Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11
GRAAD 11

NOVEMBER 2012

MATHEMATICS P2/*WISKUNDE V2*
MEMORANDUM

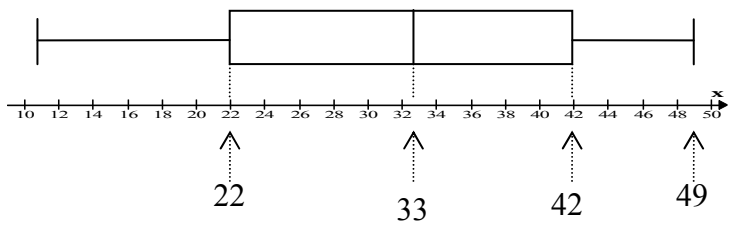
MARKS: **150**
PUNTE:

This memorandum consists of 8 pages.
Hierdie memorandum bestaan uit 8 bladsye.

QUESTION/*VRAAG* 1

1.1	Quadratic / *Kwadraties*	✓answer/*antwoord*	(1)
1.2	Yes. The shape of the graph shows it./ *Ja. Die vorm van die grafiek toon dit*	✓ Yes/*Ja* ✓ reason/*rede*	(2)
1.3	Drivers should drive at a speed between 80 km/h and 120 km/h. *Bestuurders behoort teen 'n spoed tussen 80 km/h en 120 km/h te bestuur.*	✓✓answer/*antwoord*	(2)
			[5]

QUESTION/*VRAAG* 2

2.1.1	11;18;22;25;31;35;36;42;44;49 Median/*Mediaan* = $\frac{31+35}{2}$ = 33	✓Method/*Metode* ✓ Answer/*Antwoord* Answer only: 2/2 *Slegs antwoord* :2/2	(2)
2.1.2	Q_1 = 22 Q_3 = 42 Semi IQR= $\frac{42-22}{2}$ = 10	✓ Q_1 ✓ Q_3 ✓answer/*antwoord*	(3)
2.2	Min=11, Q_1=22, Q_2=33, Q_3= 42, Max/*Maks* =49  	✓ min ✓ Q_1 and/*en* Q_3 ✓ Q_2 ✓ max/*maks*	(4)
2.3	Data is skewed to the left./*Data is skeef na links* OR/*OF* Data is more widely distributed below the median./ *Data is wyer verspreid onder die mediaan*	✓ answer/ *antwoord*	(1)
			[10]

QUESTION/*VRAAG* 3

3.1

$\frac{20+32+25+14+x+38+22+30+19+28+34+40+25}{13} = 27$

$x = 24$

✓ method/*metode*
✓ answer/*antwoord*

(2)

3.2

X	**x – x**	**$(x-x)^2$**
20	20 – 27 = – 7	49
32	32 – 27 = 5	25
25	25 – 27 = –2	4
14	14 – 27 = –13	169
24	24 – 27 = –3	9
38	38 – 27 = 11	121
22	22 – 27 = –5	25
30	30 – 27 = 3	9
19	19 – 27 = –8	64
28	28 – 27 = 1	1
34	34 – 27 = 7	49
40	40 – 27 = 13	169
25	25 – 27 = –2	4
	Sum/*Som*	**698**

SD = $\sqrt{\frac{698}{13}}$

SD = 7,33

✓ sum/*som*
✓ $\sqrt{\frac{698}{13}}$
✓ Answer/*antwoord*
Answer only: 3/3
Slegs antwoord: 3/3

(3)

3.3

One standard deviation from the mean/*Een standaardafwyking vanaf die gemiddelde*:
19,67 to/tot 34,33 ∴ 9 spectators/*toeskouers*

✓ interval
✓ answer/*antwoord*

(2)

[7]

