GAUTENG PROVINCE
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION
2026

NAME OF SCHOOL:													
CANDIDATE'S NAME:													
DATE:	D	D	M	M	2	0	2	6	BOOK NUMBER		OF		BOOK(S)
TEACHER:									PAPER NUMBER	2			
SUBJECT:	MATHEMATICS (10612)												

ANSWER ALL THE QUESTIONS IN THE QUESTION PAPER.

	MARKER				MODERATOR(S)					
QUESTION	MARKS			MARKER'S INITIALS	MARKS			MODERATORS' INITIALS		
1	0				0					
2	0				0					
3	0				0					
4	0				0					
5	0				0					
6	0				0					
7	0				0					
8	0				0					
9	0				0					
10	0				0					
11	0				0					
				TOTAL						

TIME: 3 hours

MARKS: 150

34 pages + 1 information sheet

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 11 questions. Answer ALL the questions in the spaces provided.

2. Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.

3. Answers only will NOT necessarily be awarded full marks.

4. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

5. If necessary, round-off answers correctly to TWO decimal places, unless stated otherwise.

6. Diagrams are NOT necessarily drawn to scale.

7. An INFORMATION SHEET with formulae is included at the end of the question paper.

8. No pages may be torn from this question paper.

9. Candidates may not retain a question paper or remove it from the examination room. Question papers must be returned to the invigilator at the end of the examination session.

10. Answers must be written in black/blue ink as distinctly as possible. Do NOT write in the margins.

11. Indicate the questions that you have answered by drawing a circle around the relevant numbers on the front cover of the question paper where marks are to be recorded.

12. Draw a neat line through any work/rough work that must NOT be marked.

13. In the event that you use the additional space provided:

    13.1 Write down the number of the question.
    13.2 Leave a line open and rule off after your answer.

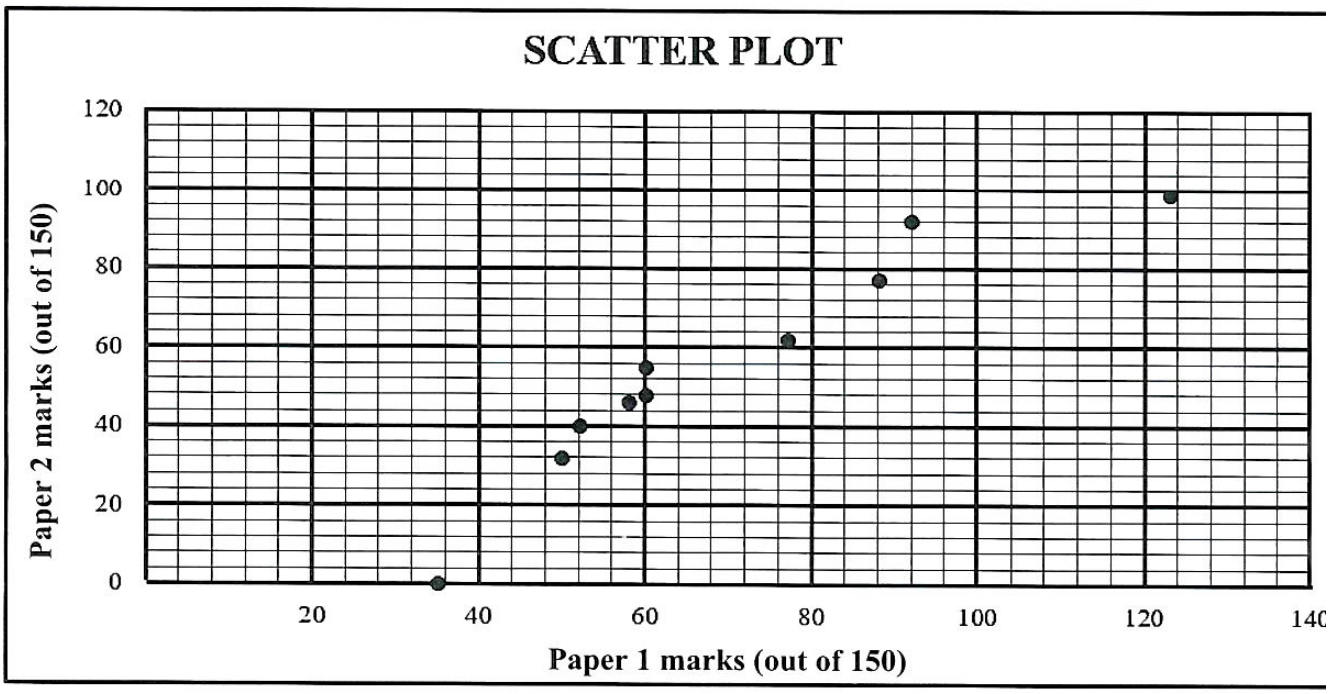
14. Write neatly and legibly.

QUESTION 1

The table below shows the marks obtained by 10 Grade 12 learners in Mathematics Paper 1 and Mathematics Paper 2 in their Preparatory Examination. All marks are out of 150.

Paper 1 (out of 150 marks)	35	50	52	58	60	60	77	88	92	123
Paper 2 (out of 150 marks)	0	32	40	46	48	55	62	77	92	99

The data is represented on the scatter plot below.



