



MATHEMATICS: PAPER III

EXAMINATION NUMBER

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Time: 2 hours

100 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 16 pages and a 4-page Diagram and Information Sheet (pages i – iv). Detach the Diagram and Information Sheet from the centre of the question paper for your own use. Please check that your paper is complete.
2. Read the questions carefully.
3. Answer ALL the questions on the question paper and hand this in at the end of the examination. You do not need to hand in the Diagram and Information Sheet.
4. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
5. Round off your answers to two decimal digits where necessary.
6. All the necessary working details must be clearly shown.
7. It is in your own interest to write legibly and to present your work neatly.

Question	1	2	3	4	5	6	7	8	9	10	11	12	Total
Marks													

SECTION A

QUESTION 1

Examine the following table of sequences:

Sequence
(1) 4; 5; 22; 112;
(2) 4; 5; 12; 20;
(3) 4; 5; 8; 17;

Each sequence is described by one of the recursive formulae below. Match each sequence with the correct formula.

Recursive Formula
(A) $T_{k+1} = 3T_k - 7$; for $k \geq 1$ with $T_1 = 4$.
(B) $T_{k+1} = T_k + T_{k-1} + 3$; for $k \geq 2$ with $T_1 = 4$ and $T_2 = 5$.
(C) $T_{k+2} = T_{k+1} \times T_k + 2$; for $k \geq 1$ with $T_1 = 4$ and $T_2 = 5$.
(D) $T_{k+1} = \frac{T_k}{2} + 1$; for $k \geq 1$ with $T_1 = 4$.

Write down only the letter of your choice.

(1) _____

(2) _____

(3) _____

[6]

QUESTION 2

During a TV Game Show, contestants have to answer randomly generated questions within a fixed time.

The probability of the first question being answered correctly is 0,8.

Whenever a question is answered correctly, the next question generated is more difficult and the probability of a correct answer is reduced by 0,1.

This means that the probability of getting the second answer correct (if the first answer is correct) will be 0,7.

Whenever a question is answered wrongly, the next question generated is of the same standard and the probability of it being answered correctly remains unchanged.

- (a) After how many consecutive correct answers will the probability of getting the next question correct, be zero?

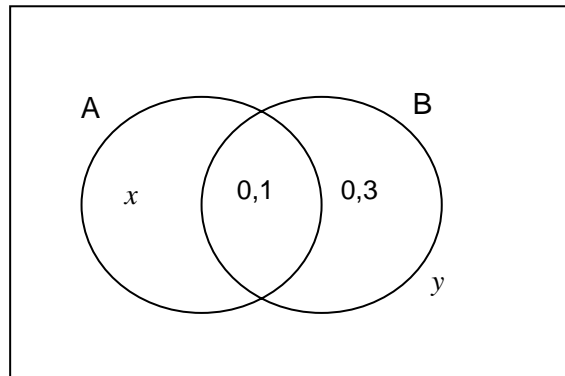
_____ (1)

- (b) Find the probability of a contestant getting the second answer correct.

(6)
[7]

QUESTION 3

- (a) If A and B are independent events, find the values of x and y . All working must be shown.



(5)

- (b) The table summarises the results of all the driving tests taken at a Test Centre in Cape Town during the first week of January.

	Male	Female	Totals
Pass	32	43	75
Fail	8	15	23
Totals	40	58	98

A person is chosen at random from those who took their test during the first week of January.

- (i) Find the probability that the person was a female who failed.

(2)

- (ii) The person chosen is a male. Find the probability that he passed the test.

(2)
[9]

QUESTION 4

All answers containing factorials must be calculated e.g.: $4! = 24$

- (a) In how many ways can the letters of the word **Geometry** be arranged, if the letter G is at the beginning?

(3)

- (b) Three men (Andries, Bongani and Chris) and 2 women (Dumi and Emily) are to stand in a straight line to have their group photograph taken.

Find the probability that Andries stands next to Dumi and Bongani stands next to Emily.

(5)
[8]

QUESTION 5

A law firm, Justice and Son, monitored the time spent on consultations with a random sample of 120 clients. The times, to the nearest minute, are summarised in the table below:

Time (minutes)	Number of Clients
10 – 14	4
15 – 19	5
20 – 24	18
25 – 29	36
30 – 34	21
35 – 39	25
40 – 44	7
45 – 49	3
50 – 54	1

(a) Estimate:

(1) the mean of the times.