QUESTION/*VRAAG* 4

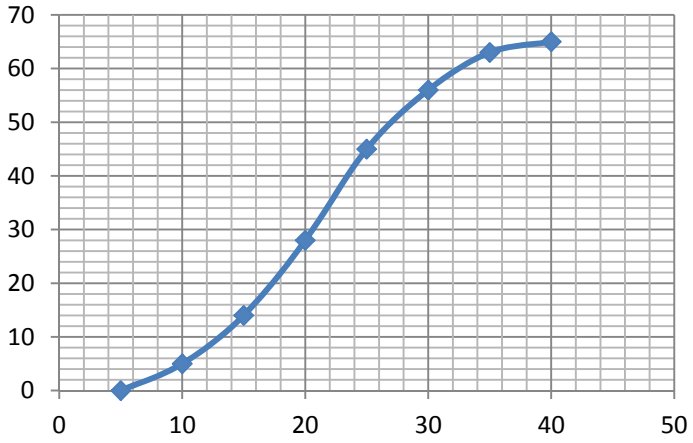
4.1

Interval	Frequency *Frekwensie*	Cumulative frequency *Kumulatiewe frekwensie*
$5 \leq x < 10$	5	5
$10 \leq x < 15$	9	14
$15 \leq x < 20$	14	28
$20 \leq x < 25$	17	45
$25 \leq x < 30$	11	56
$30 \leq x < 35$	7	63
$35 \leq x < 40$	2	65

✓First 4 correct/*eerste 4 korrek*
✓Last 3 correct/*laaste 3 korrek*

(2)

4.2



✓ (5 ; 0)
✓All points correct/*Alle punte korrek*
✓Shape/*vorm*

(3)

4.3

80% of/*van* 40 = 32
Approximately 5 learners/*Ongeveer 5 leerders*
(Accept 4, 5 or 6/*Aanvaar 4, 5 of 6*)

✓method/*metode*
✓✓answer/*antwoord*

(3)

[8]

QUESTION/*VRAAG* 5

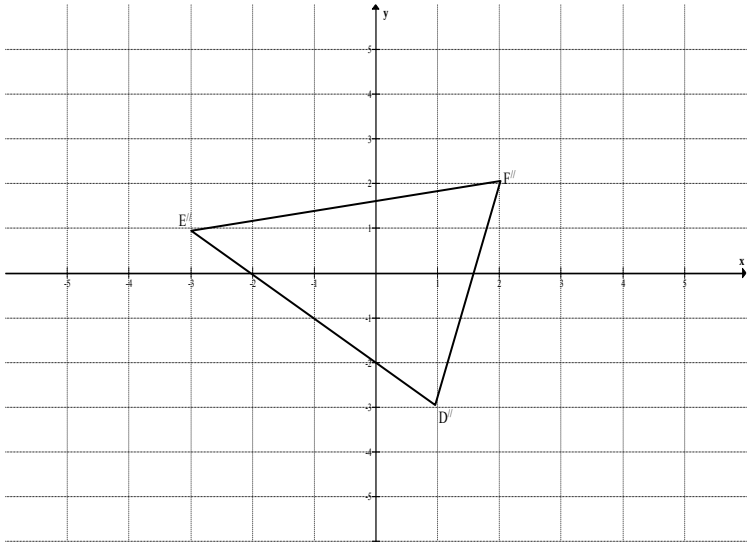
5.1	S(–6 ; 4), T(–1 ; 3), R(–7 ; –1) $ST = \sqrt{(-1+6)^2+(3-4)^2}$ $ST = \sqrt{26}$ $SR = \sqrt{(-7+6)^2+(-1-4)^2}$ $SR = \sqrt{26}$ ST = SR. ∴ ΔSTR is isosceles/*gelykbenig*.	✓Substitution/*instelling* ✓ $ST = \sqrt{26}$ ✓$SR = \sqrt{26}$ ✓Conclusion/*gevolgtrekking*	(4)
5.2	$B(\frac{-7-1}{2};\frac{-1+3}{2})$ B(– 4 ; 1)	✓Substitution/*instelling* ✓ –4 ✓1	(3)
5.3	S(–6 ; 4), B(–4 ; 1) $m_{SB} = \frac{1-4}{-4+6}$ $m_{SB} = -\frac{3}{2}$ $y-4 = -\frac{3}{2}(x+6)$ $y = -\frac{3}{2}x-5$	✓ Substitution/*instelling* ✓ Gradient/*gradiënt* ✓ Substitution/*instelling* ✓ Answer/*antwoord*	(4)
5.4	$y = -\frac{3}{2}x-5$ and/*en* A(p ; –17) $-17 = -\frac{3}{2}p-5$ $\therefore p = 8$	✓ Substitution of/*instelling van* – 17 ✓ Substitution of/*instelling van p* ✓ Answer/*antwoord*	(3)
5.5	T(–1 ; 3), R(–7; –1) and/*en* $m_{AS} = -\frac{3}{2}$ $m_{TR} = \frac{-1-3}{-7+1}$ $m_{TR} = \frac{2}{3}$ $m_{AS} \times m_{TR} = -\frac{3}{2}\times\frac{2}{3}$ $= -1$ Hence AS is perpendicular to TR *AS is loodreg op TR*	✓ $m_{TR} = \frac{2}{3}$ ✓ $m_{TR} \times m_{AS}$ ✓AS perpendicular to TR/ *AS is loodreg op TR*	(3)
5.6	STAR is a kite/*vlieër* Diagonal AS bisects TR at right angles *Skuinslyn AS halveer TR en is loodreg op TR* OR/*OF* ΔSTR and ΔRAT are both isosceles. *ΔSTR en ΔRAT is albei gelykbenig*.	✓ Kite/*vlieër* ✓✓Reason/*rede*	(3)
			[20]