1.1	Determine the equation of the least squares regression line for the data given in the table above.	(3)
1.2	Calculate the correlation coefficient.	(1)
1.3	Comment on the strength of the correlation coefficient between the marks of both papers.	(1)

1.4 If a learner scored 75 for Paper 1, predict the learner's mark for Paper 2. (2)

1.5 Calculate the value (A) in the table below.

	Mean	Median	Standard deviation	Range
Paper 1	69,5	60	24,41	88
Paper 2	55,1	51,5	**A**	99

(1)

1.6 All learners received 4 additional marks in Paper 1 due to a technical error.

1.6.1 Calculate the mean for Paper 1 after the mark adjustment. (1)

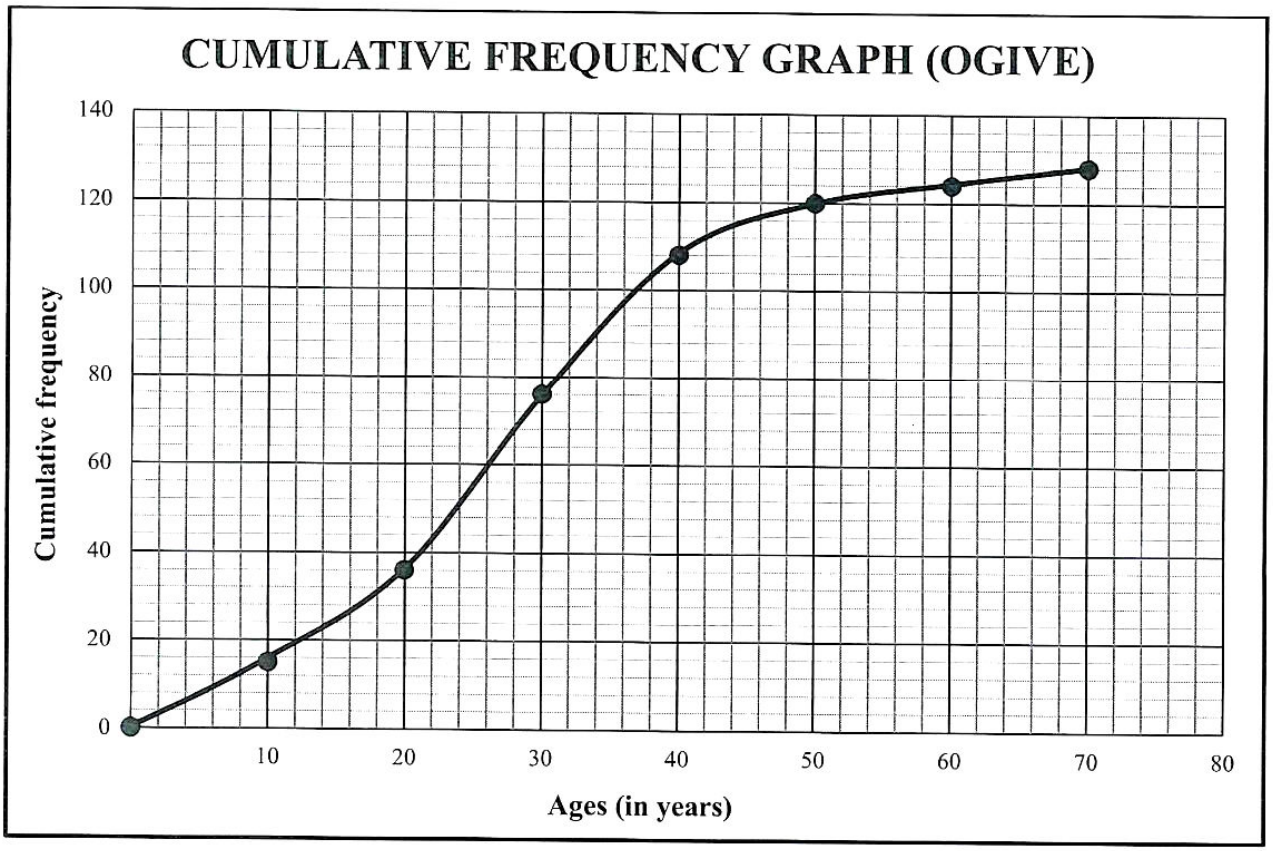
1.6.2 Explain how the standard deviation of Paper 1 will be affected by this change. (1)

1.7 After the marks had been recorded, a new learner John, wrote both papers. John obtained 52 marks in Paper 1 and 51 marks in Paper 2. In which paper did John rank higher? Justify your answer. (2)

[12]

QUESTION 2

A clothing store recorded the number of T-shirts that have been sold per age group. The data is represented in the ogive (cumulative frequency graph) below.



2.1	Use the ogive above to complete the following table: **AGE GROUPS** / **NUMBER OF T-SHIRTS SOLD** $0 < x \leq 10$ / 15 $10 < x \leq 20$ / $20 < x \leq 30$ / $30 < x \leq 40$ / $40 < x \leq 50$ / $50 < x \leq 60$ / $60 < x \leq 70$ /	(2)
2.2	Write down the modal class.	(1)

