

Based on the 2022 Advanced
Information from Edexcel exam board

Predicted A level Mathematics Paper 3A Statistics June 2022



Information for Candidates

- This predicted paper is based on the 2022 advance information from Edexcel exam board
- There are 5 questions in this question paper
- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets.
- Full marks may be obtained for answers to ALL questions

Advice to candidates:

- You must ensure that your answers to parts of questions are clearly labelled.
- You must show sufficient working to make your methods clear to the Examiner
- Answers without working may not gain full credit

Disclaimer: There is no guarantee that any specific topic will be examined this way in the summer and you cannot rely on this as your only source of revision. Visit www.naikermaths.com for more practice papers and plenty of revision resources to help you in your revision.

Question 1

Robert took a random sample of 12 days over a term at a local secondary school and recorded

- the temperature outside, x .
- the number of hot meals sold y , in the canteen

His results are shown in the scatter diagram on the next page.

(a) Describe the correlation between x and y . (1)

Robert suggests that the warmer the weather the less hot meals sold.

(b) Using the scatter diagram comment on Robert's suggestion, giving a reason for your answer. (1)

The results from Robert's random sample of 12 observations are given in the table below.

x	8	9	6	12	10	14	16	18	7	9	15	19
y	40	38	39	20	18	12	12	11	30	35	15	8

(c) Use your calculator to find the product moment correlation coefficient between x and y for these data. (1)

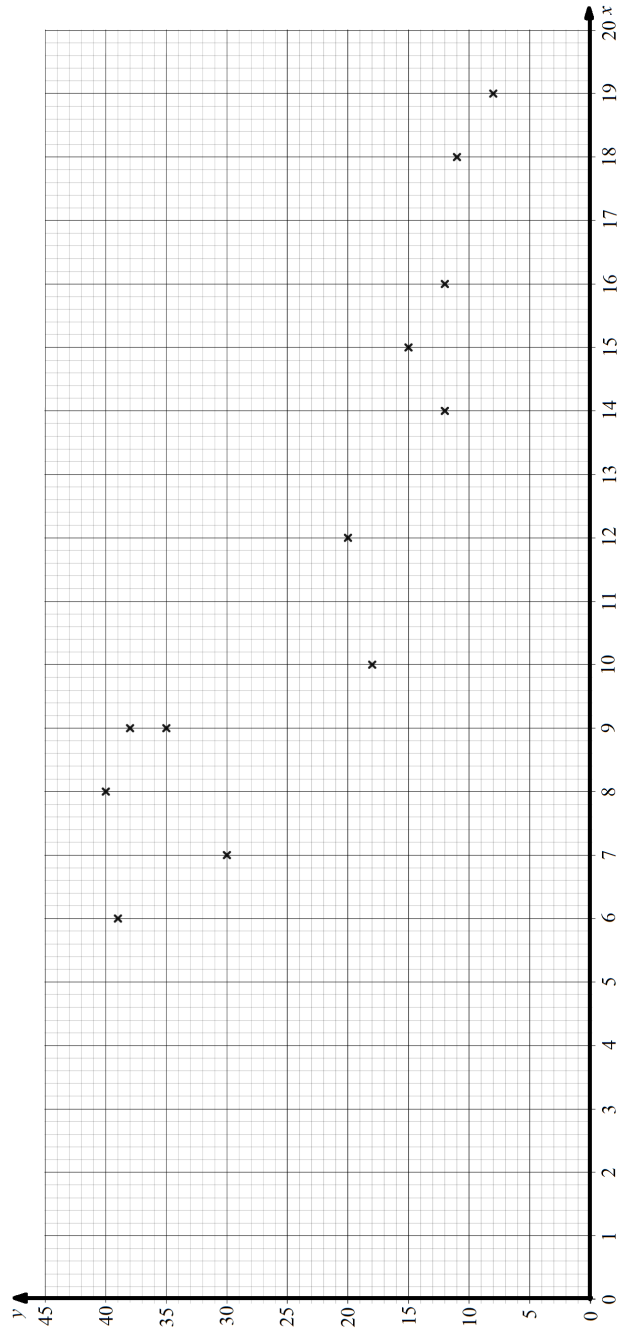
(d) Test whether or not there is evidence of a negative correlation between the temperature outside and the number of hot meals sold.

You should

- state your hypotheses clearly
- use a 5% level of significance

(3)

(Total for Question 2 is 6 marks)



Question 2

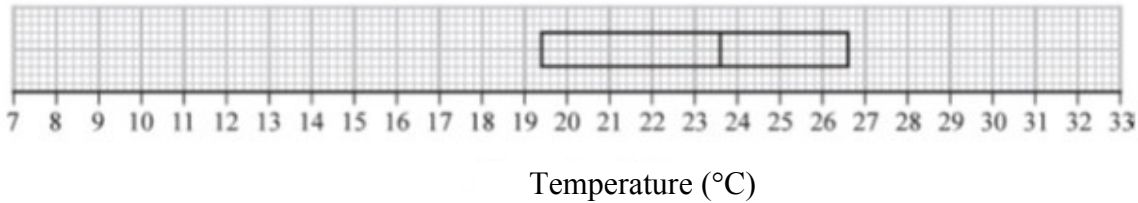


Figure 1

The partially complete box plot in Figure 1 above shows the distribution of daily mean air temperatures using the data from a large data set for Beijing in 2015

An outlier is defined as a value
 more than $1.5 \times \text{IQR}$ below Q_1 or
 more than $1.5 \times \text{IQR}$ above Q_3

The three lowest air temperatures in the data set are 10.9°C , 7.6°C and 9.5°C .
 The highest air temperature in the data set is 31.6°C .