QUESTION/*VRAAG* 6

6.1	$x + y + 2 = 0$ and/*en* Q(7;6) $y = -x - 2$ $m = -1$ y – 6 = – (x – 7) y = – x + 13	✓ $m = -1$ ✓ substitution/*instelling* ✓ answer/*antwoord*	(3)

6.2	Q(7 ; 6), R(4; –6) $m_{QR} = \frac{-6-6}{4-7}$ $m_{QR} = 4$	✓ substitution/*instelling* ✓ answer/*antwoord*	(2)
6.3	P(– 2; 0)	✓ –2 ✓0	(2)
6.4	$m_{QR} = \frac{12}{3}$ ∴ T(1 ; 12)	✓ Method/*metode* ✓ 1 ✓ 12	(3)
6.5	tan α = 4 α = 75,96° $m_{QR} = \frac{2}{3}$ ∴ tan $\theta = \frac{2}{3}$ θ = 33,69° $P\hat{Q}R$ = 75,96° – 33,69° = 42,27°	✓ tan α = 4 ✓ α = 75,96° ✓ $m_{PQ} = \frac{2}{3}$ ✓ θ = 33,69° ✓ Answer/*antwoord*	(5)
			[15]

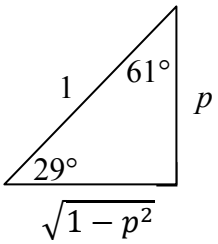
QUESTION/*VRAAG* 7

7.1.1	R/(– 1 ; – 6)	✓ – 1 ✓– 6	(2)
7.1.2	R/(6 ; 1)	✓ 6 ✓1	(2)
7.2.1	(x ; y)→ (x ; – y) → (x – 3 ; – y) (x ; y) → (x – 3 ; – y)	✓ x ✓– y ✓ x – 3 ✓ – y	(4)
7.2.2		✓ D//(1 ; – 3) ✓ E//(– 3 ; 1) ✓ F//(2 ; 2) ✓ Diagram	(4)
7.2.3	Rigid. The size and shape do not change *Rigied. Die grootte en vorm verander nie*	✓ Rigid/*rigied* ✓ reason/*rede*	(2)
7.3.1	N/$(\frac{3}{2}; -6)$	✓ $\frac{3}{2}$ ✓–6	(2)
7.3.2	Perimeter of/*omtrek van* KLMN = 10 units/*eenhede* Perimeter of/*omtrek van* K/L/M/N/= 3 × 10 = 30 units/*eenhede*	✓Method/*metode* ✓Answer/*antwoord* Answer only/*Slegs antwoord*: 2/2	(2)
7.4	Rotation about the origin through 90° anticlockwise *Rotasie rondom die oorsprong deur 90° anti-kloksgewys*	✓ 90° ✓ anticlockwise/ *anti-kloksgewys*	(2)
			[20]

QUESTION/*VRAAG* 8

8.1	$V = \pi r^2 h$ and/*en* $V = 4\,000\ cm^3$ $\pi r^2 (15) = 4\,000$ $r = 9{,}21$ cm	✓Substitution of/*instelling van* 15 ✓Substitution of/*instelling van* 4 000 ✓answer/*antwoord*	(3)
8.2	$\mathbf{V_{cone}} = \frac{1}{3}$ area of base/*opp van basis* × H $H = \sqrt{10^2 - 9{,}21^2}$ $= 3{,}89$ cm $\therefore V_{cone/kegel} = \frac{1}{3}\pi (9{,}21)^2 (3{,}89)$ $= 345{,}54\ cm^3$ $V_{container/houer} = 4\,000\ cm^3 + 345{,}54\ cm^3$ $= 4\,345{,}54\ cm^3$ [accept/*aanvaar* 4 346,4]	✓ H = 3,89 [or/*of* 3,9] ✓ Substitution/*Vervanging* ✓ V = 345,54 [or/*of* 346,4] ✓ answer/antwoord	(4)
8.3	$SA = \pi r^2 + 2\pi r h + \pi r s$ $= \pi (9{,}21)^2 + 2\pi (9{,}21)(15) + \pi (9{,}21)(10)$ $= 1\,423{,}85\ cm^2$	substitution/*instelling* : ✓ in πr^2 ✓ in $2\pi r h$ ✓ in $\pi r s$ ✓answer/*antwoord*	(4)
			[11]

