GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION
GRADE 12

2026

MATHEMATICS

(PAPER 2)

SURNAME:										
NAME:										
NAME OF SCHOOL:										
DATE:	**2**	**0**	**2**	**6**		M	M		D	D

ANSWER ALL THE QUESTIONS IN THE QUESTION PAPER.

	MARKER				MODERATOR			
QUESTION	**MARKS**			**MARKER'S INITIALS**	**MARKS**			**MODERATOR'S 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			
				TOTAL				

TIME: 3 hours

MARKS: 150

26 pages + an information sheet

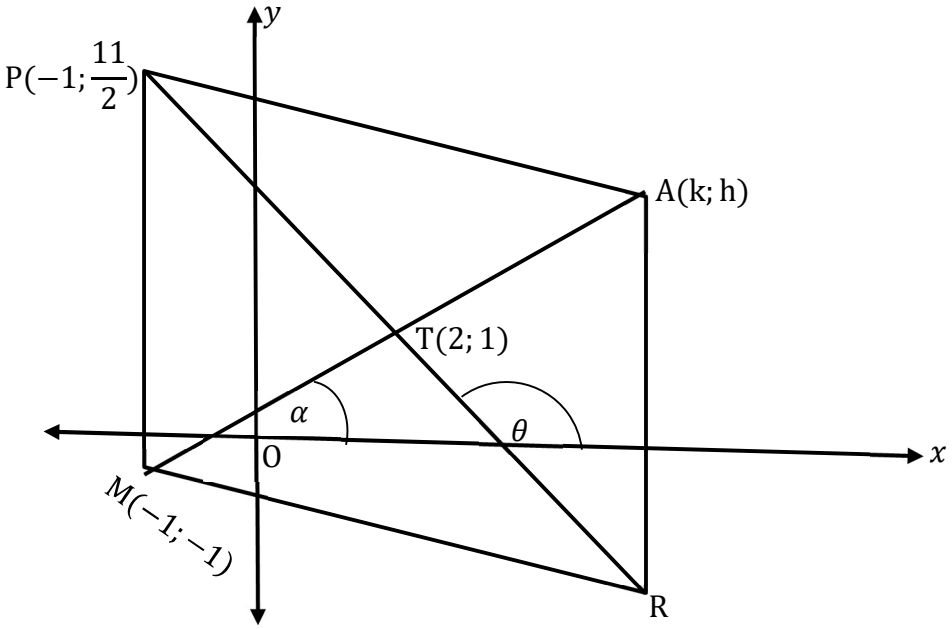
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

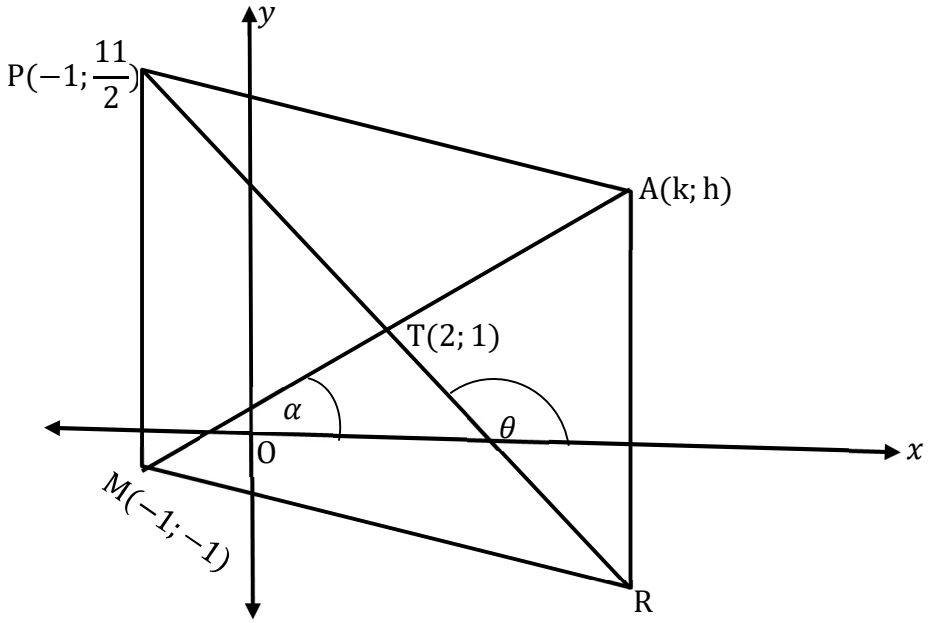
1. This question paper consists of 9 questions. Answer ALL questions in the spaces provided.
2. Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.
3. Answers only will NOT necessarily be awarded full marks.
4. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
5. If necessary, round-off answers correct 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. Draw a neat line through any work/rough work that must NOT be marked.
12. In the event that you use the additional space provided:
    12.1 Write down the number of the question.
    12.2 Leave a line and rule off after your answer.
13. Write neatly and legibly.

QUESTION 1

In the diagram below, ARMP is a quadrilateral with vertices $P\left(-1;\frac{11}{2}\right)$, $A(k;h)$, R and $M(-1;-1)$. The diagonals of ARMP intersect at T (2; 1).
α and θ are angles of inclination of AM and PR, respectively.



