



# 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.***

**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	$\text{Median/Mediaan} = \frac{136+137}{2}$ $= 136,5$	✓ answer/antwoord (1)
1.2.1	$\text{Mean/Gemiddelde} = \frac{2728}{20}$ $= 136,4 \text{ cm}$	✓ $\frac{2728}{20}$ ✓ answer/antwoord (2)
1.2.2	$\text{Range/Variasiewydte} = 145 - 127$ $= 18 \text{ cm}$	✓ answer/antwoord (1)
1.2.3	$\text{Lower quartile/Onderste kwartiel} = 132$ $\text{Upper quartile/Boonste kwartiel} = 141 \frac{1}{2}$ $\text{Interquartile range/IKO} = 141 \frac{1}{2} - 132$ $= 9,5 \text{ cm}$	✓ 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) <b>[9]</b>

**QUESTION 2/VRAAG 2**

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

**QUESTION 3/VRAAG 3**

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

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

**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	$2\operatorname{cosec} 38,2^\circ + \cos 3(146,4^\circ)$ $= 2\left(\frac{1}{\sin 38,2^\circ}\right) + \cos 3(146,4^\circ)$ $= 3,42$	✓ $\left(\frac{1}{\sin 38,2^\circ}\right)$  ✓✓ answer accurate/ antwoord akkuraat  [Answer only – full marks] [Slegs antwoord – volpunte] (3)
4.3	$\frac{\sin 45^\circ \cdot \tan^2 60^\circ}{\cos 45^\circ}$ $\frac{\left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{1}\right)\left(\frac{\sqrt{3}}{1}\right)}{\frac{1}{\sqrt{2}}}$ $\frac{\frac{3}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$ $\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{1}$ $3$	✓ $\frac{1}{\sqrt{2}}$  ✓ $\frac{\sqrt{3}}{1}$  ✓ $\frac{1}{\sqrt{2}}$  ✓ 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)

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**QUESTION 5/VRAAG 5**

5.1.1	<p>In <math>\Delta AMN</math></p> $\tan \hat{M} = \frac{AN}{MN}$ $\tan 21^\circ = \frac{AN}{15}$ $AN = 15 \cdot \tan 21^\circ$ $AN = 5,76 \text{ units/eenhede}$	<p>✓ <math>\tan \hat{M} = \frac{AN}{MN}</math></p> <p>✓ substitute/vervang</p> <p>✓ answer/antwoord</p> <p>(3)</p>
5.1.2	$PN = 2 ( 5,76)$ $= 11,52$ $\tan \hat{M} = \frac{PN}{MN}$ $= \frac{11,52}{15}$ $\hat{M} = 37,52^\circ$ $\therefore \hat{PMN} = 37,52^\circ$	<p>✓ <math>PN = 11,52</math></p> <p>✓ <math>\tan \hat{M} = \frac{11,52}{15}</math></p> <p>✓ answer/antwoord</p> <p>(3)</p>
5.1.3	$\sin 37,52 = \frac{11,52}{MP}$ $MP = \frac{11,52}{\sin 37,52}$ $MP = 18,92$ <p><b>ANY OTHER VALID METHOD/ ENIGE ANDER GELDIGE METODE</b></p>	<p>✓ <math>\sin 37,52^\circ = \frac{11,52}{MP}</math></p> <p>✓ MP subject/onderwerp</p> <p>✓ answer/antwoord</p> <p>(3)</p>
5.2	$2\sin(\theta + 15^\circ) = 1,462$ $\sin(\theta + 15^\circ) = 0,731$ $\therefore \theta + 15^\circ = 46,97^\circ$ $\theta = 46,97^\circ - 15^\circ$ $\theta = 31,97^\circ$	<p>✓ 0,731</p> <p>✓ 46,97°</p> <p>✓ answer/antwoord</p> <p>(3)</p> <p><b>[12]</b></p>

