



Province of the
EASTERN CAPE
EDUCATION

LEARNER NAME <i>LEERDER NAAM</i>	<i>Solns</i>	<i>SUT</i>
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NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

MATHEMATICS P2 / WISKUNDE V2

GRADE 11 / GRAAD 11

NOVEMBER 2016

SPECIAL ANSWER BOOK
SPESIALE ANTWOORDEBOEK

QUESTION / VRAAG	MARK / PUNT	INITIAL / PARAF.	MOD./ GEMOD.
1			
2			
3			
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6			
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11			
12			
TOTAL/TOTAAL			



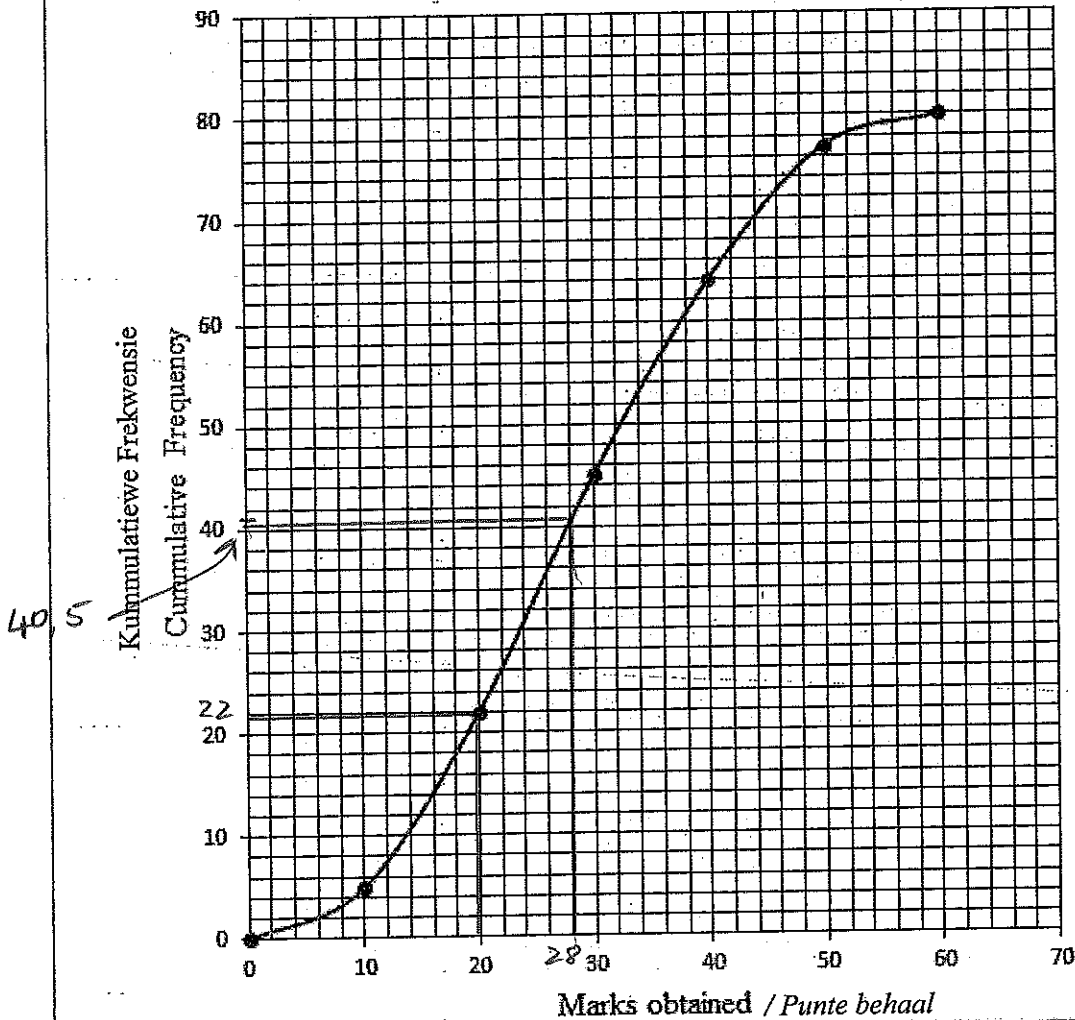
* I W I S A B 2 *

This answer book consists of 22 pages. /
Hierdie antwoordboek bestaan uit 22 bladsye.