1.1	Calculate the gradient of MT.	(2)
1.2	Determine the equation of the line that is parallel to AM and passes through P, in the form $y = mx + c$.	(3)



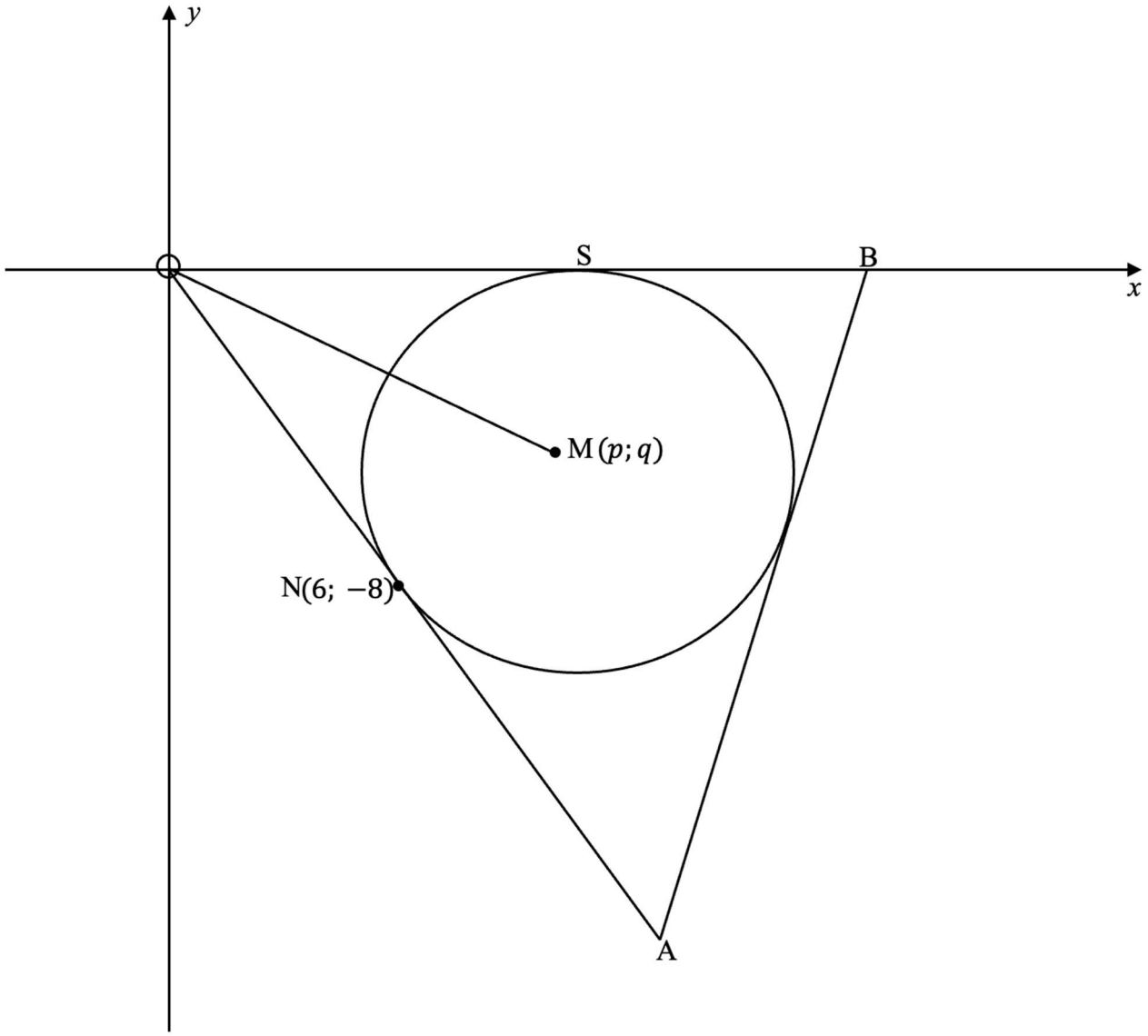
1.3	If T is the midpoint of AM, calculate the values of k and h.	(3)
1.4	Calculate the length of AM, leaving your answer **in surd form.**	(2)
1.5	If it is given that AP||RM and AR||PM, determine the coordinates of R.	(3)

1.6	Calculate the size of $P\widehat{T}A$.	(5)
1.7	Show that $P\widehat{A}M \neq 90°$.	(3)
1.8	Calculate the area of ΔMPT.	(4)

[25]

QUESTION 2

In the diagram below, a circle, centred at M$(p; q)$, touches the x-axis at S and line OA is a tangent to the circle at N$(6; -8)$.