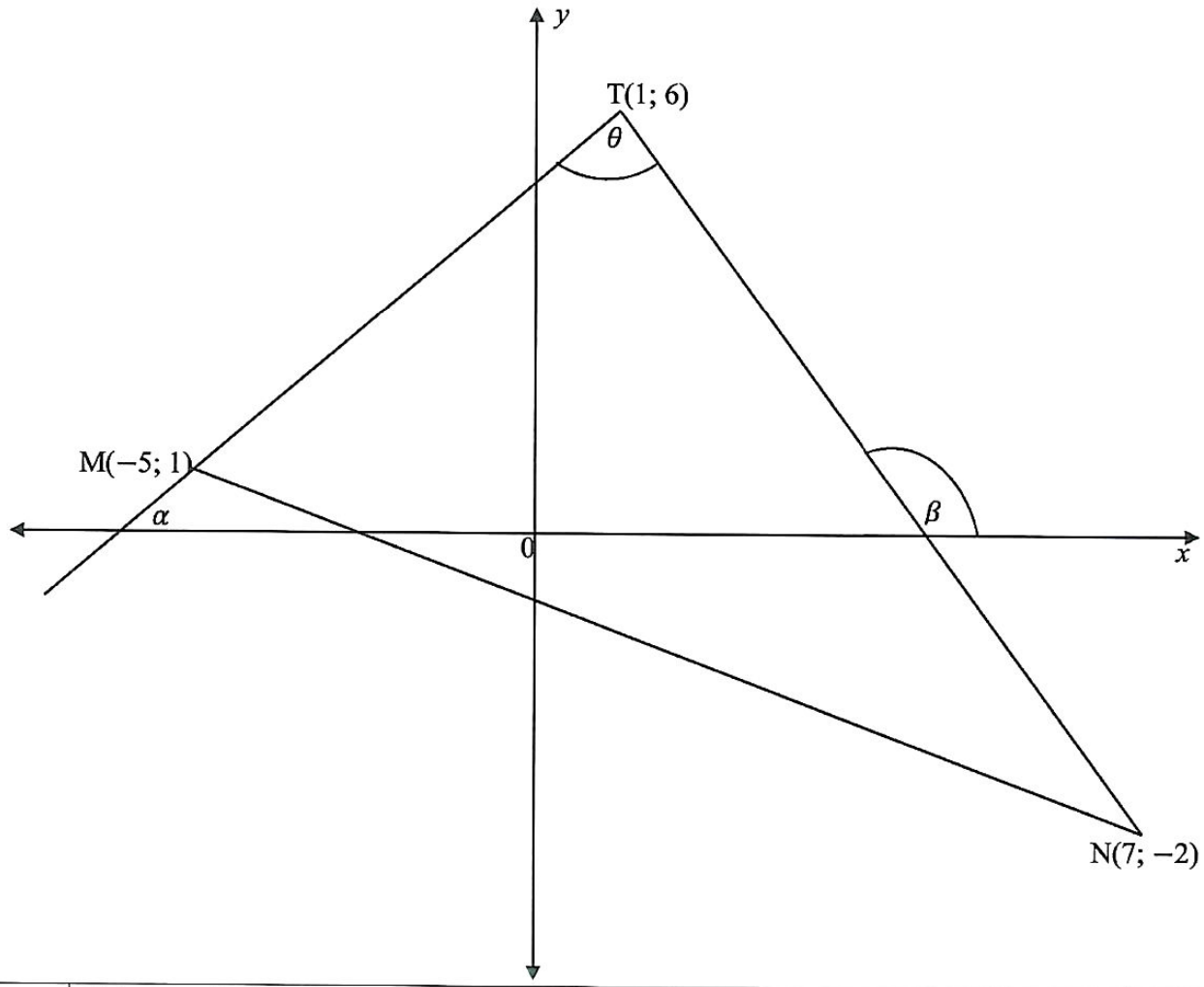
2.3	Determine the interquartile range of the data.	(3)
2.4	The owner plans a sale on all T-shirts for adults over 50, which is expected to increase sales in this category. Describe the effect that this will have on the ogive.	(2)

[8]

QUESTION 3

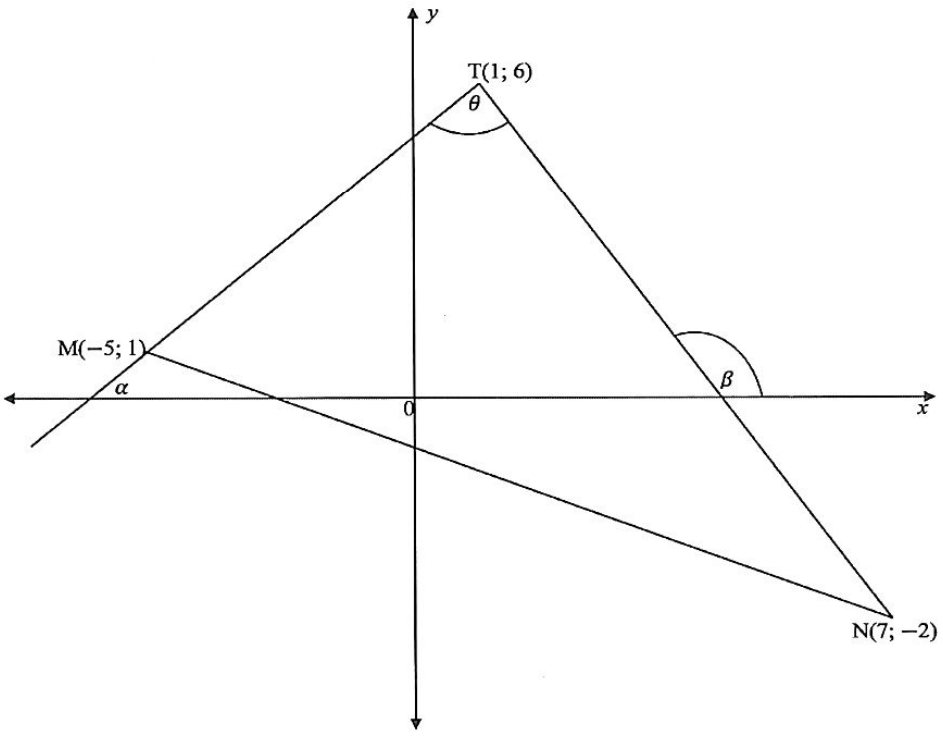
M(−5 ; 1), T(1 ; 6) and N(7 ; −2) are the vertices of ΔMTN, as show in the diagram below.

