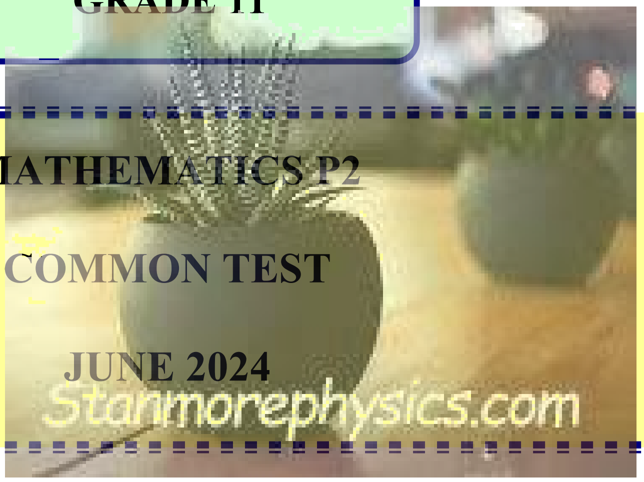
KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 11



MATHEMATICS P2

COMMON TEST

JUNE 2024

MARKS: 100

TIME: 2 hours

This question paper consists of 9 pages and 3 DIAGRAM SHEETS.

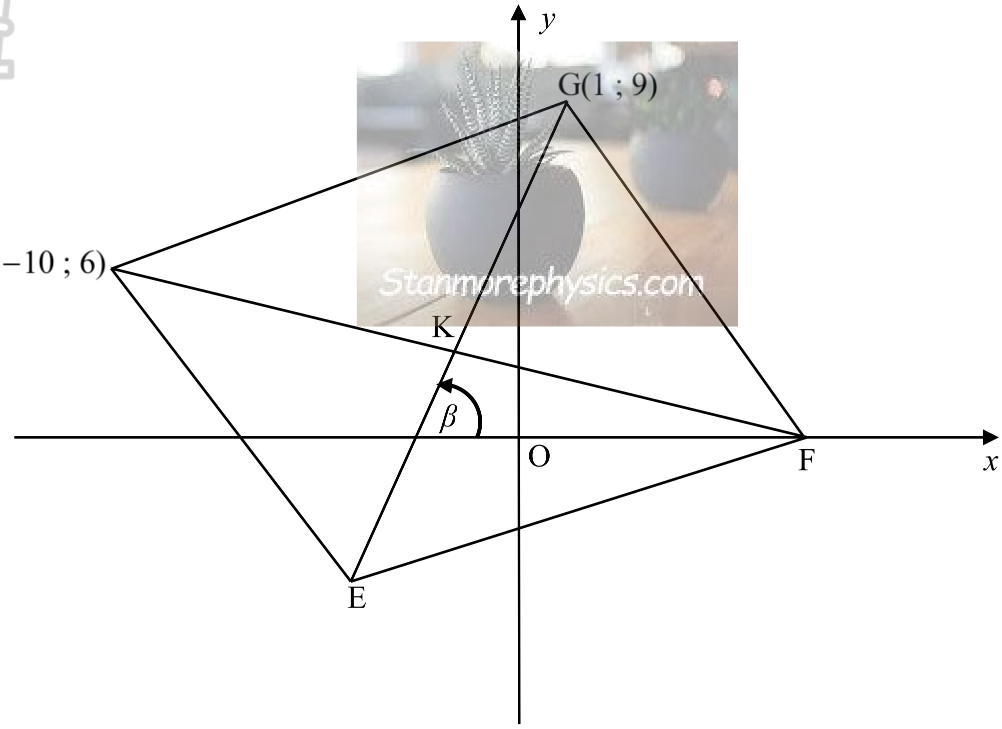
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions.
2. Answer ALL the questions.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. THREE DIAGRAM SHEETS for QUESTION 1, QUESTION 2, QUESTION 5.1, QUESTION 5.2, QUESTION 6.1, QUESTION 6.2 and QUESTION 7 are attached at the end of this question paper. Detach the DIAGRAM SHEETS and hand them in together with your ANSWER BOOK.
10. Write neatly and legibly.

QUESTION 1

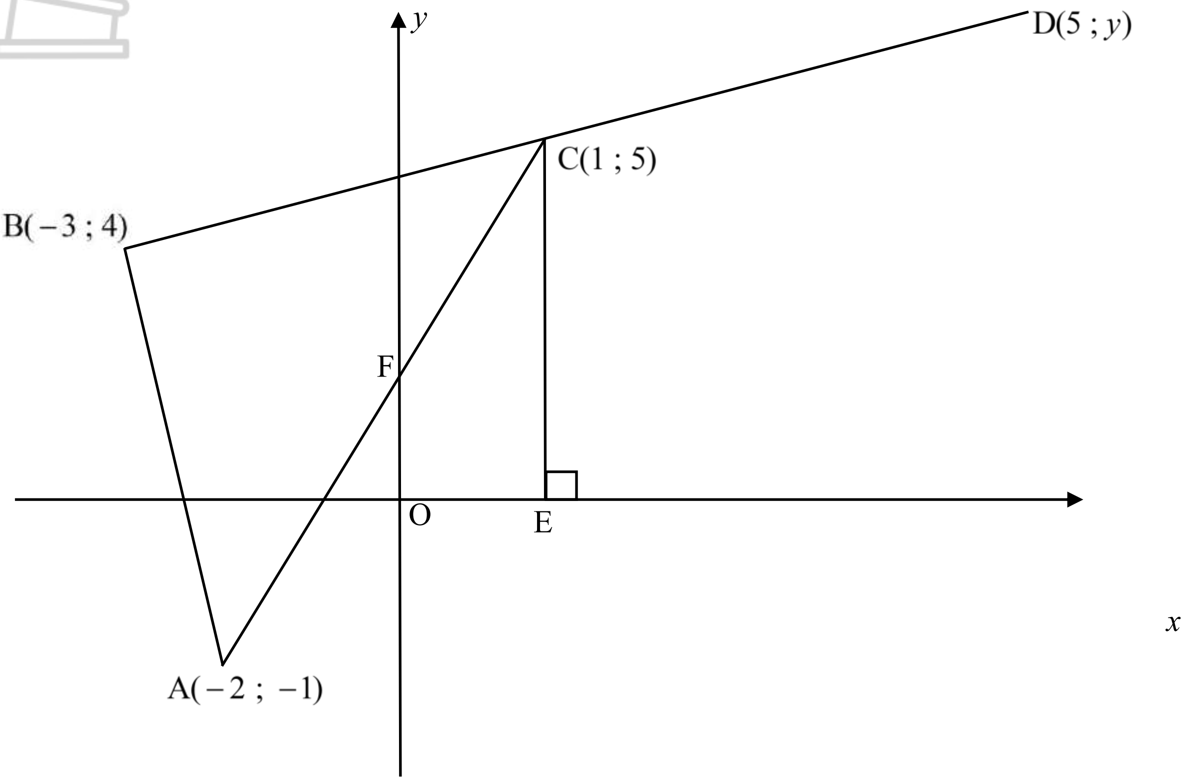
In the diagram below, D(−10 ; 6) , E, F and G(1 ; 9) are the vertices of a quadrilateral. F is a point on the x-axis. The diagonals of the quadrilateral bisect each other at K. The equation of diagonal EG is $3x - y + 6 = 0$ and β is the angle of inclination of EG.