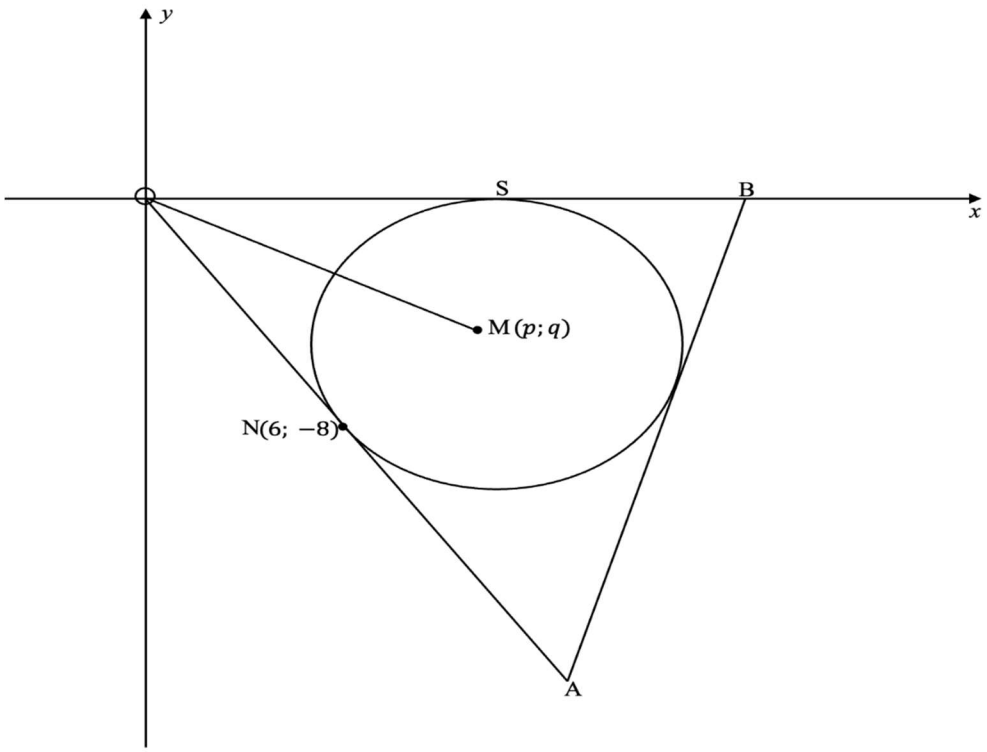


2.1	Calculate:		
	2.1.1	The length of ON	(2)

	2.1.2	The value of p	(2)
	2.1.3	The gradient of MN	(2)
	2.1.4	The value of q	(2)
2.2		Determine the equation of the circle in the form of $(x-a)^2+(y-b)^2=r^2$.	(3)
2.3		$x=k$ is a tangent to the circle. Write down the value(s) of k.	(2)

2.4	The line $y = -\frac{4}{3}x + t$ is perpendicular to OA, passes through M and cuts the circle at two different points. Determine the values of t.	(5)
2.5	Another circle with equation $(x-10)^2 + (y-6)^2 = 25$ is given. Will the two circles touch, cut or not? Give a reason for the answer.	(2)

[20]



QUESTION 3

3.1	Given: $\sin A = 2q$ and $\cos A = q$, and $0° < A < 90°$. With the aid of a diagram and **without the use of a calculator**, calculate:		
	3.1.1	The value of $\tan A$	(2)
	3.1.2	The value of q	(3)
3.2	Given that $\sin 54° = p$, express each of the following in terms of p, **without the use of a calculator:**		
	3.2.1	$\sin 594°$	(2)

	3.2.2	$\cos 36°$	(2)
	3.2.3	$\cos 18°$	(4)
3.3	Simplify the following **without the use of a calculator**: $\dfrac{\cos 140° - \sin(90° - \theta)}{\sin 410° + \cos(-\theta)}$		(6)

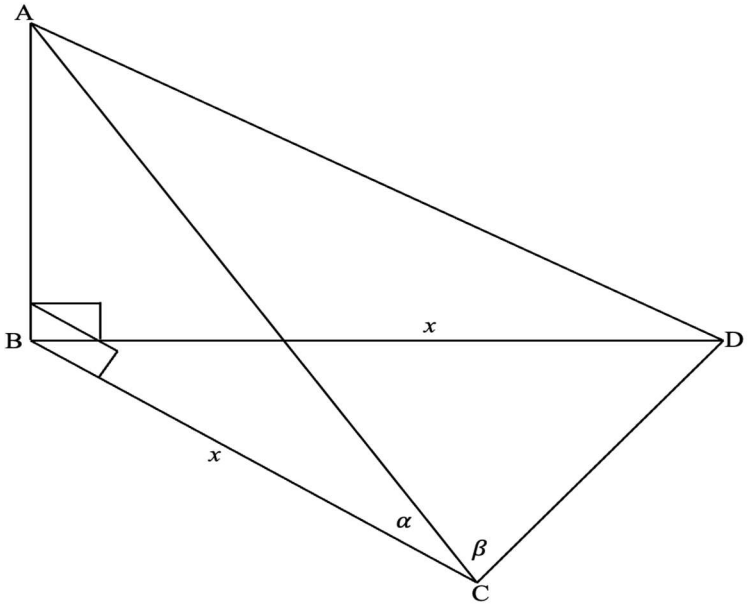
3.4	Determine, **without the use of a calculator**, the value of the following trigonometric expression: $\cos(x+65°).\cos(x+20°)-\sin(x+245°).\sin(x+20°)$	(4)
3.5	Determine the general solution of: $\cos^2 x-\sin^2 x=\frac{1}{2}$	(4)

3.6	Given the identity: $\frac{\sin 2\theta \,.\, \tan\theta}{\cos 2\theta + 1} = \tan^2\theta$		
	3.6.1	Prove the identity.	(4)
	3.6.2	Determine the value of θ for which the identity is undefined if $0° \leq \theta \leq 180°$.	(4)

[35]

QUESTION 4

In the diagram below, B, C and D are points on the same horizontal plane. AB is a vertical tower with the angle of elevation from C to A equal to α and $A\hat{C}D = \beta$. BD = BC = x.