QUESTION 1 / VRAAG 1	
1.1.1	$M = T_{\frac{1}{2}}(1+15) = T_8 = 26 \rightarrow$ (1)
1.1.2	$T_1; \dots; T_7 \therefore Q_1 = T_{\frac{1}{4}}(1+7) = T_4 = 19$
	$T_9; \dots; T_{15} \therefore Q_3 = T_{\frac{3}{4}}(9+15) = T_{12} = 33$
	$\therefore IQR = 33 - 19$
	$= 14 \rightarrow$ (3)
1.1.3	$\bar{x} = 26,13 \rightarrow$
	(2)
1.1.4	$\sigma = 7,77 \rightarrow$
	(2)
1.2	$\bar{x} \pm \sigma = 26,13 \pm 7,77 = 18,36 \text{ or } 33,9$
	Outside $\therefore 12; 15; 15; 35; 35$
	$\therefore \frac{5}{15} \times 100 = 33,33 \% \rightarrow$
	(3)
	[11]
Additional space / Bykomende ruimte	
T	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
	12 15 15 (19) 22 23 26 (26) 32 33 33 (33) 33 35 35
	Q_1 M Q_3
	18,36 33,9

QUESTION 2 / VRAAG 2

Kumulatiewe Frekwensie vir die punte behaal
 Cumulative frequency for the marks obtained



2.1

80 learners



(1)

2.2

$$\leq \frac{20}{60} = 22 \quad \geq \frac{20}{60} \approx 80 - 22 = 58$$

question should say "more than 20"

(2)

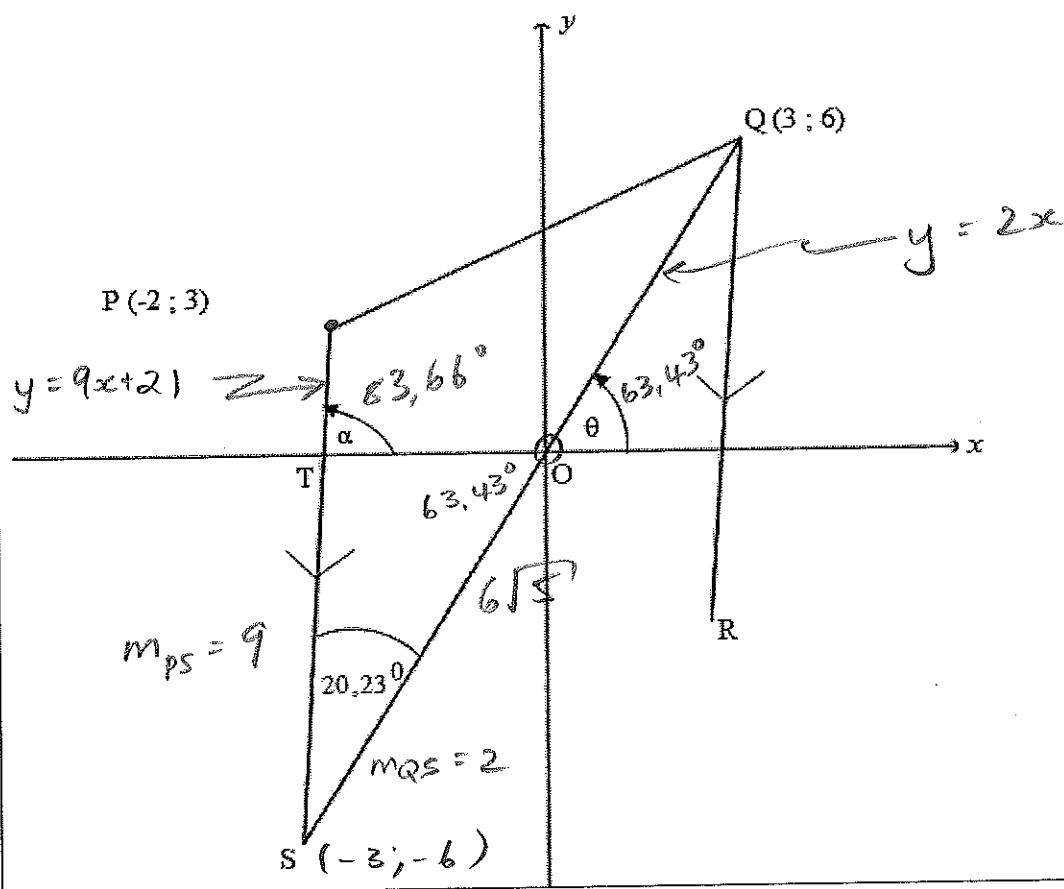
2.3

$$M = T_{\frac{1}{2}(1+80)} = T_{40,5} = 28 \text{ (out of 60)}$$

(2)

