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# PREPARATORY EXAMINATIONS *VOORBEREIDENDE EKSAMEN* 2023

## MARKING GUIDELINES/ *NASIENRIGLYNE*

### TECHNICAL MATHEMATICS/*TEGNIJSE WISKUNDE* (PAPER/*VRAESTEL 2*)

26 pages/*bladsye*

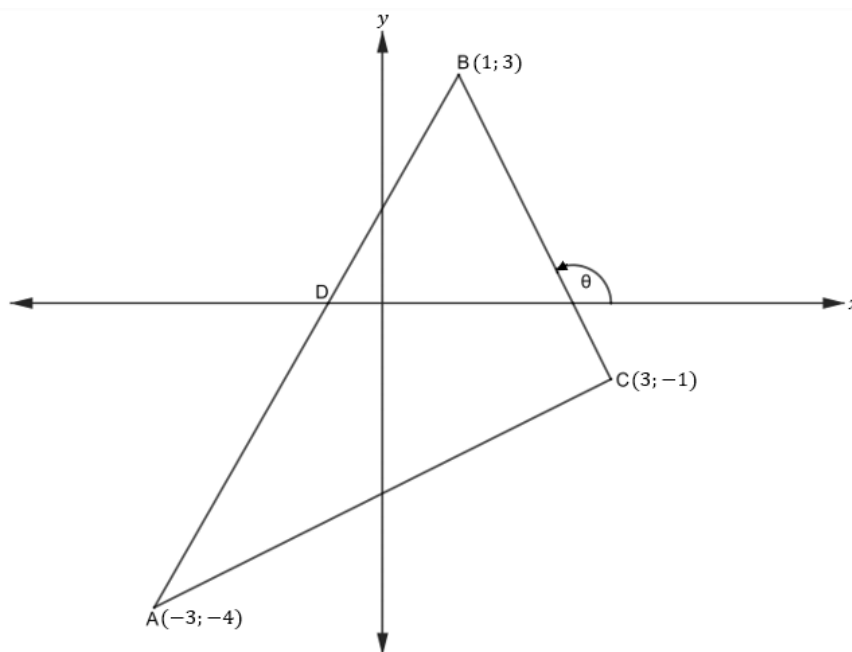
Marking Codes/ <i>Nasienkodes</i>	
<b>A</b>	Accuracy/ <i>Akkuraatheid</i>
<b>CA</b>	Consistent accuracy/ <i>Volgehoue akkuraatheid</i>
<b>M</b>	Method/ <i>Metode</i>
<b>R</b>	Rounding/ <i>Afronding</i>
<b>NPR</b>	No penalty for rounding/ <i>Geen penalisering vir afronding nie</i>
<b>NPU</b>	No penalty for units omitted/ <i>Geen penalisering indien eenhede weggelaat nie</i>
<b>SF</b>	Simplification/ <i>Vereenvoudiging</i>
<b>F</b>	Substitution in correct formula/ <i>Vervanging in korrekte formule</i>
<b>ST</b>	Statement/ <i>Bewering</i>
<b>ST/RE</b>	Statement and Reason/ <i>Bewering en Rede</i>
<b>AO</b>	Answer Only / <i>Slegs antwoord</i>

**NOTES:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and did not redo it, mark the crossed-out version.
- Consistent accuracy applies in all aspects of the marking guidelines.

**NOTAS:**

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n poging van 'n vraag deurgehaal het en dit nie oorgedoen het nie, sien die doodgetrekte weergawe na.
- Volgehoue akkuraatheid is deurgaans op alle aspekte van die nasienriglyne van toepassing.

**QUESTION/VRAAG 1**

1.1	$AB = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2}$ $AB = \sqrt{(1 - (-3))^2 + (3 - (-4))^2}$ $AB = \sqrt{16 + 49}$ $AB = \sqrt{65}$ $AB = 8,06 \text{ units/eenhede}$	<p>✓ SF                      A</p> <p>✓ <math>\sqrt{65}</math>                      CA</p> <p>✓ 8,06                      CA</p> <p><b>AO: Full marks</b>                      (3)</p> <p><b>AO: Volpunte</b></p> <p><b>NPR</b></p>
1.2	$M\left(\frac{x_A + x_C}{2}; \frac{y_A + y_C}{2}\right)$ $= M\left(\frac{-3+3}{2}; \frac{-4-3}{2}\right)$ $= M\left(0; -2\frac{1}{2}\right) \text{ or } \left(0; -\frac{5}{2}\right) \text{ or/of } (0; -2,5)$	<p>✓ <math>x = 0</math>                      A</p> <p>✓ <math>y = -2,5</math>                      A</p> <p>(2)</p>