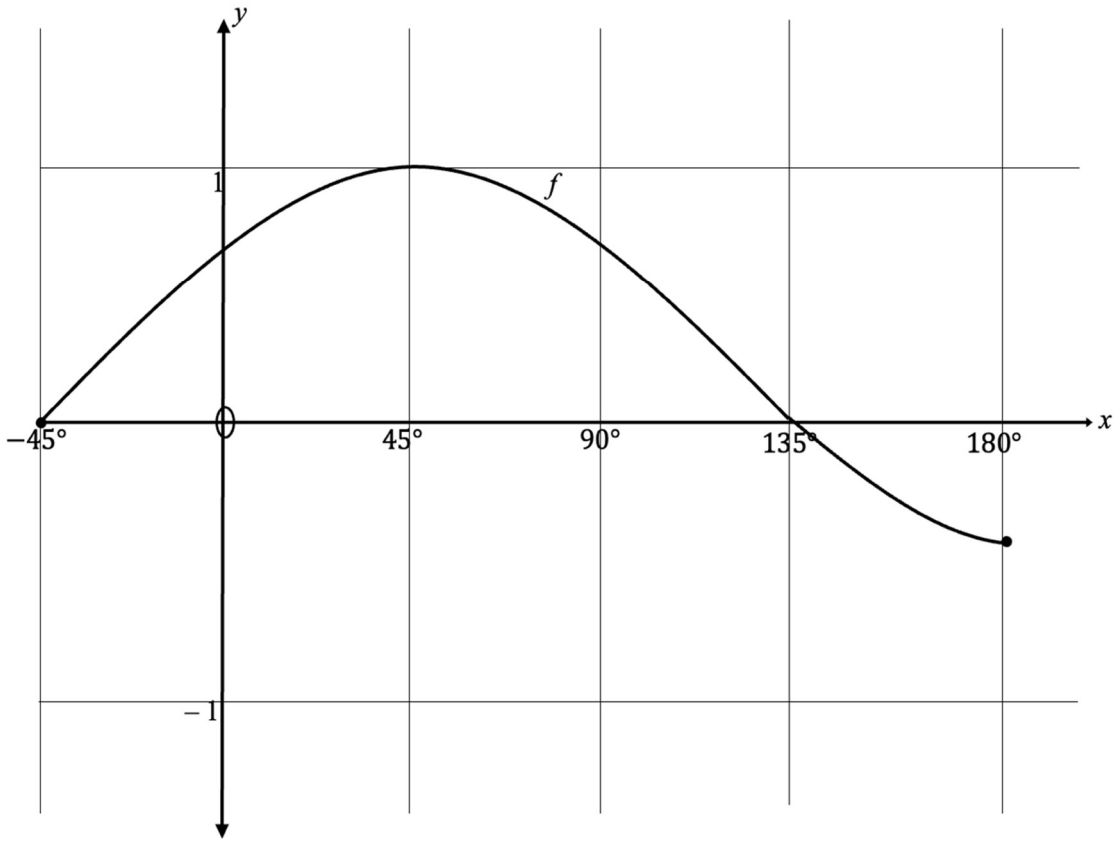


4.1	Give a reason why AC = AD.	(1)
4.2	Write AC in terms of x and α.	(2)
4.3	Show that CD = $\dfrac{2\,x\cos\beta}{\cos\alpha}$.	(4)
4.4	Hence, or otherwise, determine the length of CD if $x = 25\ cm$, $\alpha = 30°$ and $\beta = 65{,}62°$.	(2)

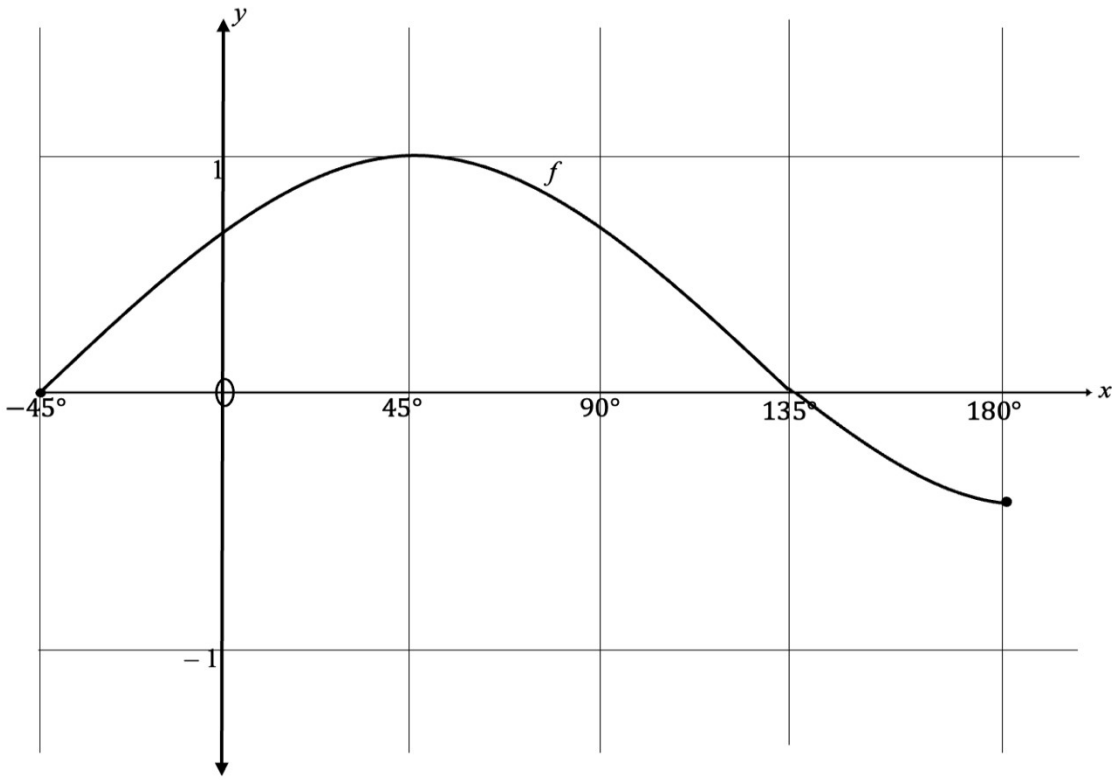
[9]