$M\widehat{T}N = \theta$. The angle of inclination of TN and MT is β and α respectively.

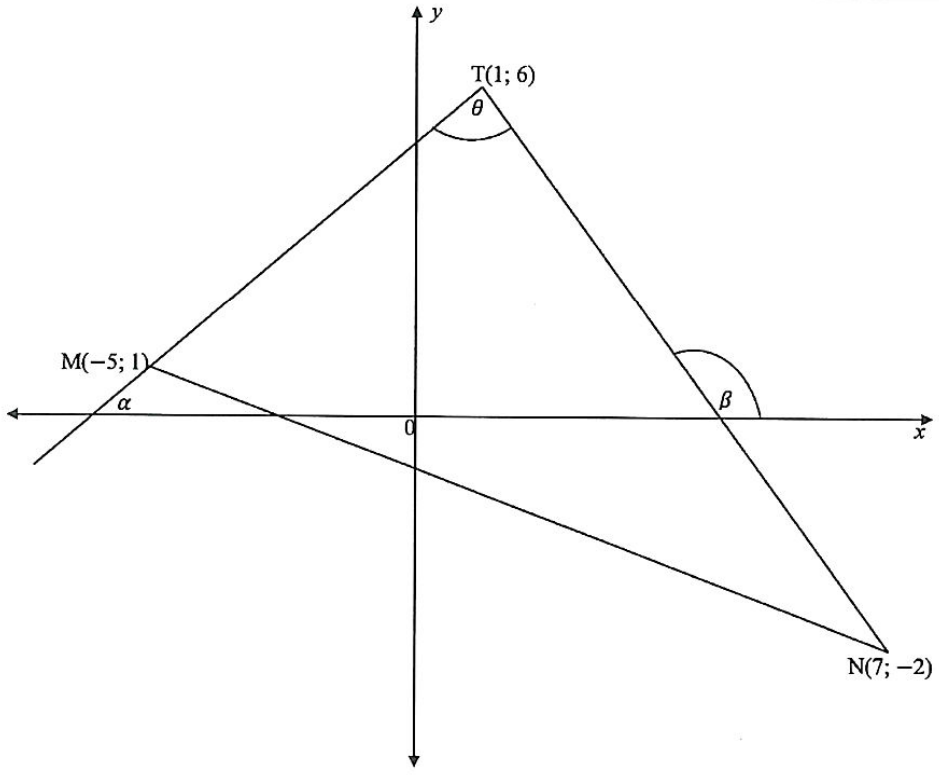


3.1	Calculate the length of MT.	(2)
3.2	Calculate the gradient of TN.	(2)

3.3	Determine the equation of TN.	(2)
3.4	Calculate the size of θ.	(4)

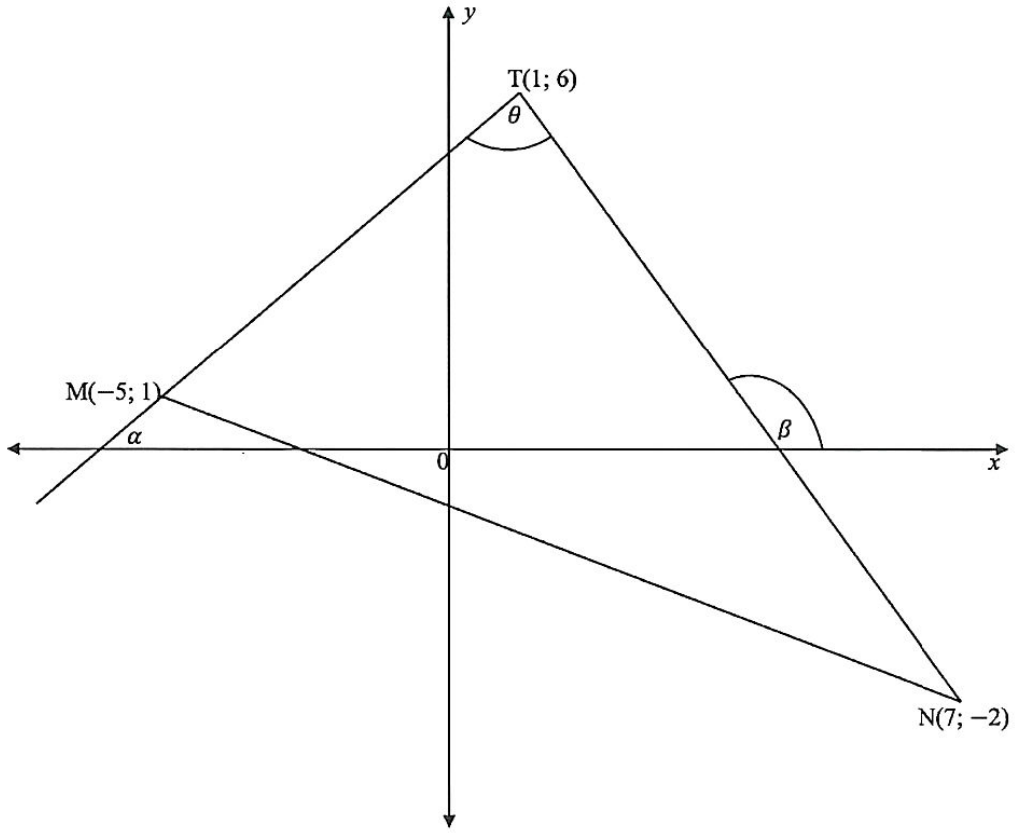


3.5	P(r ; 9) is a point in the first quadrant such that TN ⊥ TP. Calculate the value of r.	(3)



3.6	Determine the equation of the circle passing through points T, N and P.	(4)

[17]