1.3	$m_{AB} = \frac{y_B - y_A}{x_B - x_A}$ $m_{AB} = \frac{-4 - 3}{-3 - 1}$ $m_{AB} = \frac{7}{4}$ $y - 3 = \frac{7}{4}(x - 1)$ $y = \frac{7}{4}x - \frac{7}{4} + 3$ $y = \frac{7}{4}x + \frac{5}{4}$ <p>for x – intercept, let <math>y = 0</math></p> <p><i>vir x-afsnit, stel <math>y = 0</math></i></p> $0 = \frac{7}{4}x + \frac{5}{4}$ $\therefore \frac{7}{4}x = -\frac{5}{4}$ $x = -\frac{5}{7}$ $D\left(-\frac{5}{7}; 0\right)$ <p><b>OR/OF</b></p> $m_{AB} = \frac{y_B - y_A}{x_B - x_A}$ $m_{AB} = \frac{-4 - 3}{-3 - 1}$ $m_{AB} = \frac{7}{4}$ $\frac{7}{4} = \frac{3 - 0}{1 - x}$ $7 - 7x = 12$ $-7x = 5$ $x = -\frac{5}{7}$ $D\left(-\frac{5}{7}; 0\right)$	$\checkmark m_{AB} = \frac{7}{4} \quad \text{A}$ $\checkmark y = \frac{7}{4}x + \frac{5}{4} \quad \text{A}$ $\checkmark M \quad \text{A}$ $\checkmark x = -\frac{5}{7} \quad \text{CA}$ <p><b>OR/OF</b></p> $\checkmark m_{AB} = \frac{7}{4} \quad \text{A}$ $\checkmark \frac{7}{4} = \frac{3-0}{1-x} \quad \text{A}$ $\checkmark S \quad \text{CA}$ $\checkmark x = -\frac{5}{7} \quad \text{CA}$ $(4)$
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1.4	$m_{BC} = -2$ $\therefore \tan\theta = -2$ <i>Ref.</i> $\angle = 63,43^\circ$ $\theta = 180^\circ - 63,43^\circ$ $= 116,57^\circ$	$\checkmark$ SF                      A      $\checkmark$ $116,57^\circ$ CA (2)
1.5	$y = -2x + 5\dots$ ① $x^2 + y^2 = r^2$  $x^2 + y^2 = (\sqrt{5})^2$ $x^2 + y^2 = 5\dots$ ②  Subst. ① in ② or/of Verv. ① in ②  $x^2 + (-2x + 5)^2 = 5$  $x^2 + 4x^2 - 20x + 25 = 5$  $5x^2 - 20x + 20 = 0$  $x^2 - 4x + 4 = 0$  $(x - 2)(x - 2) = 0$  $x = 2$  <b>OR/OF</b>	$\checkmark$ $x^2 + y^2 = 5$ A    $\checkmark$ SF                      CA     $\checkmark$ S                      CA   $\checkmark$ $x = 2$ CA  <b>OR/OF</b>

$S(x; -2x + 5)$	✓ $(x; -2x + 5)$	A
$x^2 + y^2 = (OS)^2$		
$x^2 + (-2x + 5)^2 = (\sqrt{5})^2$	✓ SF	A
$x^2 + 4x^2 - 20x + 25 = 5$		
$5x^2 - 20x + 20 = 0$		
$x^2 - 4x + 4 = 0$	✓ S	CA
$(x - 2)(x - 2) = 0$		
$x = 2$	✓ $x = 2$	CA
<b>OR/OF</b>	<b>OR/OF</b>	
$\sqrt{5} = \sqrt{(x - 0)^2 + (y - 0)^2}$	✓ M	A
$5 = x^2 + y^2$		
$5 = x^2 + (-2x + 5)^2$	✓ SF	CA
$5 = x^2 + 4x^2 - 20x + 25$		
$0 = 5x^2 - 20x + 20$	✓ S	CA
$x = \frac{-(-20) \pm \sqrt{(-20)^2 - 4(5)(20)}}{2(5)}$		
$x = \frac{20 \pm \sqrt{0}}{10}$		
$x = 2$	✓ $x = 2$	CA (4)
		<b>[15]</b>

QUESTION/VRAAG 2		
2.1		
2.1.1	$r^2 = x^2 + y^2$ $r^2 = (-3)^2 + (-4)^2$ $r^2 = 25$ $x^2 + y^2 = 25$	<div style="display: flex; justify-content: space-between;"> <span>✓ SF</span> <span>A</span> </div> <div style="display: flex; justify-content: space-between;"> <span>✓ <math>x^2 + y^2 = 25</math></span> <span>CA (2)</span> </div>