**QUESTION 6/VRAAG 6**

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

**QUESTION 7/VRAAG 7**

7.1	$\tan\beta = \frac{LM}{MN} = 0,21 \quad \tan\theta = \frac{TN}{MN} = 0,35$ $\frac{LM}{MN} \div \frac{TN}{MN} = \frac{0,21}{0,35}$ $\frac{LM}{TN} = \frac{0,21}{0,35}$ $= \frac{3}{5}$ $\therefore LM : TN$ $3 : 5$	$\checkmark \tan\beta = \frac{LM}{MN} \quad \tan\theta = \frac{TN}{MN}$ $\checkmark \frac{LM}{MN} \div \frac{TN}{MN} = \frac{0,21}{0,35}$ $\checkmark \text{ answer/antwoord LM (3)}$ $\checkmark \text{ answer/antwoord TN (5)}$ <p style="text-align: right;">(4)</p>
7.2.1	$\tan\theta = 0,35$ $\theta = 19,29^\circ$ $\therefore \hat{MTN} = 70,71^\circ$	$\checkmark \theta = 19,29^\circ$ $\checkmark \text{ answer/ antwoord}$ <p style="text-align: right;">(2)</p>
7.2.2	$\cos 19,29^\circ = \frac{3100}{TM}$ $TM = 3284,39$ $CM = 2884,39$ $\therefore \sin 19,29^\circ = \frac{CP}{2884,39}$ $\therefore CP = 2884,39(\sin 19,29^\circ)$ $CP = 952,86 \text{ m}$	$\checkmark \cos 19,29^\circ = \frac{3100}{TM}$ $\checkmark TM = 3284,39$ $\checkmark CM = 2884,39$ $\checkmark \sin 19,29^\circ = \frac{CP}{2884,39}$ $\checkmark \text{ answer/ antwoord}$ <p style="text-align: right;">(5) [11]</p>



**QUESTION 8/ VRAAG 8**

8.1	is a parallelogram/ <i>is 'n parallelogram</i>	✓ answer/ <i>antwoord</i> (1)
8.2	In $\Delta ABD$ and/ <i>en</i> $\Delta CDB$ $\hat{D}_1 = \hat{B}_2$ [ alt. angles/ <i>verv. hoek</i> ,AD $\parallel$ BC] $\hat{B}_1 = \hat{D}_2$ [ alt. angles/ <i>verv. hoek</i> ,AB $\parallel$ DC] BD = BD [common side/ <i>dieselfde sy</i> ] $\therefore \Delta ABD \equiv \Delta CDB$ [A,A,S] $\therefore AB = DC, AD = BC$	✓S ✓R ✓S/R ✓S/R ✓S/R ✓S (6)
8.3.1	Let $\hat{N}_1 = \hat{N}_2 = x$ [ ON bisects/ <i>halveer</i> $\hat{KNM}$ ] Let $\hat{M}_1 = \hat{M}_2 = y$ [ OM bisects/ <i>halveer</i> $\hat{NMP}$ ] $\therefore 2x + 2y = 180^\circ$ [co-int./ <i>bin. hoek</i> KN $\parallel$ PM] $\therefore x + y = 90^\circ$ $\hat{O}_2 + x + y = 180^\circ$ [ int. angles of/ <i>binnehoeke</i> van $\Delta$ ] $\therefore \hat{O}_2 + 90^\circ = 180^\circ$ $\therefore \hat{O}_2 = 90^\circ$	✓S/R     ✓S/R ✓substitution/ <i>vervang</i> ( $x + y = 90^\circ$ ) (3)
8.3.2	$\hat{N}_2 = \hat{O}_1$ [alt. angle/ <i>verw. hoek</i> KP $\parallel$ NM] $\hat{O}_1 = \hat{N}_1$ [ AB = DE] KO = KN [ opp. sides =/ <i>oorst.sye</i> =] $\hat{O}_3 = \hat{M}_1$ [ alt angle/ <i>verw.</i> KP $\parallel$ MN] $\hat{O}_3 = \hat{M}_2$ $\therefore OP = PM$ [sides opp. = angles] [ <i>sye oor. = hoeke</i> ] but KN = PM [ opp. sides =/ <i>oor sye</i> =] $\therefore KO = OP$ $\therefore O$ is the midpoint/ <i>middelpunt</i>	✓ 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) <b>[16]</b>

**QUESTION 9/VRAAG 9**

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

**TOTAL/TOTAAL: 100**