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Year 10 Mathematics
AOS 6 Revision [10.1]
Mock CAT 2

51 Marks. 60 Minutes Writing.

Results:

Short Answer Questions	_____ / 35
Extended Response Questions	_____ / 16

Section A: Short Answer Questions (35 Marks)

Question 1 (1 mark)

Calculate the range of the data set:

$$\{5, 1, 9, 12, 3, 8\}$$

1, 3, 5, 8, 9, 12

$12 - 1 = 11$

$R = 11$

Question 2 (2 marks)

Good but make sure to include and working out!

A standard six-sided die is rolled. What is the probability of rolling a number greater than 4?

$Pr\ (Greater\ than\ 4) = \frac{1}{3}$

Question 3 (2 marks)

Find the mean and the median of the following data:

$$12, 9, 6, 15, 18$$

6, 9, 12, 15, 18

Median = 12

Question 4 (2 marks)

For the following data set:

$$\{10, 12, 13, 15, 17, 18, 20\}$$

Find the five-figure summary (Min, Q_1, Median, Q_3, Max).

Min = 10

$Q_1 = 12$

Median = 15

$Q_3 = 19$

Max = 20

Question 5 (3 marks)

The two-way table below shows the preferred sport for a group of Year 10 students.

	Basketball	Soccer	Total
Boys	18	12	30
Girls	15	10	25
Total	33	22	55

a. How many girls prefer basketball? (1 mark)

n (girls prefer basketball) = 15 girls

b. A student is chosen at random. What is the probability that the student is a girl who prefers soccer? (2 marks)
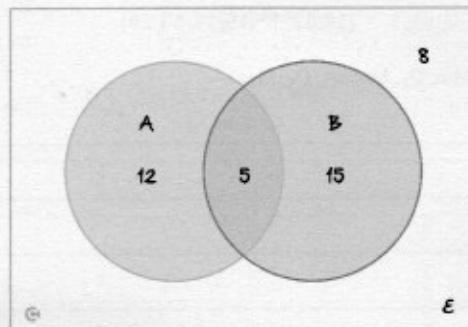
Pr (Girl prefers Soccer) = $\frac{10}{55}$

Pr (Girls prefer Soccer) = $\frac{2}{11}$

↳ Make sure to be more clear about your final answer.

Question 6 (2 marks)

Consider the Venn diagram below:

Find the probability of $P(A \cup B)$.

$$12 + 5 + 15 = \quad 12 + 20 = 32 \qquad 32 + 8 = 40$$

$$Pr(A \cup B) = \frac{32}{40}$$

$$P_r(A \cup B) = \frac{4}{5}$$

Question 7 (2 marks)

If $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cup B) = 0.8$, find $P(A \cap B)$.

$$P(A) = 0.6 \qquad P(A \cup B) = 0.8 \qquad P \ 0.6 \times 0.5 = \cancel{0.13} \ \cancel{31} \cancel{0}$$

$$P(B) = 0.5 \qquad\qquad 0.6 \times 0.5 = 0.3$$

$$P(A) \times P(B) = P(A \cap B) \qquad 0.6 - 0.3 = 6.3$$

$$0.5 - 0.3 = 0.2$$

$$0.3 + 0.2 + 0.3 = 0.8$$

So therefore $P(A \cap B) = 0.3$

Question 8 (2 marks)

Two events, A and B, are such that $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{4}$ and $P(A \cap B) = \frac{1}{10}$. Determine whether events A and B are independent. Justify your answer.

$$P(A) \times P(B) = P(A \cap B)$$

$$\frac{1}{3} \times \frac{1}{4} = \frac{1}{12} \neq \frac{1}{10}$$

good use of symbols.