1.1	Calculate the size of β.	(3)
1.2	Calculate the coordinates of F if the equation of DF is $x + 3y = 8$.	(2)
1.3	Calculate the coordinates of E.	(4)
1.4	Prove that DEFG is a rhombus.	(3)
		[12]

QUESTION 2

In the diagram below, A$(-2\,;-1)$, B$(-3\,;4)$ and C$(1\,;\,5)$ are the vertices of a triangle. BC is produced to D$(5\,;y)$, AC cuts the y-axis at F. E is a point on the x-axis such that CE is perpendicular to the x-axis.



2.1	Calculate the length of AC. Leave answer in simplified surd form.	(2)
2.2	Calculate the gradient of BC.	(2)
2.3	Calculate the value of y if B, C and D are collinear.	(3)
2.4	If H is a point such that AH $\perp$ BC, determine the equation of AH.	(3)
2.5	Calculate the coordinates of G if CBAG, in that order, is a parallelogram.	(3)
2.6	Calculate the area of CEOF.	(4)
		[17]

QUESTION 3

If $\cos 23° = \sqrt{1-g^2}$, express each of the following in terms of g:

3.1 $\sin 23°$ (3)

3.2 $\tan 113°$ (2)

3.3 $\sin(-653°)$ (2)

[7]

QUESTION 4

4.1 Simplify the following **without using a calculator**:

4.1.1 $\dfrac{\cos 390°}{\cos(-30°)} - \tan(360° - x).\cos(180° + x).\cos(x - 90°)$ (8)

4.1.2 $\dfrac{\sin 120°.\tan 330°}{\cos 240°}$ (4)

4.2 Prove the following identity: $\dfrac{\cos x.\tan^2 x}{\dfrac{1}{\cos x}+1} + \cos x = 1$ (5)

4.3 Given the expression: $\dfrac{\cos 2x.\tan x}{\sin^2 x}$.

Determine the value(s) of x, in the interval $x \in [0°\,;180°]$, for which the expression will be undefined. (3)

4.4 Solve for α and β if:

$\cos(\alpha+\beta) = -\dfrac{\sqrt{2}}{2}$ for $(\alpha+\beta) \in [0°\,;180°]$; and

$\cos(\alpha-2\beta) = \dfrac{1}{2}$ for $(\alpha-2\beta) \in [0°\,;180°]$

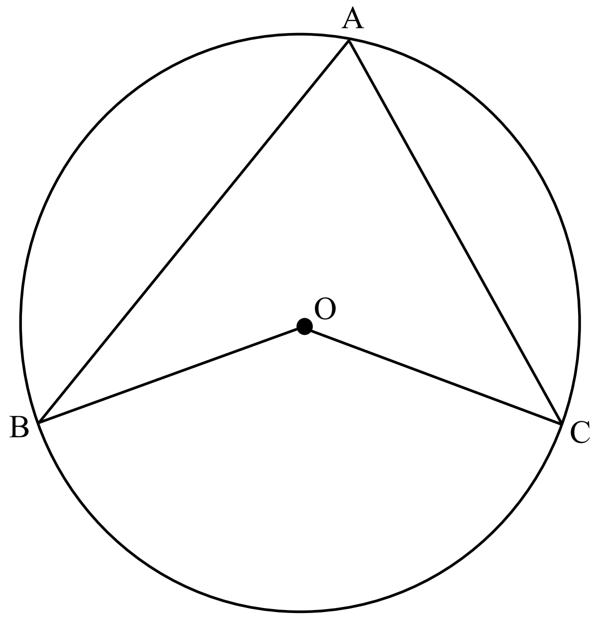
(4)

[24]

GIVE REASONS FOR YOUR STATEMENTS IN QUESTION 5, QUESTION 6 AND QUESTION 7.

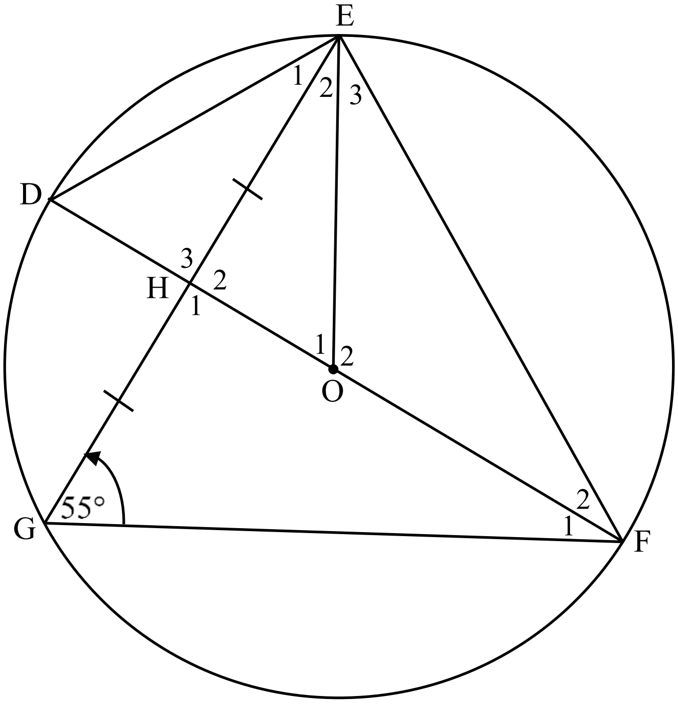
QUESTION 5

5.1 In the diagram, O is the centre of the circle. AB and AC are chords, and BO and CO have been drawn.



Use the diagram on the DIAGRAM SHEET to prove the theorem which states that the angle subtended by an arc or chord at the centre of the circle is equal to twice the angle subtended by the same arc or chord at the circumference, that is, prove that obtuse $B\hat{O}C = 2B\hat{A}C$. (5)

5.2 In the diagram below, DF is a diameter of the circle with centre O. Chord EG intersects DF at H such that GH = HE. Chords EF, GF and DE and radius OE are drawn. $E\hat{G}F = 55°$.



