

Name:

Total Marks:

A level Applied Mathematics Paper 3A Statistics



Practice Paper 3

Time: 60 mins

Information for Candidates

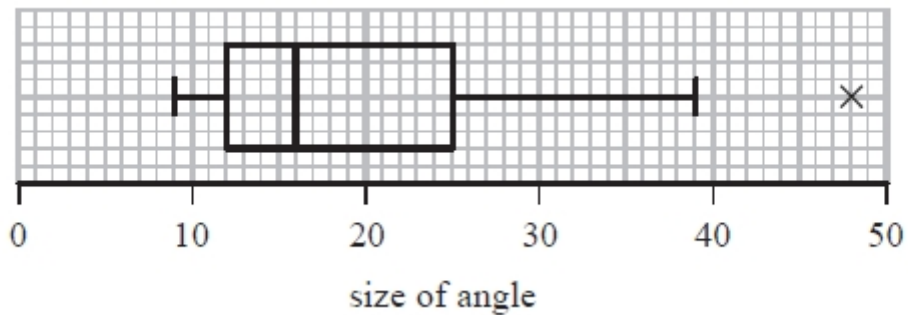
- This practice paper follows the Edexcel GCE A Level Specifications
- There are 5 questions in this question paper
- The total mark for this paper is 48.
- The marks for **each** question are shown in brackets.
- Full marks may be obtained for answers to ALL questions

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

Question 1

Each of 60 students was asked to draw a 20° angle without using a protractor. The size of each angle drawn was measured. The results are summarised in the box plot below.



- (a) Find the range for these data. (1)
- (b) Find the interquartile range for these data. (1)

The students were then asked to draw a 70° angle. The results are summarised in the table below.

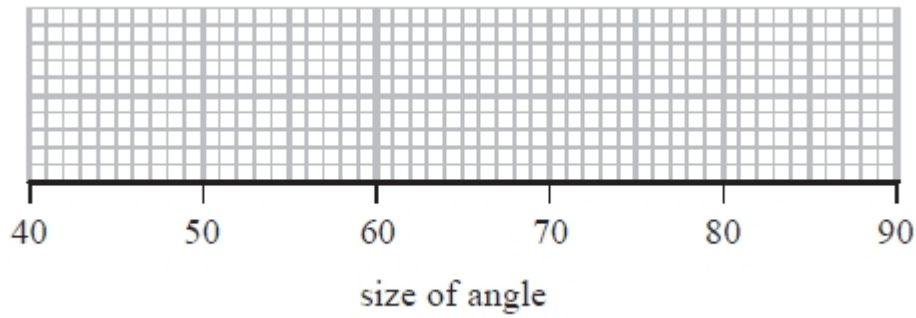
| Angle, a , (degrees) | Number of students |
|------------------------|--------------------|
| $55 \leq a < 60$ | 6 |
| $60 \leq a < 65$ | 15 |
| $65 \leq a < 70$ | 13 |
| $70 \leq a < 75$ | 11 |
| $75 \leq a < 80$ | 8 |
| $80 \leq a < 85$ | 7 |

- (c) Use linear interpolation to estimate the size of the median angle drawn. Give your answer to 1 decimal place. (2)
- (d) Show that the lower quartile is 63° (2)

For these data, the upper quartile is 75° , the minimum is 55° and the maximum is 84°

An outlier is an observation that falls either more than $1.5 \times$ (interquartile range) above the upper quartile or more than $1.5 \times$ (interquartile range) below the lower quartile.

- (e) (i) Show that there are no outliers for these data.
(ii) Draw a box plot for these data on the grid on page 3. (5)
- (f) State which angle the students were more accurate at drawing. Give reasons for your answer. (3)



(Total for question = 14 marks)

Question 2

A college has 80 students in Year 12.

20 students study Biology

28 students study Chemistry

30 students study Physics

7 students study both Biology and Chemistry

11 students study both Chemistry and Physics

5 students study both Physics and Biology

3 students study all 3 of these subjects

(a) Draw a Venn diagram to represent this information. (5)

A Year 12 student at the college is selected at random.

(b) Find the probability that the student studies Chemistry but not Biology or Physics. (1)

(c) Find the probability that the student studies Chemistry or Physics or both. (2)

Given that the student studies Chemistry or Physics or both,

(d) find the probability that the student does not study Biology. (2)

(e) Determine whether studying Biology and studying Chemistry are statistically independent. (3)

(Total for question = 13 marks)

Question 3

a) Explain what is meant by:

(i) Hypothesis test

(ii) Critical value

(iii) An acceptance region

(3)

A manager thinks that the probability of a person buying a particular product is 0.2. To test this claim he records the number of people buying this product in a random sample of 20 people

b) Find the critical region for a two tailed test, at the 10% level of significance, of whether there is evidence that the probability is different from 0.2.

(5)

c) State the actual significance level of the test

(1)

7 people buys that certain product.

(d) Comment on this observation in light of your critical region.

(2)

(Total for question = 11 marks)

Question 4

The table show the sales, p , in millions, of a smartphone t years since their first launch.

| | | | | | | | | | | | |
|-----|-------|-------|-------|-----|-------|-------|-------|-------|-------|-------|--------|
| t | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| p | 238.4 | 252.1 | 251.3 | 279 | 318.7 | 361.1 | 439.2 | 548.2 | 683.3 | 846.4 | 1028.7 |

a) Give a reason why the data is coded using the changes of variable $x = t$ and $y = \log_{10} p$.

(1)

b) The product moment correlation coefficient for the coded data is $r = 0.9735$. Comment on r for this model.

(2)

c) With reference to your answer to part b, state whether a model in the form $p = ab^t$, where a and b are constants, is a good fit for this data.

(2)

(Total for question = 5 marks)

Question 5

The table shows amount of daily maximum relative humidity, x % in tens, and the amount of daily total rainfall, y mm, from a random sample of 10 days.

| | | | | | | | | | | |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Humidity (y) | 2.9 | 1.9 | 1.6 | 2.7 | 3.1 | 2.2 | 2.7 | 1.9 | 1.7 | 2.6 |
| Rainfall (x) | 58 | 56 | 55 | 66 | 47 | 63 | 49 | 56 | 53 | 53 |

The product moment correlation coefficient for the average amount of daily total rainfall and the amount of daily maximum relative humidity is -0.136 .

- a Test for evidence of a negative population product moment correlation coefficient at the 2.5% significance level. Interpret this result in context. (3)
- b Explain why even if the population product moment correlation coefficient between two variables is close to zero there may still be a relationship between them. (2)

(Total for question = 5 marks)

TOTAL FOR PAPER IS 48 MARKS