no, they are not independent
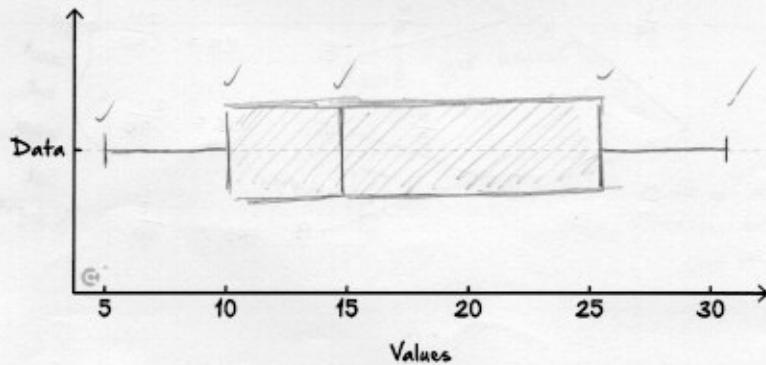
↳ *Clear answer* ○

Question 9 (2 marks)

Draw a box plot for the data represented by the following five-figure summary:

Minimum = 5, $Q_1 = 10$, Median = 15, $Q_3 = 25$, Maximum = 30.

Best plot from five – number summary

Question 10 (2 marks)

The number of goals scored by a soccer team in their last 10 matches are recorded below:

$$3, 0, 1, 4, 2, 3, 1, 2, 5, 2$$

0, 1 |2, 2|2, 3|3| 4, 5

An outlier is a data point that lies outside the range $[Q_1 - 1.5 \times IQR, Q_3 + 1.5 \times IQR]$. Identify any outliers in the given data set.

$Q_1 = 1$

$Q_3 = 3$

did wrong order... I'm actually stupid.

1.5×2
$(1 - 1.5 \times 2) = 0.5 \times 2 = 3 \rightarrow (1 - 1.5) \times 2$ ✗ wrong $1 - (1.5 \times 2)$

1.5×2
$3 + 1.5 \times 2 = 4.5 \times 2 = 8.3$ all data within $[-2, 9]$ ✓
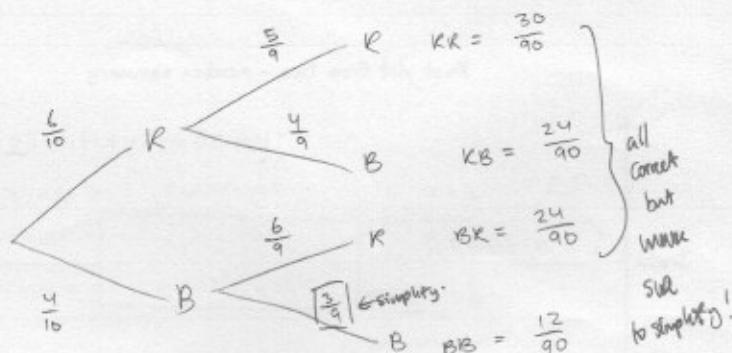
outlier = 0 Q_1 $1 - 3 = -2$ ⎫ therefore no outliers
                Q_3 $3 + 3 = 9$ ⎭

Question 11 (3 marks) ½

A bag contains 6 red balls and 4 blue balls. A student randomly picks one ball, **does not replace it**, and then picks a second ball.

Draw a **tree diagram** to represent all the possible outcomes, showing the probabilities on the branches.

$\frac{6}{10}$ R
— $\frac{5}{9}$ → R $RR = \frac{30}{90}$
— $\frac{4}{9}$ → B $RB = \frac{24}{90}$

$\frac{4}{10}$ B
— $\frac{6}{9}$ → R $BR = \frac{24}{90}$
— $\boxed{\frac{3}{9}}$ ← simplify → B $BB = \frac{12}{90}$

all correct but make sure to simplify!

Question 12 (4 marks) **Tech-Active.**

The table below shows the hours a student spent studying for a test and the score they achieved.