5.2.1 Write down the size of $\hat{D}$. Provide a reason. (2)

5.2.2 Write down the size of $\hat{O}_2$. Provide a reason. (2)

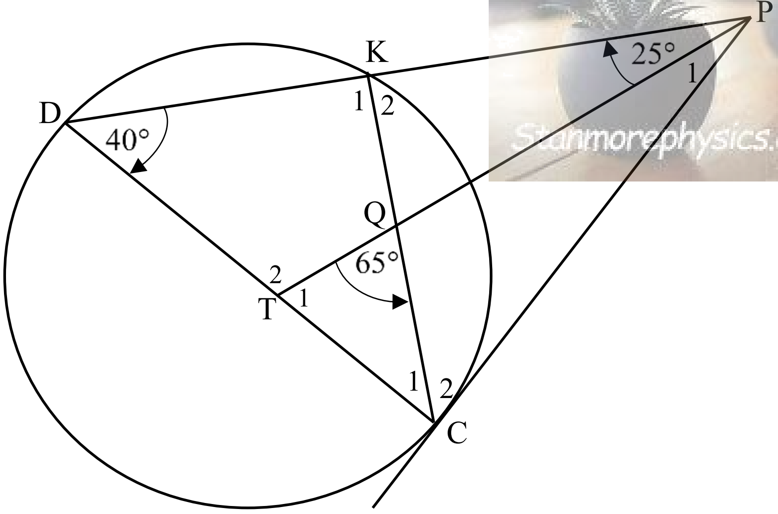
5.2.3 Calculate, giving reasons, the size of $\hat{F}_2$ (2)

5.2.4 Prove, with reasons, that DE is a tangent to the circle passing through E, F and H at E. (3)

[14]

QUESTION 6

6.1 In the diagram below, CD is a diameter and PC is a tangent to the circle at C. Chord DK is produced to P. PT intersects KC at Q. $C\hat{D}P = 40°$, $D\hat{P}T = 25°$ and $T\hat{Q}C = 65°$.



Calculate, with reasons, the size of the following angles:

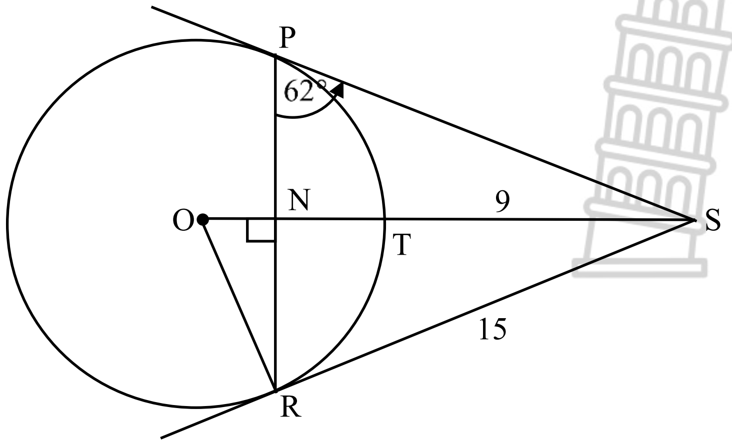
6.1.1 $\hat{C}_2$ (2)

6.1.2 $\hat{K}_1$ (2)

6.1.3 $\hat{P}_1$ (2)

6.1.4 Prove, with reasons, that $TC = QC$. (2)

6.2 In the diagram below, O is the centre of circle PTR. N is a point on chord PR such that $ON \perp PR$. RS and PS are tangents to the circle at R and P respectively. $RS = 15$ units, $TS = 9$ units and $R\hat{P}S = 62°$.



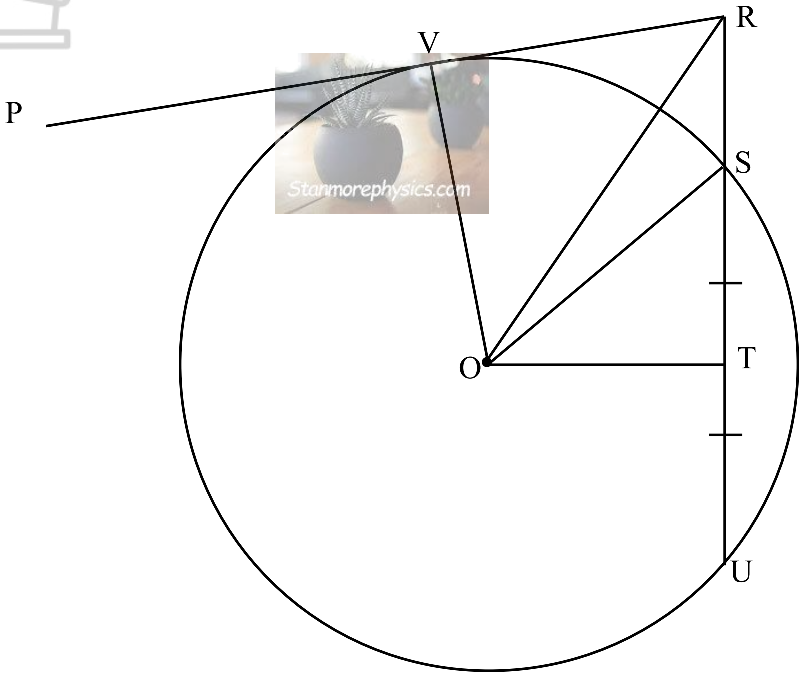
6.2.1 Calculate the size of $N\hat{O}R$. (5)

6.2.2 Calculate the length of the radius of the circle. (4)

[17]

QUESTION 7

In the diagram, O is the centre of the circle and PVR is a tangent to the circle at V.
T is a point on chord SU such that ST = TU. US extended meets PV at R. OV, OR, OS and OT are drawn.