QUESTION/*VRAAG* 9

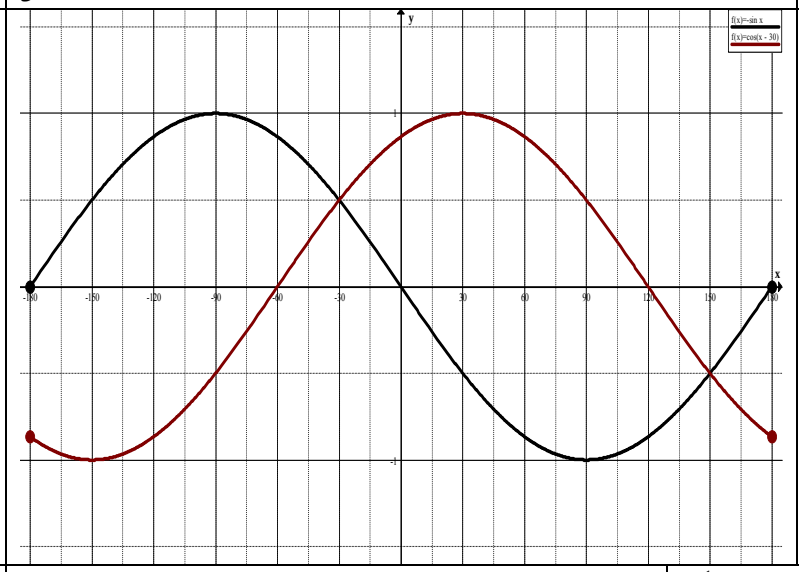
9.1.1	$\sin 29° = p$ $x^2 = 1 - p^2$ $x = \sqrt{1 - p^2}$ $\cos 29° = \sqrt{1 - p^2}$ OR/*OF* $\sin^2 29° + \cos^2 29° = 1$ $p^2 + \cos^2 29° = 1$ $\cos 29° = \sqrt{1 - p^2}$	 ✓ diagram ✓ $x = \sqrt{1 - p^2}$ ✓ answer/*antwoord* OR/*OF* ✓ identity/*identiteit* ✓ substitution/*instelling* ✓ answer/*antwoord*	(3)
9.1.2	$\tan(-569°) = -\tan 29°$ $= -\frac{p}{\sqrt{1-p^2}}$ OR/*OF* $\tan(-569°) = -\tan 29°$ $= -\frac{\sin 29°}{\cos 29°}$ $= -\frac{p}{\sqrt{1-p^2}}$	✓ $-\tan 29°$ ✓ answer/*antwoord* OR/OF ✓ $-\tan 29°$ ✓ answer/*antwoord*	(2)
9.1.3	$1 - \cos^2 61° = 1 - p^2$ OR/*OF* $1 - \cos^2 61° = \sin^2 61° = \cos^2 29°$ $= (\sqrt{1 - p^2})^2$ $= 1 - p^2$	✓✓answer/*antwoord* OR/*OF* ✓ $\sin^2 61°$ ✓ answer/*antwoord*	(2)

9.2	LHS $= \left(\frac{1}{\sin\beta} + \frac{1}{\tan\beta}\right)^2$ $= \left(\frac{1}{\sin\beta} + \frac{1}{\frac{\sin\beta}{\cos\beta}}\right)^2$ $= \left(\frac{1}{\sin\beta} + \frac{\cos\beta}{\sin\beta}\right)^2$ $= \left(\frac{1+\cos\beta}{\sin\beta}\right)^2$ $= \frac{(1+\cos\beta)^2}{sin^2\beta}$ $= \frac{(1+\cos\beta)^2}{1-cos^2\beta}$ $= \frac{(1+\cos\beta)(1+\cos\beta)}{(1+\cos\beta)(1-\cos\beta)}$ $= \frac{1+\cos\beta}{1-\cos\beta}$ = RHS	✓ $\frac{\sin\beta}{\cos\beta}$ ✓ $\left(\frac{1+\cos\beta}{\sin\beta}\right)^2$ ✓ $1 - cos^2\beta$ ✓ factors/*faktore* ✓ division/*deel*	(5)
			[12]

