Province of the
EASTERN CAPE
EDUCATION

LEARNER'S NAME: *LEERDER SE NAAM:*	SLT Solns

GRADE 11/*GRAAD 11*	

NATIONAL/*NASIONALE* SENIOR CERTIFICATE/*SERTIFIKAAT*

GRADE 11/*GRAAD 11*

NOVEMBER 2022

MATHEMATICS P2/*WISKUNDE V2*
SPECIAL ANSWER BOOK/*SPESIALE ANTWOORDEBOEK*

Marker/*Merker*				Moderator's initials / *Moderator se voorletters*																	
Question *Vraag*	Mark *Punt*			Initial Voorletters	Marks *Punte*			S M	Marks *Punte*			D M	Marks *Punte*			P M	Marks *Punte*			N M
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
TOTAL/ *TOTAAL*																				

This special answer book consists of 20 pages./
Hierdie spesiale antwoordeboek bestaan uit 20 bladsye.

IMAT4

QUESTION 1/*VRAAG 1*

3 4 5 6 7 7 8 8 8 10
T_1 T_2 T_3 T_4 T_5 T_6 T_7 T_8 T_9 T_{10}
(Q_1 = 5, M = 7, Q_3 = 8)

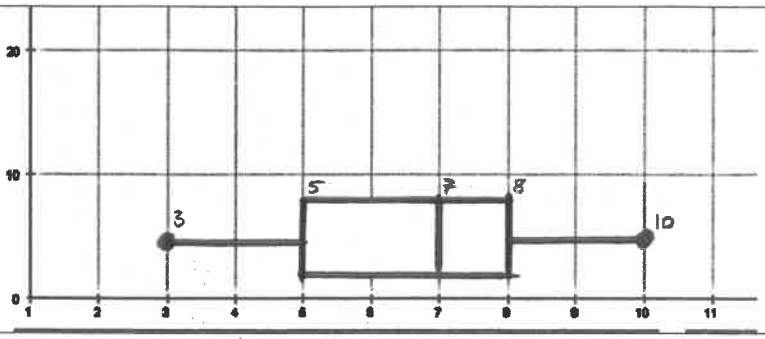
1.1 $\bar{x} = \frac{3+4+5+\ldots+10}{10} = 6,60$ ✓ hrs ✓ 6,6 (1) — 1

1.2

min	Q_1	M	Q_3	max
3	5	7	8	10

✓ min max ✓ Q_1, M, Q_3 (2) — 2

1.3



✓ box ✓ whiskers (2) — 2

1.4 $M - Q_1 = 7 - 5 = 2$ & $Q_3 - M = 8 - 7 = 1$ ✓

$M - Q_1 > Q_3 - M$ ∴ data skewed to the left ✓ (negatively skewed). (2) — 2

1.5 $\sigma = 2,01$ hrs ✓✓ (2) — 2

1.6 $\bar{x} + \sigma = 6,60 + 2,01 = 8,61$ ✓

$10 > 8,61$

∴ one learner ✓ (2) — 2

[11]