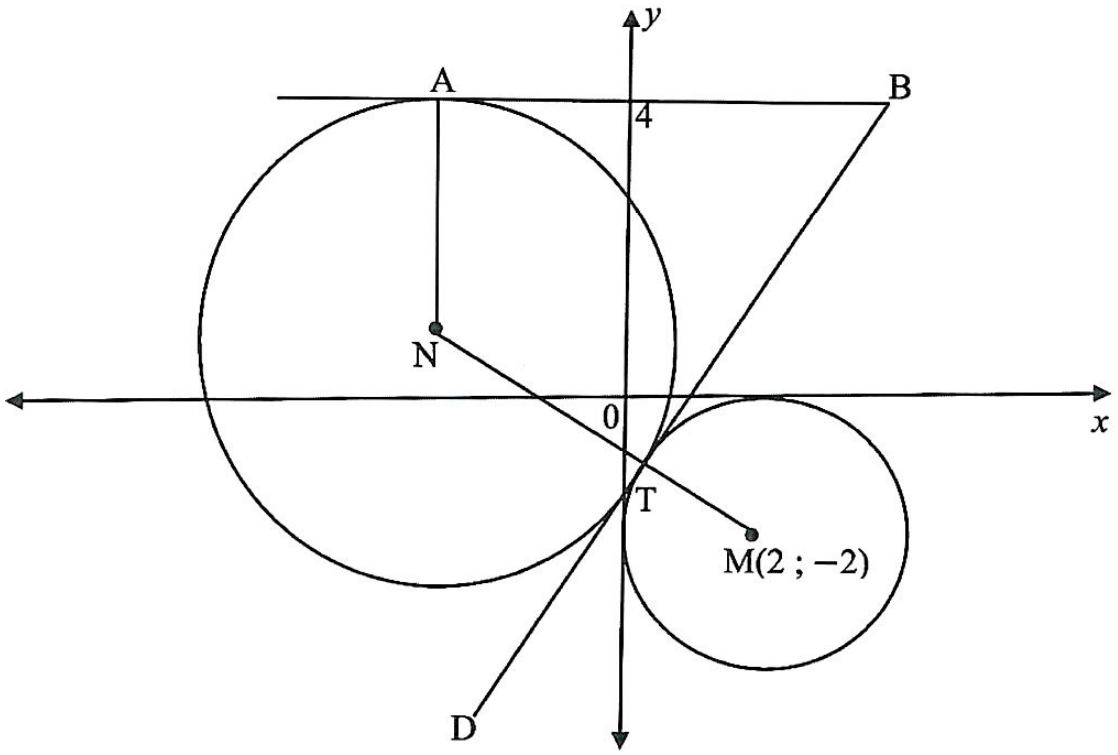
QUESTION 4

In the diagram below, N is the centre of the larger circle defined by $x^2 + y^2 + 4x - 2y + k = 0$.

AB is a tangent to the circle with centre N at point A and is parallel to the x-axis.

A second circle with centre M(2 ; −2) and radius of 2 units is drawn.

Both circles touch externally at point T and DTB is a common tangent to both circles.

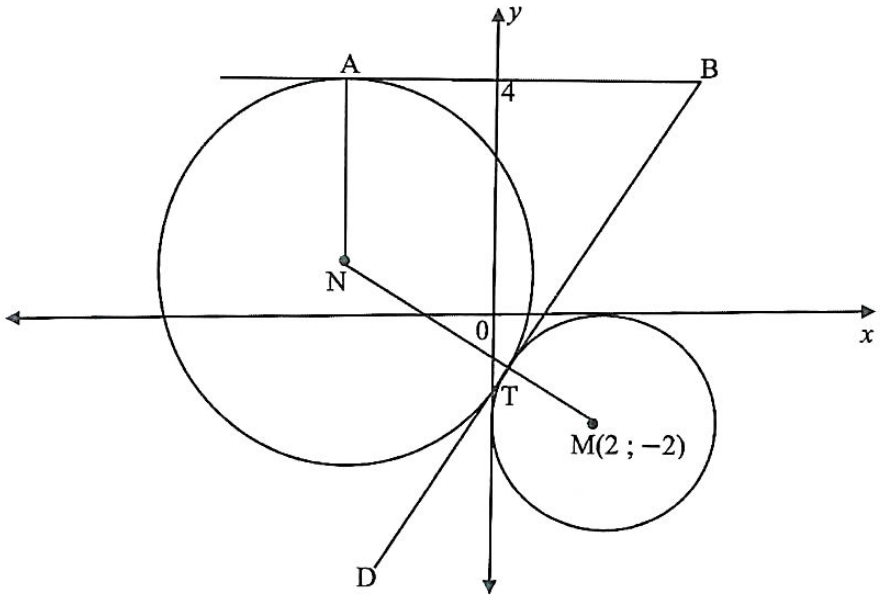


4.1	Determine the radius of the circle with centre N in terms of k.	(3)
4.2	Write down the coordinates of N.	(2)
4.3	Calculate the length of NM.	(2)

4.4	Calculate the value of k.	(3)
4.5	If the coordinates of T are $\left(\frac{2}{5}\ ;\ -\frac{4}{5}\right)$, show that the coordinates of B, are (4 ; 4).	(6)

