LIMPOPO

PROVINCIAL GOVERNMENT

REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF

EDUCATION

SEKHUKHUNE SOUTH AND EAST DISTRICTS

GRADE 11

MATHEMATICS

TEST 1

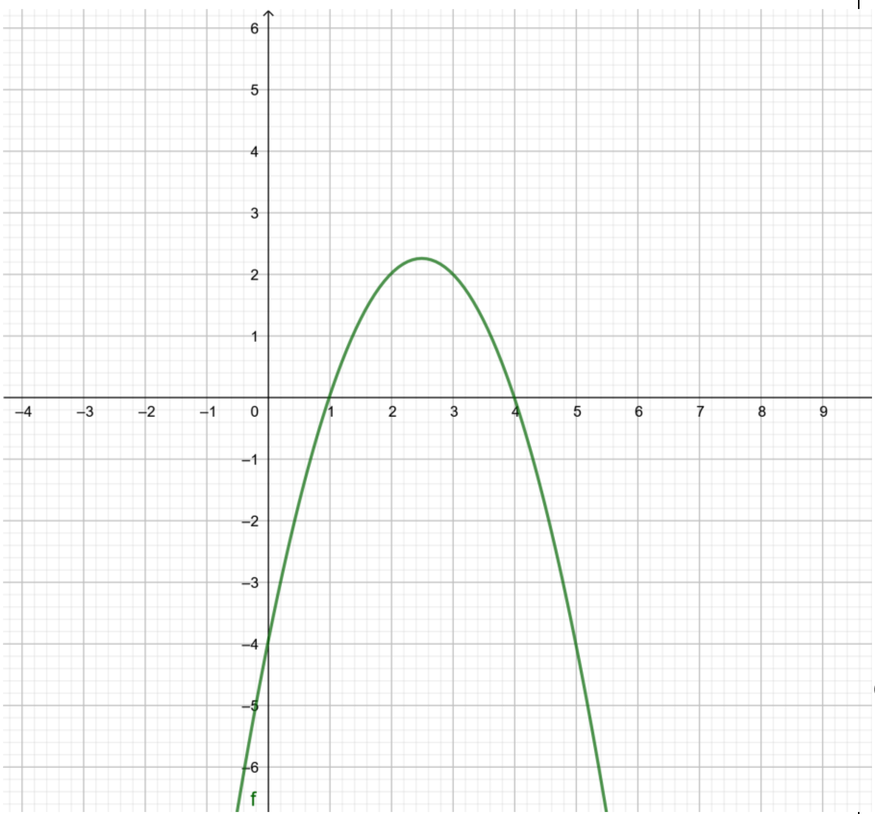
TERM 1

10 MARCH 2020

MEMORANDUM

Marks: 100 **Marks: 2 Hour**

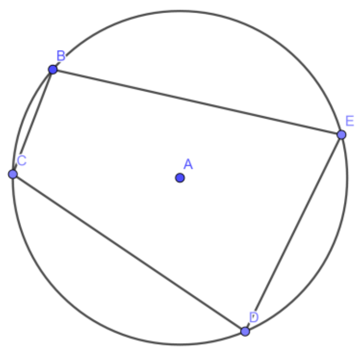
QUESTION 1

1.1	1.1.1 $2x(x-3)$ $2x = 0 \; or \; x - 3 = 0$ $x = 0$✓ $0r \; x = 3$✓	$x = 0$✓ $x = 3$✓ (2)
	1.1.2 $3x^2 - 2x = 4$ $3x^2 - 2x - 4 = 0$ ✓ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-4)}}{2(3)}$ ✓ $x = \frac{2 \pm \sqrt{48}}{6}$✓ $x = 1.49$ ✓ $or = -0{,}82$ ✓	Standard form✓ Substitution✓ simplification✓ answer✓✓ (5)
	1.1.3 $(x-1)(4-x) \geq 0$ 	Critical value✓✓ $1 \leq x \leq 4$✓✓ (4)
	1.1.4 $\sqrt{x+5} = x - 1$ $(\sqrt{x+5})^2 = (x-1)^2$ ✓ $x + 5 = x^2 - 2x + 1$ $x^2 - 3x - 4 = 0$ ✓ $(x-4)(x+1) = 0$ ✓ $\therefore x = 4$✓ $or \; x = -1$ ✓ $x \neq 4$ ✓	Squaring both sides✓ Standard form✓ Factorization✓ both solutions✓✓ rejecting $x = -4$✓ (6)

