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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.

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GRADE 11
Marking Guideline

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 **A** answer in coordinate form (2)
1.3	$midpt_{DF}=midpt_{CE}$ [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** x-value **CA** y-value (4) **CA** x_K **CA** y_K **CA** x-value **CA** y-value (4)
1.4	$3y=-x+8$ $y=-\frac{1}{3}x+\frac{8}{3}$ $m_{DF}\times m_{CE}=-\frac{1}{3}\times 3$ $=-1$ $\therefore DF\perp GE$	**A** $m_{DF}=-\frac{1}{3}$ **A** $m_{DF}\times m_{CE}=-1$ **A** conclusion (3)

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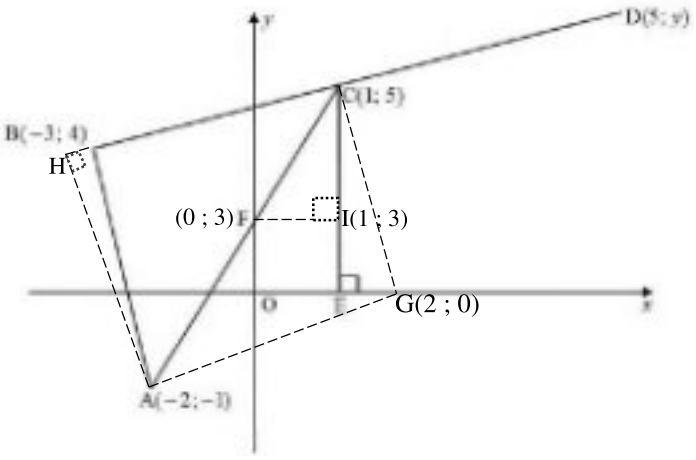
	$\therefore$ DEFG is a rhombus (diagonals bisect at right angle)	
	OR DEFG is a parallelogram (diagonals bisect each other) $DG = \sqrt{(-10-1)^2+(6-9)^2}$ $=\sqrt{130}$ $DE = \sqrt{[-10-(-3)]^2+[6-(-3)]^2}$ $=\sqrt{130}$ $\therefore DG = DE$ $\therefore$ DEFG is a rhombus (parm. with adjacent sides =)	**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** **CA** answer (2)
2.2	$m_{BC} = \frac{5-4}{1-(-3)}$ $=\frac{1}{4}$	**A** **CA** answer (2)
2.3	$m_{CD} = m_{BC}$ $\frac{y-5}{5-1} = \frac{1}{4}$ $y = 6$ **OR** $m_{BD} = m_{BC}$ $\frac{y-4}{5-(-3)} = \frac{1}{4}$ $\frac{y-4}{8} = \frac{2}{8}$ $y = 6$	**CA** m_{CD} **CA** **CA** **CA** m_{BD} **CA** equating gradients **CA** answer (3)

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2.4	 $m_{AH} = -4$ (AH ⊥ BC) $y-(-1) = -4(x-(-2))$ $y = -4x-9$ **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) **CA** $m_{AH} = -4$ **CA** substitution of A(−2 ; −1) **CA** equation of AH (3)
2.5	By using transformation: $B \to C: (-3\ ;\ 4) \to (1\ ;\ 5)$ $(x\ ;\ y) \to (x+4\ ;\ y+1)$ $G(-2+4\ ;\ -1+1)$ $\therefore G(2\ ;\ 0)$ **OR** $B \to A: (-3\ ;\ 4) \to (-2\ ;\ -1)$ $(x\ ;\ y) \to (x+1\ ;\ y-5)$ $G(1+1\ ;\ 5-5)$ $\therefore G(2\ ;\ 0)$ **OR** Midpoint of AC = $\left(\frac{-2+1}{2}\ ;\ \frac{-1+5}{2}\right)$ $= \left(-\frac{1}{2}\ ;\ 2\right)$ Midpoint of AC = Midpoint of BG $\frac{x-3}{2} = -\frac{1}{2}$ and $\frac{y+4}{2} = 2$ $x = 2$ and $y = 0$ $\therefore G(2\ ;\ 0)$ **Answer only: FULL MARKS**	**A** **CA** x-value C y **A** **CA** x-value C y-value (3) **A** Midpoint of AC **CA** x **CA** y-value (3)

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2.6	$F(0\ ;3)$ $E(1\ ;0)$ Area CEOF = Area OEIF + Area FIC $=(3\times1)+\left(\frac{1}{2}\times2\times1\right)$ $=4\,square\ units$ **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 **CA** **CA** **CA** answer (4) **A** coordinates of F & E or y_F and x_E **A** formula for area of trapezium **CA** **CA** answer (4)
		[17]