7.1 Prove that VOTR is a cyclic quadrilateral. (3)

7.2 Prove that $OR^2 = OV^2 + TR^2 - (RU - TR)^2$. (6)

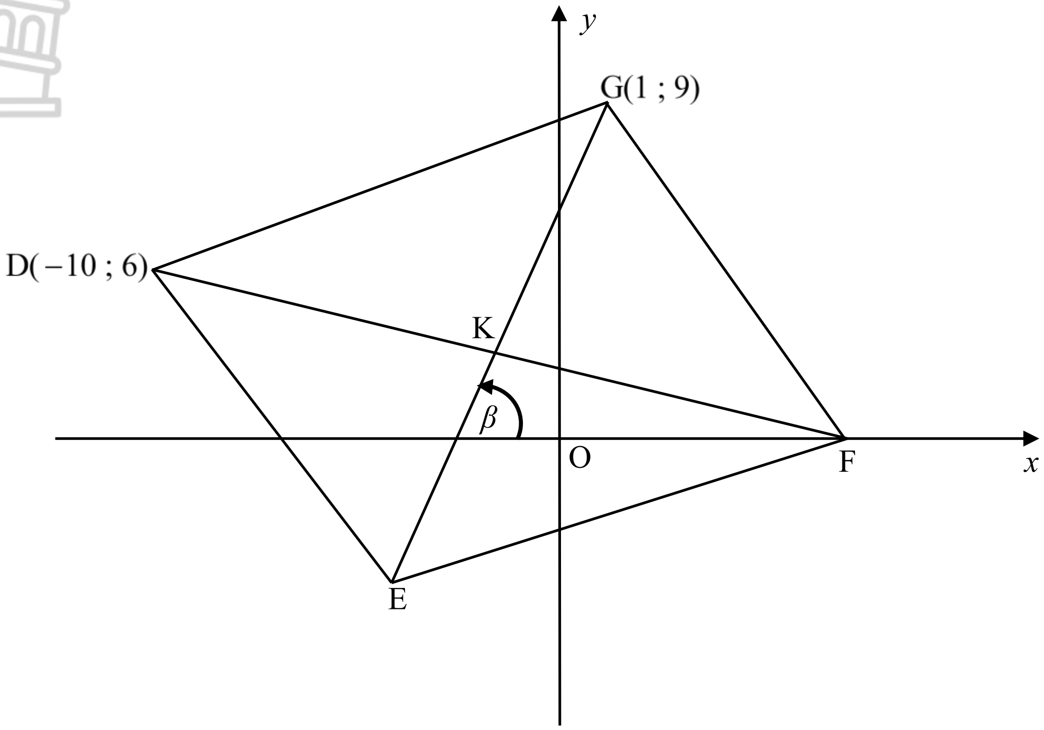
[9]

TOTAL: 100 MARKS

NAME & SURNAME:

DIAGRAM SHEET 1

QUESTION 1



TEAR OFF

QUESTION 2

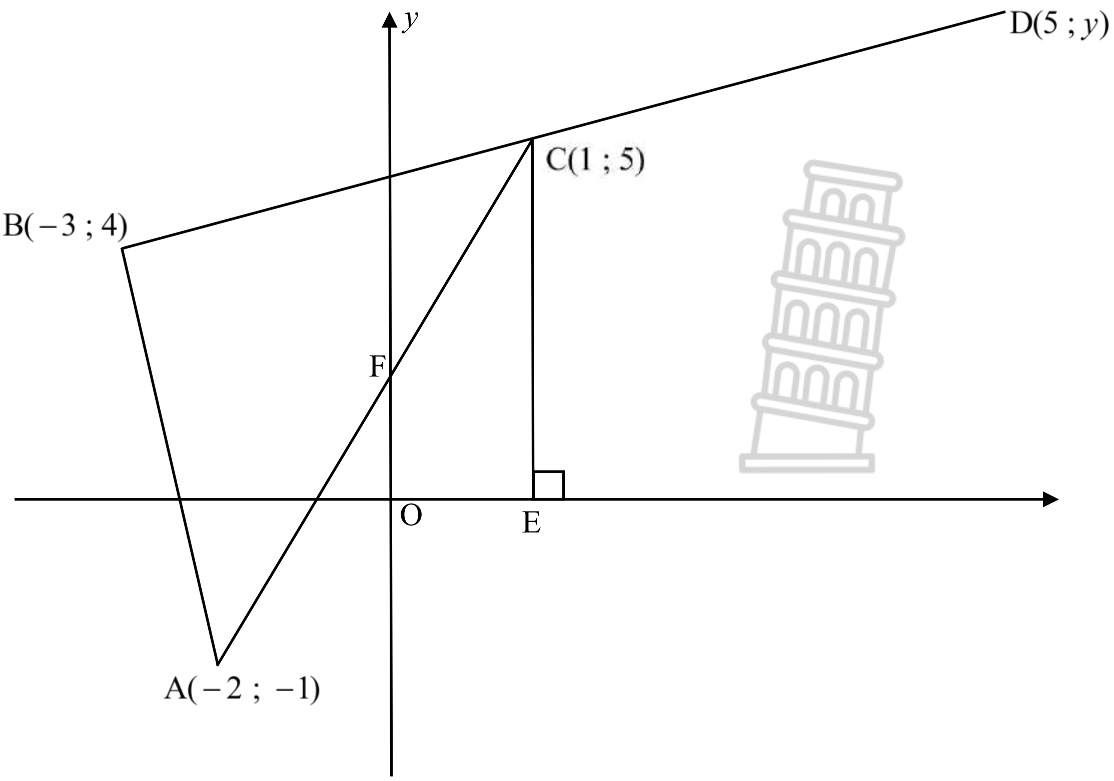


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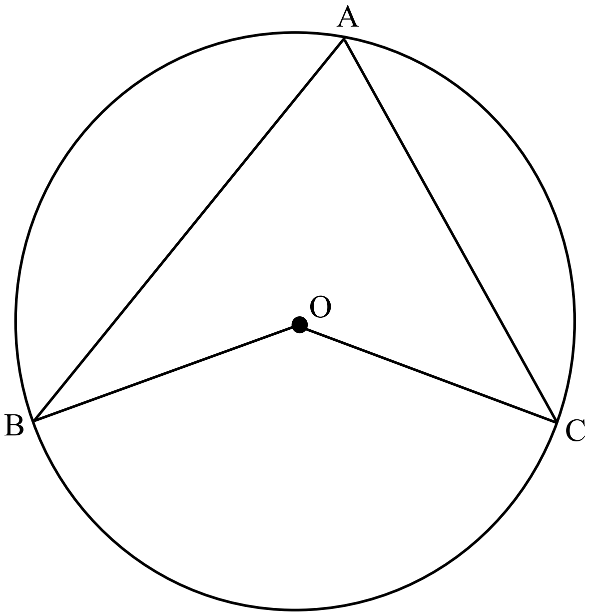
DIAGRAM SHEET 2

