education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS P2

COMMON TEST

JUNE 2024

MARKS: **50**

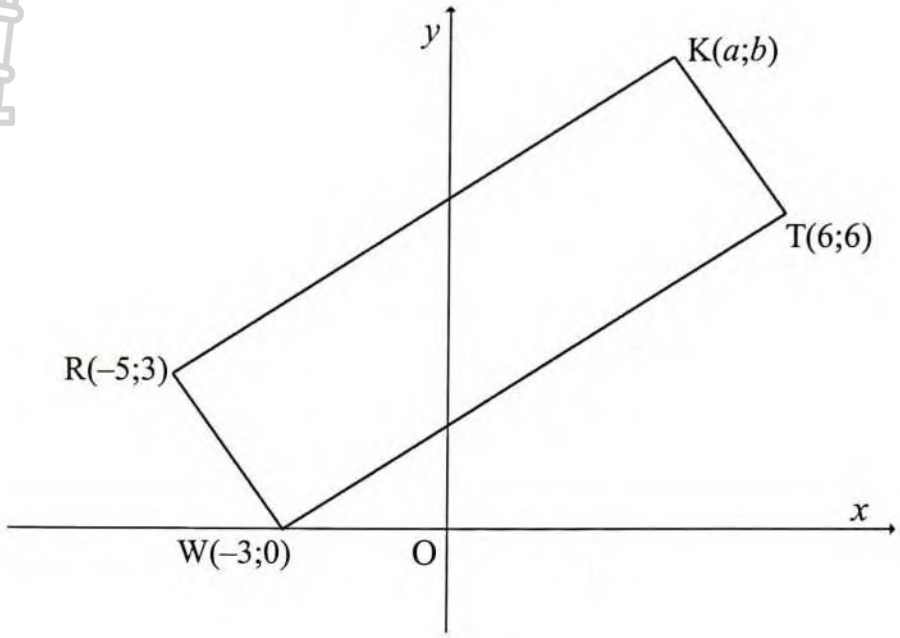
TIME:1 Hour

This question paper consists of 6 pages.

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QUESTION 1

In the diagram R(–5;3), W(–3;0), T(6;6) and K(a;b) are the vertices of quadrilateral RWTK.



1.1 Determine the coordinates of M the midpoint of line RT. (3)

1.2 Calculate the gradient of the line WT. (3)

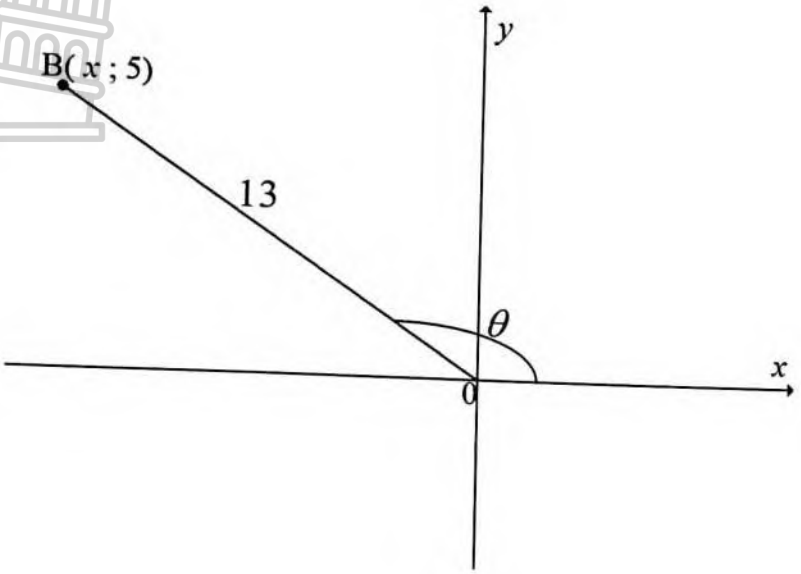
1.3 Prove that RW is perpendicular to WT. (3)

1.4 If RWTK is a parallelogram, determine the values of a and b. (4)

[13]

QUESTION 2

2.1 B $(x;5)$ is a point that lies on the Cartesian plane. It is given that OB=13 units and $B\hat{O}X=\theta$



Using the diagram and **without the use of a calculator**, determine:

2.1.1 the value of x (2)