QUESTION 5

Sketched below is the graph of $f(x) = \cos(x - 45°)$ for $-45° \leq x \leq 180°$.



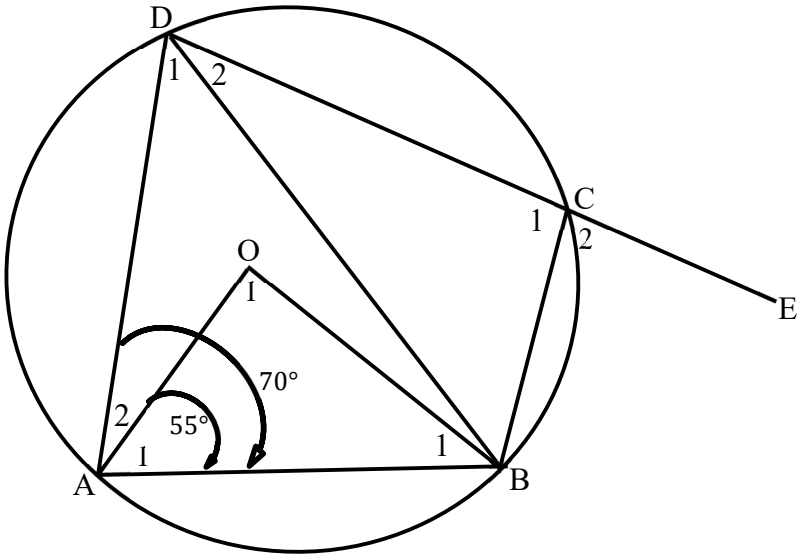
Use the graph above to answer the questions that follow.		
5.1	Write down the range of f for the given interval.	
		(2)

5.2	Draw the graph of $h(x) = \sin 2x$, for $x \in [-45°; 180°]$ on the same set of axes as the sketch of f below. Indicate all the intercepts with the axes as well as the turning points.	
		(3)
5.3	State the period of h.	
		(1)
5.4	Use your graph to determine the values of x for which f and h are both increasing.	
		(2)
5.5	Determine the values of x for which $f(x) - h(x) = 1$.	
		(2)
5.6	The graph of f is translated 60° to the left to form the graph of g. Write down the equation of g in the form $g(x) = \ldots$	
		(1)

[11]

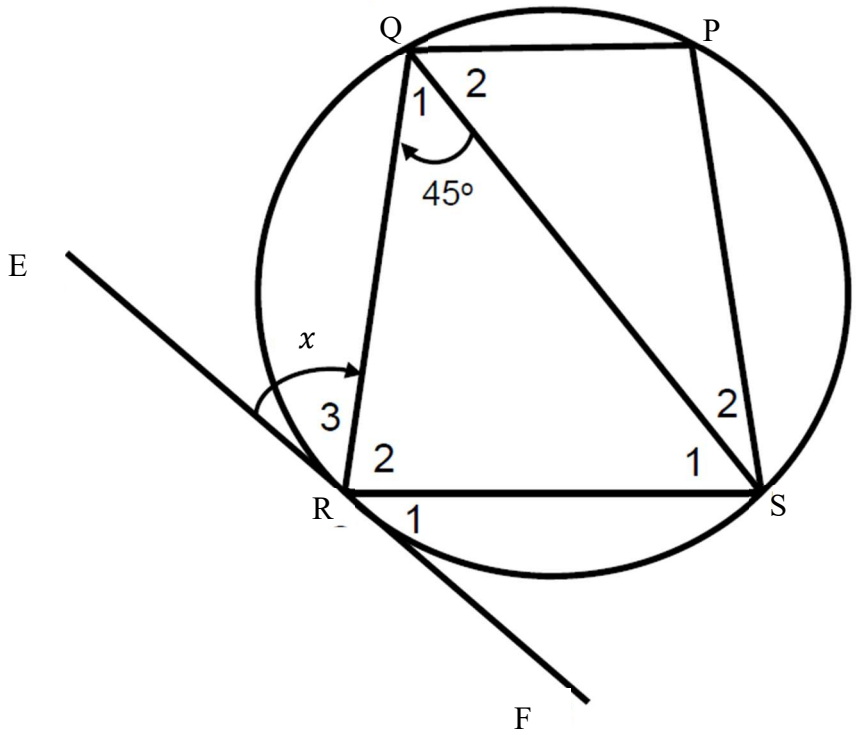
QUESTION 6

6.1 A, B, C and D are points on a circle with centre O. DE is a straight line, $B\hat{A}D = 70°$ and $0\hat{A}B = 55°$.



Determine, giving reasons, the sizes of the following angles:		
6.1.1	$\hat{B}_1$	(2)
6.1.2	$\hat{O}_1$	(2)
6.1.3	$\hat{D}_1$	(2)
6.1.4	$\hat{C}_2$	(2)