QUESTION 5.1



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QUESTION 5.2

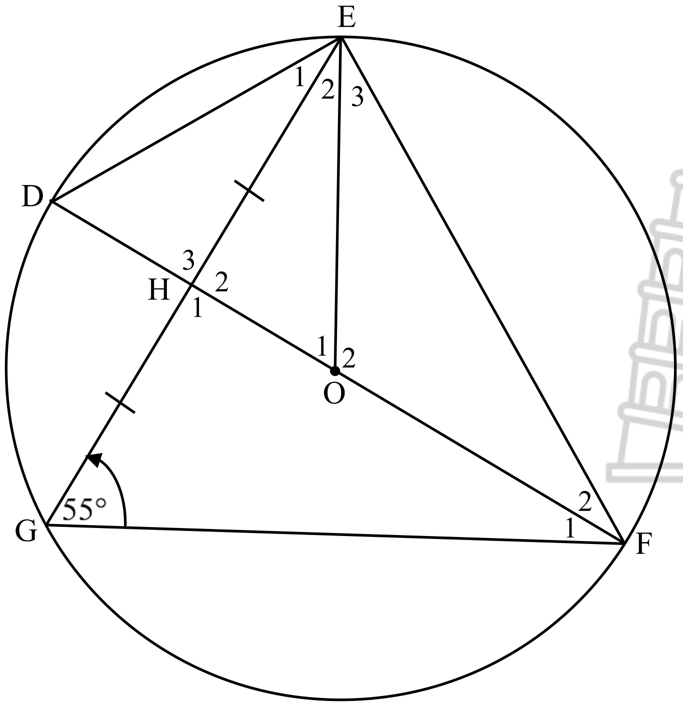

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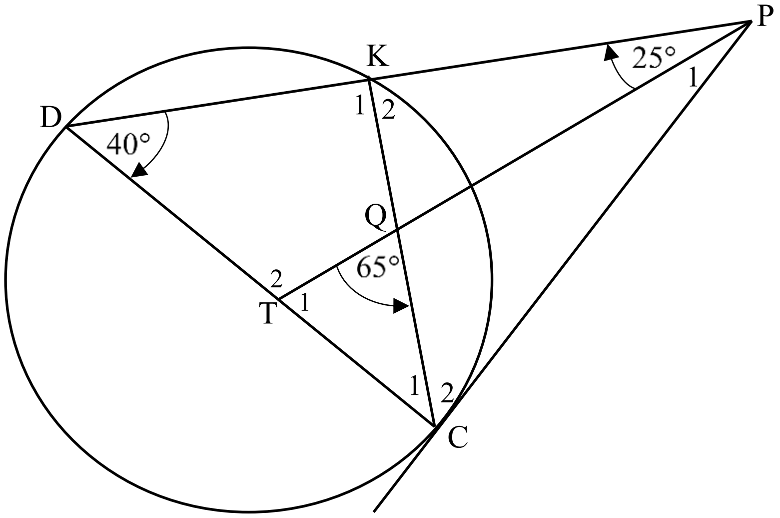
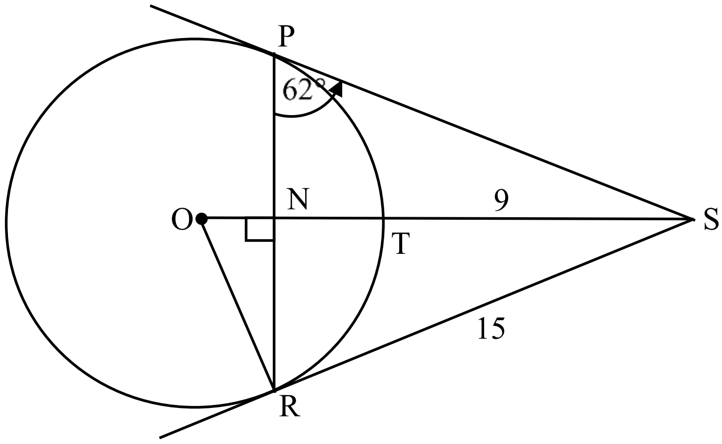
DIAGRAM SHEET 3

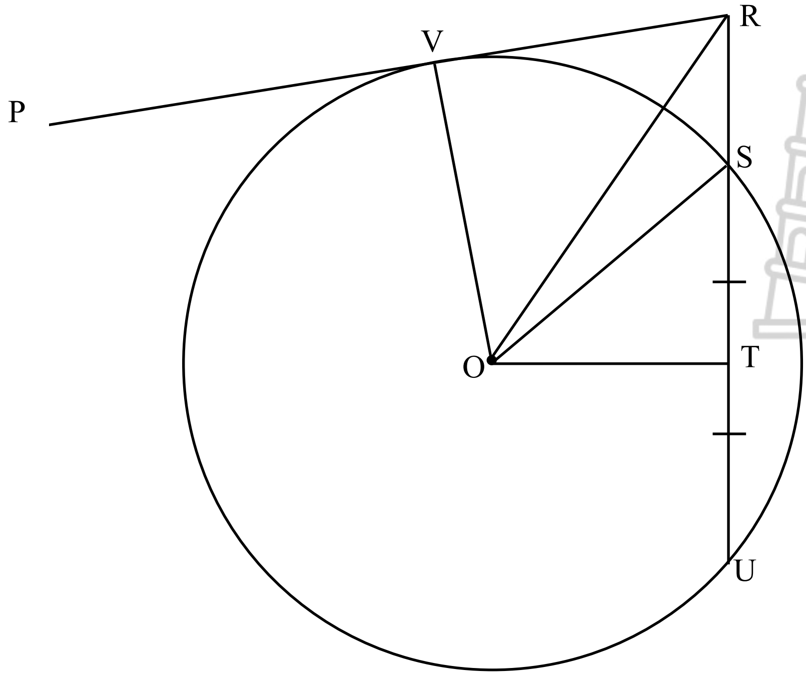
QUESTION 6.1



QUESTION 6.2



QUESTION 7



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KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

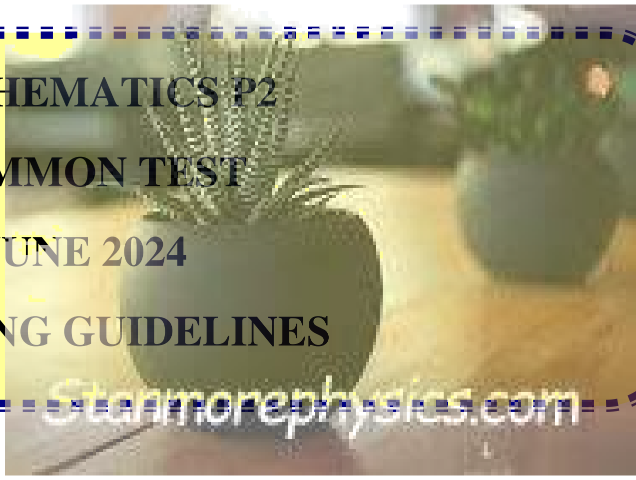
FINAL

MATHEMATICS P2

COMMON TEST

JUNE 2024

MARKING GUIDELINES



NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS: 100

These marking guidelines consist of 12 pages.

