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MATHEMATICS

GRADE 11: EXAMINATION PAPER 2 **NOV 2025**: TERM 4

TIME: 3 HOURS **TOTAL MARKS**: 150

EXAMINER: Z CRONJE **MODERATOR**: M BOTHA

Instructions to Learners:

1. Please write your name, surname, grade, and date on the answer sheet.
2. Read all questions carefully and think before your answer.
3. Clearly show ALL calculations, diagrams, graphs, etcetera that you have used in determining the answers.
4. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
5. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Write with a black or blue pen and cross out with a pencil if you make a mistake.
9. Please write neatly and legibly.
10. Good luck!!!!

This paper consists of 10 pages and 9 questions including an information sheet.

QUESTION 1

The table below shows the value of 16 randomly selected houses in a certain neighbourhood.

R1,4m	R1,7m	R1,5m	R1,7m	R1,5m	R1,6m	R1,5m	R1,6m
R1,1m	R1,0m	R1,9m	R1,5m	R1,2m	R0,9m	R2,5m	R1,3m

1.1 Determine the:

1.1.1 median (2)

1.1.2 mode (1)

1.1.3 mean (2)

1.1.4 interquartile range (3)

1.2 Draw a box-and whisker plot for the data on THE ANSWER SHEET. (4)

1.3 Determine the outlier(s). (3)

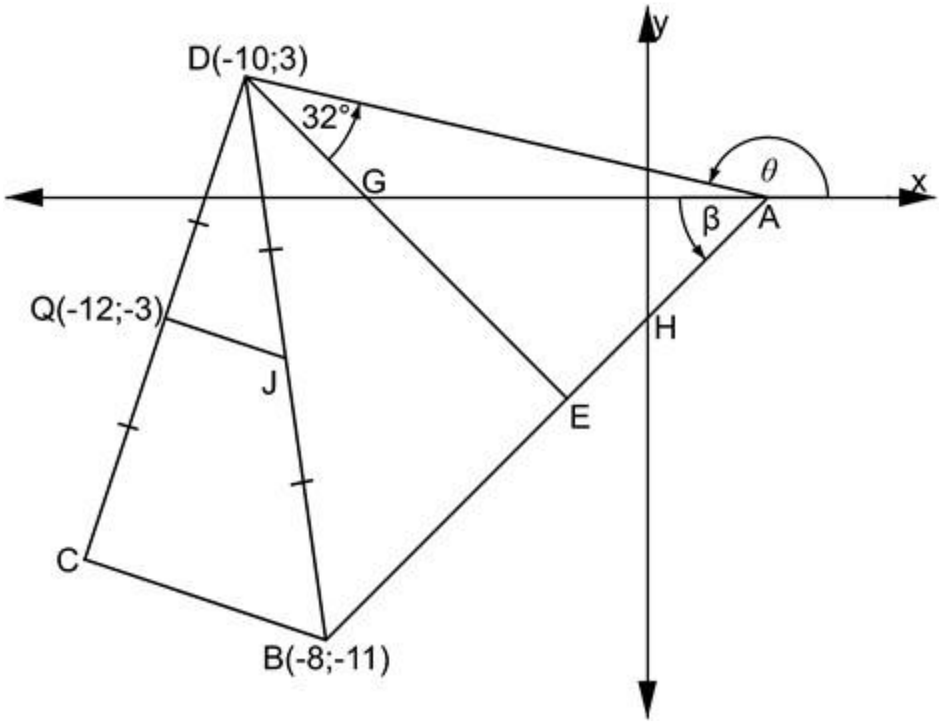
1.4 Explain what the standard deviation of data refers to. (2)

1.5 Discuss the effect of the outlier(s) on the standard deviation of data. (2)

[19]

QUESTION 2

In the diagram below, D(-10;3), C, B(-8;-11) and A are the vertices of a quadrilateral. Q(-12;-3) is the midpoint of DC. A and H are the intercepts of AB, with equation $y = x - 3$. E is a point on AB. The inclination of DA is θ and $G\hat{A}E = \beta$



2.1	Calculate the length of DB.	(2)
2.2	Determine the coordinates of J.	(2)
2.3	Determine the coordinates of A and H.	(2)
2.4	Determine the size of:	
	2.4.1 θ	(4)
	2.4.2 β	(2)
	2.4.3 $D\hat{E}A$	(3)
2.5	Determine the coordinates of C.	(3)
2.6	Prove that DCBE is a cyclic quadrilateral.	(6)
		[24]