2.1.2	$m_{OP} = \frac{y_P - y_O}{x_P - x_O}$ $= \frac{-4 - 0}{-3 - 0}$ $= \frac{4}{3}$ $\therefore m_{\text{tangent/raaklyn}} = -\frac{3}{4}$ $y - (-4) = -\frac{3}{4}(x - (-3))$ $y = -\frac{3}{4}x - \frac{9}{4} - 4$ $4y = -3x - 25$ $3x + 4y = -25$ <p><b>OR/OF</b></p> $x \cdot x_1 + y \cdot y_1 = r^2$ $x(-3) + y(-4) = 25$ $-4y = 3x + 25$ $3x + 4y = -25$	$\checkmark \frac{4}{3}$ CA $\checkmark m_{\text{tang/raak}} = -\frac{3}{4}$ CA $\checkmark \text{SF } (-3; -4)$ CA  <p><b>OR/OF</b></p> $\checkmark \text{F}$ A $\checkmark \text{SF}$ A $\checkmark \text{SF } 25$ CA  (3)
2.1.3	$3x + 4y = -25 \dots \text{ ①}$ $4x - 3y = 25 \dots \text{ ②}$ $\text{①} \times 3 \quad 9x + 12y = -75 \dots \text{ ③}$ $\text{②} \times 4 \quad 16x - 12y = 100 \dots \text{ ④}$ $\text{③} + \text{④} \quad 25x = 25$ $x = 1$ $y = -7$ $\therefore \text{R}(1; -7)$ <p><b>OR/OF</b></p> $y = -\frac{3}{4}x - \frac{25}{4}$ $4x - 3y = 25$ $4x - 3\left(-\frac{3}{4}x - \frac{25}{4}\right) = 25$ $4x + \frac{9}{4}x + \frac{75}{4} = 25$ $\frac{25}{4}x = \frac{25}{4}$ $x = 1$ $y = -7$ $\therefore \text{R}(1; -7)$	$\checkmark 9x + 12y = -75$ A $\checkmark 16x - 12y = 100$ A $\checkmark 25x = 25$ CA $\checkmark x = 1$ CA $\checkmark y = -7$ CA  <p><b>OR/OF</b></p> $\checkmark \text{SF}$ A $\checkmark \text{S}$ CA $\checkmark \frac{25}{4}x = \frac{25}{4}$ CA $\checkmark x = 1$ CA $\checkmark y = -7$ CA  (5)



2.2

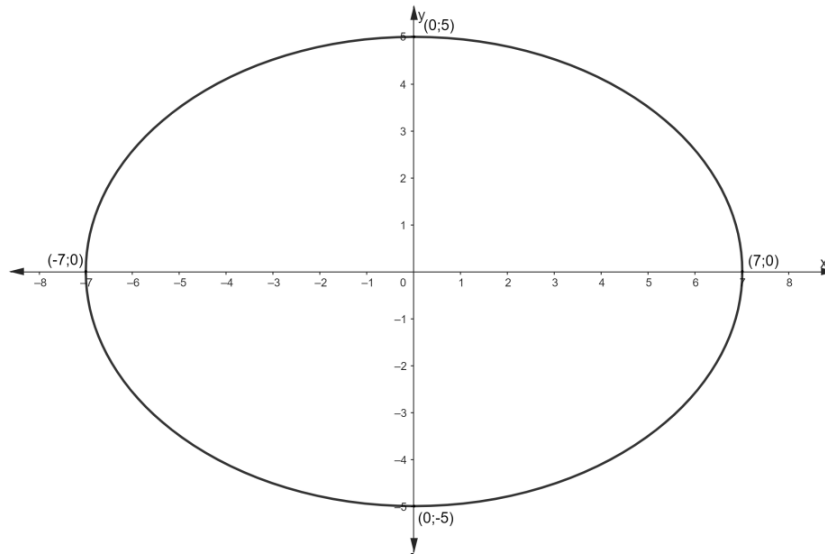
$$\frac{x^2}{7^2} + \frac{y^2}{5^2} = 1$$

$$x = \pm\sqrt{49} = \pm 7$$

$$y = \pm\sqrt{25} = \pm 5$$

- ✓ Both/Beide  $x$
- ✓ Both/Beide  $y$
- ✓ Shape/Vorm

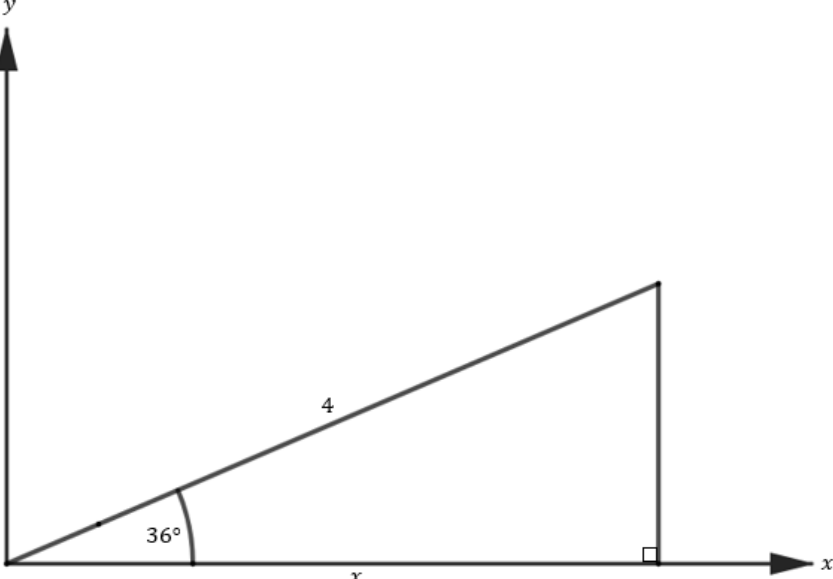
A  
A  
CA



(3)