4.6	The circle centred M is translated 3 units up to form circle M′. Calculate the area of quadrilateral ANM′B.	(5)

[21]



QUESTION 5

5.1	Given: $\sin 2\theta = \frac{\sqrt{17}}{9}$, where $2\theta \in [0°\,;\,90°]$. **Without using a calculator,** determine the value of:	
5.1.1	$\cos 2\theta$	(2)
5.1.2	$\sin(2\theta - 45°)$	(3)
5.1.3	$\cos\theta$	(3)

5.2	Given: $\sin 18° = p$ **Without using a calculator**, determine EACH of the following in terms of p:	
5.2.1	$\sin 198°$	(2)
5.2.2	$\tan 522°$	(3)
5.2.3	$\sin 9° \cos 9°$	(3)

[16]

QUESTION 6

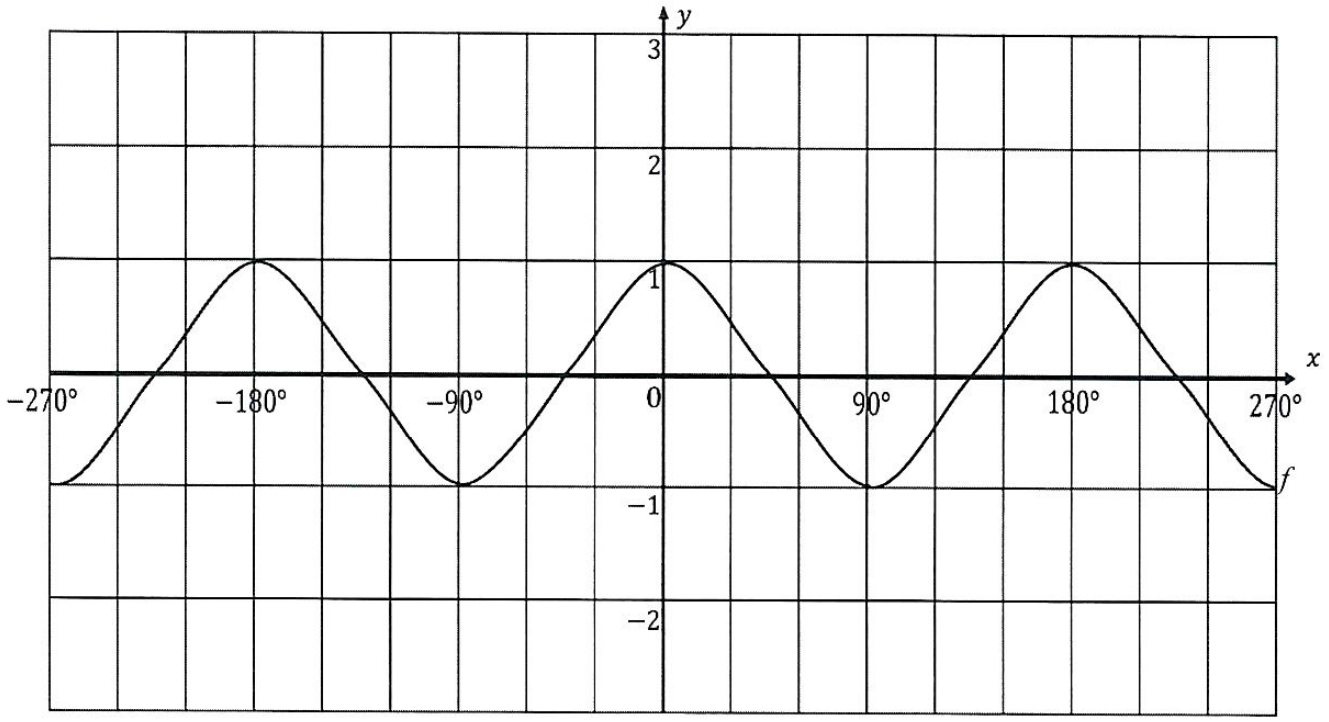
6.1	Simplify the following, **without the use of a calculator**: $$\frac{\sin 100° \tan^2 225°}{\cos 10° \sin 30°}$$	(4)
6.2	Prove the following identity: $$\frac{\cos^2\theta - \cos\theta - \sin^2\theta}{2\sin\theta\cos\theta + \sin\theta} = \frac{1}{\tan\theta} - \frac{1}{\sin\theta}$$	(4)

6.3	If $\sin 76° = x$ and $\cos 76° = y$, show that $x^2 - y^2 = \sin 62°$.	
		(4)

[12]

QUESTION 7

In the diagram below, the graph of $f(x) = \cos 2x$ for the interval $x \in [-270°; 270°]$ is drawn.



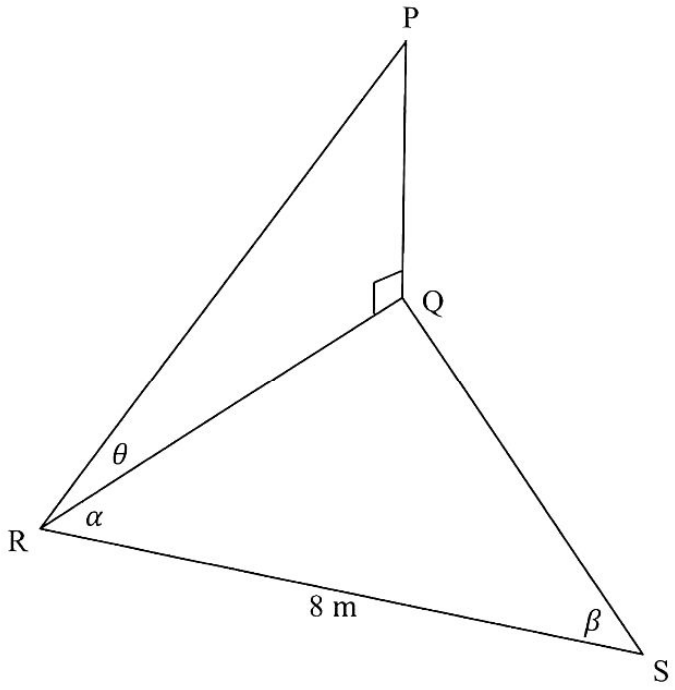
7.1	Write down the period of f.	(1)
7.2	Write down the range of $3f(x)$.	(2)
7.3	**On the same set of axes as f above**, sketch the graph of $g(x) = 1 - \sin x$. Show ALL turning points and intercepts with the axes.	(3)
7.4	Determine the general solution of $f(x) = g(x)$.	(6)