Hours Studied (x)	1	2	4	5	6
Test Score /100 (y)	55	60	75	80	95

a.   Describe the correlation between the hours studied and the test score. (1 mark) $\frac{1}{2}$

↳ when answering: Correlation + explanation.

a strong positive correlation between the x variable (Hours Studied)

and y (test score) + As study hours increased (x), test scores increased (y)

b.   The line of best fit passes through the points $(2, 60)$ and $(6, 95)$. Find the equation of this line. Give your answer accurate to one decimal place. (2 marks)

read the question!

$\dfrac{95 - 60}{6 - 2} = \dfrac{35}{4} x$

$y = \dfrac{35}{4} x + c$

$(60) = \dfrac{35}{4} (2) + c$

$y = \dfrac{35}{4} x + 42\frac{1}{2}$

$60 = 17\frac{1}{2} + c$

$↳ y = 8.75x + 42.5$

$60 - 17\frac{1}{2}$ $c = 42\frac{1}{2}$

c.   Use your equation to predict the score for a student who studied for 3 hours. (1 mark)

@   3 hours $= \dfrac{68.75}{100} ≈ \dfrac{69}{100}$

Round your answer!

Hard do you know when to round your answer or not? does it very or is it the same?

Question 13 (3 marks) Tech-Active.

A teacher records the number of books read by 5 students in a month. The data set is:

$$\{2, 3, 4, 7, 9\}.$$

The mean is given as 5.

$2 + 3 + 4 + 7 + 9 = 16 + 9 = \frac{25}{5} = 5$

$= 5 + 11 + 9$

a. Calculate the **population variance** for this data set. Give your answer in exact form. (2 marks)

squared deviations of
standard deviation.
so just about $\sqrt{}$ it.

$= 2.42$ $\dfrac{34}{3}$ $\dfrac{\Sigma (x - \bar{x})^2}{N}$

$\dfrac{(2-5)^2 + (3-5)^2 + (4-5)^2 + (7-5)^2 + (9-5)^2}{}$

$9 + 4 + 1 + 4 + 16$ $\dfrac{34}{5}$

$= \dfrac{34}{N}$ $N = 5$

b. Hence, find the **population standard deviation**. Give your answer correct to two decimal places. (1 mark)

$s = 2.61 \rightarrow$ essentially

$\sqrt{\dfrac{34}{4}} = 2.61$

$s = \sqrt{\dfrac{(x - \bar{x})^2}{n-1}}$

$s = 1$

Question 14 (5 marks)

A bag contains 5 red marbles and 3 blue marbles.
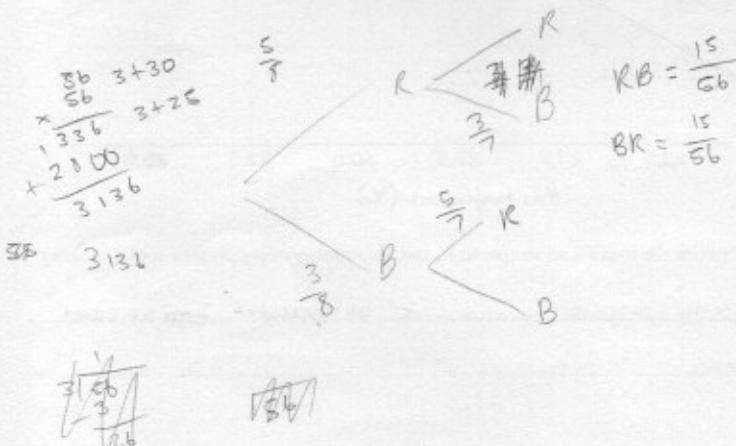
a.   A marble is drawn at random from the bag. What is the probability that it is red? (2 marks)

$$\text{Pr (Red marble)} = \frac{5}{8}$$

b.   Two marbles are drawn from the bag without replacement. What is the probability that one marble is red and
the other is blue? (Hint: consider the two possible orders). (3 marks)

$$\text{Pr}(R \cap B) = \frac{30}{56} \rightarrow \text{ make sure to simplify.}$$

$$\frac{15}{28}.$$

$$\frac{15}{56} \times \frac{15}{56} = \frac{225}{3136}$$

225

$$\begin{array}{l} 56 \quad 3+30 \\ \times 56 \quad 3+25 \\ \overline{336} \\ + 2800 \\ \overline{3136} \end{array}$$