**[13]**

QUESTION/VRAAG 3			
3.1	3.1.1	$\cos (A + C)$ $= \cos (40^\circ + 50^\circ)$ $= \cos (90^\circ)$ $= 0$	$\checkmark 0$ A <b>AO: Full marks</b> <i>AO: Volpunte</i> (1)
	3.1.2	$\frac{\cos (90^\circ + 2A - C)}{\frac{\sin (180^\circ - 3C)}{\cos (90^\circ + 80^\circ - 50^\circ)}}$ $= \frac{\sin (180^\circ - 150^\circ)}{\cos 120^\circ}$ $= \frac{\sin 30^\circ}{\cos (180^\circ - 60^\circ)}$ $= \frac{\sin 30^\circ}{-\cos 60^\circ}$ $= \frac{\sin 30^\circ}{-\frac{1}{2}}$ $= \frac{1}{\frac{1}{2}}$ $= -1$	$\checkmark$ SF                      A  $\checkmark$ S - $\cos 60^\circ$ CA $\checkmark$ S $\sin 30^\circ$ CA  $\checkmark -1$ CA <b>AO: <math>\frac{1}{4}</math></b> (4)

3.2		
3.2.1	$\cos 36^\circ = \frac{x}{4}$ $x = 4\cos 36^\circ$ $x = 3,24$	$\checkmark 4\cos 36^\circ$ A $\checkmark 3,24$ CA (2)
3.2.2	$\sin 36^\circ = \frac{y}{4}$ $y = 4\sin 36^\circ$ $y = 2,35$ <p><b>OR/OF</b></p> $x^2 + y^2 = r^2$ $(4,24)^2 + y^2 = (4)^2$ $y^2 = 5,5024$ $y = 2,35$	$\checkmark \sin 36^\circ = \frac{y}{4}$ A $\checkmark 2,35$ CA <p><b>OR/OF</b></p> $\checkmark \text{SF}$ A $\checkmark 2,35$ CA (2)

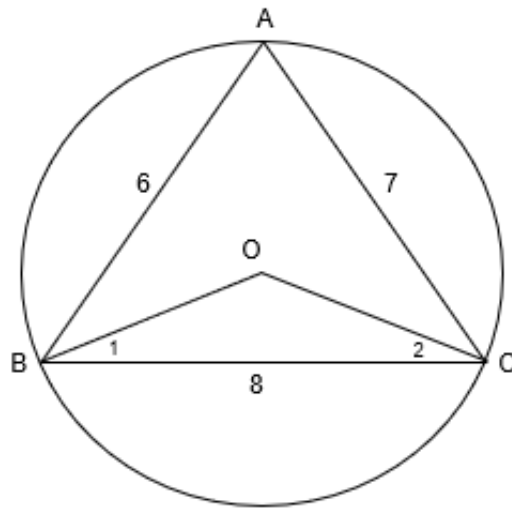
3.3	$\sin\left(\frac{\pi}{3}\right)$ $= \sin\left(\frac{\pi}{3} \times \frac{180^0}{\pi}\right)$ $= \sin 60^0$ $= \frac{\sqrt{3}}{2}$	$\checkmark \frac{\pi}{3} \times \frac{180^0}{\pi}$	A
		$\checkmark \frac{\sqrt{3}}{2}$	A
		<b>P: if/as 0,87</b>	$\frac{1}{2}$
			(2)
<b>[11]</b>			

<b>QUESTION/VRAAG 4</b>			
4.1	$\sin^2 \beta$	$\checkmark \sin^2 \beta$	A
4.2	$\frac{\tan(180^0 - \beta) \cdot \sin(180^0 + \beta)}{\sec \beta} + \cos^2(360^0 - \beta)$ $= \frac{-\tan \beta \cdot (-\sin \beta)}{\frac{1}{\cos \beta}} + \cos^2 \beta$ $= \left(-\frac{\sin \beta}{\cos \beta}\right) (\cos \beta) (-\sin \beta) + \cos^2 \beta$ $= \sin^2 \beta + \cos^2 \beta$ $= 1$	$\checkmark -\tan \beta$ $\checkmark -\sin \beta$ $\checkmark \frac{1}{\cos \beta}$ $\checkmark \frac{\sin \beta}{\cos \beta}$ $\checkmark \cos^2 \beta$ $\checkmark \sin^2 \beta + \cos^2 \beta$ $\checkmark 1$	A A A A A CA CA (7)

4.3	$\text{LHS/LK} = \cos\theta(1 + \tan^2\theta)$ $\text{LHS/LK} = \cos\theta \left(1 + \frac{\sin^2\theta}{\cos^2\theta}\right)$ $\text{LHS/LK} = \cos\theta \left(\frac{\cos^2\theta + \sin^2\theta}{\cos^2\theta}\right)$ $\text{LHS/LK} = \cos\theta \left(\frac{1}{\cos^2\theta}\right)$ $\text{LHS/LK} = \frac{1}{\cos\theta}$ $\text{LHS/LK} = \sec\theta$ <p><b>OR/OF</b></p> $\text{LHS/LK} = \cos\theta(1 + \tan^2\theta)$ $\text{LHS/LK} = \cos\theta(\sec^2\theta)$ $\text{LHS/LK} = \cos\theta \left(\frac{1}{\cos^2\theta}\right)$ $\text{LHS/LK} = \frac{1}{\cos\theta}$ $\text{LHS/LK} = \sec\theta$	$\checkmark$ I $\frac{\sin^2\theta}{\cos^2\theta}$ A $\checkmark$ S      A  $\checkmark$ S      A <b>OR/OF</b>  $\checkmark$ I $\sec^2\theta$ A $\checkmark$ I $\frac{1}{\cos^2\theta}$ A  $\checkmark$ S      A <p style="text-align: right;">(3)</p>
4.4	$2 \tan(x + 10^\circ) = 3,464$ $\tan(x + 10^\circ) = 1,732$ $\text{Ref. } \angle / \text{Verw. } \angle = 60^\circ$ $x = 60^\circ - 10^\circ \quad \text{or/of} \quad x = 180^\circ + 60^\circ - 10^\circ$ $x = 50^\circ \quad \quad \quad x = 230^\circ$ <p style="text-align: center;"><b>OR/OF</b></p> $2 \tan(x + 10^\circ) = 3,464$ $\tan(x + 10^\circ) = 1,732$ $x + 10^\circ = 60^\circ$ $x = 50^\circ$ <p>or/of</p> $x + 10^\circ = 180^\circ + 60^\circ$ $x = 230^\circ$	$\checkmark$ S      A $\checkmark$ $60^\circ$ A $\checkmark$ $50^\circ$ CA $\checkmark$ $230^\circ$ CA <p style="text-align: center;"><b>OR/OF</b></p> $\checkmark$ S      A $\checkmark$ $60^\circ$ A $\checkmark$ $50^\circ$ CA  $\checkmark$ $230^\circ$ CA <p style="text-align: right;">(4)</p>
<b>[15]</b>		