QUESTION 2/*VRAAG 2*

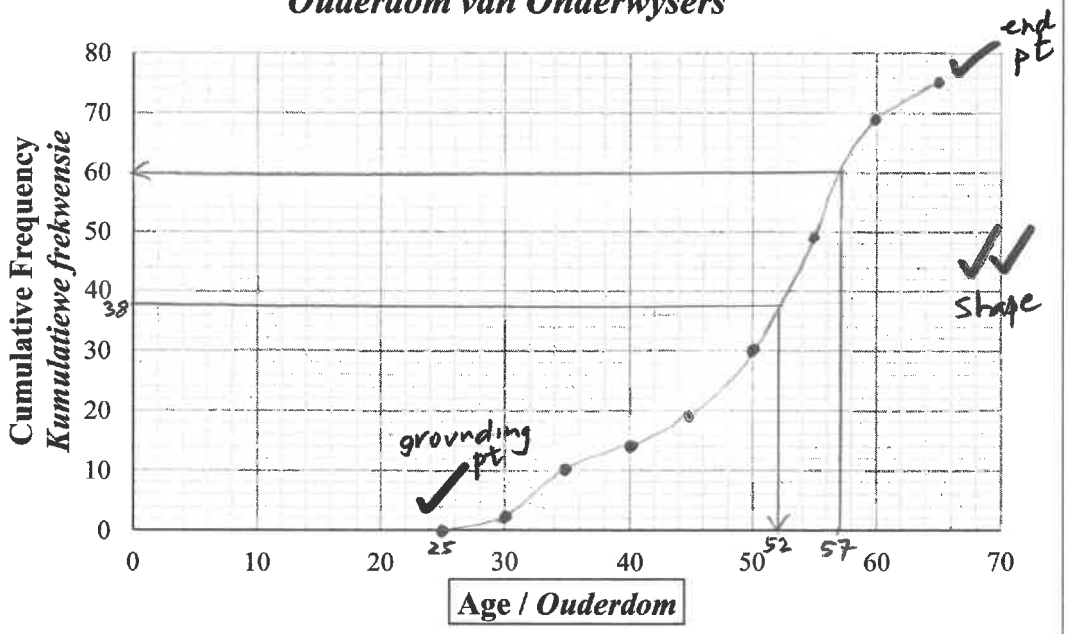
2.1

Age *Ouderdom*	Frequency *Frekwensie*	Cumulative Frequency *Kumulatiewe Frekwensie*
$25 < A \leq 30$	2	2
$30 < A \leq 35$	8	10
$35 < A \leq 40$	4	14
$40 < A \leq 45$	5	19
$45 < A \leq 50$	11	30
$50 < A \leq 55$	19	49
$55 < A \leq 60$	20	69
$60 < A \leq 65$	6	75

✓ ✓ 2

(2)

2.2



4

(4)

2.3

$T_1; \cdots; T_{75}$ $M = T_{\frac{1}{2}(n+75)} = T_{38} = 52$ yrs

51 - 53

2

(2)

2.4

$\leq 57 = 60$ $\therefore$ $> 57 = 75 - 60 = 15$ ✓

$\therefore \frac{15}{75} \times 100$

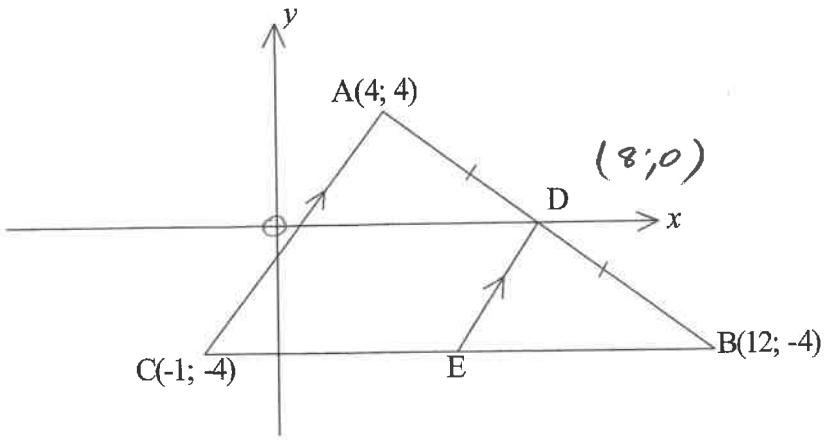
$= 20\ \%$ ✓

2

(2)

[10]

QUESTION 3/*VRAAG 3*



3.1

$AB = \sqrt{(-4-4)^2 + (12-4)^2}$ ✓ $= \sqrt{128}$ $8\sqrt{2}$

$= 11,31$ ✓ 2dp

(2)

3.2

$x_D = \frac{12+4}{2}$ $\quad y_D = \frac{4+(-4)}{2}$

$= 8$ $\quad = 0$

$\therefore D(8;0)$ ✓✓

(2)

3.3

$m_{AC} = \frac{4-(-4)}{4-(-1)} = \frac{8}{5}$ ✓

$\therefore m_{DE} = \frac{8}{5}$ //

$y = \frac{8}{5}x + c$

Sub $D(8;0)$ $\quad 0 = \frac{8}{5} \cdot 8 + c$ ✓

$-\frac{64}{5} = c$ ✓

$\therefore y = \frac{8}{5}x - \frac{64}{5}$ ✓ 1,6 −12,8

(4)

