basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 10

MATHEMATICS P2/*WISKUNDE V2*

NOVEMBER 2016

MEMORANDUM

MARKS/*PUNTE*: 100

This memorandum consists of 10 pages.
Hierdie memorandum bestaan uit 10 bladsye.

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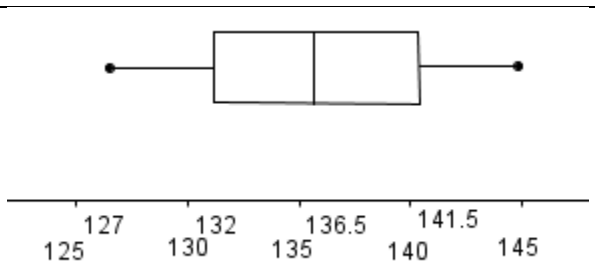
NOTE:
- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:
- *As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.*
- *Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.*
- *Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.*

QUESTION 1/*VRAAG 1*

1.1	Median/*Mediaan* $= \frac{136+137}{2}$ $= 136,5$	✓ answer/*antwoord* (1)
1.2.1	Mean/*Gemiddelde* $= \frac{2728}{20}$ $= 136,4$ cm	✓ $\frac{2728}{20}$ ✓ answer/*antwoord* (2)
1.2.2	Range/*Variasiewydte* = 145 – 127 = 18 cm	✓ answer/*antwoord* (1)
1.2.3	Lower quartile/*Onderste kwartiel* = 132 Upper quartile/*Boonste kwartiel* $= 141\frac{1}{2}$ Interquartile range/*IKO* $= 141\frac{1}{2} - 132$ = 9,5 cm	✓ Lower quartile/*Onderste kwartiel* ✓ Upper quartile/*Boonste kwartiel* ✓ answer/*antwoord* (3)
1.3		✓ median/min/max/ *mediaan/min/mak* ✓Q_1 and/ en Q_3 (2) **[9]**

QUESTION 2/*VRAAG 2*

2.1	Modal class(*Module klas*) $100 \leq x < 110$	✓ answer/*antwoord* (1)
2.2	$110 \leq x < 120$	✓✓answer/*antwoord* (2)
2.3	Estimate Mean IQ of students/*Geskatte gemiddelde IK* $= \frac{3480}{30}$ $= 116$	✓ 3480 ✓ 30 ✓ answer/*antwoord* (3) **[6]**

QUESTION 3/*VRAAG 3*

3.1	AB $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3-1)^2 + (6-1)^2}$ $= \sqrt{29}$ AC $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(6-1)^2 + (3-1)^2}$ $= \sqrt{29}$ AB = AC ∴ ΔABC is isosceles/$gelykbenig$	✓subst. in corr. formula/*vervang in korrekte formule* ✓ distance/*afstand* AB ✓subst. in corr. formula/*vervang in korrekte formule* ✓AB = AC (4)
3.2.1	AD is parallel to the *x*-axis/*AD parallel aan x-as* ∴ A and D have the same *y*-coordinates/*A en D het dieselfde y-koördinate* but AD = 5 units/*eenhede* ∴ D(8 ; 5) CD is perpendicular to the *x*-axis/*CD is loodreg met x-as* ∴ C and D have the same *x*-coordinate/*C en D het dieselfde x-koördinate* But C lies on the *x*-axis./*C lê op x-as* ∴ C(8 ;0)	✓coordinates D/ *koördinate D* ✓ coordinates C/ *koördinate C* (2)

3.2.2	P is midpoint of AC the diagonals of the kite/ *P is middelpunt van AC, die hoeklyne van die ruit* $\therefore$ P $\frac{3+8}{2}$; $\frac{5+0}{2}$ P $\left(\frac{11}{2}\ ;\ \frac{5}{2}\right)$	✓ *x*-value/*waarde* ✓ *y*-value/*waarde* (2)
3.2.3.	B(–1 ; –4) D(8 ; 5) $m_{bd} = \frac{5+4}{8+1}$ $= 1$	✓ substitution/*vervang* ✓answer/*antwoord* (2)
3.2.4	A(3 ; 5) C(8 ; 0) AC $= \sqrt{(0-5)^2 + (8-3)^2}$ $= \sqrt{50}$	✓ substitution *vervang* ✓ answer/*antwoord* (2)
3.2.5	B(–1 ; –4) D(8 ; 5) BD $= \sqrt{(5+4)^2 + (8+1)^2}$ $= \sqrt{162}$ Area $= \frac{1}{2}$ (BD.AC) $= \frac{1}{2}(\sqrt{162} \,.\, \sqrt{50})$ $= 45$	✓ length/*lengte* BD ✓ substitution/ *vervang* ✓ answer/*antwoord* (3) **[15]**