QUESTION/VRAAG 5		
5.1		<i>f</i> : ✓ Shape/Vorm      A ✓ <i>x</i> -int./afs.      A ✓ TP/DP              A <i>g</i> : ✓ Shape/Vorm      A ✓ TP/DP              A ✓ <i>x</i> -int./afs.      A (6)
5.2	$180^\circ$	✓ $180^\circ$ A (1)
5.3	$\sin 2x + 2\cos x = 0$ $\sin 2x = -2\cos x$ $\therefore x = 90^\circ$ or/of $x = 270^\circ$	✓ $90^\circ$ CA ✓ $270^\circ$ CA (2)
5.4	$-2 \leq y \leq 2$  <b>OR/OF</b> $y \in [-2; 2]$	✓ Endpoints/ <i>Eindpunte</i> A ✓ Notation/ <i>Notasie</i> A  <b>OR/OF</b> ✓ Endpoints/ <i>Eindpunte</i> A ✓ Notation/ <i>Notasie</i> A (2)
<b>[11]</b>		

## QUESTION/VRAAG 6



6.1	$\cos A = \frac{AB^2 + AC^2 - BC^2}{2 \cdot AB \cdot AC}$	✓ F      A
	$\cos A = \frac{6^2 + 7^2 - 8^2}{2 \cdot 6 \cdot 7}$	✓ $\cos A =$ A
	$\cos A = \frac{1}{4}$	✓ SF      A
	$\hat{A} = 75,5^\circ$	✓ S      A
	<b>OR/OF</b>	<b>OR/OF</b>
	$BC^2 = AB^2 + AC^2 - 2AB \cdot AC \cdot \cos \hat{A}$	✓ F      A
	$8^2 = 6^2 + 7^2 - 2(6)(7)\cos \hat{A}$	✓ SF      A
	$-21 = -84\cos \hat{A}$	✓ S      A
	$\cos \hat{A} = \frac{1}{4}$	✓ $\cos \hat{A} = \frac{1}{4}$ A
	$\hat{A} = 75,5^\circ$	(4)
6.2	$\widehat{BOC} = 2\widehat{BAC}$ $\angle \text{ at cent.} = 2 \times \angle \text{ at circ.}$ <i>mdpt. <math>\angle = 2 \times \text{omtr. } \angle</math></i>	✓ RE      A
	$\widehat{BOC} = 2(75,5^\circ)$	
	$\widehat{BOC} = 151^\circ$	✓ $151^\circ$ CA (2)

6.3	$\widehat{O\hat{B}C} = \frac{180^\circ - 151^\circ}{2}$ $\widehat{O\hat{B}C} = 14,5^\circ$ $\frac{OC}{\sin 14,5^\circ} = \frac{BC}{\sin 151^\circ}$ $OC = \frac{\sin 14,5^\circ \times 8}{\sin 151^\circ}$ $OC = 4,13$ <p><math>\therefore d = 2 \times OC = 2(4,13) = 8,26</math> units/eenhede</p> <p style="text-align: center;"><b>OR/OF</b></p> $BC^2 = OB^2 + OC^2 - 2OB \cdot OC \cdot \cos \widehat{B\hat{O}C}$ $8^2 = OB^2 + OB^2 - 2 \cdot OB \cdot OB \cdot \cos 151^\circ$ $64 = 2 \cdot OB^2 + 1,75 \cdot OB^2$ $3,75 \cdot OB^2 = 64$ $OB = 4,13$ <p><math>\therefore d = 2(4,13) = 8,26</math> units/eenhede</p>	<p>✓ 14,5° CA</p> <p>✓ SF CA</p> <p>✓ 4,13 CA</p> <p>✓ 8,26 CA</p> <p style="text-align: center;"><b>OR/OF</b></p> <p>✓ F A</p> <p>✓ SF CA</p> <p>✓ 4,13 CA</p> <p>✓ 8,26 CA</p> <p style="text-align: right;"><b>NPR/NPU</b> (4)</p>
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6.4	<p>Area of/Opp van <math>\Delta BOC = \frac{1}{2} \times OB \times OC \times \sin \widehat{BOC}</math></p> <p>Area of/Opp van <math>\Delta BOC = \frac{1}{2} \times 4,13 \times 4,13 \times \sin 151^\circ</math></p> <p>Area of/Opp van <math>\Delta BOC = 4,1 \text{ unit}^2/\text{eenheid}^2</math></p> <p style="text-align: center;"><b>OR/OF</b></p> <p>P/Omtrek <math>\Delta OBC = OB + OC + BC</math></p> <p>P/Omtrek <math>\Delta OBC = 16,26</math></p> <p>Semi – Perimeter/Omtrek <math>= \frac{P}{2} = \frac{16,26}{2} = 8,13</math></p> <p>A/Opp <math>\Delta OBC = \sqrt{\frac{P}{2} \left(\frac{P}{2} - OB\right) \left(\frac{P}{2} - OC\right) \left(\frac{P}{2} - BC\right)}</math></p> <p>A/Opp <math>\Delta OBC = \sqrt{8,13(4)(4)(0,13)}</math></p> <p>A/Opp <math>\Delta OBC = 4,1 \text{ units}^2/\text{eenhede}^2</math></p>	<p>✓ SF                      CA</p> <p>✓ 4,1                      CA</p> <p style="text-align: center;"><b>OR/OF</b></p> <p>✓ SF                      CA</p> <p>✓ 4,1                      CA</p> <p style="text-align: right;"><b>NPR/NPU</b>                      (2)</p>
<b>[12]</b>		