3.4

$E(x;-4)$ $\quad -4 = \frac{8}{5}x - \frac{64}{5}$ ✓ OR horizontal

$\frac{44}{5} = \frac{8}{5}x$

$\frac{11}{2} = x$

$\therefore E\left(\frac{11}{2}; -4\right)$ 5,5

✓✓

(3)

[11]

3.4 (OR) $CE = EB$ ✓R line through midpt ∥ to 2nd side

$x_E = \frac{-1 + 12}{2}$ $\quad y_E = -4$

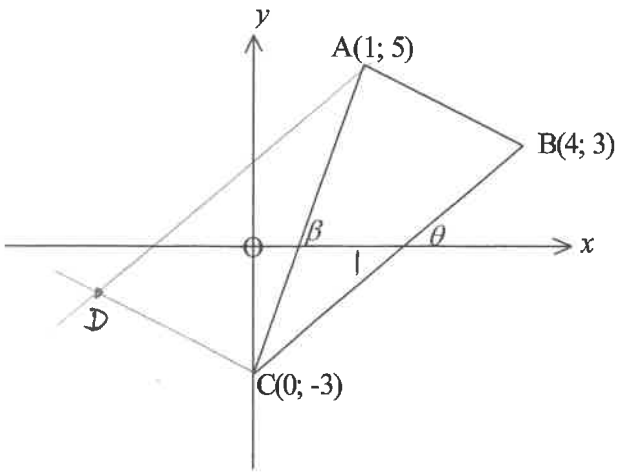
$= \frac{11}{2}$

3

$\therefore E\left(\frac{11}{2}; -4\right)$ ▷

✓ ✓

QUESTION 4/*VRAAG 4*



4.1

$B(4;3) \xrightarrow[\leftarrow 3]{\uparrow 2} A(1;5)$ ✓

$C(0;-3) \xrightarrow[\leftarrow 3]{\uparrow 2} D(-3;-1)$ ✓

2

(2)

4.2

$CF = \sqrt{(p-(-3))^2 + (8-0)^2} = \sqrt{(p+3)^2 + 64}$

Now, $\sqrt{(p+3)^2 + 64} = 12$ ✓

()²bs $(p+3)^2 + 64 = 144$ ✓

$(p+3)^2 = 80$ ✓

$p+3 = \pm\sqrt{80}$

$p+3 = \sqrt{80}$ or $p+3 = -\sqrt{80}$

$p = 5,94\ldots$ $p = -11,94\ldots$

$\therefore p = 6$ ✓ $= -12$ ✓

nearest $\in \mathbb{Z}$

5

(5)

(OR)

$p^2 + 6p - 71 = 0$ ✓ std form

4.3

$m_{AC} = \frac{5-(-3)}{1-0}$ $\quad m_{BC} = \frac{3-(-3)}{4-0}$

$= 8$ $\quad = \frac{3}{2}$ ✓

$\tan \beta = 8$ $\quad \tan \theta = \frac{3}{2}$ ✓

ref $\angle$ $= 82,87...^\circ$ $\quad$ ref $\angle$ $= 56,30...^\circ$

tan + in $\quad$ tan + in

I: $\beta = 82,87...^\circ$ ✓ $\quad$ I: $\theta = 56,30...^\circ$ ✓

$\hat{I} = 56,30...^\circ$ vert opp $\angle$s =

$82,87...^\circ = A\hat{C}B + 56,30...^\circ$ ext $\angle$ $\triangle$

$\therefore A\hat{C}B = 26,57^\circ$ ✓ accept $26,56^\circ$

(5)

[12]

