



# basic education

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Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NASIONALE  
SENIOR SERTIFIKAAT**

**GRAAD 10**

**TEGNIESE WISKUNDE V2**

**MODEL 2016**

**MEMORANDUM**

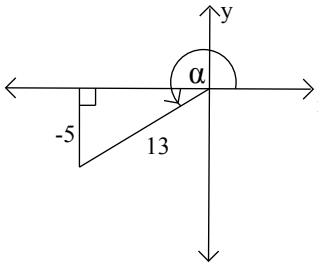
**PUNTE: 100**

**Hierdie memorandum bestaan uit 8 bladsye.**

## VRAAG 1

1.1	$m_{AC} = \frac{-1-2}{2-0} \quad \text{or} \quad = \frac{2+1}{0-2}$ $= -\frac{3}{2}$	✓ antwoord (1)
1.2	$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$ $M\left(\frac{-3+2}{2}; \frac{0-1}{2}\right)$ $M\left(-\frac{1}{2}; -\frac{1}{2}\right)$	✓ formule  ✓ antwoord (2)
1.3	$m_{MD} = \frac{-\frac{1}{2}-2}{-\frac{1}{2}-0} = 5$ $y - y_1 = m(x - x_1)$ $y - 2 = 5(x - 0)$ $y = 5x + 2$	✓ subst. in grad. formule ✓ 5 ✓ verv. in reg. lyn. formule ✓ vergelyking (4)
1.4	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(-3 - 0)^2 + (0 - (-3))^2}$ $\sqrt{(-3 - 0)^2 + 9} = \sqrt{13}$ $t^2 + 6t + 9 + 9 = 13$ $t^2 + 6t + 5 = 0$ $(t + 5)(t + 1) = 0$ $t = -1$	✓ formule  ✓ verv.  ✓ faktore ✓ antwoord (4)
1.5	$AB = \sqrt{13}$ $DC = \sqrt{(0 - 2)^2 + (2 - (-1))^2}$ $= \sqrt{13}$ $AD = \sqrt{(0 - (-3))^2 + (2 - 0)^2}$ $= \sqrt{13}$ $BC = \sqrt{(-1 - 2)^2 + (-3 - (-1))^2}$ $= \sqrt{13}$ <p>Alle sye is gelyk en <math>\widehat{ADC} = 90^\circ</math>            ABCD is dus 'n vierkant.</p>	✓ lengte van DC  ✓ lengte van AD  ✓ lengte van AB  ✓ gevolgtrekking (4)
		[15]

**VRAAG 2**

2.1.1	$\sin(x+y) = \sin(43+32,5)$ $= 0,97$	slegs antw. volpunte	✓ verv. ✓ antwoord (2)
2.1.2	$\sec\left(\frac{x-y}{2}\right) = \sec\left(\frac{43-32,5}{2}\right)$ $= \frac{1}{\cos\left(\frac{21}{4}\right)}$ $= 1,00$	slegs antw. volpunte	✓ ver.na cos. ✓ antwoord (2)
2.2.1	$13\sin \alpha + 5 = 0$ en $90^\circ < \alpha < 270^\circ$  $\sin \alpha = \frac{-5}{13}$ $x^2 + (-5)^2 = 13^2$ $\therefore x = -12$ $\therefore \cot \alpha = \frac{-12}{-5} = \frac{12}{5}$		✓ korrekte diag. ✓ $\frac{-5}{13}$ ✓ $x = -12$ ✓ antwoord (4)
2.2.2	$\cos \alpha + \tan \alpha = \frac{-12}{13} + \frac{5}{12}$ $= \frac{-144 + 65}{156}$ $= \frac{-79}{156}$		✓ $\frac{-12}{13}$ ✓ $\frac{5}{12}$ ✓ antwoord (3)
2.3	$\cot x = \tan 53^\circ + \sin 233^\circ$ $\frac{1}{\tan x} = \tan 53^\circ + \sin 233^\circ$ $\tan x = \frac{1}{\tan 53^\circ + \sin 233^\circ}$ $x = \tan^{-1}\left(\frac{1}{\tan 53^\circ + \sin 233^\circ}\right)$ $= 62,15^\circ$ <p style="text-align: right;"><i>antw. 62,12° twee punte</i></p>		✓ $\frac{1}{\tan x}$ ✓ $\tan^{-1}$ ✓ antwoord (3)
			<b>[14]</b>