QUESTION 3

3.1 Given $\cos 28° = t$

Determine the following in terms of t:

3.1.1 $\tan 28°$ (4)

3.1.2 $\sin 62°$ (2)

3.1.3 $\cos 208°$ (3)

3.2 Prove the following identity:

$$\frac{\sin 270° \, . \cos(-\theta) \, . \cos^2(\theta - 180°)}{\sin(90° - \theta)\tan(315°) \, . \cos(180° + \theta)} = \cos\theta$$ (6)

3.3 Simplify the following expression:

$$\frac{1 - \cos^2 x}{\cos x - \cos^2 x} - \frac{\cos^2 x + \sin^2 x}{\cos(-x)}$$ (5)

[20]

QUESTION 4

Given the expression: $3 - 3\sin^2 x$

4.1 Show that $3 - 3\sin^2 x = 3\cos^2 x$ (2)

4.2 Hence, determine the general solution of the equation:

$3\cos^2 x = 5\sin x - \sin^2 x$ (4)

4.3 Sketch the graph of $f(x) = \sin x$ for $x \in [0°; 270°]$ on the ANSWER SHEET. (3)

4.4 Write down the range of f. (2)

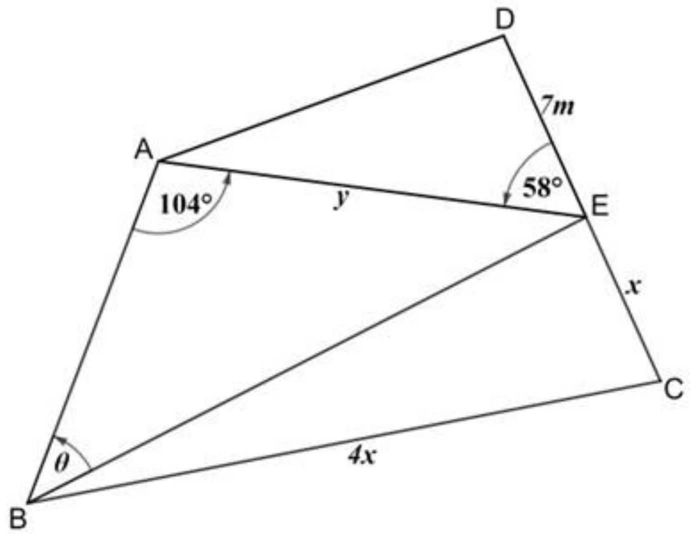
4.5 Given the graph of $g(x) = k.f(x)$

Determine the value(s) of k for which $g(x) = -3$ has a real solution. (2)

[13]

QUESTION 5

Study quadrilateral ABCD in the diagram below. E is a point on CD, such that ABCE is a cyclic quadrilateral.
$\mathrm{DE} = 7m, \mathrm{EC} = x, \mathrm{BC} = 4x, \mathrm{B}\hat{\mathrm{A}}\mathrm{E} = 104°$ and $\mathrm{A}\hat{\mathrm{E}}\mathrm{D} = 58°$.



5.1 Determine the length of BE in terms of x. (4)

5.2 Hence, show that $\sin\theta = \frac{y \sin 104°}{x\sqrt{17 - 8\cos 76°}}$ (2)

5.3 Given that the area of ΔAED is equal to 37 square metres, determine the value of y. (3)

5.4 Determine the size of $\mathrm{E}\hat{\mathrm{B}}\mathrm{C}$ in terms of θ. (2)

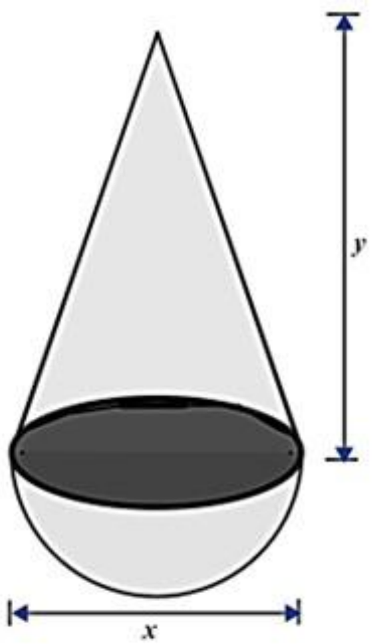
5.5 Hence, or otherwise, determine the size of θ. (5)

5.6 Calculate the value of x. (3)

[19]

QUESTION 6

The object below is composed of a cone and a hemisphere. The diameter of the hemisphere is $\boldsymbol{x}$ cm and the height of the cone is $\boldsymbol{y}$ cm.