5

OR

$AB = \sqrt{(5-3)^2 + (1-4)^2} = \sqrt{13}$

$BC = \sqrt{(3-(-3))^2 + (4-0)^2} = \sqrt{52}$

$AC = \sqrt{(5-(-3))^2 + (1-0)^2} = \sqrt{65}$

$AB^2 = BC^2 + AC^2 - 2.BC.AC \cos A\hat{C}B$

$13 = 52 + 65 - 2.\sqrt{52}.\sqrt{65}.\cos A\hat{C}B$

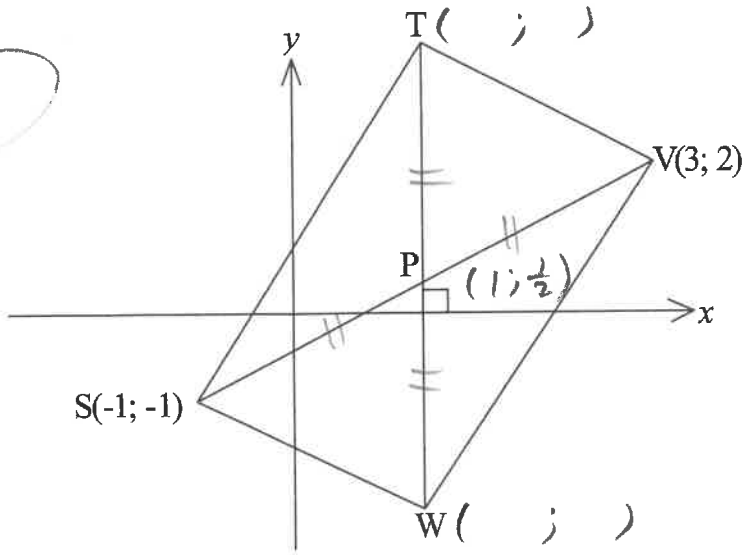
$\cos A\hat{C}B = 0,89...$ $\quad \frac{2\sqrt{5}}{5}$

ref $\angle$ $= 26,56...^\circ$

cos + in

I: $A\hat{C}B = 26,57^\circ$

QUESTION 5/*VRAAG 5*



Rectangle

$x_P = \frac{-1+3}{2}$ $y_P = \frac{-1+2}{2}$

$= 1$ $= \frac{1}{2}$

$\therefore P(1; \frac{1}{2})$ ✓

✓

$SV = \sqrt{(2-(-1))^2 + (3-(-1))^2} = \sqrt{25} = 5$ ✓

$\therefore TW = 5$ ✓ SV = TW given

$\therefore TP = PW = 2\frac{1}{2}$ given bisected

$\frac{1}{2} + 2\frac{1}{2}$ $\frac{1}{2} - 2\frac{1}{2}$

$\therefore T(1; 3)$ and $W(1; -2)$ ✓ ✓ (6)

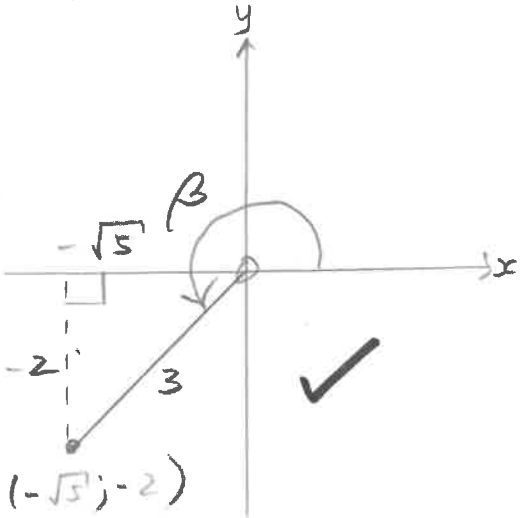
[6]

6

QUESTION 6/*VRAAG 6*

6.1

Draw your sketch here
Teken jou skets hier



Do your calculations here
Doen jou berekeninge hier

$\sin\beta = -\frac{2}{3}$ Q (III) IV $\frac{-2}{3}$ $\frac{y}{r}$

$\beta \in [0°; 270°]$ Q I II (III)

$y = -2$ $r = 3$

$x^2 + (-2)^2 = (3)^2$ Pythag

$x^2 = 5$

$x = \pm\sqrt{5}$

$x = -\sqrt{5}$ reject +

$\therefore 1 + \tan^2\beta = 1 + \left(\frac{y}{x}\right)^2$

$= 1 + \left(\frac{-2}{-\sqrt{5}}\right)^2$ sub

$= 1 + \frac{4}{5}$

$= \frac{9}{5}$

5

(5)

