



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

SEKHUKHUNE SOUTH AND EAST DISTRICTS

GRADE 11

MATHEMATICS

TEST 1

TERM 1

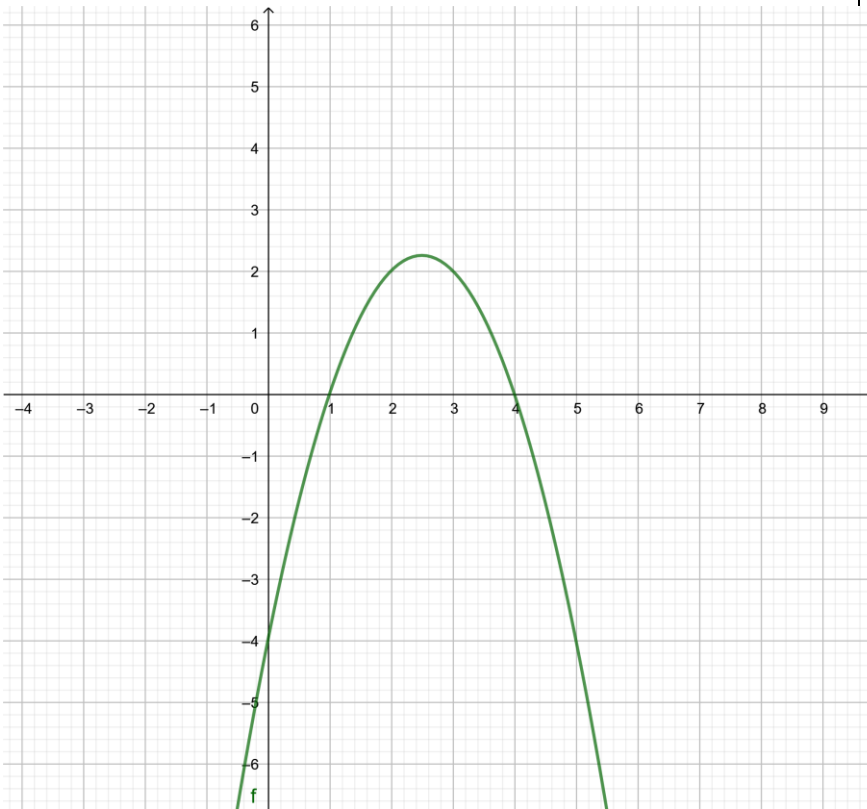
10 MARCH 2020

MEMORANDUM

Marks: 100

Marks: 2 Hour

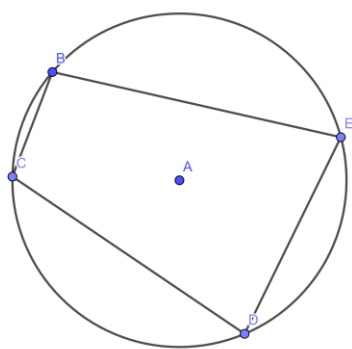
QUESTION 1

1.1	<p>1.1.1 $2x(x - 3)$ $2x = 0$ or $x - 3 = 0$ $x = 0✓$ or $x = 3✓$</p>	<p>$x = 0✓$ $x = 3✓$</p> <p>(2)</p>
	<p>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 $x = -0.82 ✓$</p>	<p>Standard form✓ Substitution✓ simplification✓ answer✓✓</p> <p>(5)</p>
	<p>1.1.3 $(x - 1)(4 - x) \geq 0$</p> 	<p>Critical value✓✓ $1 \leq x \leq 4✓✓$</p> <p>(4)</p>
	<p>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 $x = -1 ✓$ $x \neq 4 ✓$</p>	<p>Squaring both sides✓ Standard form✓ Factorization✓ both solutions✓✓ rejecting $x = -4✓$</p> <p>(6)</p>