2.4	Marks obtained / Punte behaal	Frequency / Frekwensie	cum freq	(5)
	$0 < x \leq 10$	5	5	
	$10 < x \leq 20$	17	22	
	$20 < x \leq 30$	23	45	
	$30 < x \leq 40$	19	64	
	$40 < x \leq 50$	13	77	
	$50 < x \leq 60$	3	80	
2.5	$20 < x \leq 30$			(1)
				[11]
Additional space / Bykomende ruimte				

QUESTION 3 / VRAAG 3



3.1	$m_{QS} = \frac{6 - 0}{3 - 0}$ $= 2$	$Q(3;6) \quad O(0;0) \quad S$	(2)
3.2	$\tan \theta = 2$ $\theta = 63,43\dots^\circ$ $\tan \theta = m$	$\therefore \theta = 63,43^\circ$	(2)

3.3.1	$\hat{tOS} = 63,43^\circ \text{ vert opp } ^{NS} =$ $\alpha = 83,66^\circ \text{ Ext } \Delta$ $\therefore \tan 83,66^\circ = m_{PS}$ $\quad \quad \quad \downarrow$ $\quad \quad \quad \underline{9} = m_{PS}$	(4)
3.3.2	$y = 9x + c$ $\text{sub } P(-2; 3)$ $3 = 9(-2) + c$ $21 = c$ $\therefore \underline{y = 9x + 21}$	(3)
3.4	$y = 9x + 21 \quad \dots 1 \quad y = 2x \quad \dots 2$ $\therefore 9x + 21 = 2x$ $7x = -21$ $x = -3$ $\therefore y = 2(-3)$ $= -6$ $\therefore \underline{S(-3; -6)}$	(4)

<p>3.5</p>	<p>QS Q(3;6) S(-3;-6)</p> $= \sqrt{(6 - (-6))^2 + (3 - (-3))^2}$ $= \sqrt{180}$ $= \sqrt{36 \cdot 5}$ $= \sqrt{36} \cdot \sqrt{5}$ $= 6\sqrt{5}$	<p>(3)</p>				
<p>3.6</p>	<p>PS P(-2;3) S(-3;-6)</p> $= \sqrt{(-6 - 3)^2 + (-3 - (-2))^2}$ $= \sqrt{82}$ <p>\therefore area ΔPQS</p> $= \frac{1}{2} (\sqrt{82})(6\sqrt{5}) \sin 20,23^\circ$ $= 21,01 \text{ units}^2$	<p>(5)</p>				
<p>3.7</p>	<p> $P(-2;3) \xrightarrow[9 \downarrow]{1 \leftarrow} S(-3;-6)$ $Q(3;6) \xrightarrow[9 \downarrow]{1 \leftarrow} R(2;-3)$ </p>	<p>(3)</p>				
<p>3.8</p>	<p> $m_{AB} = \frac{4 - (-1)}{5 - 0} = 1$ A(5;4) B(0;-1) $m_{BC} = \frac{2 - (-1)}{t} = \frac{3}{t}$ B(0;-1) C(t;2) </p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;"> Cell : $m_{AB} = m_{BC}$ </td> <td style="padding: 5px;"> $\therefore t = 3$ </td> </tr> <tr> <td style="padding: 5px;"> $1 = \frac{3}{t}$ </td> <td style="padding: 5px;"> $\xrightarrow{\hspace{2cm}}$ </td> </tr> </table>	Cell : $m_{AB} = m_{BC}$	$\therefore t = 3$	$1 = \frac{3}{t}$	$\xrightarrow{\hspace{2cm}}$	<p>(4)</p>
Cell : $m_{AB} = m_{BC}$	$\therefore t = 3$					
$1 = \frac{3}{t}$	$\xrightarrow{\hspace{2cm}}$					
		<p>[30]</p>				

QUESTION 4 / VRAAG 4

4.1.1

$$\sin \beta = \frac{4}{p} \quad p > 0 \quad \cos \beta = -\frac{3}{p}$$

$$= +$$

$$= -$$

$$= \text{I } \textcircled{\text{II}}$$

$$= \textcircled{\text{II}} \text{ III}$$

$$\therefore \text{Q II}$$

$$\therefore \underline{\beta \in [90^\circ; 180^\circ]}$$

(3)