QUESTION 4/*VRAAG 4*

4.1.1(a)	$\frac{b}{c}$	✓ answer/*antwoord* (1)
4.1.1(b)	$\frac{a}{b}$	✓ answer/*antwoord* (1)
4.1.1(c)	$\frac{b}{c}$	✓✓ answer/*antwoord* (2)
4.1.2	$\tan\theta = \frac{a}{b}$ $\tan 50^\circ = \frac{5}{b}$ $\therefore b = \frac{5}{\tan 50^\circ}$ $b = 4{,}20$	✓ correct ratio/ *korrekte verhouding* ✓ *b* value/*waarde* (2)
4.2	$2\text{cosec } 38{,}2^\circ + \cos 3(146{,}4^\circ)$ $= 2\left(\frac{1}{\sin 38.2^\circ}\right) + \cos 3(146{,}4^\circ)$ $= 3{,}42$	✓ $\left(\frac{1}{\sin 38.2^\circ}\right)$ ✓✓ answer accurate/ *antwoord akkuraat* [Answer only – full marks] *[Slegs antwoord – volpunte]* (3)
4.3	$\frac{\sin 45^\circ . \tan^2 60^\circ}{\cos 45^\circ}$ $\frac{\left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{1}\right)\left(\frac{\sqrt{3}}{1}\right)}{\frac{1}{\sqrt{2}}}$ $\frac{\frac{3}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$ $\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{1}$ 3	✓ $\frac{1}{\sqrt{2}}$ ✓ $\frac{\sqrt{3}}{1}$ ✓ $\frac{1}{\sqrt{2}}$ ✓answer/*antwoord* (4)
4.4	$\cos\beta = \frac{3}{5}$ $y^2 = 5^2 - 3^2$ $y = 4$ $\therefore \cot\alpha = \frac{4}{3}$	✓ $\cos\beta = \frac{3}{5}$ ✓application Pyth. Th. *toepassing van Pyth. St.* ✓ $y = 4$ ✓answer/*antwoord* (4) **[17]**

QUESTION 5/*VRAAG 5*

5.1.1	In ΔAMN $\tan \widehat{M} = \frac{AN}{MN}$ $\tan 21° = \frac{AN}{15}$ $AN = 15.\tan 21°$ AN = 5,76 units/*eenhede*	✓ $\tan \widehat{M} = \frac{AN}{MN}$ ✓ substitute/*vervang* ✓answer/*antwoord* (3)
5.1.2	PN = 2 (5,76) = 11,52 $\tan \widehat{M} = \frac{PN}{MN}$ $= \frac{11,52}{15}$ $\widehat{M} = 37,52°$ $\therefore P\widehat{M}N = 37,52°$	✓ PN =11,52 ✓$\tan \widehat{M} = \frac{11,52}{15}$ ✓ answer/*antwoord* (3)
5.1.3	$\sin 37,52 = \frac{11,52}{MP}$ $MP = \frac{11,52}{\sin 37,52}$ MP = 18,92 **ANY OTHER VALID METHOD/** ***ENIGE ANDER GELDIGE METODE***	✓ $\sin 37,52° = \frac{11,52}{MP}$ ✓ MP subject/*onderwerp* ✓answer/*antwoord* (3)
5.2	$2\sin(\theta + 15°) = 1,462$ $\sin(\theta + 15°) = 0,731$ $\therefore \theta + 15° = 46,97°$ $\theta = 46,97° - 15°$ $\theta = 31,97°$	✓0,731 ✓46,97° ✓answer/*antwoord* (3) **[12]**

QUESTION 6/*VRAAG 6*

6.1	$a = 2$	✓answer/*antwoord* (1)
6.2	Period/t*ydperk* $f = 360°$	✓answer/*antwoord* (1)
6.3	$y \in [0 ; 2]$	✓0 ✓2 (2)
6.4	$0° < x < 180°$	✓critical values/ *kritiese waardes* ✓correct inequalities / *korrekte ongelykhede* (2)
6.5	$y = -\cos x + 1$	✓✓ answer/*antwoord* (2) **[8]**