QUESTION 3

3.1	$\cos23°=\frac{\sqrt{1-g^2}}{1}=\frac{x}{r}$ $y^2=(1)^2-\left(\sqrt{1-g^2}\right)^2$ $y^2=1-1+g^2$ $y=\pm\sqrt{g^2}$ $y=g$ $\sin23°=g$ **OR** $\sin^223°+\cos^223°=1$ $\sin^223°=1-\cos^223°$ $=1-\left(\sqrt{1-g^2}\right)^2$ $=1-\left(1-g^2\right)$ $=g^2$ $\therefore\sin23°=g$	**A** using $x^2+y^2=r^2$ **CA** $y=$ **CA** answer (3) **A** **CA** **CA** answer (3)

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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)

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4.2	$\text{LHS} = \dfrac{\cos x.\tan^2 x}{\dfrac{1}{\cos x}+1} + \cos x$ $= \dfrac{\cos x\left(\dfrac{\sin^2 x}{\cos^2 x}\right)}{\dfrac{1+\cos x}{\cos x}} + \cos x$ $= \left(\dfrac{\sin^2 x}{\cos x}\right) \times \dfrac{\cos x}{1+\cos x} + \cos x$ $= \dfrac{\sin^2 x}{1+\cos x} + \cos x$ $= \dfrac{1-\cos^2 x}{1+\cos x} + \cos x$ $= \dfrac{(1+\cos x)(1-\cos x)}{1+\cos x} + \cos x$ $= 1-\cos x+\cos x$ $= 1$ $= \text{RHS}$ **OR** $\text{LHS} = \dfrac{\cos x.\tan^2 x}{\dfrac{1}{\cos x}+1} + \cos x$ $= \dfrac{\cos x.\dfrac{\sin^2 x}{\cos^2 x}}{\dfrac{1+\cos x}{\cos x}} + \cos x$ $= \dfrac{\sin^2 x}{\cos x} \times \dfrac{\cos x}{1+\cos x} + \cos x$ $= \dfrac{\sin^2 x}{1+\cos x} + \cos x$ $= \dfrac{\sin^2 x+\cos x(1+\cos x)}{1+\cos x}$ $= \dfrac{\sin^2 x+\cos x+\cos^2 x}{1+\cos x}$ $= \dfrac{1+\cos x}{1+\cos x}$ $= 1$ $= \text{RHS}$	**A** **A** denominator as a single fraction **A** **A** factorisation **A** **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)

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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]

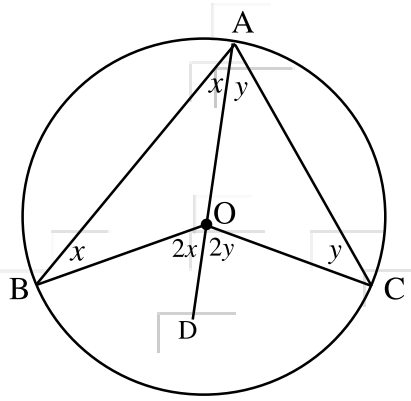
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S	**A mark for a correct statement** **(A statement mark is independent of a reason)**
	'n Punt vir 'n korrekte bewering ***('n Punt vir 'n bewering is onafhanklik van die rede)***
R	**A mark for the correct reason** **(A reason mark may only be awarded 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

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QUESTION 5

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

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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** **A** R (2)
6.1.2	$\hat{K}_1 = 90°$	[in a semi-circle]	✓**A** **A** R (2)
6.1.3	$\hat{P}_1 = 65° - 40°$ $= 25°$	[exterior of a Δ]	✓**A** **A** answer (2)
6.1.4	$\hat{T}_1 = \hat{D} + D\hat{P}T$ $=40°+25°$ $=65°$ $\therefore TC = QC$ **OR** $\hat{C}_1 = 50°$ $\hat{T}_1 = 65°$ $\therefore \hat{T}_1 = T\hat{Q}C = 65°$ $\therefore TC = QC$	[exterior of a Δ] 's] 's in a Δ] 's]	 **A** **A** **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 's of Δ]	✓**A** S/R **A** S/R **A** S/R **A** S **A** answer (5)

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

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QUESTION 7

7.1	$P\hat{V}O = 90°$ $O\hat{T}R = 90°$ $\therefore$VOTR is a cyclic quadrilateral o r **OR** $O\hat{V}R = 90°$ $O\hat{T}R = 90°$ $\therefore O\hat{V}R + O\hat{T}R = 180°$ $\therefore$ V OTR is a cyclic quadrilateral ’s of cyclic quad.]	✓**A** S /R **A** **A** **A** S /R **A** S/R **A** R (3)
7.2	In ΔROT: $OR^2 = TR^2 + OT^2$ [Pythagoras] In ΔSOT: $OT^2 = OS^2 - ST^2$ [Pythagoras] $\therefore OR^2 = TR^2 + OS^2 - ST^2$ but OS = OV [radii] and ST = TU [given] $\therefore OR^2 = TR^2 + OV^2 - TU^2$ also: TU = RU − TR $\therefore OR^2 = TR^2 + OV^2 - (RU - TR)^2$	**A** **A** s **A** **A A** substitution for OS and ST **A** TU = RU − TR (6)
		[9]

TOTAL: 100

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