2.1.2 $\cos\theta$ (1)

2.1.3 $\dfrac{12\sin\theta}{\cos\theta}$ (2)

2.2 Given that $x=20°$ and $y=21°$, calculate the value of the following (correct to TWO decimal places).

2.2.1 $\cos 2y$ (1)

2.2.2 $\sin(x+y)$ (2)

2.2.3 $\sec x$ (2)

[10]

QUESTION 3

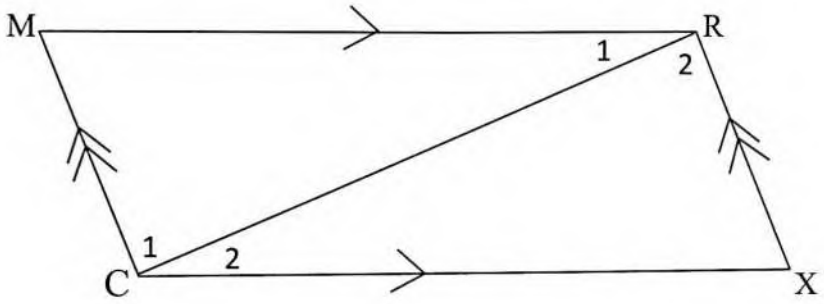
3.1 **Without the use of a calculator**, calculate the value of:
$\sin^2 45° - \cos 60° + \tan 10° \cot 10°$ (4)

3.2 Solve for x, correct to ONE decimal place where $0° \leq x \leq 90°$, if: $\frac{1}{3\sin x} = 2$ (3)

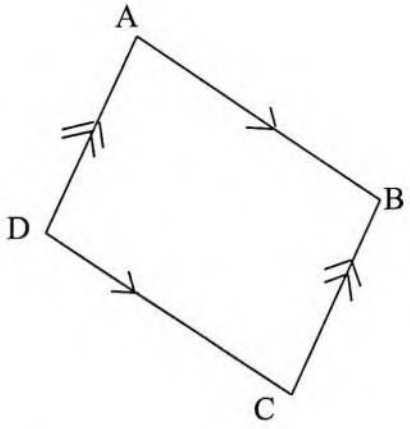
[7]

QUESTION 4

4.1 Use the diagram below to prove that the opposite sides of a parallelogram are equal (4)



4.2 In the diagram below ABCD is a parallelogram with $\hat{A} = 5x + 5°$ and $\hat{C} = 8x - 16°$.



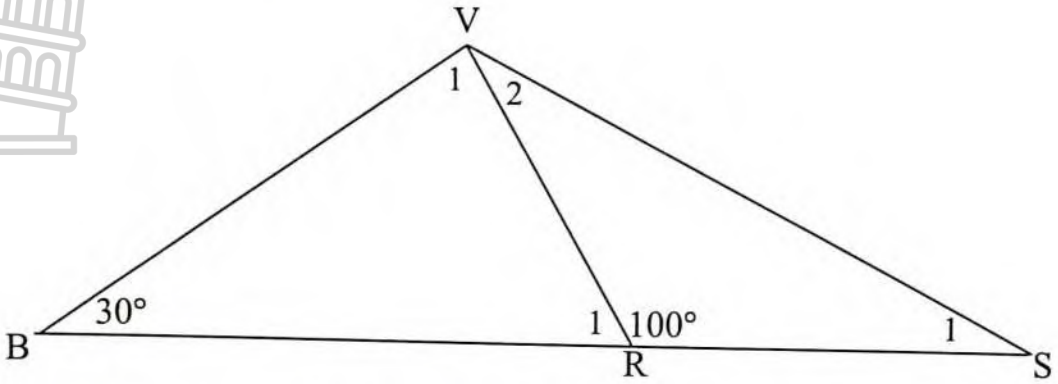
4.2.1 Calculate the value of x. (3)

4.2.2 Determine the size of $\hat{B}$. (4)

[11]