QUESTION 7/*VRAAG 7*

7.1	$\tan\beta = \frac{LM}{MN} = 0,21$ $\tan\theta = \frac{TN}{MN} = 0,35$ $\frac{LM}{MN} \div \frac{TN}{MN} = \frac{0,21}{0,35}$ $\frac{LM}{TN} = \frac{0,21}{0,35}$ $= \frac{3}{5}$ ∴ LM : TN 3 : 5	✓ $\tan\beta = \frac{LM}{MN}$ $\tan\theta = \frac{TN}{MN}$ ✓ $\frac{LM}{MN} \div \frac{TN}{MN} = \frac{0,21}{0,35}$ ✓ answer/*antwoord* LM (3) ✓ answer/*antwoord* TN (5) (4)
7.2.1	$tan\theta = 0,35$ θ = 19,29° ∴ $\hat{MTN}$ = 70,71°	✓ θ = 19,29° ✓ answer/ *antwoord* (2)
7.2.2	cos 19,29° = $\frac{3100}{TM}$ TM = 3284,39 CM = 2884,39 ∴ sin 19,29° = $\frac{CP}{2884,39}$ ∴ CP = 2884,39(sin 19,29°) CP = 952,86 m	✓ cos 19,29° = $\frac{3100}{TM}$ ✓ TM = 3284,39 ✓ CM = 2884,39 ✓ sin 19,29° = $\frac{CP}{2884,39}$ ✓ answer/ *antwoord* (5) **[11]**

QUESTION 8/ *VRAAG 8*

8.1	is a parallelogram/*is 'n parallelogram*	✓answer/*antwoord* (1)
8.2	In Δ ABD and/*en* Δ CDB $\hat{D}_1 = \hat{B}_2$ [alt. angles/ *verv. hoek* ,AD ∥ BC] $\hat{B}_1 = \hat{D}_2$ [alt. angles/ *verv. hoek* ,AB ∥ DC] BD = BD [common side/ *dieselfde sy*] ∴ Δ ABD ≡ Δ CDB [A,A,S] ∴ AB = DC, AD = BC	✓S ✓R ✓S/R ✓S/R ✓S/R ✓S (6)
8.3.1	Let $\hat{N}_{1=}\ \hat{N}_{2=}\ x$ [ON bisects/*halveer* $\hat{KNM}$] Let $\hat{M}_{1=}\ \hat{M}_{2=}\ y$ [OM bisects/*halveer* $\hat{NMP}$] ∴ $2x + 2y = 180°$ [co-int./*bin. hoek* KN ∥ PM] ∴ $x + y = 90°$ $\hat{O}_2 + x + y = 180°$ [int. angles of/*binnehoeke van* Δ] ∴ $\hat{O}_2 + 90° = 180°$ ∴ $\hat{O}_2 = 90°$	✓S/R ✓S/R ✓substitution/*vervang* ($x + y = 90°$) (3)
8.3.2	$\hat{N}_{2=}\ \hat{O}_1$ [alt. angle/*verw. hoek* KP ∥ NM] $\hat{O}_{1\ =}\ \hat{N}_1$ [AB = DE] KO = KN [opp. sides =/*oorst.sye* =] $\hat{O}_{3=}\ \hat{M}_1$ [alt angle/*verw*. KP ∥ MN] $\hat{O}_{3=}\ \hat{M}_2$ ∴ $OP = PM$ [sides opp. = angles] *[sye oor. = hoeke]* but KN = PM [opp. sides =/*oor sye* =] ∴ KO = OP ∴ O is the midpoint/*middelpunt*	✓ S/R ($N_2 = O_1$ *and/* $O_1 = N_1$) ✓ S/R ✓ S/R ($O_3 = M_1$ *and* $O_3 = M_2$) ✓ S/R ✓ S/R ✓ S (6) **[16]**

QUESTION 9/*VRAAG 9*

9.1	half the length of /*die helfde van die lengte van*	✓ answer/*antwoord* (1)
9.2	AB ∥ QR [line joining midpoint] [*lyn deur middelpunte*] AB = $\frac{1}{2}$ QR [line joining midpoint] [*lyn deur middelpunte*] DE ∥ QR [line joining midpoint/*lyn deur middelpunte*] DE = $\frac{1}{2}$ QR ∴ AB ∥ DE and/*en* AB = DE ∴ ADEB is a parm. [one pair of opp. sides = and ∥] *[een paar teenoorstande sye = en ∥]*	✓R ✓S/R ✓S ✓S (both/*albei*) ✓ R (5) **[6]**

TOTAL/*TOTAAL*: 100

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