LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE

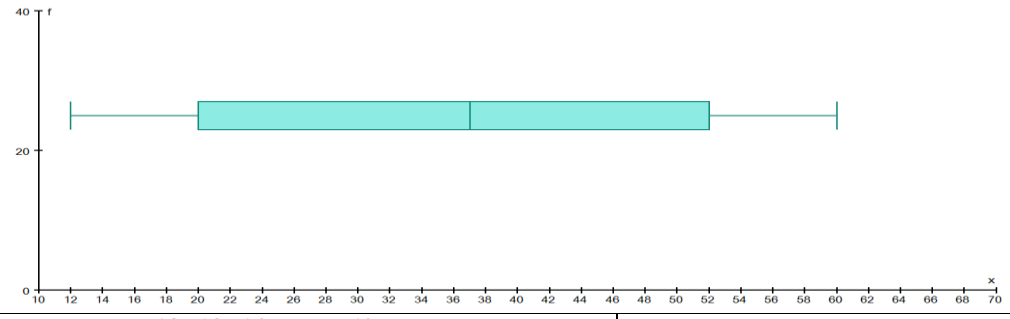
GRADE 10

MATHEMATICS
FINAL EXAMINATION PAPER 2 MEMO
NOVEMBER 2018

MARKS : 100
DURATION : 2 Hours

This memorandum consists of seven (7) pages, including the cover page.

QUESTION 1

1.1.	Minimum $= 12$ Lower quartile $(Q_1) = 20$ Median$(Q_2) = 37$ Upper quartile$(Q_3) = 52$ Maximum$= 60$	✓Min $=12$ ✓Q_1 $=20$ ✓Q_2 $=37$ ✓Q_3 $=52$ ✓Max $= 60$	(5)
1.2.			✓ shape ✓ 12& 60 ✓Q_1 Q_2 Q_3 (3)
1.3.1	Mean$(\bar{x}) = \frac{12+13+14+\ldots+60}{31}$ $= \frac{1126}{31}$ $\approx 36{,}32$	✓ 1126 ✓36,32	(2)
1.3.2	IQR $= Q_3 - Q_1$ $= 52 - 20$ $= 32$	✓method ✓32	(2)
1.4.	$\frac{8}{31} \times 100\%$ $= 25{,}81\%$	✓8 ✓25,81%	(2)
			[14]

QUESTION 2

2.1.	Midpoint of AC $M = (\frac{x_1+x_2}{2}; \frac{y_1+y_2}{2})$ $= \left(\frac{-4+2}{2}; \frac{3+5}{2}\right)$ $= (-1; 4)$	✓ correct substitution ✓$(-1; 4)$	(2)
2.2.	$m_{AC} = \frac{y_2-y_1}{x_2-x_1}$ $m_{AC} = \frac{5-3}{2-(-4)}$ $m_{AC} = \frac{2}{6}$ $m_{AC} = \frac{1}{3}$	✓ correct substitution ✓$m_{AC} = \frac{1}{3}$	(2)
2.3.	$m_{AC} = \frac{1}{3}$ from 2.2. above	✓$m_{AC} = \frac{1}{3}$	(3)

	$m_{BD} = \frac{y_2 - y_1}{x_2 - x_1}$ $m_{BD} = \frac{10-(-2)}{-3-1}$ $m_{BD} = -3$ and $m_{AC} \times m_{BD} = \frac{1}{3} \times -3 = -1$ $\therefore AC \perp BD$, since $m_{AC} \times m_{BD} = -1$	✓$m_{BD} = -3$ ✓ $m_{AC} \times m_{BD} = \frac{1}{3} \times -3 = -1$	
2.4.	Midpoint of BD $= (\frac{x_1+x_2}{2}; \frac{y_1+y_2}{2})$ $= \left(\frac{-3+1}{2}; \frac{10-2}{2}\right)$ $= (-1; 4)$ $AC \perp BD$ (proved in 2.3.) $\therefore ABCD$ is a rhombus, because diagonals bisect each other at right angles.	✓ midpoint of BD ✓ rhombus ✓ reason	(3)
			[10]