_____ (3)

(2) the percentage of clients who spent less than the mean time in consultation.

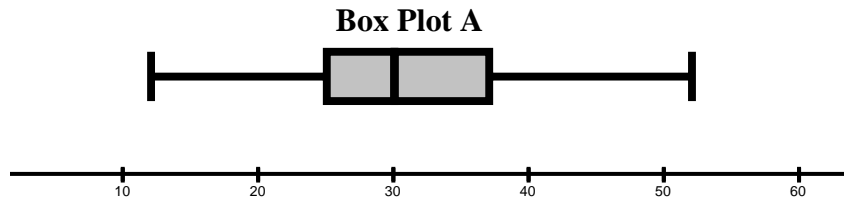
 _____ (2)

(3) the standard deviation of the times.

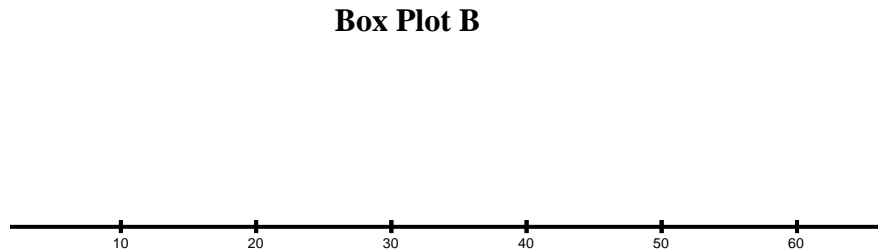
_____ (3)

- (b) A Box and Whisker plot of the data is drawn, in **Box Plot A** below, with the following: Minimum = 12 minutes; $Q_1 = 25$; $Q_2 = 30$; $Q_3 = 37$ and Maximum = 52.

Data regarding consultation times is captured from a second law firm, Peace and Company. They found that the least time spent was 20 minutes, the longest was 40 minutes and the quartiles were 24, 35 and 36 minutes respectively.



- (1) On the scaled graph in **Box Plot B** below, draw the Box Plot to represent the data from Peace and Company.



(2)

- (2) Using the following headings, compare and contrast the two Box Plots.

- (i) Range and inter-quartile range

(2)

- (ii) Skewness

(2)
[14]

QUESTION 6

An air traffic controller co-ordinates the movement of aircraft in the air and on the ground at airports to prevent accidents.

Explain why the quoted statistics could be misleading in the following statement:

'Errors by air traffic controllers climbed from 756 in 2007 to 898 in 2008 – an increase of almost 19%.'

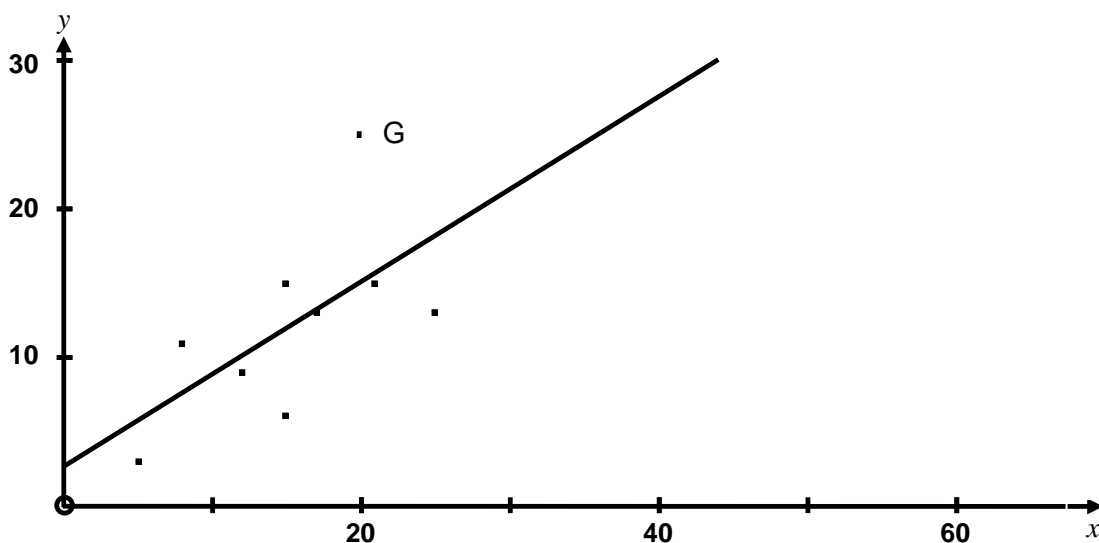
[2]

QUESTION 7

A supermarket wants to survey how long in seconds (y) it takes to scan (x) items at a till point.