QUESTION/*VRAAG* 10

10.1	$\frac{\sin(-x).\tan(x-360°).\sin(450°-x)}{\cos 180°} + \cos^2(x-180°)$ $\frac{-\sin x.\tan x.\cos x)}{-1} + \cos^2 x$ $\frac{\sin x.\frac{\sin x}{\cos x}.\cos x)}{1} + \cos^2 x$ $\sin^2 x + \cos^2 x$ 1	✓ $-\sin x$ ✓ tan *x* ✓ cos *x* ✓ $\boldsymbol{cos^2 x}$ ✓ – 1 ✓ $\frac{\sin x}{\cos x}$ ✓$\boldsymbol{sin^2 x + cos^2 x}$ ✓answer/*antwoord*	(8)
10.2	sin *x* –3cos *x* = 0 sin *x* = 3cos *x* tan *x* = 3 x = 71,57° + 180°*k* (k ∈ℤ)	✓ sin *x* = 3cos *x* ✓ tan *x* = 3 ✓ 71,57° + 180°*k* ✓ k ∈ℤ	(4)
10.3	$2.\sqrt{\sin\alpha} = 1$ $\sqrt{\sin\alpha} = \frac{1}{2}$ $\sin\alpha = \frac{1}{4}$ $\alpha = 180° - 14{,}48°$ $\alpha = 165{,}52°$	✓ $\sin\alpha = \frac{\mathbf{1}}{\mathbf{4}}$ ✓ 14,48° ✓ 165,52°	(3)
			[15]

QUESTION/*VRAAG* 11

11.1	3	✓ 3	(1)
11.2		*f* : ✓*x* –intercepts/ *x-afsnitte* ✓ turning points/ *draaipunte* ✓shape/*vorm* *g* : ✓ *y*-intercept/ *y-afsnit* ✓ *x*-intercepts/ *x-afsnitte* ✓shape/*vorm*	(6)
11.3	$g(x) - f(x) \leq 0$ $g(x) \leq f(x)$ $x \in [-180° ; -30°]$ or/*of* $x \in [150° ; 180°]$ OR/*OF* $-180° \leq x \leq -30°$ or/*of* $150° \leq x \leq 180°$	✓ Values/*waardes* ✓ Notation/*notasie* ✓ Values/*waardes* ✓ Notation/*notasie* per interval	(4)
11.4.1	$g(x) = \cos(x - 30°)$ $h(x) = \cos(x - 30° - 60°) + 1$ $= \cos(x - 90°) + 1$	✓ $-90°$ ✓ $+ 1$	(2)
11.4.2	Maximum value of/*maksimum waarde van* $h(x) - f(x) = 3$	✓✓ 3	(2)
11.5	$-\sin x = \sin(-x)$	✓ $\sin x$ ✓ $\sin(-x)$	(2)
			[17]

QUESTION/*VRAAG* 12

12.1	$\sin 30° = \frac{40}{QS}$ QS = 80 m	✓ $\sin 30° = \frac{40}{QS}$ ✓ answer/*antwoord*	(2)
12.2	$P\hat{S}Q = 65° \; and/en \; Q\hat{P}S = 85°$ $\frac{PQ}{\sin 65°} = \frac{80}{\sin 85°}$ PQ = 72,78 m	✓ $P\hat{S}Q \; and/en \; Q\hat{P}S$ ✓ sine formula/*sinus formule* ✓ answer/*antwoord*	(3)
12.3	$Area_{PQS} = \frac{1}{2} \times 80 \times 72{,}78 \times \sin 30°$ $= 1\,455{,}60 \text{ m}^2$ $Area_{QRS} = \frac{1}{2} \times 40 \times 80 \sin 60°$ $= 1\,385{,}64 \text{ m}^2$ $Area_{PQRST} = 2 \times 1\,455{,}50 + 1\,385{,}64 \text{ m}^2$ $= 4\,296{,}84 \text{ m}^2$	✓substitution into area formula/*instelling in area formule* ✓$Area_{PQS}$ ✓Substitution/*instelling* ✓$Area_{QRS}$ ✓answer/*antwoord*	(5)
			[10]
		TOTAL/*TOTAAL*:	**150**