4.1.2

$$\tan \beta = \frac{\sin \beta}{\cos \beta}$$

$$= \frac{4}{p} \div -\frac{3}{p}$$

$$= \frac{4}{p} \times -\frac{p}{3}$$

$$= -\frac{4}{3}$$

D

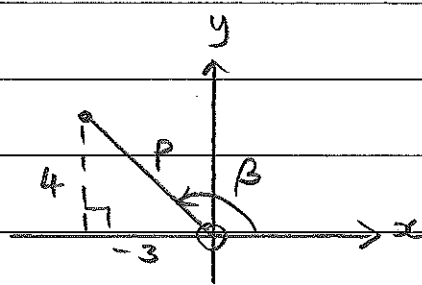
(2)

4.1.3

$$\tan \beta = -\frac{4}{3} \quad \frac{4}{-3} \quad \frac{y}{x}$$

$$\sin \beta = \frac{4}{p} \quad \frac{y}{r}$$

$$\therefore p = 5 \quad \text{Pythag}$$



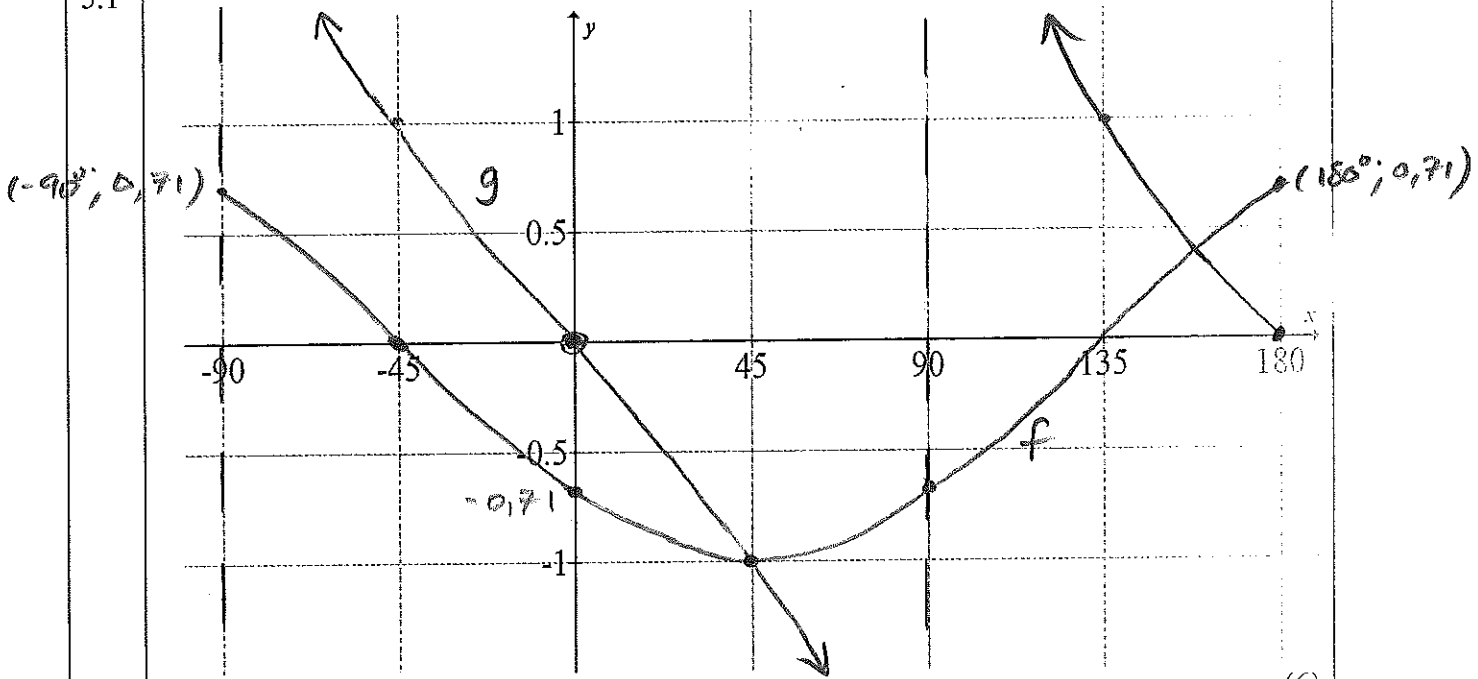
(2)