3136

$$\frac{5}{8}$$

$$\frac{3}{8}$$

$$R \begin{cases} R \\ \frac{3}{7} B \end{cases}$$

$$B \begin{cases} \frac{5}{7} R \\ B \end{cases}$$

$$RB = \frac{15}{56}$$

$$BR = \frac{15}{56}$$
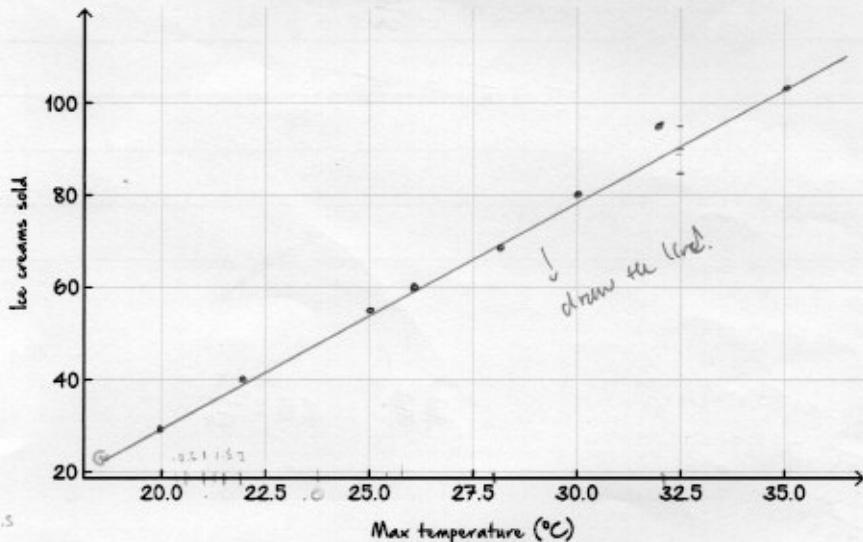
Section B: Extended Response Questions (16 Marks)

Question 15 (7 marks) **Tech-Active.**

[handwritten: of example line that best fits it ext]

A local ice cream shop owner records the number of ice creams sold per day and the maximum temperature for that day. The data for 8 days is shown below.

Max Temperature (°C), x	22	25	28	30	32	35	20	26
Ice Creams Sold, y	40	55	70	80	95	110	30	60

a. Construct a scatterplot of the data on the grid below. (2 marks)

Ice Creams Sold vs Max Temperature

[handwritten on graph: draw the line.]

b. Describe the correlation between the maximum temperature and the number of ice creams sold. (1 mark)

A strong positive correlation + as temperature, the ice cream sales increase.

c. A line of best fit for this data passes through the points $(22, 40)$ and $(35, 110)$. Find the equation of this line. Give your answer both in exact form and rounded to four decimal places. (2 marks)

$$\frac{40-110}{22-35} = \frac{70}{13} x$$

$$y = \frac{70}{13} x + c$$

$$40 = \frac{70}{13} (22) + c$$

$$40 = \frac{1540}{13} + c$$

$$\frac{520}{13} - \frac{1540}{13} \qquad -\frac{1020}{13}$$

$$y = \frac{70}{13} x + \left(-78\frac{6}{13}\right)$$

$$y = 5.3846 - 78.4615$$

↳ for not exact value use ≈

$$78\frac{6}{13} x \qquad 78\frac{6}{13} \; x$$

d. Use your equation to predict the number of ice creams sold on a day with a maximum temperature (1 mark)

≈ 78 ice cream

do we keep fractions mixed or improper? is this the same for all?

e. Use your equation to predict the number of ice creams sold on a day with a maximum temperature of 40 °C. Give your answer correct to the nearest integer. (1 mark)

~~136~~   137 ice cream.