QUESTION/VRAAG 7			
7.1	the angle that the chord subtends in the alternate segment. <i>die hoek in die teenoorstaande sirkel segment.</i>	✓ RE	A (1)
7.2			
7.2.1	$\angle^s$ opp. = sides/ $\angle^e$ teenoor = sye	✓ RE	A (1)
7.2.2	$\textcircled{1} \hat{C}_1 = \hat{E}_2 = 35^\circ$ $\angle$ tan chord $\angle$ raaklyn koord $\textcircled{2} \hat{A} = \hat{C}_1 = 35^\circ$ $\angle$ tan chord $\angle$ raaklyn koord $\textcircled{3} \hat{C}_4 = \hat{E}_2 = 35^\circ$ $\angle^s$ opp = sides $\angle^e$ teenoor = sye <p style="text-align: center;"><b>OR/OF</b></p> $\textcircled{1} \hat{C}_1 = \hat{E}_2 = 35^\circ$ $\angle$ tan chord $\angle$ raaklyn koord $\textcircled{2} \hat{A} = \hat{E}_2 = 35^\circ$ $\angle^s$ in same segment $\angle^e$ in dies. segment $\textcircled{3} \hat{C}_4 = \hat{E}_2 = 35^\circ$ $\angle^s$ opp equal sides $\angle^e$ teenoor = sye	✓ ST/RE ✓ ST ✓ ST  ✓ ST/RE ✓ ST/RE ✓ ST	A A A  A A A (3)

7.2.3	$\widehat{ECB} = 90^\circ$	$\angle$ in semi-circle	✓ ST/RE	A
	$\widehat{B}_3 = 180^\circ - 90^\circ - 35^\circ$ $\widehat{B}_3 = 55^\circ$ $\widehat{C}_5 = \widehat{B}_3 = 55^\circ$	$\angle$ in halwe sirkel Int. $\angle\Delta$ / <i>binne <math>\angle^e\Delta</math></i> $\angle$ tan chord/ $\angle$ raaklyn koord	✓ ST ✓ ST	CA CA (3)
7.2.4	$\widehat{EOC} = 2 \times \widehat{CBO}$	$\angle$ at cent. = 2 x $\angle$ at circ.  <i>mdpt. <math>\angle = 2x</math> Omtr. <math>\angle</math></i>	✓ ST ✓ RE	A A (2)
	<b>[10]</b>			

QUESTION/VRAAG 8				
8.1	corresponding/ooreenstemmende		✓ ST	A (1)
8.2				
8.2.1	$\frac{BF}{CF} = \frac{AE}{CE}$ $\frac{r}{4} = \frac{12}{8}$ $r = 6$	prop theorem/ <i>eweredigheid</i> ; $EF \parallel AB$	✓ ST ✓ RE ✓ 6	A A CA (3)
8.2.2	Parallelogram.	Both pairs of opposite sides are parallel  <i>Twee pare teenoorst. sye ewewydig</i>	✓ ST ✓ RE	A A (2)