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

	$= 3^{2x+1+2x-3-3x+3-x} \cdot 5^{2x-3-2x+4} \checkmark$ $= 3.5$ $= 15 \quad \checkmark$	Simplification✓ Answer✓ (4)
2.2	2.2.1 $\left(\frac{1}{2}\right)^x = 32$ $2^{-x} = 2^5 \checkmark$ $-x = 5 \checkmark$ $\therefore x = -5 \checkmark$	Same base✓ Equating indice✓ answer✓ (3)
	2.2.2 $2^x - 5 \cdot 2^{x+1} = -144$ $2^x(1 - 5 \cdot 2) = -144 \quad \checkmark$ $2^x(-9) = -144$ $2^x = 16$ $2^x = 2^4 \checkmark$ $x = 4 \checkmark$	Common factor✓ Same base✓ Answer ✓ (3)
	2.2.3 $2 - 16x^{-\frac{3}{2}} = 0$ $-16x^{-\frac{3}{2}} = -2$ $x^{-\frac{3}{2}} = \frac{1}{8} \checkmark$ $x = 2^{-3 \times \frac{-2}{3}} \checkmark$ $x = 4 \checkmark$	Isolating x✓ Raising both sides by $\frac{-2}{3}$ ✓ answer✓ (3)
	2.2.4 $\sqrt[5]{9} = 243$ $(\sqrt[5]{9})^x = (243)^x$ $9 = 3^{5x} \checkmark$ $3^2 = 3^{5x}$ $2 = 5x \checkmark$ $x = \frac{2}{5} \checkmark$	Exponential form✓ Equating the exponents✓ Answer ✓ (3)
QUESTION 3		
3.1	Bisects the chord ✓	✓ Answer (1)
3.2	3.2.1 $OF \perp DC$ (line drawn from centre to the mid-point) $OD^2 = OF^2 + FD^2 \quad \checkmark$ $= 3^2 + 4^2 \checkmark$ $= 25$ $\therefore OD = 5 \checkmark$ 3.2.2 $AO = OD = 5 \checkmark$ (radii) $AE^2 = AO^2 - OE^2$ (Pythagoras) ✓ $= 5^2 - 4^2$ $= 9$ $\therefore AE = 3 \checkmark$ $AB = 9 \checkmark$ (line drawn from the centre \perp to the chord)	✓ Pythagoras ✓ Method ✓ answer (3) ✓ 5 ✓ Pythagoras ✓ AE = 3 ✓ AB = 9 (4)

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



PROOF: Construction Join C to A and A to E ✓

$$\angle A_1 = 2\angle B \quad (\angle \text{ at centre} = 2\angle \text{ at circum}) \quad \checkmark$$

$$\angle A_2 = 2\angle D \quad (\angle \text{ at centre} = 2\angle \text{ at circum}) \quad \checkmark$$

$$\text{But } \angle A_1 + \angle A_2 = 360 \quad (\angle \text{ round a point}) \quad \checkmark$$

$$\therefore 2\angle B + 2\angle D = 360^\circ$$

$$\therefore \angle B + \angle D = 180^\circ \quad \checkmark$$

✓ Construction
✓ S/R
✓ S/R
✓ S/R

✓ Conclusion (5)

4.3

4.3.1 $\angle E_2 = \angle C$ ext \angle of a cyclic quad. ✓

But $\angle C = \angle D_3$ corresponding angles, $CB \parallel ED$ ✓

$$\angle E_2 = \angle D_3$$

$EF = DF$ ✓ sides opp. Equal angles

$$4.3.2 \quad \angle F = 180^\circ - 2x \quad \checkmark \quad \text{sum of angles in a } \Delta \quad \checkmark$$

$$4.3.3 \quad \angle C = \angle D = x \quad \checkmark \quad (\text{Corresp. angles. } CB \parallel ED) \quad \checkmark$$

$$\angle A_1 = 2\angle C = 2x \quad (\angle \text{ at centre}) \quad \checkmark$$

$$\angle A_1 + \angle F = 2x + 180^\circ - 2x = 180^\circ$$

\therefore 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

$$4.4.1 \quad \angle F_1 = x \quad \text{tan-chord theorem} \quad \checkmark$$

$$\angle B_1 = 2x \quad (\angle \text{ at centre} = 2\angle \text{ at circum}) \quad \checkmark$$

$$\angle C_2 = 90^\circ - x \quad \text{Right angle}$$

$$\angle G_1 = 90^\circ - x \quad (\text{sum of int } \angle \text{'s of } \Delta) \quad \checkmark$$

$$\angle G_2 = 90^\circ - x \quad (\angle \text{s. opp} = \text{sides}) \quad \checkmark$$

✓ S/R

✓ S/R

✓ S/R

✓ S/R

	$\hat{G}_1 = \hat{G}_2 \quad \checkmark$ CG bisect the $B\hat{G}H$	$\checkmark S$ (5)
	4.4.2 $\hat{C}EF = 90^0 - x \quad \checkmark$ (<i>opp \angle's of cyclic quard</i>) \checkmark $\hat{D}_2 = 90^0 \quad \checkmark$ (line from centre \perp to chord) \checkmark $\hat{G}BD = 90^0 + x$ (ext \angle of Δ) $\therefore \hat{G}BD = \hat{C}EF$	$\checkmark S \checkmark R$ $\checkmark S \checkmark R$ $\checkmark SR$ (5)

TOTAL = 100