Question 16 (9 marks) ~~Example fie four summary.~~ ✓

The test scores (out of 50) for two Year 10 classes, 10 A and 10 B, are displayed in the back-to-back stem-and-leaf plot below.

Class 10A	Stem	Class 10B
9, 7, 5, 5	2	0, 2, 8
9, 8, 4, 2, 0	3	1, 3, 5, 5, 9
7, 5	4	0, 2, 6

25, 23, ㉗ 29, 20, 38, 34, 35, ㉞ 45, 47

20, 22, ㉛ 31, 33 ㉟, 35 39 ㊵ 42, 46

Key : 1 | 6 means 16

a. Determine the five-figure summary for both Class 10 A and Class 10 B. (3 marks)
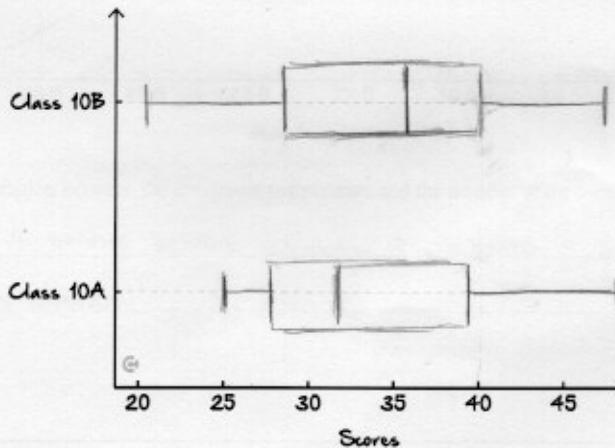
10A

Min = 25	
Q₁ = 27	Range = 22
Median = 32	IQR = 12
Q₃ = 39	
Max = 47	

10B

Min = 20	
Q₁ = 28	Range = 26
Median = 35	IQR = 12
Q₃ = 40	
Max = 46	

b. On the axes below, draw parallel box plots to compare the scores of the two classes. (2 marks)

Best plots of test scores (out of 50)

Class 10B

Class 10A

Scores (20, 25, 30, 35, 40, 45)

c. For Class 10 A, the mean score is $\bar{x} \approx 32.7$, and the standard deviation is $\sigma \approx 8.4$. For Class 10 B, calculate the mean and range. (3 marks)

Range = 26

$11 + 6 = 17$

Mean = $\dfrac{20 + 22 + 28 + 31 + 33 + 35 + 35 + 39 + 40 + 42 + 46}{20}$ $24 + 17 = 11 + 30 = 41$

$66 + 60 + 60 + 70 + 80 =$

$120 + 130 + 80 = 250 + 80 = 330$

$\bar{x} = 33.7$

$330 + 41 = 371$

$\dfrac{371}{11}$

33.7

$11\overline{)371}$

-33

41

-33

8.0

7.7

d. Write a brief statement comparing the performance of the two classes. Refer to at least one measure of centre and one measure of spread in your comparison. (1 mark)

Class 10A with a range of 22 and Class 10B with a range of 26 shows that 10A has a slight higher consistence in scores and Class 10 A has a lower average mark of 32.7 compared to 10B with an average of 33.7. ✓

↓

When writing written answers seperate the (Centre, Spreet Spread.

Centre : Class 10 B's median (35) and mean (~33.7) are both higher than Class 10 A's median (32) and mean (~32.7) so 10B performmed slightly better.

Spread : The middle 50% spread is the same (IQR = 12), but 10B has a wider overall range (26) (10B's = 26)(10A's = 22), indicating slight more variability.

reause
remember = State summary
then explain.

key words: median,
Mean,
IQR,   } the measures of 5-figure summary
Range,

higher,
better,   } adjectives to describe the summary's.
same,
variability