QUESTION 3

3.1.	$(x_2 - x_1)^2 + (y_2 - y_1)^2 = r^2$ $(x - (-7))^2 + (2 - (-2))^2 = (5)^2$ $x^2 + 14x + 49 + 16 = 25$ $x^2 + 14x + 40 = 0$ $(x + 4)(x + 10) = 0$ $x = -4 \; or \; x = -10$	✓ formula ✓ correct substitution ✓ standard form ✓ factors ✓ $x - \; values$	(5)
			[5]

QUESTION 4

4.1.1	$\cos x = 0{,}922$ $\therefore x = 22{,}78°$	✓ $x = 22{,}78°$	(1)
4.1.2	$\frac{\sin x}{0{,}2} - 2 = 1{,}24$ $\sin x = (1{,}24 + 2) \times 0{,}2$ $\sin x = 0{,}648$ $\therefore x = 40{,}39°$	✓ $\sin x = 0{,}648$ ✓ $x = 40{,}39°$	(2)
4.1.3	$\tan \frac{x}{2} - \frac{1}{\sqrt{3}} = 0$		(3)

	$\tan\frac{x}{2}=\frac{1}{\sqrt{3}}$ $\frac{x}{2}=30°$ $\therefore x=60°$	✓ $\tan\frac{x}{2}=\frac{1}{\sqrt{3}}$ ✓ $\frac{x}{2}=30°$ ✓ $x=60°$	
4.2.1	$tan\alpha=\frac{5}{12}=\frac{y}{x}$ $\therefore x=12\ and\ y=5$ $x^2+y^2=r^2$ $(12)^2+(5)^2=r^2$ $169=r^2$ $r=13$	✓ $x=12$ ✓ $y=5$ ✓ correct substitution into the formula ✓$r=13$	(4)
4.2.2 (a)	$\cos\alpha=\frac{x}{r}$ $\cos\alpha=\frac{12}{13}$	✓	(1)
4.2.2 (b)	$sin^2\alpha+cos^2\alpha=(\frac{5}{13})^2+(\frac{12}{13})^2$ $=\frac{25}{169}+\frac{144}{169}$ $=\frac{169}{169}$ $=1$	✓substitution ✓simplification ✓1	(3)
4.2.3	$\cos\alpha=\frac{12}{13}$ $\therefore \alpha=22{,}62°$ or $tan\alpha=\frac{5}{12}$ $\therefore \alpha=22{,}62°$ or $\sin\alpha=\frac{5}{13}$ $\therefore \alpha=22{,}62°$	✓ answer ✓ correct rounding off	(2)
4.3.	$\cos 60°+tan^2 45°-\sin 0°$ $=\frac{1}{2}+(1)^2-0$ $=\frac{3}{2}$ or $1\frac{1}{2}$ or 1,5	✓ $\cos 60°=\frac{1}{2}$ ✓ $tan^2 45°=1$ ✓ $\sin 0°=0$ ✓ answer	(4)
			[20]

QUESTION 5

5.1.	$a = 3$ $b = 1$	✓ $a = 3$ ✓ $b = 1$	(2)
5.2.	Minimum value is -1	✓ -1	(1)
5.3.1	$g(180°) - f(180°) = 1 - (-3) = 4$	✓ correct values for subst. ✓ 4	(2)
5.3.2	$90° < x < 270°$	✓✓answer	(2)
5.4.1	$h(x) = sinx + 1 - 3$ $= sinx - 2$	✓ subtracting 3 from $g(x)$ ✓ answer	(2)
5.4.2	$y \in [-3; -1]$ or $-3 < y < -1$	✓✓answer	(2)
			[11]

QUESTION 6

6.1.1	$\tan 58° = \frac{h}{10m}$ $h = 10m \times \tan 58°$ $\therefore h = 16{,}00\ m$	✓ ratio ✓answer	(2)
6.1.2	$\tan 48° = \frac{h}{10+d}$ $10 + d = \frac{16{,}00m}{\tan 48°}$ $10 + d = 14{,}41$ $d = 4{,}41\ m$	✓ ratio ✓ simplification ✓ answer	(3)
6.2.	$\tan 60° = \frac{QR}{15m}$ $QR = 15m \times \tan 60°$ $QR = 15\sqrt{3}\ m$ $\cos 60° = \frac{15\ m}{RP}$ $RP = \frac{15\ m}{\cos 60°}$ $RP = 30\ m$ OR $(RP)^2 = (QR)^2 + (PQ)^2$ $(RP)^2 = (15\sqrt{3}m)^2 + (15m)^2$ $(RP)^2 = 900m^2$ $RP = 30\ m$	✓ ratio ✓ $QR = 15\sqrt{3}\ m$ ✓ $RP = 30\ m$ ✓ $QR + RP$ ✓$55{,}98\ m$	(5)