(a) Complete the box plot in Figure 1. Write down any outliers. (3)

(b) Using your knowledge of the large data set, suggest from which month the two outliers are likely to have come. (1)

Using the data from the same large set, Craig produced the following summary statistics for the daily mean air temperature, $x^\circ\text{C}$, for Beijing in 2015.

$$n = 166 \quad \sum x = 4222.8 \quad S_{xx} = 4877.585$$

(c) Show that, to 3 significant figures, the standard deviation is 5.42°C (1)

Craig decides to model the air temperature with the random variable $T \sim N(25.44, 5.42^2)$.

(d) Using Craig's model, calculate the 10th to 90th interpercentile range. (3)

Craig wants to model another variable from the large data set for Beijing using a normal distribution.

(e) State two variables from the large data set for Beijing that are **not** suitable to be modelled by a normal distribution. Give a reason for each answer. (2)

(Total for Question 2 is 11 marks)

Question 3

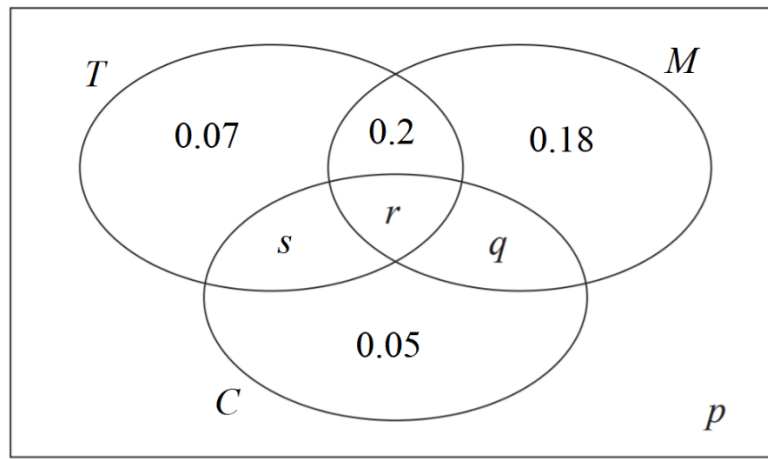
The Venn diagram shows the results from a random sample of people.

T is the event that the person drinks tea

M is the event that the person drinks milk

C is the event the person drinks coffee

The Venn diagram, where p , q , r and s are probabilities, gives the probability for each subset.



- (a) Find the proportion of people who drink exactly one of the drinks. (1)

No person likes all three drinks and $P(T) = 0.41$

- (b) Find
- (i) the value of r
 - (ii) the value of s (3)

Given that $P(M|C) = \frac{30}{49}$

- (c) find
- (i) the value of q
 - (ii) the value of p (4)

- (d) Determine whether or not the events $(T \cap M')$ and C are independent.
Show your working clearly. (3)

(Total for Question 4 is 11 marks)

Question 4

A local sports centre has showers with two temperature settings, warm and hot.

On the warm setting, the water temperature may be modelled by a Normal distribution with mean $30\text{ }^{\circ}\text{C}$ and standard deviation $2\text{ }^{\circ}\text{C}$.

(a) Using the model, find the probability that the next time the shower is used on the warm setting, the water temperature is

- (i) exactly $31\text{ }^{\circ}\text{C}$,
- (ii) more than $31\text{ }^{\circ}\text{C}$.

(2)

The sports centre manager thinks that a water temperature of more than $33\text{ }^{\circ}\text{C}$ is too high for the warm setting.

She tests the water temperature on the warm setting on 5 randomly selected days.

Given that the probability of the water temperature being more than $33\text{ }^{\circ}\text{C}$ is 0.0668.

(b) find the probability of the water temperature being more than $33\text{ }^{\circ}\text{C}$

- (i) on only the first of these 5 days,

(2)

- (ii) on more than 1 of these 5 days.

(3)

On the hot setting, the water temperature may be modelled by a Normal distribution with standard deviation $1.5\text{ }^{\circ}\text{C}$.

The probability that the water temperature is more than $42\text{ }^{\circ}\text{C}$ is 0.0005.

(c) Find the mean water temperature on this setting, giving your answer to 1 decimal place.

(3)

(Total for Question 2 is 10 marks)



Question 5

A machine puts liquid into bottles of medicine. The amount of liquid put into each bottle, D ml, follows a normal distribution with mean 28 ml.

Given that 5% of the bottles contain less than 27.29 ml,

(a) find, to 2 decimal places, the value of k such that $P(27.29 < D < k) = 0.55$.

(5)

A random sample of 200 bottles is taken.

(b) Using a normal approximation, find the probability that fewer than half of these bottles contain between 27.29 ml and k ml.

(3)

The machine is adjusted so that the standard deviation of the liquid put in the bottles is now 0.7 ml.

Following the adjustments, Hannah believes that the mean amount of liquid put in each bottle is less than 28 ml.

She takes a random sample of 20 bottles and finds the mean amount of liquid to be 27.72 ml.

(c) Showing all your working, test Hannah's belief at the 5% level of significance.

(5)

(Total for question 5 is 13 marks)

TOTAL FOR PAPER IS 50 MARKS