VOLUME FORMULAE	
Cone	$\frac{1}{3}\pi r^2 h$
Hemisphere	$\frac{2}{3}\pi r^3$

6.1 Show that the volume of the object can be expressed as follows:

$$\frac{\pi x^2(x+y)}{12}$$ (4)

6.2 Given x = 5cm and y = 8cm, determine the volume of the object in cubic centimetres.

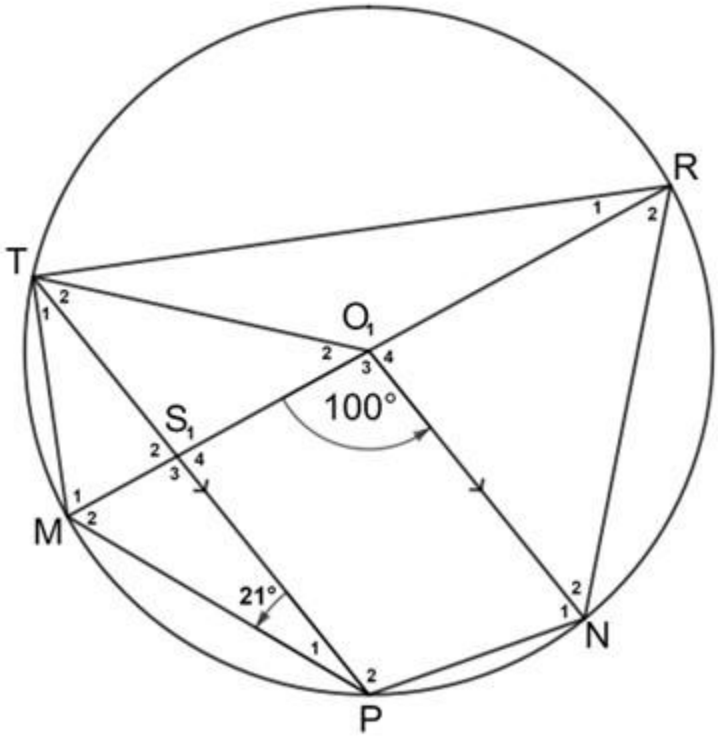
Use the formula $V = \frac{\pi x^2(x+y)}{12}$ (2)

6.3 Explain how the volume of the object is affected if the height of the cone is halved. (1)

[7]

QUESTION 7

In the diagram below, circle with centre O is shown. T, M, P, N and R are points on the circumference of the circle. TP||ON, $\widehat{O}_3 = 100°$ and $\widehat{P}_1 = 21°$



7.1 Give a reason why $M\hat{T}R = 90°$ (1)

7.2 Determine, with reason, the size of:

7.2.1 $\widehat{O}_2$ (3)

7.2.2 $\widehat{R}_1$ (3)

7.2.3 $\widehat{R}_2$ (3)

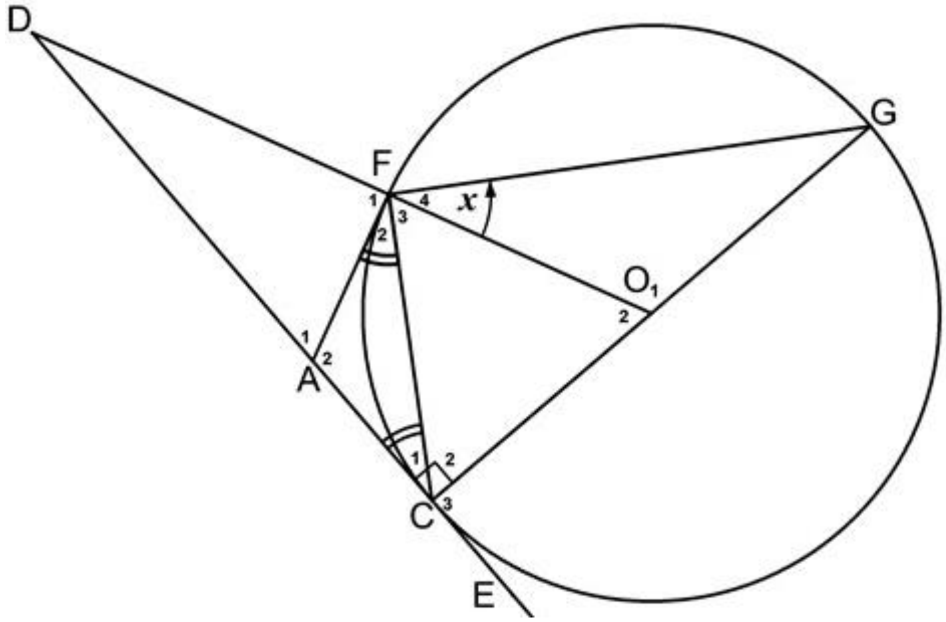
7.2.4 $\widehat{S}_4$ (3)