<p>4.2</p>	$\begin{aligned} \bullet \sin 143^\circ &= \sin(180^\circ - 37^\circ) \bullet \sin 53^\circ = \sin(90^\circ - 37^\circ) \\ &= \sin 37^\circ & &= \cos 37^\circ \\ \bullet \cos 127^\circ &= \cos(90^\circ + 37^\circ) \\ &= -\sin 37^\circ \end{aligned}$ $\begin{aligned} \therefore (\sin 37^\circ)(-\sin 37^\circ) - (\cos 37^\circ)\cos 37^\circ \\ &= -\sin^2 37^\circ - \cos^2 37^\circ \\ &= -(\sin^2 37^\circ + \cos^2 37^\circ) = \underline{\underline{-1}} \end{aligned}$	<p>(5)</p>
<p>4.3</p>	$\begin{aligned} \text{LHS} &= \left(\tan y + \frac{1}{\tan y}\right)(1 - \cos^2 y) \\ &= \left(\frac{\sin y}{\cos y} + \frac{1}{\frac{\sin y}{\cos y}}\right)(\sin^2 y) \\ &= \left(\frac{\sin y}{\cos y} + \frac{\cos y}{\sin y}\right) \sin^2 y \\ &= \left(\frac{\sin^2 y + \cos^2 y}{\sin y \cos y}\right) \sin^2 y \\ &= \left(\frac{1}{\sin y \cos y}\right) \cdot \frac{\sin^2 y}{1} \\ &= \frac{\sin y}{\cos y} \\ &= \tan y \\ &= \underline{\underline{\text{RHS}}} \end{aligned}$	<p>(6)</p>

4.4	$\cos \theta - \frac{1}{\cos \theta} = \frac{5}{6}$	$\text{II: } \theta = 131,81^\circ + k360^\circ$	(6) [24]
	$L\cos = 6\cos \theta$	$\text{III: } \theta = 228,19^\circ + k360^\circ$	
	$(\therefore \cos \theta \neq 0)$	$(k \in \mathbb{Z})$	
	$x \text{ km}$		
	$6\cos^2 \theta - 6 = 5\cos \theta$		
	$6\cos^2 \theta - 5\cos \theta - 6 = 0$		
	$(2\cos \theta - 3)(3\cos \theta + 2) = 0$		
	$\therefore \cos \theta = \frac{3}{2} \text{ or } -\frac{2}{3}$		
	$\text{no soln} \rightarrow \text{ref}^\wedge = 48,18\dots^\circ$		
	$\cos = \text{in}$		
Additional space / Bykomende ruimte			

QUESTION 5 / VRAAG 5

5.1



(6)

5.2

$$f(x) - g(x) \leq 0$$

$$y_f \leq y_g$$

$$y_f - y_g \leq 0$$

$$x \in (-90^\circ; 45^\circ]$$

(2)

5.3

$$f(x) = -\cos(45^\circ - x) = \cos(45^\circ - x + 45^\circ)$$

$$h(x)$$

$$= \cos(90^\circ - x)$$

$$= -f(x - 45^\circ)$$

$$= \sin x$$

$$= -[-\cos(45^\circ - (x - 45^\circ))]$$

(2)

[10]

(OR)