QUESTION 5

5.1 In the diagram , $\hat{B}=30°$ and $V\hat{R}S=100°$.

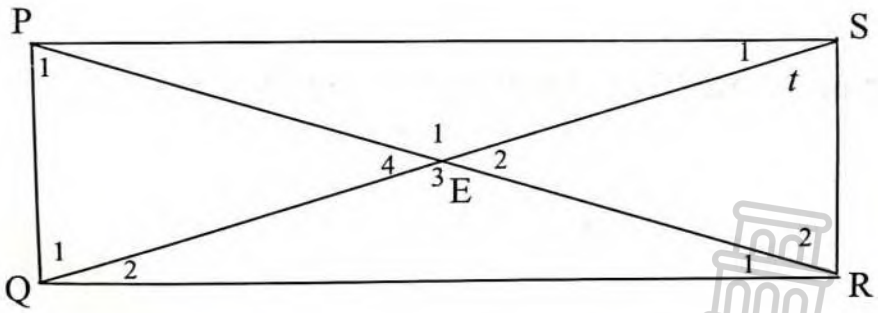


Determine ,with reasons the size of the following angles.

5.1.1 $\hat{V}_1$ (2)

5.1.2 $\hat{S}_1$, if $VR = RS$. (2)

5.2 In the diagram below PQRS is a rectangle with E being the point of intersection of the diagonals. $Q\hat{S}R=t$.



Calculate the size of $\hat{E}_4$ in terms of t. (4)

[9]

TOTAL: [50]

FINAL

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QUESTION 1

1.1	$M\left(\frac{x_1+x_2}{2};\frac{y_1+y_2}{2}\right)$ $M\left(\frac{6+(-5)}{2};\frac{6+3}{2}\right)$ $M\left(\frac{1}{2};\frac{9}{2}\right)$	✓A Formula ✓A Substitution ✓CA Answer (3)
1.2	$m_{WT}=\frac{y_2-y_1}{x_2-x_1}$ $=\frac{6-0}{6-(-3)}$ $=\frac{2}{3}$	✓A Formula ✓A Substitution ✓CA Answer (3)
1.3	$m_{RW}=\frac{y_2-y_1}{x_2-x_1}$ $=\frac{3-0}{-5-(-3)}$ $=\frac{-3}{2}$ $m_{WT}\times m_{RW}=\frac{2}{3}\times\frac{-3}{2}=-1$ ∴ RW is perpendicular to WT	✓A substitution ✓A $\frac{-3}{2}$ ✓A $\frac{2}{3}\times\frac{-3}{2}=-1$ (3)
1.4	$x=\frac{x_1+x_2}{2}$ $y=\frac{y_1+y_2}{2}$ $\frac{1}{2}=\frac{a-3}{2}$ $\frac{9}{2}=\frac{b+0}{2}$ $a=4$ b = 9 **OR** Sliding method $a=6-2$ $b=6+3$ $a=4$ $b=9$	✓CA $\frac{1}{2}=\frac{a-3}{2}$ ✓CA $a=4$ ✓CA $\frac{9}{2}=\frac{b+0}{2}$ ✓CA $b=9$ **ANSWER ONLY MAX: 2/4** (4)
		[13]

QUESTION 2

2.1.1	$x^2 + y^2 = r^2$ $x^2 + 5^2 = 13^2$ $x = \pm 12$ $x = -12$	✓A substitution ✓CA $x = -12$ (CA provided x is negative) (2)
2.1.2	$\cos\theta$ $= \frac{-12}{13}$	✓CA answer (1)
2.1.3	$12\left(\frac{\sin\theta}{\cos\theta}\right)$ $= 12\left(\frac{\frac{5}{13}}{\frac{-12}{13}}\right)$ $= -5$	✓CA substitution ✓CA answer (2)
2.2.1	$\cos 2(21°)$ $= \cos 42°$ **NOTE: Penalise only here for rounding** $= 0,74$	✓A answer (1)
2.2.2	$\sin(20° + 21°)$ $= \sin 41°$ $= 0,66$ **ANSWER ONLY: FULL MARKS**	✓A $(20° + 21°)$ ✓A answer (2)
2.2.3	$\sec(20°)$ $= \frac{1}{\cos(20°)}$ $= 1,06$ **ANSWER ONLY: FULL MARKS**	✓A $\frac{1}{\cos 20°}$ ✓A answer (2)
		[10]

