

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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October 2021

Pearson Edexcel International Advanced Level

Time 1 hour 30 minutes

Paper

reference

WST01/01

Mathematics

International Advanced Subsidiary/Advanced Level Statistics S1

You must have:

Mathematical Formulae and Statistical Tables (Yellow), calculator

Total Marks

Candidates may use any calculator permitted by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Values from the statistical tables should be quoted in full. If a calculator is used instead of the tables, the value should be given to an equivalent degree of accuracy.
- Inexact answers should be given to three significant figures unless otherwise stated.

Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 6 questions in this question paper. The total mark for this paper is 75.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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Question 1 continued

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Q1

(Total 7 marks)





Question 2 continued

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Question 2 continued

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Question 2 continued

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(Total 12 marks)

Q2

Grading box for Q2.



3. The stem and leaf diagram shows the ages of the 35 male passengers on a cruise.

Age		Key: 1 3 represents an age of 13 years
1	3	(1)
2	7 9	(2)
3	1 2 8 8	(4)
4	5 5 6 7 8 8 9	(7)
5	2 2 3 3 4 4 5 6 6 8	(10)
6	0 1 1 4 4 4 7	(7)
7	3 6	(2)
8	7 8	(2)

- (a) Find the median age of the male passengers. (1)

- (b) Show that the interquartile range (IQR) of these ages is 16 (2)

An outlier is defined as a value that is more than

$1.5 \times \text{IQR}$ above the upper quartile

or

$1.5 \times \text{IQR}$ below the lower quartile

- (c) Show that there are 3 outliers amongst these ages. (3)

- (d) On the grid in Figure 1 on page 9, draw a box plot for the ages of the male passengers on the cruise. (4)

Figure 1 on page 9 also shows a box plot for the ages of the female passengers on the cruise.

- (e) Comment on any difference in the distributions of ages of male and female passengers on the cruise.
State the values of any statistics you have used to support your comment. (1)

Anja, along with her 2 daughters and a granddaughter, now join the cruise.

Anja's granddaughter is younger than both of Anja's daughters.

Anja had her 23rd birthday on the day her eldest daughter was born.

When their 4 ages are included with the other female passengers on the cruise, the box plot does not change.

- (f) State, giving reasons, what you can say about
(i) the granddaughter's age
(ii) Anja's age. (3)



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Question 3 continued

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Boxplot of Age (females). The x-axis represents Age (females) from 10 to 90. The plot shows a median age of approximately 68, with the interquartile range (IQR) spanning from about 56 to 72. Whiskers extend from approximately 34 to 93. There are two outliers marked with 'x' at ages 20 and 28.

Statistic	Approximate Value
Minimum (whisker)	34
First Quartile (Q1)	56
Median	68
Third Quartile (Q3)	72
Maximum (whisker)	93
Outlier 1	20
Outlier 2	28

(Total 14 marks)

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4. Three bags **A**, **B** and **C** each contain coloured balls.

Bag **A** contains 4 red balls and 2 yellow balls only.

Bag **B** contains 4 red balls and 1 yellow ball only.

Bag **C** contains 6 red balls only.

In a game

Mike takes a ball at random from bag **A**, records the colour and places it in bag **C**.

He then takes a ball at random from bag **B**, records the colour and places it in bag **C**.

Finally, Mike takes a ball at random from bag **C** and records the colour.

- (a) Complete the tree diagram on the page opposite, to illustrate the game by adding the remaining branches and all probabilities.

(3)

- (b) Show that the probability that Mike records a yellow ball exactly twice is $\frac{1}{10}$

(3)

Given that Mike records exactly 2 yellow balls,

- (c) find the probability that the ball drawn from bag **A** is red.

(2)

Mike plays this game a large number of times, each time starting with the bags containing balls as described above. The random variable X represents the number of yellow balls recorded in a single game.

- (d) Find the probability distribution of X

(3)

- (e) Find $E(X)$

(2)

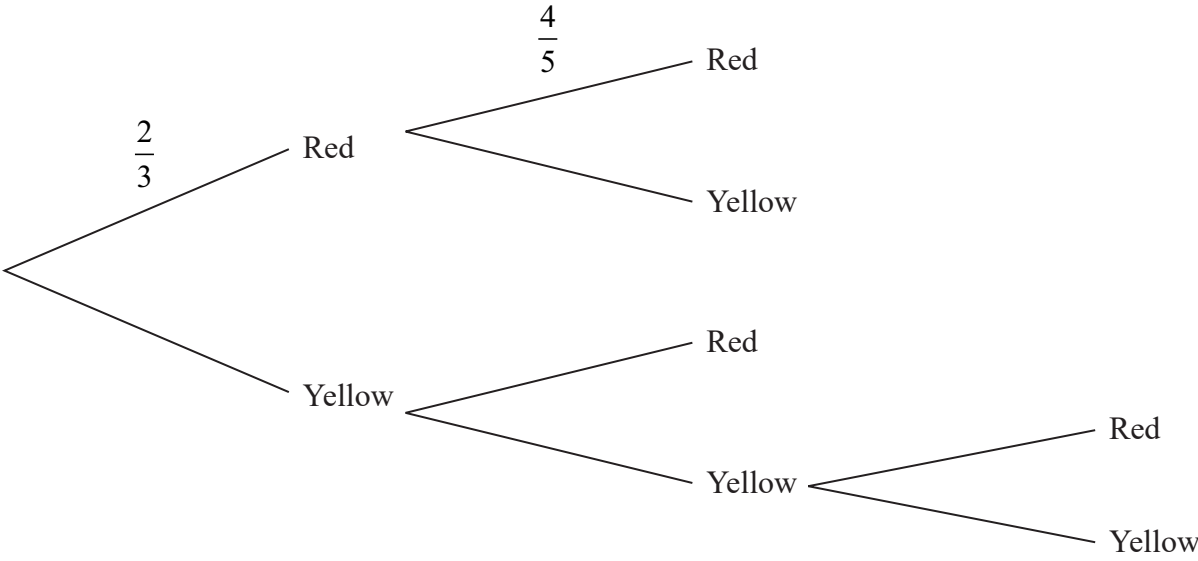


Question 4 continued

Bag A

Bag B

Bag C



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Question 4 continued

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Question 4 continued

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Q4

(Total 13 marks)



5. The discrete random variable Y has the following probability distribution.

y	-9	-5	0	5	9
$P(Y=y)$	q	r	u	r	q

where q , r and u are probabilities.

- (a) Write down the value of $E(Y)$ **(1)**

The cumulative distribution function of Y is $F(y)$

Given that $F(0) = \frac{19}{30}$

- (b) show that the value of u is $\frac{4}{15}$ (3)

Given also that $\text{Var}(Y) = 37$

- (c) find the value of q and the value of r (4)

The coordinates of a point P are $(12, Y)$

The random variable D represents the length of OP

- (d) Find the probability distribution of D (6)



Question 5 continued

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Question 5 continued

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Question 5 continued

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(Total 14 marks)

Q5



- (d) Work out the minimum total height needed. (2)

Question 6 continued

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Question 6 continued

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Question 6 continued

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END

TOTAL FOR PAPER: 75 MARKS