• reflect in x-axis

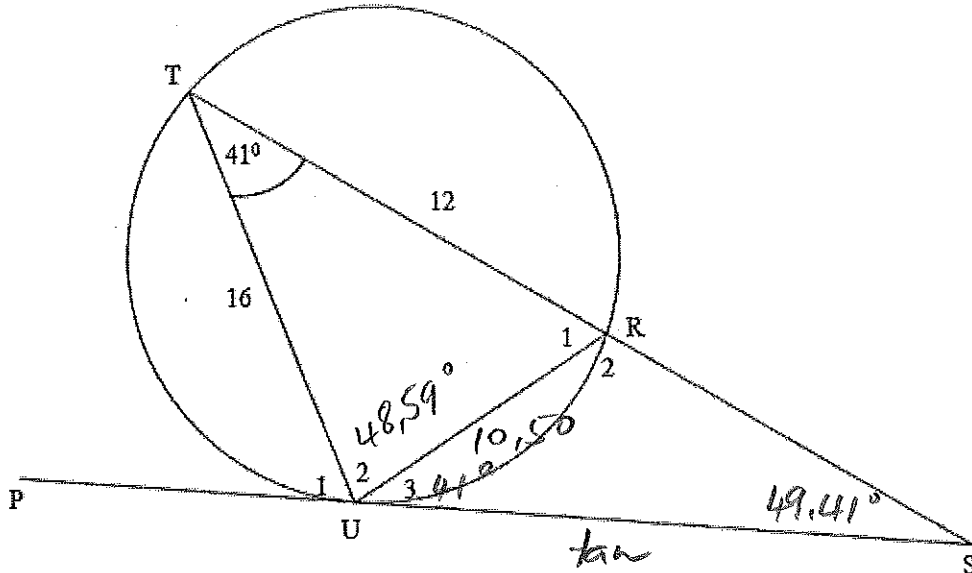
• $45^\circ \rightarrow$

$$\therefore h(x) = \sin x$$

QUESTION 6 / VRAAG 6

6.1 $c^2 = a^2 + b^2 - 2ab \cos C$ (1)

6.2



6.2.1 $UR^2 = 16^2 + 12^2 - 2 \cdot 16 \cdot 12 \cdot \cos 41^\circ$
 $= 110,19 \dots$
 $\therefore UR = \sqrt{110,19 \dots}$ \ominus reject
 $= 10,50 \text{ cm}$ \rightarrow (3)

6.2.2 $12^2 = 16^2 + 10,50^2 - 2 \cdot 16 \cdot 10,50 \cdot \cos \hat{U}_2$
 $\frac{127}{192} = \cos \hat{U}_2$
 $\text{ref}^\wedge = 48,58 \dots^\circ$
 $\cos + \text{in}^\wedge$
 $I: \hat{U}_2 = 48,59^\circ$ \rightarrow (3)

6.2.3

$$\hat{U}_3 = 41^\circ$$

^ tan chord

$$\therefore \hat{U}_{2+3} = 89,59^\circ$$

$$\therefore \hat{S} = 49,41^\circ \quad \wedge \text{ } \Delta = 180^\circ$$

$$\frac{TRS}{\sin 89,59^\circ} = \frac{16}{\sin 49,41^\circ}$$

$$TRS = \underline{21,07 \text{ cm}}$$

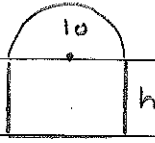
(5)

[12]

Additional space / Bykomende ruimte

QUESTION 7 / VRAAG 7

7.1



$$7500 \text{ cm} = 75 \text{ m}$$

$$\downarrow +10$$

$$h = 75 - 10$$

$$= 65 \text{ m}$$

$$BA = \pi(10)^2 + \frac{1}{2}(4\pi(10)^2) + 2\pi(10)(65)$$

$$= 314,15... + 628,31... + 4084,07...$$

$$= \underline{5026,55 \text{ m}^2}$$

if base excluded: $4712,39 \text{ m}^2$

(5)