1.2	$x+4=2y \qquad \cdots(1)$ $y^2-xy+21=0 \qquad \cdots(2)$ $x=2y-4 \qquad \cdots(3)$ ✓ $\therefore y^2-y(2y-4)+21=0$ ✓ $\therefore y^2-2y^2+4y+21=0$ $\therefore -y^2+4y+21=0$ $\therefore y^2-4y-21=0$ ✓ $\therefore (y+3)(y-7)=0$ ✓ $\therefore y=-3 \text{ or } y=7$ ✓ $\therefore x=2(-3)-4 \text{ or } x=2(7)-4$ $\therefore x=-10 \text{ or } x=10$ ✓	$x=2y-4$✓ substitution✓ standard form✓ factors✓ y-values✓ x-values✓ (6)
1.3	$2(x-3)^2+2=0$ $2(x^2-6x+9)+2=0$ $2x^2-12x+20=0$✓ $\Delta=b^2-4ac$ $=(-12)^2-4(2)(20)$✓ $=144-160$ $=-16$ ✓ $\therefore \text{roots are non real/imaginary}$ ✓	Standard form✓ substitution✓ -16✓ conclusion✓ (4)
1.4	$g(x)=2x^2-px+3$ $x=\frac{-b}{2a}=\frac{-(-p)}{2(-2)}=\frac{-p}{4}$ ✓ $y=-2\left(\frac{-p}{4}\right)^2-p\left(\frac{-p}{4}\right)+3$✓ $-2\left(\frac{-p}{4}\right)^2-p\left(\frac{-p}{4}\right)+3=3\frac{1}{8}$ $-\frac{p^2}{8}+\frac{2p^2}{8}=\frac{1}{8}$ ✓ $p^2=1$ $p=\pm1$ ✓ OR Max value$=\frac{4ac-b^2}{4a}$✓ $\frac{4(-2)(3)-p^2}{4(-2)}=\frac{25}{8}$✓ $\frac{-24-p^2}{-8}=\frac{25}{8}$ $-192-8p^2=-200$✓ $8p^2=8$ $p=\pm1$✓	$x=\frac{-p}{4}$✓ Substitution✓ Simplification✓ P = ±1✓ (4)
QUESTION 2		
2.1	$\frac{3^{2x+1}.15^{2x-3}}{27^{x-1}.3^{x}.5^{2x-4}}$ $=\frac{3^{2x+1}.3^{2x-3}.5^{2x-3}}{3^{3x-3}.3^{x}.5^{2x-4}}$ ✓✓	Prime bases✓✓

	$= 3^{2x+1+2x-3-3x+3-x}.5^{2x-3-2x+4}$ ✓ $= 3.5$ $= 15$ ✓	Simplification✓ Answer✓ (4)
2.2	2.2.1 $(\frac{1}{2})^x = 32$ $2^{-x} = 2^5$ ✓ $-x = 5$ ✓ $\therefore \quad x = -5$ ✓	Same base✓ Equating indice✓ answer✓ (3)
	2.2.2 $2^x - 5.2^{x+1} = -144$ $2^x(1-5.2) = -144$ ✓ $2^x(-9) = -144$ $2^x = 16$ $2^x = 2^4$ ✓ $x = 4$ ✓	Common factor✓ Same base✓ Answer ✓ (3)
	2.2.3 $2\text{-}16x^{-\frac{3}{2}}=0$ $-16x^{-\frac{3}{2}} = -2$ $x^{-\frac{3}{2}} = \frac{1}{8}$ ✓ $x = 2^{-3\times\frac{-2}{3}}$ ✓ $x = 4$ ✓	Isolating x✓ Raising both sides by $\frac{-2}{3}$✓ answer✓ (3)
	2.2.4 $\sqrt[x]{9} = 243$ $(\sqrt[x]{9})^x = (243)^x$ $9 = 3^{5x}$ ✓ $3^2 = 3^{5x}$ $2 = 5x$✓ $x = \frac{2}{5}$ ✓	Exponential form✓ Equating the exponents✓ Answer ✓ (3)
	QUESTION 3	
3.1	Bisects the chord ✓	✓ Answer (1)
3.2	3.2. 1 OF⊥ DC (line drawn from centre to the mid-point) $OD^2 = OF^2 + FD^2$ ✓ $= 3^2 + 4^2$✓ $= 25$ ∴OD = 5✓ 3.2.2 AO = OD = 5✓ (radii) $AE^2 = AO^2 - OE^2$ (Pythagoras) ✓ $= 5^2 - 4^2$ $= 9$ ∴AE = 3✓ AB = 9 ✓ (line drawn from the centre ⊥ to the chord)	✓ Pythagoras ✓Method ✓ answer (3) ✓5 ✓Pythagoas ✓ AE = 3 ✓AB = 9 (4)