**QUESTION 3**

3.1.1	$SQ = 5m - 1,5m = 3,5m$	✓ antwoord (1)
3.1.2	$\sin 63^\circ = \frac{SQ}{SR}$ $\sin 63^\circ = \frac{3,5}{SR}$ $\therefore SR = 3,93m$	✓ $\sin 63^\circ = \frac{3,5}{SR}$  ✓ antwoord (2)
3.1.3	$\cos 15^\circ = \frac{PQ}{PR}$ $PR = \frac{PQ}{\cos 15^\circ}$ $PR = \frac{5m}{\cos 15^\circ}$ $= 5,18m$ <p>Or</p> $\sin 75^\circ = \frac{PQ}{PR}$ $PR = \frac{PQ}{\sin 75^\circ}$ $= \frac{5m}{\sin 75^\circ}$ $= 5,18m$	✓ $\cos 15^\circ$  ✓ maak PR die onderwerp van die formule ✓ verv.  ✓ antwoord  OF ✓ $\sin 75^\circ$  ✓ maak PR die onderwerp van die formule ✓ verv. ✓ antwoord (4)
3.2.1	$\frac{AB}{BC} = \tan 52^\circ$ $\therefore \frac{45}{BC} = \tan 52^\circ$ $BC = \frac{45}{\tan 52^\circ}$ $\therefore BC = 35,16 m$	✓ $\frac{AB}{BC} = \tan 52^\circ$  ✓ $BC = \frac{45}{\tan 52^\circ}$  ✓ antwoord (3)
3.2.2	$\frac{AB}{BD} = \tan 38^\circ \therefore \frac{45}{BD} = \tan 38^\circ$ $\therefore BD = 57,60m$ $CD = 35,16m + 57,60m$ $CD = 92,76m$	✓ $\frac{45}{BD} = \tan 38^\circ$ ✓ lengte van BD  ✓ antwoord (3)
		<b>[13]</b>

## VRAAG 4

4.1		<ul style="list-style-type: none"> <li>✓ y-afsnit van <math>g</math></li> <li>✓ vorm van <math>g</math></li> <li>✓ <math>x</math> afsnit van <math>f</math></li> <li>✓ <math>y</math> afsnit van <math>f</math></li> <li>✓ vorm van <math>f</math></li> </ul> <p style="text-align: right;">(5)</p>
4.2	$x = 90^\circ$ en $x = 270^\circ$	<ul style="list-style-type: none"> <li>✓ antwoord</li> </ul> <p style="text-align: right;">(1)</p>
4.3	$y \in [0; 2]$ OF $0 \leq y \leq 2$	<ul style="list-style-type: none"> <li>✓✓ antwoord in korrekte notasie</li> </ul> <p style="text-align: right;">(2)</p>
4.4	$(180^\circ ; 0)$	<ul style="list-style-type: none"> <li>✓ <math>180^\circ</math></li> <li>✓ 0</li> </ul> <p style="text-align: right;">(2)</p>
4.5	$180^\circ < x < 270^\circ$ OF $x \in (180^\circ; 270^\circ)$	<ul style="list-style-type: none"> <li>✓✓ antwoord in korrekte notasie</li> </ul> <p style="text-align: right;">(2)</p>
		<b>[12]</b>

**VRAAG 5**

5.1	Indien hulle gelyke hoeke is OF Hulle ooreenstemende sye is eweredig.	✓ antwoord (1)
5.2.1	<i>in <math>\triangle ABC</math> and <math>\triangle EDC</math></i> $\hat{A}CB = \hat{E}CB = 76^\circ$ .....ooreenkomstige hoeke $\hat{A} = \hat{E} = \frac{180^\circ - 76^\circ}{2} = 52^\circ$ .....vew. binne hoeke, $AB \parallel DE$ $\hat{B} = \hat{D} = 52^\circ$ ...verw binne hoeke, $AB \parallel DE$ $\therefore \triangle ABC \parallel \triangle EDC (A.A.A)$	✓ stelling en rede ✓ stelling en rede ✓ stelling en rede ✓ stelling en rede (4)
5.2.2	As ten minste een paar teenoorstaande sye gelyk is.	✓✓ rede (2)
5.3.1	$x = 38mm$ ....middelpunt stelling	✓ waarde van $x$ ✓ rede (2)
5.3.2	$\alpha = 46^\circ$ .....verw. $\angle e$ ; $YZ \parallel DE$	✓ waarde van $\alpha$ ✓ rede (2)
5.3.3	$\hat{D}FE + 46^\circ + 40^\circ = 180^\circ$ $\angle$ som van $\triangle$ $\hat{D}FE = 180^\circ - 86^\circ = 94^\circ$ $\hat{Y}FZ = \hat{D}EF$ <i>regoorstaande <math>\angle e</math></i> $\hat{Y}FZ = 94^\circ$  <i>Of</i> $\hat{D}FY = 46^\circ + 40^\circ$ <i>Of</i> $\hat{E}FZ = 46^\circ + 40^\circ$ <i>buite. <math>\angle</math> van <math>\triangle DFE</math></i> $\hat{Y}FZ = 180^\circ - 86^\circ$ $\angle e$ <i>op reguitlyn DFZ or EFY</i> $\therefore \hat{Y}FZ = 94^\circ$  <i>OF</i> $\hat{Y}FZ = 180^\circ - (\alpha + \beta)$ <i>som van <math>\angle e</math> van <math>\triangle FYZ</math></i> $= 180^\circ - (46^\circ + 40^\circ)$ <i>verw.. <math>\angle s =</math>; <math>DE \parallel YZ</math></i> $= 94^\circ$	✓ twee stellings en redes ✓ antwoord  OF ✓✓ twee stellings en redes ✓ antwoord  OF ✓ twee stellings en redes ✓ antwoord (2)
		[13]