They decide to select the results from 9 shoppers. The results in the table below are plotted in the scatterplot.

	A	B	C	D	E	F	G	H	I
x (no of items)	5	8	12	15	15	17	20	21	25
y (time in seconds)	3	11	9	6	15	13	25	15	13



- (a) Use your calculator to find the equation of the regression line, drawn on the scatterplot, which best fits the given data.

(4)

- (b) Calculate the value of r , the correlation coefficient for the data.

(2)

- (c) Estimate the time that the teller would take to scan 21 items at the till.

(2)

- (d) It was found that an error was made with the time value of point G (20; 25). In fact the point should have been (20; 20).

If the correlation coefficient for the new least squares line of best fit was now calculated, would it indicate a stronger or a weaker correlation? Validate your answer.

(3)
[11]

QUESTION 8

A car magazine reported the following correlations:

- The correlation between car weight and car reliability is: $-0,34$
- The correlation between car weight and annual maintenance is: $0,27$

Which of the following statements is TRUE? Write down only the correct letter as your answer.

- (i) Heavier cars tend to be less reliable.
- (ii) Heavier cars tend to cost more to maintain.
- (iii) Car weight is related more strongly to reliability than to maintenance cost.

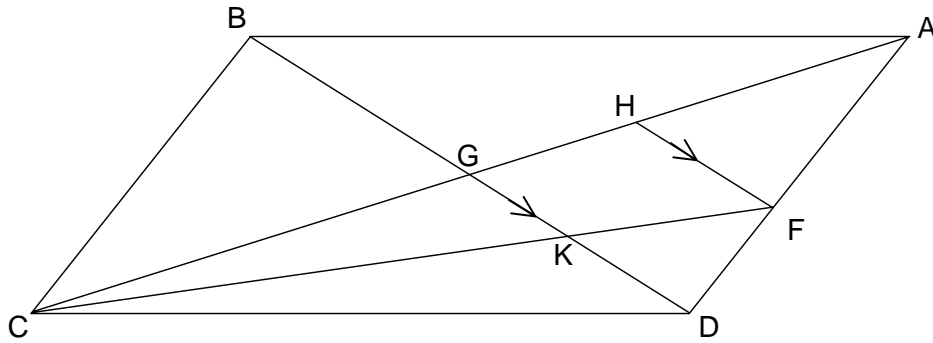
- A (i) only
- B (ii) only
- C (iii) only
- D (i) and (ii)
- E (i), (ii) and (iii)

[2]

SECTION B

QUESTION 9

No reasons are needed in this question.



Refer to the diagram.

ABCD is a parallelogram with diagonals BD and CA.

$HF \parallel BD$.

$CG = 72$ units; $DF = 24$ units; $FA = 40$ units

Find:

- (a) the length of GA.

_____ (1)

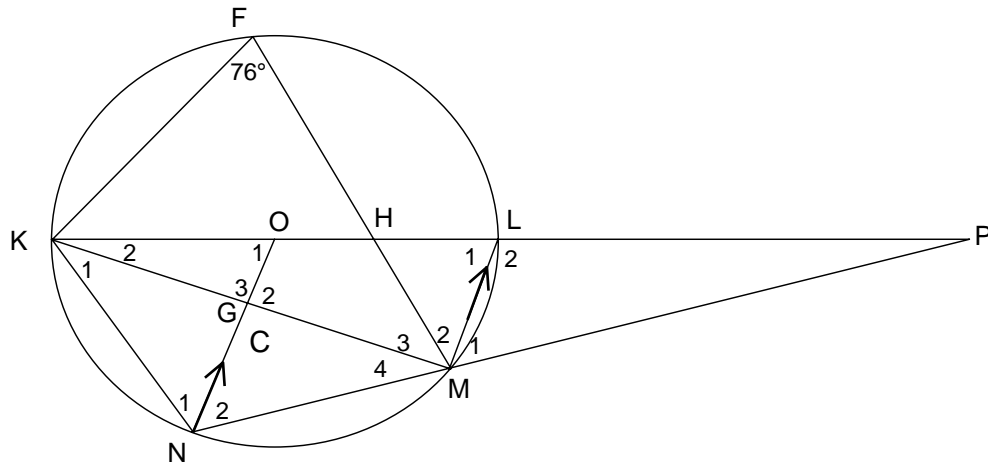
- (b) the length of GH.