	QUESTION 4	
4.1.1	$\hat{A}_2 = \hat{B}_1 = 41^0$ ✓ ($<$ in the same segment) ✓ $\hat{C}_4 = \hat{B}_1 = 41^0$ ✓ (tan-chord theorem) ✓ $\hat{D}_1 = \hat{C}_4 = 41^0$ ✓ ($< s$ opp = sides) ✓ OR $\hat{D}_1 = \hat{A}_2 = 41$ (tan-chord theorem)	S ✓and R✓ S✓ and R✓ S✓ and R✓ (6)
4.1.2	(a) $\hat{D}_2 + 34^0 = 78^0$✓ (tan-chord theorem) $\therefore \hat{D}_2 = 44^0$✓ (b) $41° + \hat{B}_2 + 44° + 34° = 180°$✓ (opp $< s$ of a cyclic quad) $\therefore \hat{B}_2 = 61°$✓ $(c)\hat{D}_4 = 41^0 + 61^0$ ✓ ✓ (ext. $< s$ of a cyclic quard) $\therefore \hat{D}_4 = 102^0$ **OR** $\hat{D}_4 + 44° + 31^0 = 180°$ (int.$<_s$ of aΔ)✓ $\hat{D}_4 = 102^0$✓ (d) $\hat{F} + 41^0 + 41^0 = 180^0$ (int. $< s$ of a Δ) ✓ $\hat{F} = 98^0$✓	✓S and R ✓Answer (2) ✓ S and R ✓Answer (2) ✓S and R ✓Answer (2) ✓S and R ✓Answer ✓S and R ✓Answer (2)
4.1.3	$\hat{A} + \hat{F} = 40° + 98^0$✓ $= 138°$ ✓ ✓ $\neq 180°$ $\hat{A} + \hat{F} \neq 180^0$ $\therefore CADF\ is\ not\ cyclic\ quadrilateral$ (Opp angles not Suppl.✓	✓ statement ✓ 138° ✓ $\neq 180°$ ✓ Conclusion (4)
4.2		



	PROOF: Construction Join C to A and A to E ✓ $\angle A_1 = 2\angle B$ $\quad \angle\, at\ centre = 2\angle\, at\ circum)$ ✓ $\hat{A}_2 = 2\hat{D}$ $\quad \angle\, at\ centre = 2\angle\, at\ circum)$ ✓ But $\hat{A}_1 + \hat{A}_2 = 360$ $\quad \angle\, round\ a\ point)$ ✓ $\therefore\ 2\hat{B} + 2\hat{D} = 360^0$ $\therefore \hat{B} + \hat{D} = 180^0$ ✓	✓ Construction ✓S/R ✓S/R ✓S/R ✓Conclusion (5)
4.3	4.3.1 $\angle E_2 = \angle C$ ext ∠ of a cyclic quad. ✓ But ∠C = $\angle D_3$ corresponding angles, CB∥ED✓ $\angle E_2 = \angle D_3$ EF = DF ✓ sides opp. Equal angles 4.3.2 ∠F = 180° − $2x$ ✓ $sum\ of\ angles\ in\ a\ \Delta$✓ 4.3.3 ∠C = ∠D = x ✓ (Corresp. angles. CB∥ED) ✓ $\angle A_1 = 2\angle C = 2x$ (∠ at centre) ✓ $\angle A_1 + = \angle F = 2x + 180° - 2x$ =180° ∴ BACF is a cyclic quad (Opp. angles supplementary) ✓	✓ S/R ✓ S/R ✓ Conclusion (3) ✓✓ S/R (2) ✓✓ S/R ✓ S/R ✓ S/R ✓180° ✓ reason
4.4	4.4.1 $\hat{F}_1 = x$ tan-chord theorem ✓ $\hat{B}_1 = 2x$ $\quad \angle\, at\ centre = 2\angle\, at\ circum$ ✓ $\hat{C}_2 = 90^0 - x$ $\quad Right\ angle$ $\hat{G}_1 = 90^0 - x$ $\quad (\,sum\ of\ int\ \angle`s\ of\ \Delta)$ ✓ $G_2 = 90^0 - x$ $\quad (\angle s.\grave{o}pp = sides)$ ✓	✓S/R ✓S/R ✓S/R ✓S/R

	$\hat{G}_1 = \hat{G}_2$ ✓ CG bisect the B$\hat{G}H$	✓S (5)
	4.4.2 $\hat{CEF} = 90^0 - x$ ✓ $(opp \angle`s\ of\ cyclic\ quard)$✓ $\hat{D}_2 = 90^0$ ✓ (line from centre ⊥ to chord) ✓ $\hat{GBD} = 90^0 + x$ (ext $\angle$ of Δ) $\therefore \hat{GBD} = \hat{CEF}$	✓S ✓R ✓S✓R ✓SR (5)

TOTAL = 100