**VRAAG 6**

6.1.1	Albei teenoorstaande sye is parallel	✓ antwoord (1)
6.1.2	$2x + 20 = 5x - 40$ ...teenoorstaande $\angle$ e of //m $3x = 60^\circ$ $x = 20^\circ$	✓ stelling ✓ rede ✓ vereenvoudiging ✓ antwoord (4)
6.2.1	$8x + 2^\circ + 4x + 2^\circ + x - 2^\circ + 5x - 2^\circ = 360^\circ$ som van hoeke in 'n vierkant. $18x = 360^\circ$ $x = 20^\circ$	✓ stelling ✓ rede ✓ vereenvoudiging ✓ antwoord (4)
6.2.2	$\hat{A} = 8x + 2 = 8(20^\circ) + 2^\circ = 162^\circ$ $\hat{B} = 4x + 2 = 4(20^\circ) + 2^\circ = 82^\circ$ $\hat{C} = 5x - 2 = 5(20^\circ) - 2^\circ = 98^\circ$ $\hat{D} = x - 2 = 20^\circ - 2^\circ = 18^\circ$  $\hat{A} + \hat{D} = 162^\circ + 18^\circ = 180^\circ$ Dus $AB \parallel DC$ <i>ko-binne</i> $\angle$ e Daarom is ABCD 'n trapesium.  Of $\hat{B} + \hat{C} = 82^\circ + 92^\circ = 180^\circ$ Dus $AB \parallel DC$ <i>ko-binne</i> $\angle$ e Daarom is ABCD 'n trapesium.	✓ waarde van A  ✓ waarde van D ✓ $\hat{A} + \hat{D} = 180^\circ$ ✓ rede  OF  ✓ waarde van $\hat{B}$  ✓ waarde van $\hat{C}$ ✓ $\hat{B} + \hat{C} = 180^\circ$ ✓ rede (4)
		<b>[13]</b>

**VRAAG 7**

7.1	$CP^2 = PA^2 + AC^2$ (Pythagoras) $10^2 = 6^2 + AC^2$ $AC = 8 \text{ m}$	✓ stelling ✓ rede ✓ verv. ✓ antwoord (4)
7.2	Laat die nuwe punt R wees sodat $AR = 5 \text{ m}$ $CR^2 = RA^2 + AC^2$ (Pythagoras) $CR^2 = 5^2 + 8^2$ $CR = \sqrt{89} \text{ m}$	✓ stelling ✓ verv. ✓ antwoord (3)
		<b>[7]</b>

**VRAAG 8**

8.1.1	$122^{\circ} + 0,46 \times 60^{\circ}$ $= 122^{\circ} + 27,6'$ <p style="text-align: right;">slegs antw. volpunte</p> $= 122^{\circ} + 27' + 0,6 \times 60^{\circ}$ $= 122^{\circ} 27' 36''$	$\checkmark \times 60^{\circ}$ $\checkmark + 27,6'$  $\checkmark$ antwoord (3)
8.1.2	$83^{\circ} 59' 13'' = \left( 83 + \frac{59}{60} + \frac{13}{60 \times 60} \right)$ $= 83,99^{\circ}$ <p style="text-align: right;">slegs antw. volpunte</p>	$\checkmark \frac{59}{60}$ $\checkmark \frac{13}{60^2}$ $\checkmark$ antwoord (3)
8.2	$\theta = \frac{s}{r} = \frac{4}{6}$ $= \frac{2}{3}$ $\theta = \frac{2}{3} \times \frac{180^{\circ}}{\pi}$ $= 38,39^{\circ}$	$\checkmark$ formule  $\checkmark \frac{2}{3}$  $\checkmark$ omskakeling  $\checkmark$ antwoord (4)
8.3	$6\pi - 15^{\circ} + \frac{4\pi}{3}$ $= \frac{3 \times 6\pi + 4\pi}{3} - 15^{\circ}$ $= \frac{22\pi}{3} - 15^{\circ}$ $= \left( \frac{22}{3} \times 180^{\circ} \right) - 15^{\circ}$ $= 1305^{\circ}$	$\checkmark \frac{22\pi}{3}$   $\checkmark$ omskakeling  $\checkmark$ antwoord (3)
		<b>[13]</b>
		<b>TOTAAL: 100</b>