7.3 Identify quadrilateral OSPN. Give ONE reason for your answer. (2)

[15]

QUESTION 8

Circle FCG is shown in the diagram below. DE is a tangent to the circle at C.
A is a point on DE, OC ⊥ DE, $\hat{F}_4 = x$.



8.1 Prove, with reasons, that O is the centre of the circle. (5)

8.2 Determine, with reasons, THREE other angles equal to x: (6)

8.3 Determine, with reasons, the following angles in terms of x:

8.3.1 $\hat{F}_3$ (3)

8.3.2 $\hat{O}_1$ (3)

8.3.3 $\hat{O}_2$ (3)

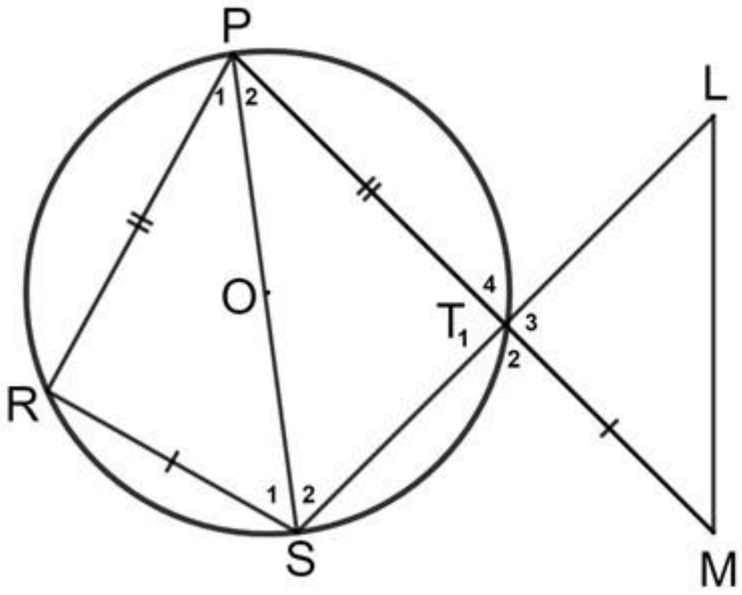
8.3.4 $\hat{D}$ (3)

8.4 Prove, with reasons, that AF is a tangent to the circle at F. (3)

[26]

QUESTION 9

The diagram below shows circle O, with P, R, S and T on the circumference.
PT extends to M and ST extends to L. RS = TM and LS = 2RS.



9.1 Write down the size of $\hat{R}$. (1)

9.2 Prove, with reasons, that LM is the radius of the circle passing through L and S. (6)

[7]

TOTAL: 150

INFORMATION SHEET

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$A = P(1 + ni)$ $A = P(1 - ni)$ $A = P(1 + i)^n$ $A = P(1 - i)^n$

$T_n = a + (n - 1)d$ $S_n = \frac{n}{2}[2a + (n - 1)d]$

$T_n = ar^{n-1}$ $S_n = \frac{a(r^n - 1)}{r - 1}$; $r \neq 1$ $S_\infty = \frac{a}{1 - r}$; $-1 < r < 1$

$F = \frac{x[(1+i)^n - 1]}{i}$ $P = \frac{x[1 - (1+i)^{-n}]}{i}$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$

$y = mx + c$ $y - y_1 = m(x - x_1)$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \tan\theta$

$(x - a)^2 + (y - b)^2 = r^2$ In ΔABC: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

In ΔABC: $a^2 = b^2 + c^2 - 2bc.\cos A$ Area $\Delta ABC = \frac{1}{2}ab.\sin C$

$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta$ $\sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$

$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta$ $\cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases}$$ $\sin 2\alpha = 2\sin\alpha.\cos\alpha$

$\bar{x} = \frac{\Sigma x}{n}$ $\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$

$P(A) = \frac{n(A)}{n(S)}$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$\hat{y} = a + bx$ $b = \frac{\Sigma(x - \bar{x})(y - \bar{y})}{\Sigma(x - \bar{x})^2}$