6.2 In the diagram below, P, Q, R and S are points on the circumference of a circle. ERF is a tangent to the circle at R. $\widehat{Q}_1 = 45°$ and $\widehat{R}_3 = x$.

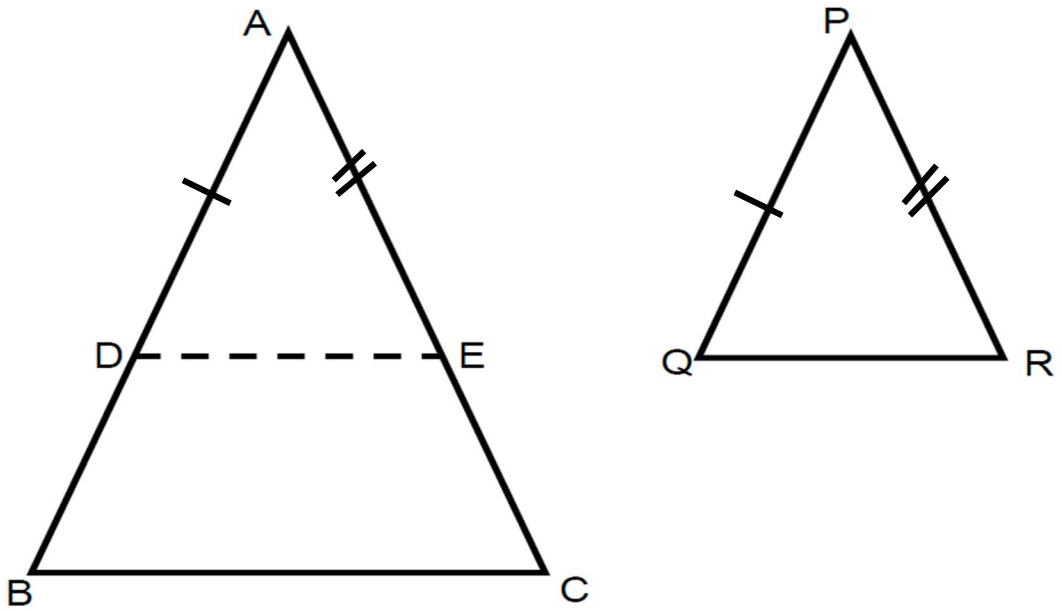


Answer the following questions, giving reasons for your answers.		
6.2.1	Determine the size of $\widehat{S}_1$ in terms of x.	(2)
6.2.2	Prove that $\widehat{P} = x + 45°$.	(4)

[14]

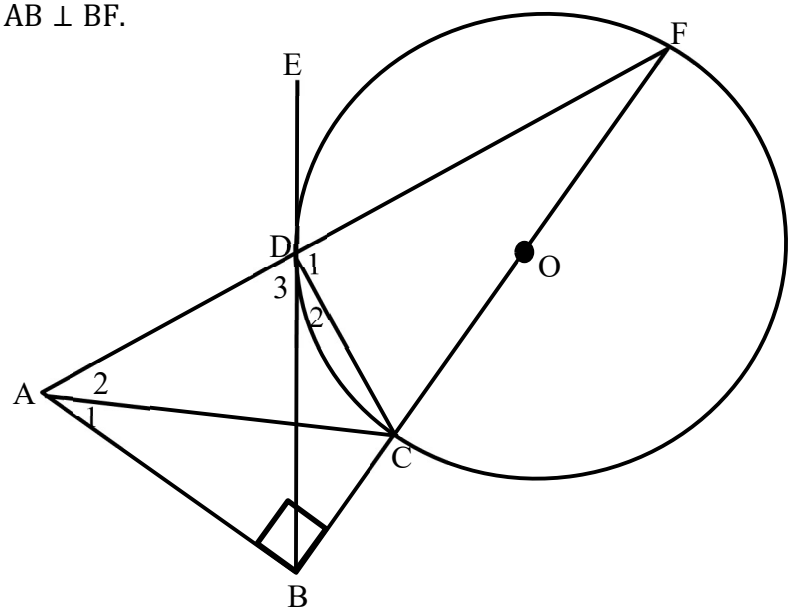
QUESTION 7

7.1 In the diagram below, ΔABC and ΔPQR are drawn such that $\hat{A} = \hat{P}$, $\hat{B} = \hat{Q}$, and $\hat{C} = \hat{R}$. DE is drawn such that $AD = PQ$ and $AE = PR$.