8.2.3	$\frac{AD}{DB} = \frac{AE}{EC}$ <p style="text-align: right;">prop theorem/<i>eweredigheid</i>; DE    BC</p> $\frac{t}{15} = \frac{12}{8}$ $t = \frac{45}{2}$ $t = 22,5 \text{ or/of } \frac{45}{2} \text{ or/of } 22\frac{1}{2}$	<p>✓ RE      A</p> <p>✓ ST      A</p> <p>✓ 22,5      CA</p> <p style="text-align: right;"><b>NPR</b>      (3)</p>
8.2.4	$\frac{AD}{EF} = \frac{22,5}{15} = \frac{3}{2}$ $\frac{AE}{EC} = \frac{12}{8} = \frac{3}{2}$ $\frac{DE}{FC} = \frac{6}{4} = \frac{3}{2}$ $\therefore \frac{AD}{EF} = \frac{AE}{EC} = \frac{DE}{FC}$ <p><math>\therefore \triangle ADE     \triangle EFC</math>      sides in prop./<i>sye in verhouding</i></p> <p><b>OR / OF</b></p> <p><math>\hat{A} = \hat{E}_1</math>      Corr. <math>\angle^s =</math>; AB//EF Ooreenst. <math>\angle^e =</math>; AB//EF</p> <p><math>\hat{E}_3 = \hat{C}</math>      Corr. <math>\angle^s =</math>; DE//BC Ooreenst. <math>\angle^e =</math>; DE//BC</p> <p><math>\hat{D}_1 = \hat{F}_2</math>      3<sup>rd</sup> <math>\angle \Delta</math> 3<sup>de</sup> <math>\angle \Delta</math></p> <p><math>\therefore \triangle ADE     \triangle EFC</math>      [<math>\angle, \angle, \angle</math>]</p>	<p>✓ ST      CA</p> <p>✓ ST      CA</p> <p>✓ ST      CA</p> <p>✓ RE      CA</p> <p><b>OR / OF</b></p> <p>✓ ST/RE      CA</p> <p>✓ ST      CA</p> <p>✓ ST      CA</p> <p>✓ RE      CA</p> <p style="text-align: right;">(4)</p>
<b>[13]</b>		

QUESTION/VRAAG 9				
9.1				
9.1.1	$\hat{S} = \hat{S}$	Common $\angle$ /Gemeensk. $\angle$	✓ ST/RE	A
	$\hat{Q} = \hat{XYS}$	Both/Beide $90^\circ$ (Given / Gegee)	✓ ST/RE	A
	$\hat{R} = \hat{XYS}$	$3^{rd} \angle \Delta / 3^{e} \angle \Delta$	✓ ST/RE	A
	$\Delta SYX \parallel \Delta SQR$	$[\angle, \angle, \angle]$	✓ RE	A (4)
9.1.2	$\frac{SY}{SX} = \frac{SQ}{SR}$		✓ SR	A (1)
9.1.3	$\frac{SY}{SX} = \frac{SQ}{SR}$ $\frac{SY}{25} = \frac{30}{SY + 4\sqrt{5}}$ $SY(SY + 4\sqrt{5}) = 750$  $SY^2 + 4\sqrt{5}SY - 750 = 0$  $SY = \frac{-4\sqrt{5} \pm \sqrt{(4\sqrt{5})^2 - 4(1)(-750)}}{2(1)}$ $SY = 23,28$ or/of $SY = -32,22$ N. A./N. v. T.		✓ SF	A
			✓ S	CA
			✓ SF	CA
			✓ 23,28	CA
			<b>NPR/NPU</b>	(4)

9.2	9.2.1	$\frac{\text{Area } \Delta SYX}{\text{Area } \Delta SQR} = \frac{\frac{1}{2} \times (YS)(XY)}{\frac{1}{2} \times (QS)(QR)}$ $\frac{\text{Area } \Delta SYX}{\text{Area } \Delta SQR} = \frac{\frac{1}{2} \times (23,28)(5\sqrt{5})}{\frac{1}{2} \times (30)(15)}$ $\frac{\text{Area } \Delta SYX}{\text{Area } \Delta SQR} = 0,60 \text{ units}^2/\text{eenhede}^2$	✓ SF	CA
	9.2.2	$A_{QRYS} = A_{\Delta SQR} - A_{\Delta SYX}$ $A_{QRYS} = \frac{1}{2} (30)(15) - \frac{1}{2} (23,28)(5\sqrt{5})$ $A_{QRYS} = 225 - 130,39 \dots$ $A_{QRYS} = 94,86 \text{ units}^2/\text{eenhede}^2$	✓ M ✓ SF	A CA
			✓ 0,60 NPR/NPU	CA (3)
			✓ 94,86 NPR/NPU	CA (3)
<b>[15]</b>				

QUESTION/VRAAG 10		
10.1	$n = \frac{11000}{60}$ $n = \frac{550}{3} \text{ rev/s}$ $n = 183,33 \text{ rev/s}$	✓ 183,33    A <b>NPR/NPU</b> (1)
10.2	$v = \pi Dn$ $v = \pi(0,32) \left( \frac{11000}{60} \right)$ $v = 58,6667\pi \text{ m/s}$ $v = 184,30 \text{ m/s}$	✓ F    A ✓ SF    A  ✓    CA <b>NPR/NPU</b> (3)
10.3	$\omega = 2\pi n$ $\omega = 2\pi \left( \frac{11000}{60} \right)$ $\omega = 366,67\pi \text{ rad/s}$ $\omega = 1151,90 \text{ rad/s}$	✓ F    A ✓ SF    CA  ✓    CA 1151,90 <b>NPR/NPU</b> (3)