	$\therefore QP = QR + RP$ $= 15\sqrt{3}\ m + 30\ m$ $= 55{,}98\ m$		
			[10]

QUESTION 7

7.1.	Total Surface Area $= 2\pi rh + 2\pi r^2$ $= 2\left(\frac{22}{7}\right)(17{,}5m)(60m) + 2(\frac{22}{7})(17{,}5m)^2$ $= 8\ 525\ m^2$	✓ formula ✓✓ correct subst. ✓answer	(4)
7.2.	Volume $= \pi r^2 h$ $= \frac{22}{7})(17{,}5m)^2(60m)$ $= 57\ 750\ m^3$	✓ formula ✓ correct subst. ✓answer	(3)
			[7]

QUESTION 8

8.1.1	90° diagonals of a rhombus bisect each other at right angles	✓answer ✓ reason	(2)
8.1.2	$(BC)^2 = (OB)^2 + (OC)^2$ (theorem of Pythag.) $(BC)^2 = (40\ mm)^2 + (30\ mm)^2$ $(BC)^2 = (2\ 500\ mm)^2$ $\therefore BC = 50\ mm$	✓ correct substitution ✓ answer	(2)
8.1.3	$OE = 25\ mm$ (midpoint theorem)	✓ answer ✓ reason	(2)
8.2.1	$\widehat{A_1} = x$ $(It\ is\ given\ that\ EA\ bisect\ \hat{A})$ $\widehat{E_1} = \widehat{A_1} = x$ (alternate $\angle s$ and AB$\parallel DC$) $D\hat{C}B = 2x$ (Opp. $\angle s$ of a parm.) $\widehat{C_1} = x$ (It is given that FC bisects $\hat{C}$) $\widehat{C_2} = x$ (It is given that FC bisects $\hat{C}$) $\widehat{F_2} = \widehat{C_1} = x$ (alternate $\angle s$ and AB$\parallel DC$)	✓ Angle and reason ✓ Angle and reason ✓ Angle and reason ✓ Angle and reason ✓ Angle and reason	(5)
8.2.2	$\widehat{A_1} = \widehat{C_1} = x$ (proved in 8.2.1.) $\widehat{F_1} = \widehat{E_2} = 180° - x$ $(\angle son\ a\ str.line)$ AECF is a parm. (Opp. $\angle s =$)	✓ statement and reason ✓ statement and reason	(2)

8.3.1	In ΔADF and ΔCBE $FD = BE$ (given) $\widehat{D_1} = \widehat{B_2}$ (alternate $\angle s$, AD $\parallel BC$) $AD = BC$ (Opp. sides of a parm.) $\therefore \Delta ADF \equiv \Delta CBE$ (S,A,S)	✓ statement and reason ✓ statement and reason ✓ reason	(3)
8.3.2	In ΔABE and ΔCDF $BE = FD$ (given) $\widehat{B_1} = \widehat{D_2}$ (alternate $\angle s$, AB $\parallel DC$) $AB = DC$ (Opp. sides of a parm.) $\therefore \Delta ABE \equiv \Delta CDF$ (S,A,S)	✓ statement and reason ✓ statement and reason ✓ reason	(3)
8.3.3	$\widehat{A_1} + \widehat{A_2} + \widehat{A_3} = \widehat{C_1} + \widehat{C_2} + \widehat{C_3}$ ($opp\ \angle s\ of\ a\ parm.$) $\widehat{A_1} = \widehat{C_3}$ (from congruency) $\widehat{A_3} = \widehat{C_1}$ (from congruency) $\widehat{A_2} = \widehat{C_2}$	✓ statement and ✓reason ✓ statement and reason ✓ statement and reason	(4)
			[23]

GRAND-TOTAL = 100