QUESTION 1

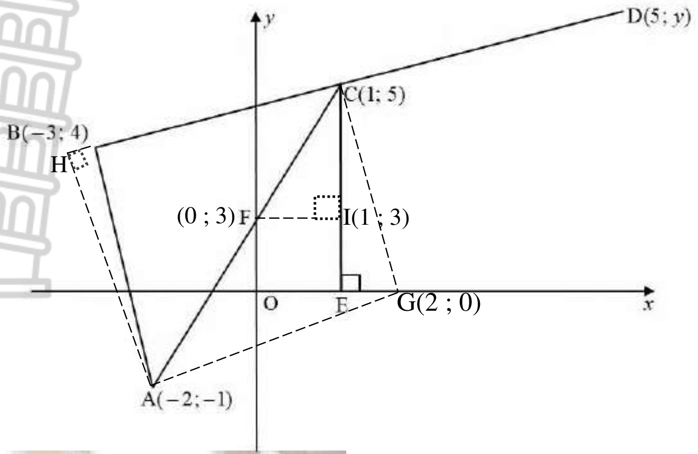
1.1	Equation of EG: $3x - y + 6 = 0$ $y = 3x + 6$ $\therefore m_{EG} = 3$ $\therefore \tan\beta = m_{EG} = 3$ $\beta = 71{,}57°$	✓**A** $y = 3x + 6$ ✓**CA** $\tan\beta = m_{EG} = 3$ ✓**CA** answer (3)
1.2	$x + 3(0) = 8$ $x = 8$ $\therefore F(8\ ;\ 0)$ **Answer only: FULL MARKS**	✓**A** substitute $y = 0$ ✓**A** answer in coordinate form (2)
1.3	$midpt_{DF} = midpt_{GE}$ [diagonals bisect] $K\left(\frac{-10+8}{2}\ ;\ \frac{6+0}{2}\right)$ $K(-1\ ;\ 3)$ $\therefore -1 = \frac{x+1}{2}$ and $3 = \frac{y+9}{2}$ $\therefore x = 3$ and $y = -3$ $\therefore E(-3\ ;\ -3)$ **OR** $x + 3y = 8$ $x + 3(3x+6) = 8$ $x + 9x + 18 = 8$ $10x = -10$ $x = -1$ $\therefore y = 3(-1) + 6$ $y = 3$ $\therefore K(-1\ ;\ 3)$ $\frac{x+1}{2} = -1$ and $\frac{y+9}{2} = 3$ $x = -3$ and $y = -3$ $\therefore E(-3\ ;\ -3)$ **CA only applies if both values are negative**	✓**CA**✓**CA** co-ordinates of K ✓**CA** x-value **CA**✓y-value (4) ✓**CA** x_K ✓**CA** y_K ✓**CA** x-value ✓**CA** y-value (4)
1.4	$3y = -x + 8$ $y = -\frac{1}{3}x + \frac{8}{3}$ $m_{DF} \times m_{GE} = -\frac{1}{3} \times 3$ $= -1$ $\therefore DF \perp GE$	✓**A** $m_{DF} = -\frac{1}{3}$ ✓**A** $m_{DF} \times m_{GE} = -1$ ✓ **A** conclusion (3)

	$\therefore$ DEFG is a rhombus (diagonals bisect at right angle)	
	OR DEFG is a parallelogram (diagonals bisect each other) $DG=\sqrt{(-10-1)^2+(6-9)^2}$ $=\sqrt{130}$ $DE=\sqrt{[-10-(-3)]^2+[6-(-3)]^2}$ $=\sqrt{130}$ $\therefore DG=DE$ $\therefore$ DEFG is a rhombus (parm. with adjacent sides =)	✓**A** $DG=\sqrt{130}$ ✓**CA** $DE=\sqrt{130}$ ✓**A** conclusion (3)
		[12]

QUESTION 2

2.1	$AC=\sqrt{(1-(-2))^2+(5-(-1))^2}$ $=\sqrt{9+36}$ $=3\sqrt{5}$ **Penalise if answer is not simplified**	✓**A** substitution in correct formula ✓**CA** answer (2)
2.2	$m_{BC}=\dfrac{5-4}{1-(-3)}$ $=\dfrac{1}{4}$	✓**A** substitution in correct formula ✓**CA** answer (2)
2.3	$m_{CD}=m_{BC}$ $\dfrac{y-5}{5-1}=\dfrac{1}{4}$ $y=6$ **OR** $m_{BD}=m_{BC}$ $\dfrac{y-4}{5-(-3)}=\dfrac{1}{4}$ $\dfrac{y-4}{8}=\dfrac{2}{8}$ $y=6$	✓**CA** m_{CD} ✓**CA** equating gradients ✓**CA** answer (3) ✓**CA** m_{BD} ✓**CA** equating gradients ✓**CA** answer (3)

2.4



$m_{AH} = -4$ (AH ⊥ BC)

$y-(-1) = -4(x-(-2))$

$y = -4x-9$

✓CA $m_{AH} = -4$
✓CA substitution of $A(-2\ ;\ -1)$
✓CA equation of AH
(3)

OR

$m_{AH} = -4$

$-1 = -4(-2)+c$

$c = -9$

$\therefore y = -4x-9$

✓CA $m_{AH} = -4$
✓CA substitution of $A(-2\ ;\ -1)$
✓CA equation of AH
(3)

2.5

By using transformation:

$B \to C : (-3\ ;4) \to (1\ ;5)$

$(x\ ;y) \to (x+4\ ;y+1)$ ✓ A rule

$G(-2+4\ ;\ -1+1)$

$\therefore G(2\ ;\ 0)$ ✓CA x-value CA✓ y-value (3)

OR

$B \to A : (-3\ ;4) \to (-2\ ;\ -1)$

$(x\ ;y) \to (x+1\ ;y-5)$ ✓A rule

$G(1+1\ ;\ 5-5)$

$\therefore G(2\ ;\ 0)$ ✓CA x-value CA✓ y-value (3)

OR

Midpoint of AC $= \left(\frac{-2+1}{2}\ ;\ \frac{-1+5}{2}\right)$

$= \left(-\frac{1}{2}\ ;2\right)$ ✓A Midpoint of AC

Midpoint of AC = Midpoint of BG

$\frac{x-3}{2} = -\frac{1}{2}$ and $\frac{y+4}{2} = 2$

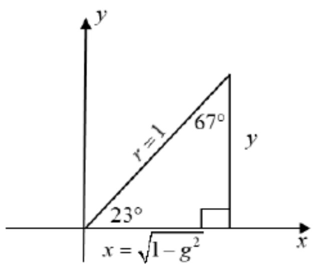
$x = 2$ and $y = 0$

$\therefore G(2\ ;0)$ ✓CA x-value ✓CA y-value (3)

Answer only: FULL MARKS

2.6	$F(0\,;3)$ $E(1\,;0)$ Area CEOF = Area OEIF + Area FIC $= (3\times1)+\left(\frac{1}{2}\times2\times1\right)$ $= 4\,square\ units$	✓**A** coordinates of F & E or y_F and x_E ✓**CA** area of OEIF ✓**CA** area of FIC ✓**CA** answer (4)
	OR	
	$F(0\,;3)$ $E(1\,;0)$ CEOF is a trapezium………………...[OF∥EC] Area CEOF $= \frac{1}{2}(OF+EC)\times OE$ $=\frac{1}{2}(3+5)\times1$ $= 4\,square\ units$	✓**A** coordinates of F & E or y_F and x_E ✓**A** formula for area of trapezium ✓**CA** substitution into area of trapezium ✓**CA** answer (4)
		[17]

