education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS

MARKING GUIDELINE

COMMON TEST

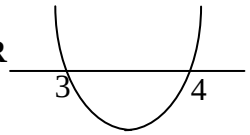
MARCH 2020

MARKS: 75

This marking guideline consists of 7 pages.

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

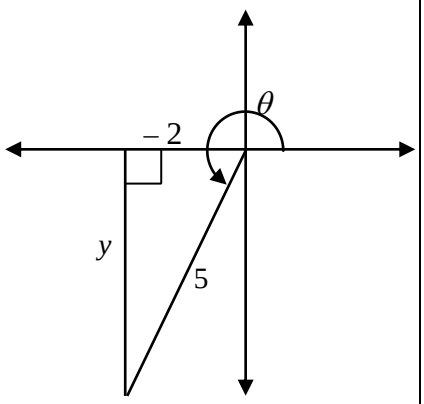
QUESTION 1

1.1.1	$2x\left(x-\frac{1}{2}\right)=0$ $x=0$ or $x=\frac{1}{2}$	$x=0$ ✓ $x=\frac{1}{2}$ (2)
1.1.2	$4x^2+11x=2$ $4x^2+11x-2=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{-11\pm\sqrt{(11)^2-4(4)(-2)}}{2(4)}$ $x=0{,}17$ or $x=-2{,}92$	✓ standard form ✓ substitution into the correct formula ✓ x-value ✓ x-value (4)
1.1.3	$x-\sqrt{8-2x}=0$ $x=\sqrt{8-2x}$ $x^2=8-2x$ $x^2+2x-8=0$ $(x+4)(x-2)=0$ $x\neq -4$ or $x=2$ $\therefore x=2$ only	✓ isolate $\sqrt{8-2x}$ ✓squaring both sides ✓ factors ✓ rejecting $x=-4$ ✓ correct solution (5)
1.1.4	$x(x-7)+12<0$ $x^2-7x+12<0$ $(x-3)(x-4)=0$ + ○ 3 ——— ○ 4 + **OR**  $3<x<4$ **OR** $x\in(3;4)$	✓standard form ✓ method ✓✓correct solution (4)
1.2	$x=3y-5$ …….(1) $(2x-y-2)(x+y)=0$ ……(2) Substitute (1) into (2): $(2(3y-5)-y-2)(3y-5+y)=0$ $(6y-10-y-2)(4y-5)=0$ $(5y-12)(4y-5)=0$ $y=\frac{12}{5}$ or $y=\frac{5}{4}$ $x=\frac{11}{5}$ or $x=-\frac{5}{4}$	✓correct substitution ✓ factors ✓values of y ✓values of x (4)
		[19]

QUESTION 2

2.1	$\sqrt{18}+2\sqrt{2}+\frac{1}{\sqrt{2}}$ $= 3\sqrt{2}+2\sqrt{2}+\frac{1}{\sqrt{2}}$ $= 5\sqrt{2}+\frac{1}{\sqrt{2}}\times\frac{\sqrt{2}}{\sqrt{2}}$ $= 5\sqrt{2}+\frac{\sqrt{2}}{2}$ $=\frac{11\sqrt{2}}{2}$	✓ for $3\sqrt{2}$ ✓rationalizing denominator ✓answer (3)
2.2.1	$\sqrt[x]{16}=128$ $2^{\frac{4}{x}}=2^7$ $\frac{4}{x}=7$ $x=\frac{4}{7}$	✓ $2^{\frac{4}{x}}$ ✓ 2^7 ✓ equating exponents ✓answer (4)
2.2.2	$\frac{3^{2x+1}-3^{2x-1}}{3^x}=24$ $\frac{3^{2x}(3^1-3^{-1})}{3^x}=24$ $3^x\left(2\frac{2}{3}\right)=24$ $3^x=9$ $3^x=3^2$ $x=2$	✓ factorising ✓simplification ✓like bases ✓ answer (4)
		[11]