7.5	Determine the value(s) of x in the interval $0° < x \leq 270°$ for which:	
7.5.1	$f'(x) = 0$	(2)
7.5.2	$f(x + 30°) - 1 = 0$	(1)

[15]

QUESTION 8

PQ is a vertical tower and the angle of elevation of P from R is θ. Points Q, R and S are in the same horizontal plane. $Q\hat{R}S = \alpha$, $Q\hat{S}R = \beta$ and RS = 8 metres



8.1	Express PQ in terms of QR and θ.	(2)
8.2	Show that $QR = \frac{8\sin\beta}{\sin(\alpha+\beta)}$.	(2)

8.3	It is further given that $\alpha = \beta$. Prove that PQ $= \frac{4\sin\theta}{\cos\beta\cos\theta}$.	(4)
8.4	If $\beta = 67°$ and $\theta = 25°$, determine the length of PQ.	(2)

[10]

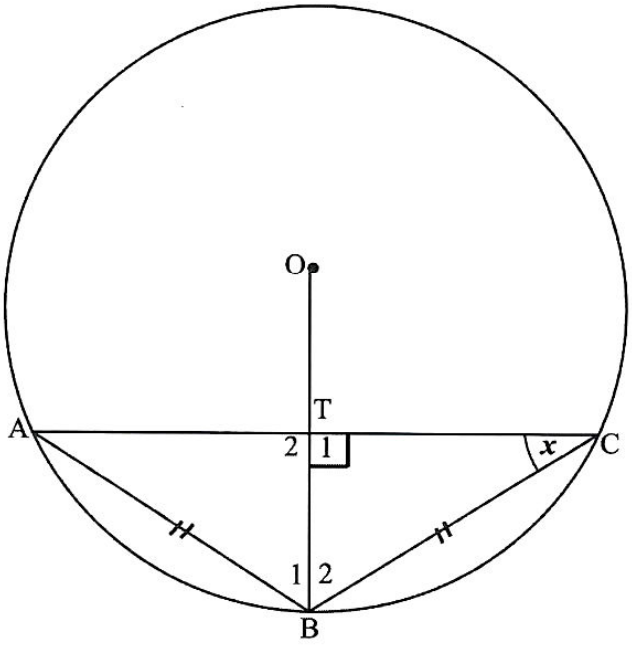
Provide reasons for your statements in QUESTIONS 9, 10 and 11.

QUESTION 9

In the diagram below, O is the centre of the circle A, B and C.

T is a point on OB such that OB ⊥ AC.

AB = BC and $T\hat{C}B = x$.



9.1	Write down the size of $\hat{B}_2$ in terms of x.	(2)
9.2	Prove that OB bisects $A\hat{B}C$.	(2)

9.3	It is further given that OA $= r$ and the ratio of OT : TB is 1 : 3. Determine the length of AC in terms of r.	(4)

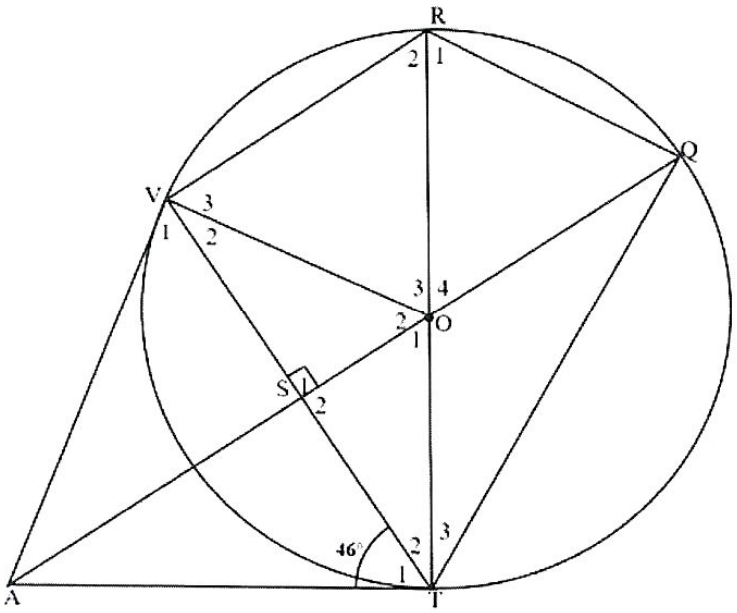
[8]

QUESTION 10

In the diagram below, R, Q, T and V are points on the circle with centre O.

AT is a tangent to the circle at T. QO is produced to A. S is a point on chord VT such that OS ⊥ VT.

OV and OT are joined. $\hat{T}_1 = 46°$.