7.2

$$V = \frac{1}{2} \left(\frac{4}{3} \pi (10)^3 \right) + \pi (10)^2 (65)$$

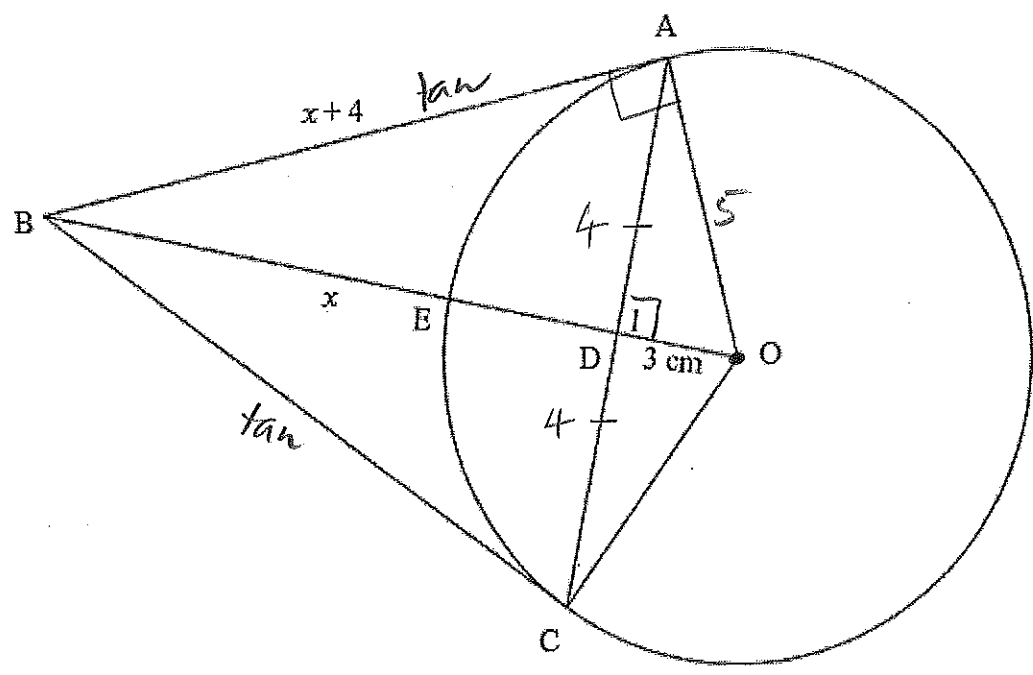
$$= 2094,39... + 20420,35...$$

$$= \underline{22514,75 \text{ m}^3}$$

(5)

[10]

QUESTION 8 / VRAAG 8



8.1 $\hat{D}_1 = 90^\circ$ \rightarrow line from centre O to mdpt chord (2)

8.2 $AD = DC = 4$
 $OA = 5 \text{ cm}$ \rightarrow given
 Pythag

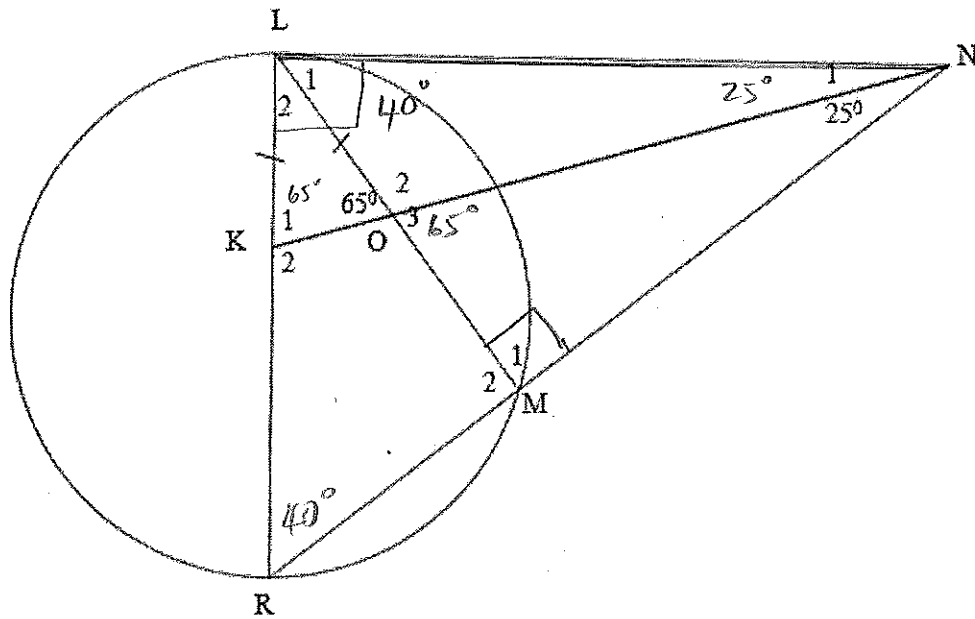
2
~~(4)~~

8.3 $\hat{A} \text{ ??? } \hat{BAO} ? \hat{BAD} ? \hat{DAO} ?$
 Should be clearly asked !!!
 $\hat{BAO} = 90^\circ$ \rightarrow tan \perp rad (2)

8.5 8.4.	$OE = 5$	radius	
	$\therefore BO = x + 5$		
	$(x+5)^2 = (x+4)^2 + 5^2$	Pythag	
	$x^2 + 10x + 25 = x^2 + 8x + 16 + 25$		
	$2x = 16$		
	$x = 8 \text{ cm} \rightarrow$		
			(4)
			[10]
	Additional space / Bykomende ruimte		

*

QUESTION 9 / VRAAG 9



9.1

$$\hat{O}_3 = 65^\circ$$

$$\therefore \hat{M}_1 = 90^\circ$$

\therefore LN is diam



vert opp \hat{N} 's =

$$\hat{N}$$
's $\Delta = 180^\circ$

conv \hat{N} in semi $\odot = 90^\circ$

(5)

9.2

\hat{L} ??? \hat{L}_{1+2} ? \hat{L}_1 ? \hat{L}_2 ?