10.4	<p>In <math>\triangle ODC</math>:</p> $\frac{OD}{16} = \sin 30^\circ \quad \text{OR/OF} \quad \frac{OD}{16} = \cos 60^\circ$ $OD = 16 \sin 30^\circ \quad \text{OR/OF} \quad OD = 16 \cos 60^\circ$ $OD = 8 \text{ cm}$ $h = 16 - OD = 16 - 8$ $h = 8 \text{ cm}$	$\checkmark \frac{OD}{16}$ A $\checkmark \sin 30^\circ$ <b>OR/OF</b> $\cos 60^\circ$ A  $\checkmark 8$ CA (3)
10.5	$4h^2 - 4dh + x^2 = 0$ $4(8)^2 - 4(2 \times 16)(8) + x^2 = 0$ $256 - 1024 + x^2 = 0$ $x^2 = 768$ $x = 16\sqrt{3}$ $x = 27,71 \text{ cm}$ <p style="text-align: center;"><b>OR/OF</b></p> $AC^2 = OA^2 + OC^2 - 2 \cdot OA \cdot OC \cdot \cos 120^\circ$ $AC^2 = 16^2 + 16^2 - 2(16)(16) \cdot \cos 120^\circ$ $AC = 16\sqrt{3} = 27,71 \text{ cm}$	$\checkmark F$ A $\checkmark SF$ A  $\checkmark 27,71$ CA <p style="text-align: center;"><b>OR/OF</b></p> $\checkmark F$ A $\checkmark SF$ A $\checkmark 27,71$ CA <b>NPR/NPU</b> (3)
<b>[13]</b>		



QUESTION/VRAAG 11		
11.1	$80^\circ \times \frac{\pi}{180^\circ}$ $= \frac{4}{9}\pi$ $= 1,4 \text{ radians}$	✓ 1,4      A <b>NPR/NPU</b> (1)
11.2	$s = r\theta$ $s = (7) \left(\frac{4}{9}\pi\right)$ $s = 9,77 \text{ cm}$	✓ F      A ✓ SF      CA ✓ 9,77      CA <b>NPR/NPU</b> (3)
11.3	$A_{\text{Bigger Sector}} = \frac{sr}{2}$ $A_{\text{Bigger Sector}} = \frac{(9,77)(7)}{2}$ $A_{\text{Bigger Sector}} = 34,20 \text{ cm}^2$ $A_{\text{Smaller Sector}} = \frac{r^2\theta}{2}$ $A_{\text{Smaller Sector}} = \frac{(3)^2 \left(\frac{4}{9}\pi\right)}{2}$ $A_{\text{Smaller Sector}} = 6,26 \text{ cm}^2$ $A_T = 34,20 - 6,28$ $A_T = 27,92 \text{ cm}^2$	✓ 34,20      CA  ✓ 6,26      CA  ✓ M      A ✓ 27,92      CA <b>NPR/NPU</b> (4)
<b>[8]</b>		

QUESTION/VRAAG 12			
12.1			
12.1.1	$15^2 = 9^2 + (8 + y)^2$ $144 = (8 + y)^2$ $12 = 8 + y$ $y = 4 \text{ cm}$	✓ M ✓ S ✓ 4	A CA CA (3)
12.1.2	$V = V_{\text{cone/keël}} - V_{\text{cut-off/afsnij}}$ $V = \frac{1}{3}\pi r^2 H - \frac{1}{3}\pi r^2 y$ $V = \frac{1}{3}(3,14)(9)^2(4 + 8) - \frac{1}{3}(3,14)(3)^2(4)$ $V = 1017,36 - 37,64$ $V = 979,72 \text{ cm}^3$	✓ M ✓ SF ✓ 979,72	A A CA (3)
		<b>PR</b>	(3)

	<p>12.1.3</p> $TSA = SA_{\text{cone/keël}} - SA_{\text{cut-off/afsnj}} + SA_{\text{BASE/BASIS}}$ $SA_{\text{cone/keël}} = (3,14)(9)(15)$ $SA_{\text{cone/keël}} = 423,9 \dots \text{cm}^2$ $l_{\text{cut-off/afsnj}} = \sqrt{4^2 + 3^2} = 5 \text{cm}$ $SA_{\text{cut-off/afsnj}} = (3,14)(3)(5)$ $SA_{\text{cut-off/afsnj}} = 47,1 \dots \text{cm}^2$ $SA_{\text{BASE/BASIS}} = (3,14)(3)^2 = 28,26 \dots \text{cm}^2$ $TSA = 423,9 - 47,1 + 28,26$ $TSA = 405,06 \text{cm}^2$ $\text{Number of tins/Aantal blikkies} = \frac{405,06}{90}$ $\text{Number of tins/Aantal blikkies} = 4,5 \dots = 5 \text{ tins/blikkies}$	<p>✓ 423,9 CA</p> <p>✓ 5 A</p> <p>✓ 47,1 CA</p> <p>✓ 28,26 CA</p> <p>✓ 5 CA</p> <p>(5)</p>
12.2	$A_T = a \left( \frac{O_1 + O_n}{2} + O_2 + O_3 + \dots + O_{n-1} \right)$ $A_T = 5 \left( \frac{7,4 + 8,1}{2} + 6,9 + 5,6 + 7,8 + 6,7 + 7,4 \right)$ $A_T = 5(42,15)$ $A_T = 210,75 \text{m}^2$	<p>✓ F A</p> <p>✓ SF A</p> <p>✓ 210,75 CA</p> <p>(3)</p>
<b>[14]</b>		

**TOTAL/TOTAAL: 150**