6.2.1

$\cos 75° = m$ $\frac{m}{1}$ $\frac{x}{r}$

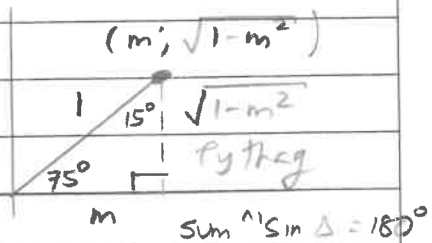
$\cos^2 105°$

$= [\cos(180° - 75°)]^2$

$= [-\cos 75°]^2$

$= [-m]^2$

$= m^2$



2

(2)

6.2.2

$\sin 15° = \sin(90° - 75°)$

$= \cos 75°$

$= m$

2

(2)

6.2.3

$\tan 15° = \frac{m}{\sqrt{1-m^2}}$ $\frac{o}{a}$ not $\frac{y}{x}$

2

(2)

6.2.1 $\cos^2 105^\circ = [\cos(90^\circ + 15^\circ)]^2$

$= [-\sin 15^\circ]^2$ ✓

$= \left[-\frac{m}{1}\right]^2$ $\frac{o}{h}$ NOT $\frac{y}{r}$!

$= m^2$ ✓

6.2.2. $\sin 15^\circ = \frac{m}{1}$ $\frac{o}{h}$

$= m$ ✓✓

6.2.3. $\tan 15^\circ = \frac{\sin 15^\circ}{\cos 15^\circ}$

$\cos 15^\circ = \cos(90^\circ - 75^\circ)$

$= \sin 75^\circ$

$= \frac{\sqrt{1-m^2}}{1}$ $\frac{y}{r}$

$= \sqrt{1-m^2}$

$\therefore \tan 15^\circ = \frac{m}{\sqrt{1-m^2}}$ ✓✓ (6.2.2.)

6.3.1

- $\cos(180° - k) = -\cos k$
- $\sin(k - 90°) = \sin(k + 270°) = \sin(270° + k) = -\cos k$
- $(\tan(540° + k))^2 = (\tan(180° + k))^2 = (\tan k)^2 = \tan^2 k$
- $\sin(90° + k) = \cos k$
- $\cos(-k) = \cos k$

$$\therefore \frac{(-\cos k)(-\cos k) - 1}{\tan^2 k\,(\cos k \times \cos k)} = -\frac{\cos^2 k - 1}{\sin^2 k} \cdot \frac{1}{\cos^2 k} \quad \left(\tan k = \frac{\sin k}{\cos k}\right)$$

$$= \frac{-\sin^2 k}{\sin^2 k}$$

$$= -1$$

(7)

6.3.2

Expression UD when: $k \in [0°; 360°]$

- $\tan k$: UD
- $\frac{\sin k}{\cos k}$: UD
- $\cos k = 0$
- $k = 90°$ or $270°$

- $\tan^2 k \cdot \cos^2 k = 0$
- $\tan^2 k = 0$ or $\cos^2 k = 0$
- $\tan k = 0$; $\cos k = 0$
- $\frac{\sin k}{\cos k} = 0$ done
- $\sin k = 0$
- $k = 0°; 180°$ or $360°$

$0°$; $90°$ $180°$; $270°$ $360°$

(6)

6.4

$$LHS = \frac{1+\sin\theta}{1-\sin\theta} - \frac{1-\sin\theta}{1+\sin\theta}$$

$$= \frac{(1+\sin\theta)(1+\sin\theta) - (1-\sin\theta)(1-\sin\theta)}{(1-\sin\theta)(1+\sin\theta)} \checkmark \text{LCD}$$

$\checkmark \ldots$

$$= \frac{1+2\sin\theta+\sin^2\theta - (1-2\sin\theta+\sin^2\theta)}{1-\sin^2\theta} \checkmark \text{and } 4\sin\theta$$

$\checkmark \ldots$

$$= \frac{1+2\sin\theta+\sin^2\theta-1+2\sin\theta-\sin^2\theta}{\cos^2\theta}$$

$$= \frac{4\sin\theta}{\checkmark\cos^2\theta}$$

$$RHS = \frac{4\tan\theta}{\cos\theta} = \frac{4\sin\theta}{\cos\theta} \times \frac{1}{\cos\theta} = \frac{4\sin\theta}{\cos^2\theta}$$