Should be clearly asked !!!

$$\hat{N}_1 = 25^\circ$$

$$\hat{K}_1 = 65^\circ$$

$$\therefore \hat{L}_{1+2} = 90^\circ$$



given, bisected

\hat{N} 's opp = sides

$$\hat{N}$$
's $\Delta = 180^\circ$

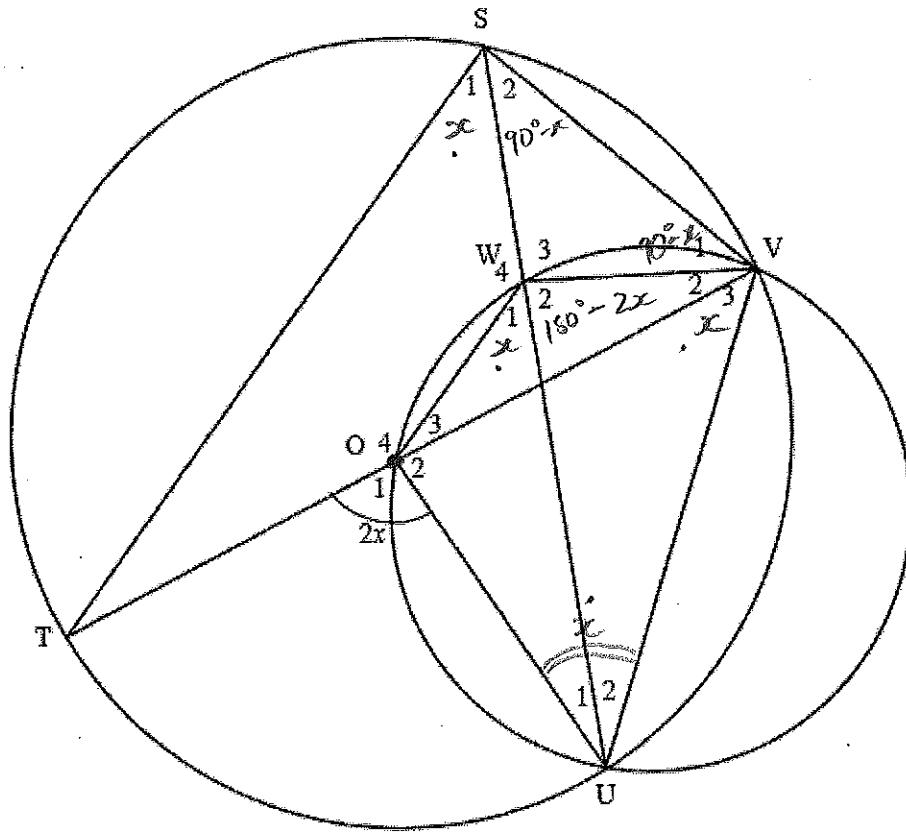
(5)

9.3	$\hat{L}_1 = 40^\circ$	$\wedge^1 S \Delta = 180^\circ$	(3)
	but $\hat{R} = 40^\circ$	$\wedge^1 S \Delta = 180^\circ$	
	$\therefore \hat{L}_1 = \hat{R}$	both $= 40^\circ$	
9.4	$\therefore LN$ is tan \rightarrow	conv \wedge tan chord	(2)
			[15]

Additional space / Bykomende ruimte

9.4.	$\hat{L}_{1+2} = 90^\circ$	9.2.	
	$\therefore LR$ is diam \rightarrow	conv tan \perp rad	

QUESTION 10 / VRAAG 10



10.1

$\hat{S}_1 = x$

$\hat{\text{at centre}} = 2 \hat{\text{at O'ca}}$

$\hat{V}_3 = x$

$\hat{\text{in same O segm}} =$

$\hat{U}_{1+2} = x$

ext $\hat{\Delta}$

$\hat{W}_1 = x$

$\hat{\text{in same O segm}} =$

(8)

10.2	$\hat{W}_2 + x + x = 180^\circ$ $\therefore \hat{W}_2 = 180^\circ - 2x \rightarrow$	opp $\hat{\Delta}$'s cyclic quad $= 180^\circ$	(4)
10.3	$\hat{S}_2 = 90^\circ - x$ $180^\circ - 2x = 90^\circ - x + \hat{V}_1$ $\therefore 90^\circ - x = \hat{V}_1$ $\therefore \hat{V}_1 = \hat{S}_2$ $\therefore SW = WV \rightarrow$	$\hat{\Delta}$ in semi $\circ = 90^\circ$ ext $\hat{\Delta}$ both $= 90^\circ - x$ sides opp $= \hat{\Delta}$'s	(5)
	Additional space / Bykomende ruimte	[17]	