QUESTION 3

3.1	$\cos 23° = \frac{\sqrt{1-g^2}}{1} = \frac{x}{r}$ $y^2 = (1)^2 - \left(\sqrt{1-g^2}\right)^2$ $y^2 = 1-1+g^2$ $y = \pm\sqrt{g^2}$ $y = g$ $\sin 23° = g$ 	✓**A** using $x^2+y^2=r^2$ ✓**CA** $y=g$ ✓**CA** answer (3)
	OR	
	$\sin^2 23° + \cos^2 23° = 1$ $\sin^2 23° = 1-\cos^2 23°$ $=1-\left(\sqrt{1-g^2}\right)^2$ $= 1-(1-g^2)$ $= g^2$ $\therefore \sin 23° = g$	✓**A** square identity ✓**CA** substitution ✓**CA** answer (3)

3.2	$\tan 113° = \tan(180° - 67°)$ $= -\tan 67°$ $= -\dfrac{\sqrt{1-g^2}}{g}$	✓**A** $-\tan 67°$ ✓**CA** answer (2)
3.3	$\sin(-653°) = \sin 67$ $= \sqrt{1-g^2}$	✓**A** $\sin(-653°) = \sin 67°$ ✓**CA** answer (2)
		[7]

QUESTION 4

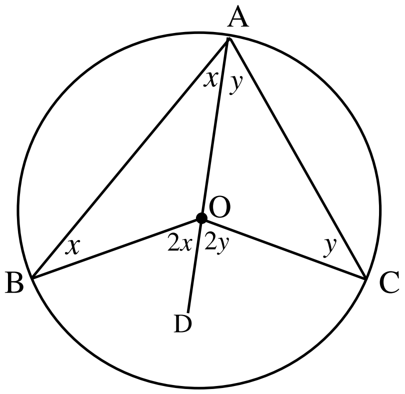
4.1.1	$\dfrac{\cos 390°}{\cos(-30°)} - \tan(360° - x).\cos(180° + x).\cos(x - 90°)$ $= \dfrac{\cos 30°}{\cos 30°} - (-\tan x)(-\cos x)(\sin x)$ $= 1 - \left(-\dfrac{\sin x}{\cos x}\right)(-\cos x)(\sin x)$ $= 1 - \sin^2 x$ $= \cos^2 x$	✓**A** $\cos 390° = \cos 30°$ ✓**A** $\cos(-30°) = \cos 30°$ ✓**A** $\tan(360° - x) = -\tan x$ ✓**A** $\cos(180° + x) = -\cos x$ ✓**A** $\cos(x - 90°) = \sin x$ ✓**A** $-\tan x = \left(-\dfrac{\sin x}{\cos x}\right)$ ✓**CA** simplification ✓**CA** answer (8)
4.1.2	$\dfrac{\sin 120°.\tan 330°}{\cos 240°} = \dfrac{\sin 60°.(-\tan 30°)}{-\cos 60°}$ $= \dfrac{\frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{3}}}{\frac{1}{2}}$ $= 1$	✓**A** $\sin 60°$ and $-\tan 30°$ ✓**A** $-\cos 60°$ ✓**A** substitution of special angles ✓**CA** answer (4)

4.2	$LHS=\dfrac{\cos x.\tan^2 x}{\dfrac{1}{\cos x}+1}+\cos x$ $=\dfrac{\cos x\left(\dfrac{\sin^2 x}{\cos^2 x}\right)}{\dfrac{1+\cos x}{\cos x}}+\cos x$ $=\left(\dfrac{\sin^2 x}{\cos x}\right)\times\dfrac{\cos x}{1+\cos x}+\cos x$ $=\dfrac{\sin^2 x}{1+\cos x}+\cos x$ $=\dfrac{1-\cos^2 x}{1+\cos x}+\cos x$ $=\dfrac{(1+\cos x)(1-\cos x)}{1+\cos x}+\cos x$ $=1-\cos x+\cos x$ $=1$ $=RHS$ **OR** $LHS=\dfrac{\cos x.\tan^2 x}{\dfrac{1}{\cos x}+1}+\cos x$ $=\dfrac{\cos x\,.\,\dfrac{\sin^2 x}{\cos^2 x}}{\dfrac{1+\cos x}{\cos x}}+\cos x$ $=\dfrac{\sin^2 x}{\cos x}\times\dfrac{\cos x}{1+\cos x}+\cos x$ $=\dfrac{\sin^2 x}{1+\cos x}+\cos x$ $=\dfrac{\sin^2 x+\cos x(1+\cos x)}{1+\cos x}$ $=\dfrac{\sin^2 x+\cos x+\cos^2 x}{1+\cos x}$ $=\dfrac{1+\cos x}{1+\cos x}$ $=1$ $=RHS$	✓**A** quotient identity ✓**A** denominator as a single fraction ✓**A** square identity ✓**A** factorisation ✓**A** simplification (5) ✓**A** quotient identity ✓**A** denominator as a single fraction ✓**A** writing as a single fraction ✓**A** simplification ✓**A** square identity (5)
4.3	$x=0°$ $x=90°$ $x=180°$	✓**A** $x=0$ ✓**A** $x=90°$ ✓**A** $x=180°$ (3)

4.4	$\cos(\alpha+\beta)=-\frac{\sqrt{2}}{2}$ $(\alpha+\beta)=180°-\cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$ $(\alpha+\beta)=180°-45°$ $(\alpha+\beta)=135°$..............................(1) $\cos(\alpha-2\beta)=\frac{1}{2}$ $(\alpha-2\beta)=\cos^{-1}\left(\frac{1}{2}\right)$ $(\alpha-2\beta)=60°$............................(2) $(1)-(2):\quad 3\beta=75°$ $\beta=25°$ $\alpha=110°$	✓**A** $(\alpha+\beta)=135°$ ✓**A** $(\alpha-2\beta)=60°$ ✓**A** $\beta=25°$ ✓**A** $\alpha=110°$ (4)
		[24]

GEOMETRY • *MEETKUNDE*	
S	**A mark for a correct statement** **(A statement mark is independent of a reason)**
	'n Punt vir 'n korrekte bewering ***('n Punt vir 'n bewering is onafhanklik van die rede)***
R	**A mark for the correct reason** **(A reason mark may only be awarded if the statement is correct)**
	'n Punt vir 'n korrekte rede ***('n Punt word slegs vir die rede toegeken as die bewering korrek is)***
S/R	**Award a mark if statement AND reason are both correct**
	Ken 'n punt toe as die bewering EN rede beide korrek is