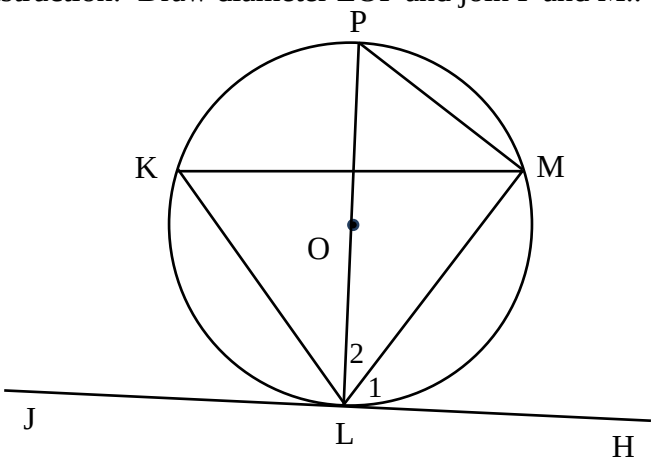
QUESTION 3

3.1	$y^2 = r^2 - x^2$ $= 5^2 - (-2)^2$ $= 21$ $y = -\sqrt{21}$  $\tan\theta = \frac{-\sqrt{21}}{-2}$ $= \frac{\sqrt{21}}{2}$	✓ correct sketch in correct quadrant ✓ value of y ✓ answer (3)
3.2	$\frac{\cos 115^\circ . \cos 214^\circ}{\cos 65^\circ . \sin 236^\circ}$ $= \frac{-\cos 65^\circ . -\cos 34^\circ}{\cos 65^\circ . -\sin 56^\circ}$ $= \frac{\cos 34^\circ}{-\sin 56^\circ}$ $= -\frac{\cos 34^\circ}{\cos 34^\circ}$ **OR** $= -\frac{\cos 56^\circ}{\cos 56^\circ}$ $= -1$	$-\cos 65^\circ$ $-\cos 34^\circ$ $-\sin 56^\circ$ $\cos 34^\circ$ **OR** $\sin 56^\circ$ -1 (5)
3.3	$\cos(90^\circ + x).\tan(540^\circ + x).\cos(180^\circ - x) + \sin(-90^\circ)$ $= (-\sin x).\tan(180^\circ + x)(-\cos x) - \sin 90^\circ$ $= (-\sin x)(\tan x)(-\cos x) - 1$ $= (-\sin x)\left(\frac{\sin x}{\cos x}\right)(-\cos x) - 1$ $= \sin^2 x - 1$ $= -(1 - \sin^2 x)$ $= -\cos^2 x$	$-\sin x$ $\tan x$ $-\cos x$ -1 $\frac{\sin x}{\cos x}$ $\sin^2 x - 1$ ✓ answer (7)
		[15]

QUESTION 4

4.1	$AC^2 = AO^2 - OC^2$ [Pythagoras] $= 10^2 - 5^2$ $= 75$ $AC = \sqrt{75} = 8{,}66\,cm$ $AB = 2 \times AC$ [line from centre $\perp$ to chord] $= 17{,}32\,cm$	✓ S/ R ✓ value of AC ✓R ✓ answer (4)
4.2	$T\hat{V}R = \hat{O}_1$ [ext. $\angle$ of cyclic quad.] $= 96^\circ$ $\hat{O}_2 = 360^\circ - \hat{O}_1$ [$\angle$s around a point] $= 360^\circ - 96^\circ$ $= 264^\circ$ $\hat{R}_1 = \frac{1}{2}\hat{O}_2$ [$\angle$ at centre = $2 \times \angle$ at circumf.] $= \frac{1}{2}(264^\circ)$ $= 132^\circ$ $\hat{R}_2 = 180^\circ - \hat{R}_1$ [$\angle$s on a straight line] $= 180^\circ - 132^\circ$ $= 48^\circ$	✓ S ✓ R ✓ size of $\hat{O}_2$ ✓ S ✓ R ✓ size of $\hat{R}_1$ ✓ answer (7)
4.3	$\hat{S}_1 = R\hat{V}T - \hat{R}_2$ [ext. $\angle$ of ΔRVS] $= 96^\circ - 48^\circ$ $= 48^\circ$ $\therefore \hat{S}_1 = \hat{R}_2$ [both $= 48^\circ$] $\therefore VS = VR$ [sides opp. to = $\angle$s] And ΔRVS is isosceles.	✓ S / R ✓ S ✓ S / R (3)
		[14]

QUESTION 5

5.1	Construction: Draw diameter LOP and join P and M..  Proof: $\hat{L}_1 + \hat{L}_2 = 90^\circ$ [tangent $\perp$ radius] $P\hat{M}L = 90^\circ$ [$\angle$ in a semi-circle] $\hat{P} + \hat{L}_2 = 90^\circ$ [sum of $\angle$s of ΔPML] $\therefore \hat{P} = \hat{L}_1$ But: $\hat{P} = \hat{K}$ [$\angle$s in the same segment] $\therefore \hat{L}_1 = \hat{K}$	✓ construction ✓ S /R ✓ S/R ✓ S ✓R (5)
5.2.1	$\hat{B}_3 = 90^\circ$ [$\angle$ in a semi-circle] $\therefore \hat{B}_3 = C\hat{D}E$ [both $= 90^\circ$] $\therefore$ BCDE is a cyclic quadrilateral [converse: ext. $\angle$ of a cyclic quadrilateral]	✓ S ✓ R ✓ R (3)
5.2.2	$\hat{B}_2 = \hat{A} = x$ [tan-chord-theorem] $\hat{B}_2 = \hat{C}_1 = x$ [$\angle$s in the same segment] $\therefore \hat{C}_1 = \hat{A} = x$	✓ S ✓ R ✓ S ✓ R (4)

5.2.3	$\hat{E}_1 = 180^\circ - (\hat{A} + \hat{B}_3)$ [sum of $\angle$s of ΔABE] $= 180^\circ - (x + 90^\circ)$ $= 90^\circ - x$ $\hat{E}_3 = 180^\circ - (\hat{C}_1 + C\hat{D}E)$ $= 180^\circ - (x + 90^\circ)$ [sum of $\angle$s of ΔCDE] $= 90^\circ - x$ $\therefore \hat{E}_1 = \hat{E}_3$	$\hat{E}_1 = 90^\circ - x$ $\hat{E}_3 = 90^\circ - x$ (2)
5.2.4	$\hat{E}_2 = 180^\circ - (\hat{E}_1 + \hat{E}_3)$ [$\angle$s on a straight line] $= 180^\circ - (90^\circ - x + 90^\circ - x)$ $= 2x$ $\therefore \hat{E}_2 \neq \hat{A}$ $\therefore$ CE is not a tangent to the circle through A, B and E. [converse of tan-chord-theorem does not apply]	$\hat{E}_2 = 2x$ $\therefore \hat{E}_2 \neq \hat{A}$ (2)
		[16]

TOTAL: 75