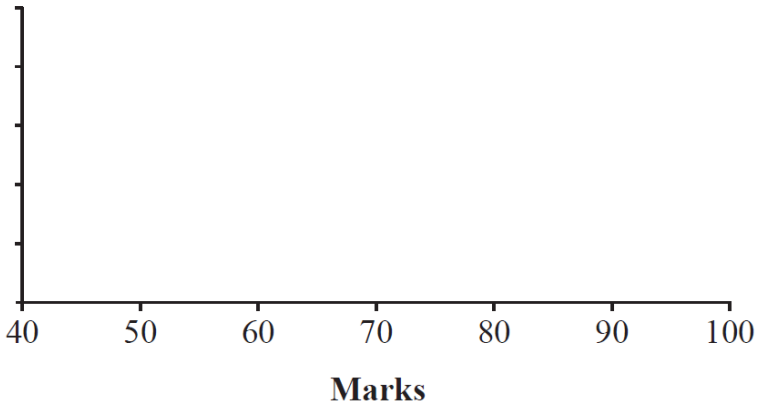
Year 12 students completed tests in Digital Technology, Home Economics and Religious Studies.

Q4

The results in each test were normally distributed.

The mean of the Digital Technology results was 65 and the standard deviation was 5

(a) On the grid below sketch the distribution of the Digital Technology results.



[2]

Niamh got 71 marks in the Digital Technology test.

(b) Calculate Niamh's standardised score in Digital Technology.

Answer _____ [2]

Niamh's standardised score in the Home Economics test was 0.3

(c) **(i)** Which test did Niamh do better in?

Digital Technology ☐ **Home Economics** ☐ [1]

(ii) Give a reason for your answer.

Harry, Kyle and Ethan entered a junior sporting competition.

Q5 The points scored by all competitors in the junior sporting competition were normally distributed with a mean of 98 and a standard deviation of 3.2

(a) Harry scored 102 points in the competition.

(i) Calculate Harry's standardised score.

Answer _____ [2]

Kyle's standardised score in the competition was 1.4

(ii) Who scored more points in the competition?

Tick one box.

Harry ☐ **Kyle** ☐

Give a reason for your answer.

_____

_____

_____ [2]

Ethan's standardised score was calculated to be −0.31

(b) Calculate how many points Ethan scored in the competition.