QUESTION 5

5.1			
	Construction:		
	Draw AO extended to D		✓**A** construction
	Proof:		
	$\hat{BAO} = \hat{ABO} = x$	[∠'s opp. = sides]	✓**A** S/R
	$\hat{BOD} = 2x$	[ext. ∠ of Δ]	✓**A** S/R
	Similarly: $\hat{COD} = 2y$	[ext. ∠ of Δ]	✓**A** S
	$\hat{BOC} = 2x + 2y$		
	$= 2(x + y)$		✓**A** 2 $(x + y)$
	$= 2\hat{A}$		(5)
5.2.1	$\hat{D} = \hat{G} = 55°$	[∠'s in the same segment]	✓**A** S **A**✓ R (2)
5.2.2	$\hat{O}_2 = 2(55°) = 110°$	[∠ at centre = 2 ×∠ at circumference]	✓**A** S ✓ **A** R (2)
	OR		**OR**
	$\hat{D} = D\hat{E}O = 55°$	[∠'s opp = sides]	✓**A** S/R
	$\therefore \hat{O}_2 = 110°$	[ext ∠ of Δ]	✓**A** S/R (2)
	OR		**OR**
	$\hat{D} = D\hat{E}O = 55°$	[∠'s opp = sides]	✓**A** S/R
	$\therefore \hat{O}_1 = 70°$	[sum of ∠s in Δ]	
	$\therefore \hat{O}_2 = 180° - 70° = 110°$	[sum of ∠'s on a st line]	✓ **A S/R** (2)
5.2.3	$\hat{F}_2 + \hat{E}_3 + \hat{O}_2 = 180°$	[sum of ∠s in Δ]	✓**A** S/R
	$\hat{F}_2 = \hat{E}_3$	[∠s opp equal sides]	
	$\therefore \hat{F}_2 = 35°$		✓**A** S/R (2)
	OR		
	$D\hat{E}F = 90°$	[∠ in semi-circle]	✓**A** S/R
	$\hat{D} + D\hat{E}F + \hat{F}_2 = 180°$	[sum of ∠s in Δ]	
	$\therefore \hat{F}_2 = 35°$		✓**A** S/R (2)

5.2.4	$\hat{H}_3 = \hat{H}_2 = 90°$ $\therefore \hat{E}_1 = 35°$ $\therefore \hat{E}_1 = \hat{F}_2$ ∴ DE is a tangent	[line from centre to midpt of chord] [sum of ∠s in Δ **OR** ext ∠ of Δ] [converse tan chord theorem]	✓**A** S/R ✓**A** S/R ✓**A** R (3)
			[14]

QUESTION 6

6.1.1	$\hat{C}_2 = 40°$	[tan-chord theorem]	✓**A** S ✓**A** R (2)
6.1.2	$\hat{K}_1 = 90°$	[∠ in a semi-circle]	✓**A** S ✓**A** R (2)
6.1.3	$\hat{P}_1 = 65° - 40°$ $= 25°$	[exterior ∠ of a Δ]	✓**A** S/R ✓**A** answer (2)
6.1.4	$\hat{T}_1 = \hat{D} + D\hat{P}T$ $=40°+25°$ $=65°$ $\therefore TC = QC$ $\hat{C}_1 = 50°$ $\hat{T}_1 = 65°$ $\therefore \hat{T}_1 = T\hat{Q}C = 65°$ $\therefore TC = QC$	[exterior ∠ of a Δ] [sides opp. =∠'s] **OR** [radius ⊥ to tangent] [sum of ∠'s in a Δ] [sides opp. = ∠'s]	 ✓**A** S/R ✓**A** R (2) ✓**A** S/R ✓**A** R (2)
6.2.1	$SP = SR$ $S\hat{R}P = S\hat{P}R = 62°$ $O\hat{R}S = 90°$ $\therefore O\hat{R}N = 28°$ $N\hat{O}R = 90° - 28°$ $N\hat{O}R = 62°$	[tans from same point] [∠'s opp. = sides] [tan ⊥ rad] [sum of ∠'s of Δ]	✓**A** S/R ✓**A** S/R ✓**A** S/R ✓**A** S ✓**A** answer (5)

6.2.2	In ΔORS: let $\text{OT} = r$ $\therefore \text{OT} = \text{OR} = r$ $\text{OS} = \text{OT} + 9 = r + 9$ $\text{OS}^2 = \text{OR}^2 + \text{RS}^2$ $(r+9)^2 = r^2 + 15^2$ $r^2 + 18r + 81 = r^2 + 225$ $18r = 144$ $r = 8$ units $\therefore radius = 8$ units	radii Pythagoras	✓A LHS ✓A RHS ✓A simplification ✓A answer (4)
		OR	**OR**
	$\text{N}\hat{\text{R}}\text{S} = \text{N}\hat{\text{P}}\text{R} = 62°$ In ΔNRS: $\cos 62° = \frac{NR}{15}$ $\therefore \text{NR} = 15.\cos 62°$ $\text{N}\hat{\text{R}}\text{O} = 90° - 62° = 28°$ In ΔONR: $\cos 28° = \frac{\text{NR}}{\text{OR}}$ $\therefore \text{OR} = \frac{15.\cos 62°}{\cos 28°}$ $\therefore \text{OR} = 7.98$ units	∠'s opp = sides radius ⊥ to tangent	✓A S/R ✓A NR ✓A OR ✓A Answer
			[17]

QUESTION 7

7.1	$P\hat{V}O = 90°$ $O\hat{T}R = 90°$ $\therefore$VOTR is a cyclic quadrilateral	[rad $\perp$ tan] [line from centre to midpoint of a chord] [conv. ext. $\angle$of a cyclic quad.] [conv. opp. $\angle$'s suppl]	✓**A** S/R ✓**A** S/R ✓**A** R (Any) (3)
	OR	**OR**	
	$O\hat{V}R = 90°$ $O\hat{T}R = 90°$ $\therefore O\hat{V}R + O\hat{T}R = 180°$ $\therefore$ VOTR is a cyclic quadrilateral	[rad $\perp$ tan] [line from centre to midpoint of a chord] [conv. opp. $\angle$'s of cyclic quad.]	✓**A** S/R ✓**A** S/R ✓**A** R (3)
7.2	In ΔROT: $OR^2 = TR^2 + OT^2$ In ΔSOT: $OT^2 = OS^2 - ST^2$ $\therefore OR^2 = TR^2 + OS^2 - ST^2$ but OS = OV and ST = TU $\therefore OR^2 = TR^2 + OV^2 - TU^2$ also: TU = RU − TR $\therefore OR^2 = TR^2 + OV^2 - (RU - TR)^2$	[Pythagoras] [Pythagoras] [radii] [given]	✓**A** S ✓**A** S ✓**A** substitution for OT^2 ✓✓**A A** substitution for OS and ST ✓ **A** TU = RU − TR (6)
			[9]

TOTAL: 100