QUESTION 3

3.1	$\left(\frac{1}{\sqrt{2}}\right)^2 - \frac{1}{2} + \tan 10° \frac{1}{\tan 10°}$ $= \frac{1}{2} - \frac{1}{2} + 1$ $= 1$	✓A $\left(\frac{1}{\sqrt{2}}\right)^2$ accept $\left(\frac{\sqrt{2}}{2}\right)^2$ ✓A $\frac{1}{2}$ ✓A $\frac{1}{\tan 10°}$ ✓CA answer (4)
3.2	$6\sin x = 1$ $\sin x = \frac{1}{6}$ $x = 9,6°$ **NOTE: do not penalise for rounding**	✓A $6\sin x = 1$ ✓A simplification ✓CA answer (3)
		[7]

QUESTION 4

4.1	In ΔMRC and ΔXCR $\hat{R}_1 = \hat{C}_2$ Alt ∠s. MR//CX. $\hat{C}_1 = \hat{R}_2$ Alt ∠s. MC//RX. CR = CR Common side. $\Delta MRC \equiv \Delta XCR$ (AAS) MR=XC MC=XR RC=CR **NOTE: Penalise ONCE if parallel lines are not stated**	✓A S/R ✓A S/R ✓A $\Delta MRC \equiv \Delta XCR$ …(AAS) ✓A conclusion (4)
4.2.1	$8x - 16° = 5x + 5°$ opp ∠s of parm $3x = 21°$ $x = 7°$	✓A S/R ✓A $3x = 21°$ ✓CA x-value (CA provided x is positive) (3)
4.2.2	$\hat{D} = \hat{B}$ opp ∠s of parm $\hat{B} + \hat{D} + \hat{A} + \hat{C} = 360°$ Sum ∠s of quad $2\hat{B} + 80° = 360°$ $2\hat{B} = 280°$ $\hat{B} = 140°$	✓A S/R ✓A S/R ✓CA S ✓CA answer

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	OR $\hat{C} = 8(7°) - 16°$ $\hat{C} = 40°$ $\hat{B} + \hat{C} = 180°$ Co-int $\angle$s. $AB \parallel DC$ $\hat{B} = 180° - 40°$ $\hat{B} = 140°$	✓CA 40° ✓S✓R ✓CA answer (4)
		[11]

QUESTION 5

5.1.1	$\hat{V}_1 + 30° = 100°$ Ext $\angle$ of Δ $\hat{V}_1 = 70°$ **OR** $\hat{R}_1 = 80°$ $\angle$s on a str. line $\hat{V}_1 = 70°$ sum of Δ	✓A S/R ✓A answer (2) ✓A S/R ✓A answer
5.1.2	$\hat{S}_1 = \hat{V}_2$ $\angle$s opp = sides $\hat{S}_1 + \hat{V}_2 + V\hat{R}S = 180°$ Sum $\angle$s Δ $2\hat{S}_1 + 100° = 180°$ $2\hat{S}_1 = 80°$ $\hat{S}_1 = 40°$ **OR** $\hat{R}_1 + V\hat{R}S = 180°$ $\angle$s on a str line $\hat{R}_1 = 80°$ $\hat{S}_1 = \hat{V}_2$ $\angle$s opp = sides $\hat{S}_1 + \hat{V}_2 = \hat{R}_1$ Ext $\angle$ of Δ $2\hat{S}_1 = 80°$ $\hat{S}_1 = 40°$	✓A S/R ✓A S ✓A answer (3) ✓A $\hat{R}_1 = 80$ ✓A S/R ✓A answer

5.2	ES = ER	diagonals of rectangle	✓A S/R
	$\hat{R}_2 = t$	$\angle$s opp =sides	
	$\hat{E}_2 + \hat{R}_2 + E\hat{S}R = 180°$	Sum $\angle$ of Δ	
	$\hat{E}_2 + t + t = 180°$		
	$\hat{E}_2 = 180° - 2t$		✓A $\hat{E}_2$
	$\hat{E}_4 = \hat{E}_2$	Vert opp $\angle$s	✓A S/R
	$\hat{E}_4 = 180° - 2t$		✓A answer
			(4)
	OR		
	$\hat{Q}_1 = t$	Alt $\angle$s PS$\parallel$QR	✓A S/R
	$\hat{P}_1 = t$	$\angle$s opp = sides	✓A S/R
	$\hat{E}_4 + \hat{Q}_1 + \hat{P}_1 = 180°$	Sum $\angle$s Δ	✓A S
	$\hat{E}_4 = 180° - 2t$		✓A answer
			[9]

TOTAL: 50