7.1.1	Give a reason why $\Delta ADE \equiv \Delta PQR$.	
		(1)
7.1.2	Hence, prove that $\frac{AB}{PQ} = \frac{AC}{PR}$.	
		(5)

7.2 C, D and F are points on a circle with centre O. ADF is a straight line and BE is a tangent to the circle at point D. AB ⊥ BF.

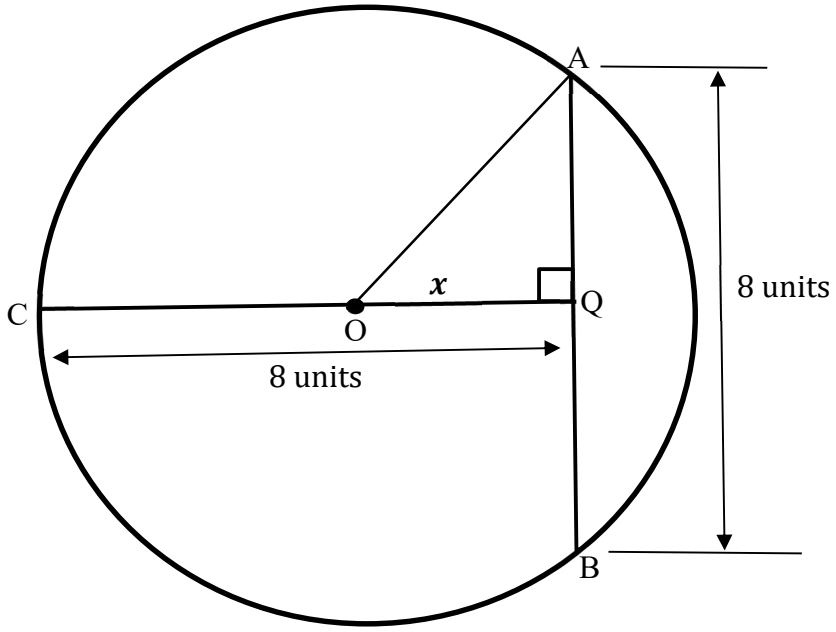


7.2.1	Prove that ABCD is a cyclic quadrilateral.	(3)
7.2.2	Prove that AB is a tangent to the circle passing through A, C and F.	(4)

[13]

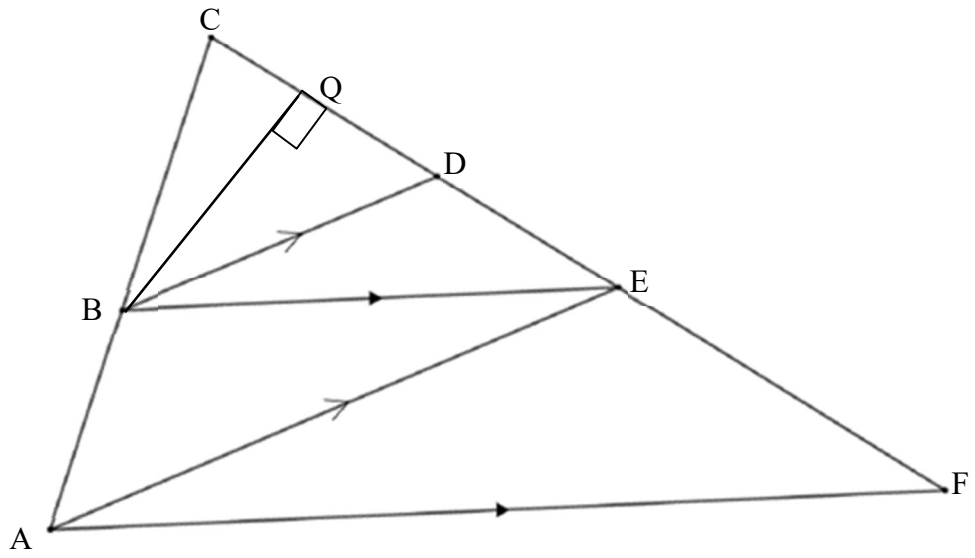
QUESTION 8

8.1 In the diagram below, O is the centre of the circle and C is a point on the circumference of the circle. Chord AB = 8 units. CQ = 8 units and passes through the centre of the circle. OQ $= x$ units and CQ $\perp$ AB.



Calculate, with reasons the length of OC.	
	(5)

8.2 In ΔCAF below, B is a point on AC while Q, D and E are points on FC. BD||AE and BE||AF. $AC : BC = 9 : 5$. $BQ \perp CD$.