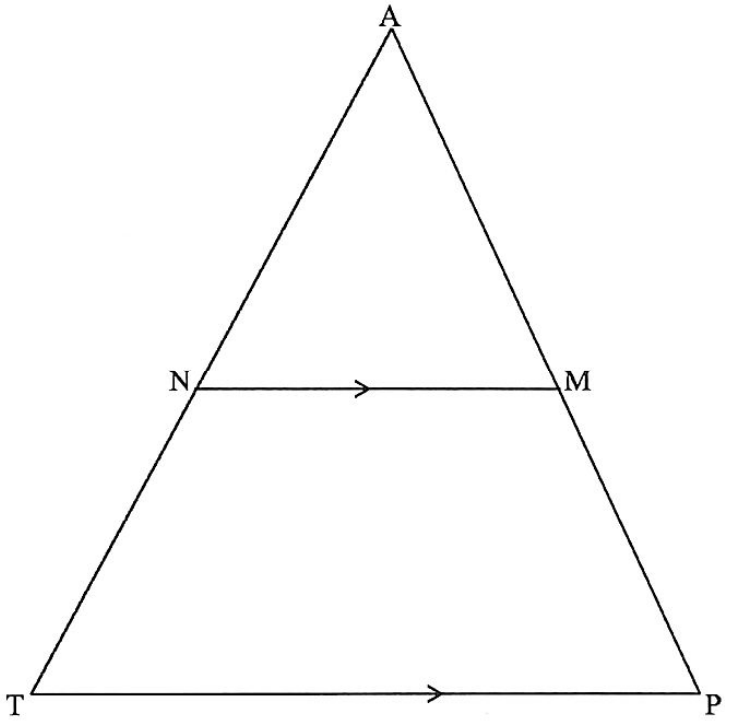
10.1	Calculate, with reasons, the size of the following angles:	
10.1.1	$\hat{R}_2$	(2)
10.1.2	$\hat{T}_3$	(5)

10.2	Prove that TAVO is a cyclic quadrilateral.	(4)
10.3	Prove that AV is a tangent to the circle passing through V, O and S at V.	(2)

[13]

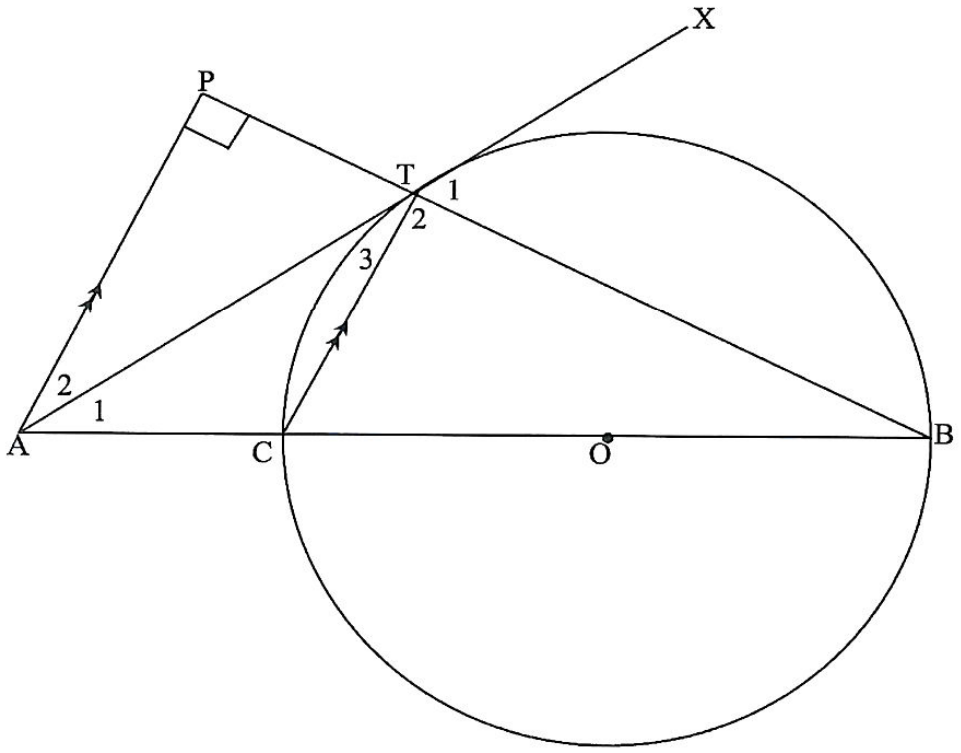
QUESTION 11

11.1 In the diagram below ΔATP is drawn. Line NM intersects AT and AP at N and M respectively such that NM || TP.



Use the diagram above to prove the theorem that states that a line drawn parallel to one side of a triangle divides the other two sides proportionally, that is, prove that $\frac{AN}{NT} = \frac{AM}{MP}$.	
	(5)

11.2 In the diagram below, BC is a diameter of the circle with centre O. ATX is a tangent to the circle at T. BT is produced to P such that BP ⊥ PA. BC is produced to A.
PA || TC.



11.2.1	Prove that ΔAPT ||| Δ BPA.	(4)

11.2.2	Prove that $AC = \sqrt{\frac{PT.CB}{3}}$, if $BT = 3AC$.	(3)
11.2.3	Given that Δ TBC ||| Δ PBA, prove that $PT = \frac{PB.TC^2}{TB^2}$.	(6)

[18]

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: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$a^2 = b^2 + c^2 - 2bc.\cos A$

$area\ \Delta ABC = \frac{1}{2}ab\sin C$

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

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

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

$\sin 2\alpha = 2\sin\alpha.\cos\alpha$

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

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

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