 _____ (3)

(c) the value of Area $\triangle AHF$:Area $\triangle ACD$.

(4)
[8]

QUESTION 10



Refer to the diagram.

O is the centre of the circle and diameter KL is produced to meet NM produced at P.
 $ON \parallel LM$ and $\hat{F} = 76^\circ$.

Calculate, giving reasons, the size of:

(a) \hat{L}_1

(2)

(b) \hat{O}_1

(2)

(c) \hat{M}_4

(2)

(d) $\hat{N}_1 + \hat{N}_2$

(2)

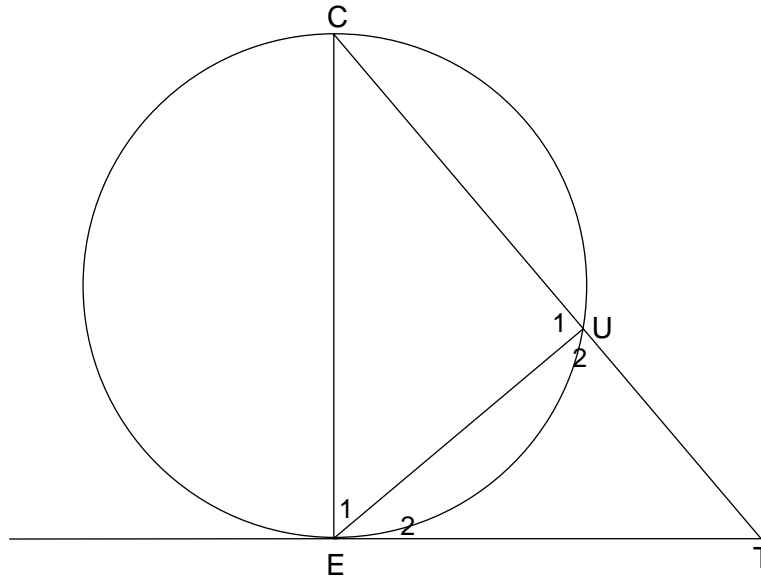
(e) \hat{M}_1

(4)

(f) Prove that $KG = GM$.

(4)
[16]

QUESTION 11



In the diagram, EC is the diameter of the circle.
TE is a tangent to the circle at E.

- (a) Prove $\triangle CUE \sim \triangle EUT$.

_____ (4)

- (b) Name another triangle which is similar to $\triangle CUE$.

_____ (1)

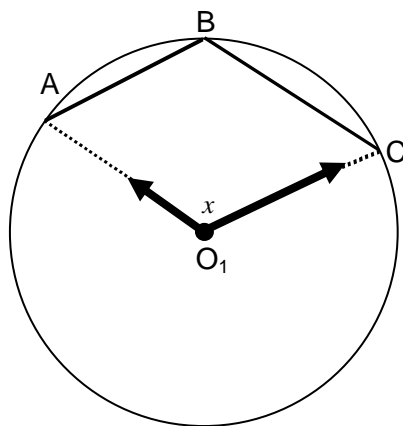
- (c) Find the perimeter of $\triangle EUT$ if $CU = 8$ cm and $UT = 4$ cm.
Leave your answer correct to two decimal digits.

(5)
[10]

QUESTION 12



The time shown on the clock is exactly twelve minutes past ten or 10h12.
The clock is now represented in the figure below.



(a) Find the size of \hat{B} in terms of x , giving reasons.

(3)

(b) Hence find the size of \hat{B} in degrees. Show all working.

(4)
[7]

Total: 100 marks