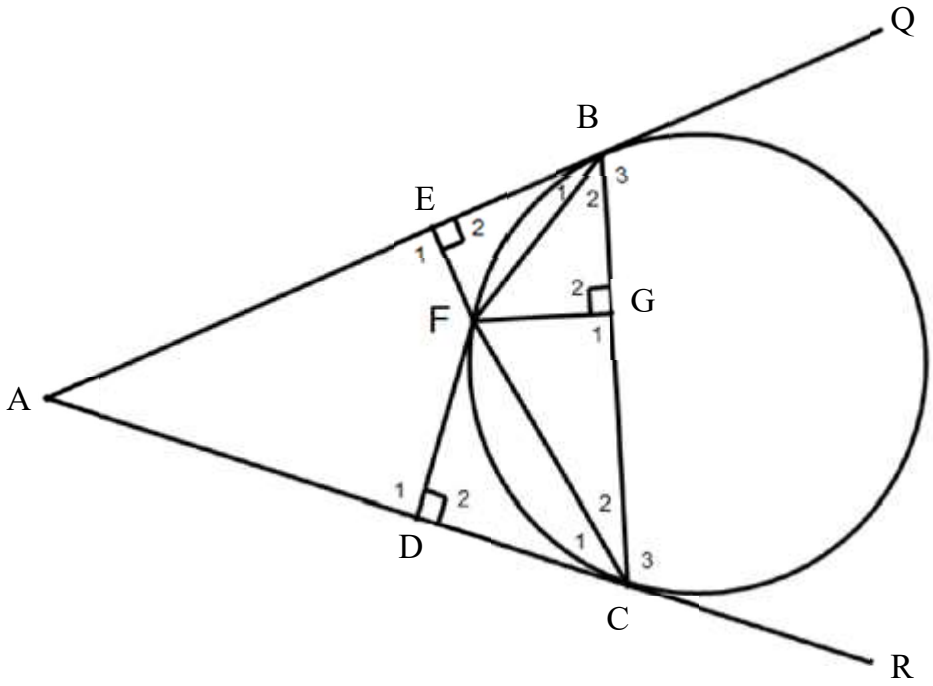


8.2.1	Determine the ratio AB : BC.	(1)
8.2.2	Calculate the length of AC if it is given that $AB = 6$ units.	(2)
8.2.3	Determine, with reason(s), the value of $\frac{\text{Area of } \Delta BDC}{\text{Area of } \Delta BED}$.	(2)
8.2.4	If it is given that $FC = 15$ units calculate, giving reasons, the length of DE.	(4)

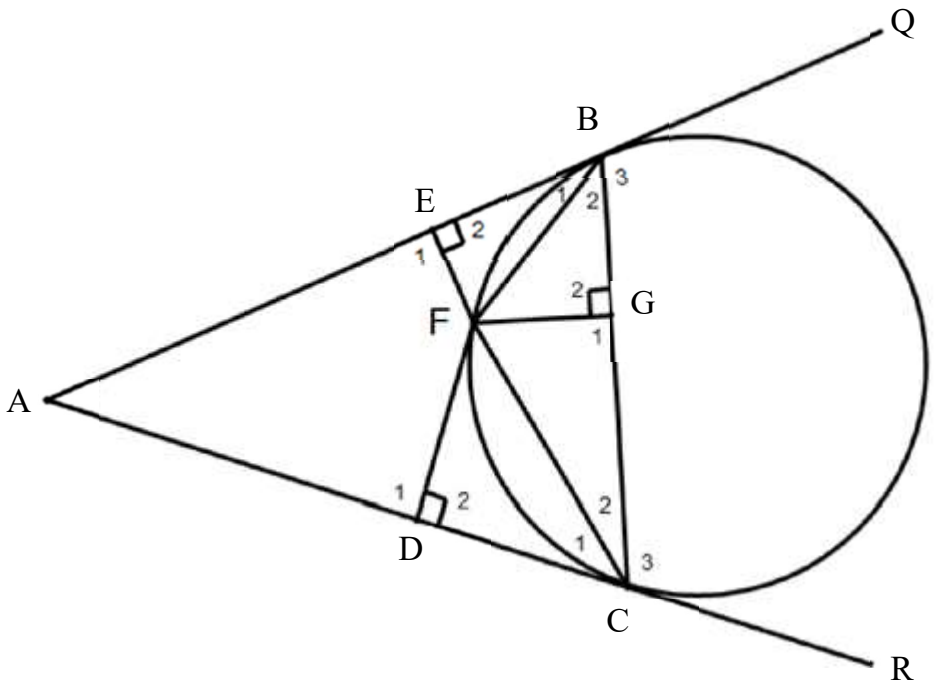
[14]

QUESTION 9

In the diagram below, BCF is a triangle with points B, F and C on the circumference of the given circle. AQ and AR are tangents to the circle at B and C respectively. FE ⊥ AB, FG ⊥ BC and FD ⊥ AC.



9.1	Prove that ΔBEF ||| ΔCGF.	
		(3)



9.2	Prove that $FG^2 = FE \times FD$.	
		(6)

[9]

ADDITIONAL SPACE		

ADDITIONAL SPACE		

ADDITIONAL SPACE

TOTAL: 150

END

INFORMATION SHEET

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

$A = P(1 + in)$

$A = P(1 - in)$

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

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

$\sum_{i=1}^{n} 1 = n$

$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$

$T_n = a + (n-1)d$

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

$T_n = ar^{n-1}$

$S_n = \frac{a(1-r^n)}{1-r}; r \neq 1$

$S_\infty = \frac{a}{1-r}; -1 < r < 1$

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

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

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

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$

$y = mx + c$

$y - y_1 = m(x - x_1)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \tan\theta$

$(x - 'n)^2 + (y - b)^2 = r^2$

In ΔABC: $\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$

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

Area of $\Delta ABC = \frac{1}{2}ab.\sin C$

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

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

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

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

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

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

$\bar{x} = \frac{\sum x}{n}$

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

$P(A) = \frac{n(A)}{n((S)}$

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

$\hat{y} = a + bx$

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

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MATHEMATICS P2

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