$\therefore LHS = RHS$ ▷

(5)

6.5

$$6\sin^2\theta + \cos\theta = 4$$

$$6(1 \checkmark - \cos^2\theta) + \cos\theta = 4$$

$$6 - 6\cos^2\theta + \cos\theta = 4$$

$$0 = 6\cos^2\theta - \cos\theta - 2 \checkmark$$

$$0 = (3\cos\theta - 2)(2\cos\theta + 1) \checkmark$$

$\therefore \cos\theta = 2/3 \checkmark$ or $\cos\theta = -\frac{1}{2} \checkmark$

ref $\hat{}$ = 48,18...°	ref $\hat{}$ = 60°
Cos + in	Cos − in
I: $\theta = 48{,}19° + k\cdot 360°;\ k \in \mathbb{Z}$ ▷	II: $\theta = 120° + k\cdot 360°;\ k \in \mathbb{Z}$ ▷
or ✓both	or ✓both
IV: $\theta = 311{,}81° + k\cdot 360°;\ k \in \mathbb{Z}$ ▷	III: $\theta = 240° + k\cdot 360°;\ k \in \mathbb{Z}$ ▷

(7)

6.6

$p = \tan A + \sin A \qquad q = \tan A - \sin A$

$pq = (\tan A + \sin A)(\tan A - \sin A)$ ✓

$= \tan^2 A - \sin^2 A$ ✓

$= \frac{\sin^2 A}{\cos^2 A} - \sin^2 A$ ✓

$= \frac{\sin^2 A - \sin^2 A \cdot \cos^2 A}{\cos^2 A}$ ✓num

$= \frac{\sin^2 A (1 - \cos^2 A)}{\cos^2 A}$ ✓cf

$= \frac{\sin^2 A \cdot \sin^2 A}{\cos^2 A}$

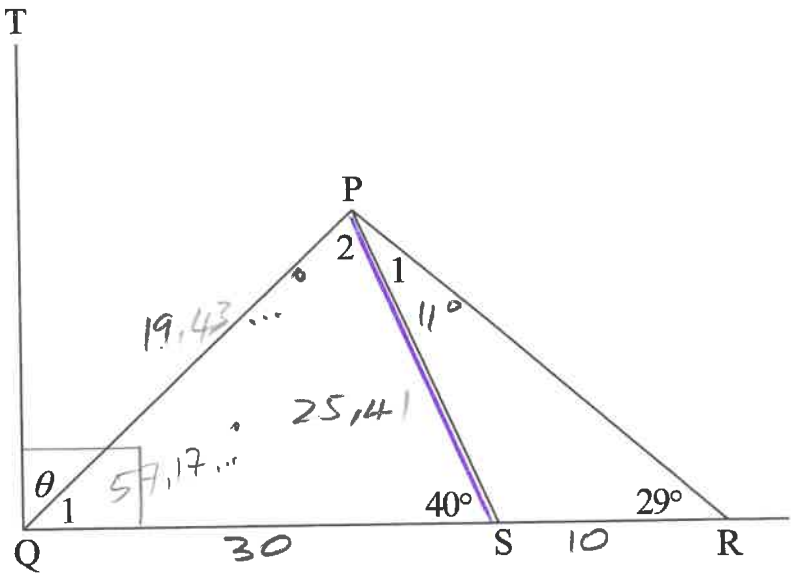
$= \tan^2 A \cdot \sin^2 A$ ▷

5

(5)

[41]

QUESTION 7/*VRAAG 7*



7.1

$\hat{P}_1 = 11°$ ✓R ext ∠ Δ ✓

(1)

7.2

$\frac{PS}{\sin 29°} = \frac{10}{\sin 11°}$ ✓

$PS = 25,41$ m ✓✓

(3)

7.3

$PQ^2 = 30^2 + 25,41^2 - 2.30.25,41 \cos 40°$ ✓

$= 377,75...$

$PQ = 19,43...$ ✓ accept 19,44

$\frac{\sin Q_1}{25,41} = \frac{\sin 40°}{19,43...°}$ ✓

$\sin \hat{Q}_1 = 0,84...$

ref ∠ $= 57,17...°$

Sin + in accept 57,16°

I: $\hat{Q}_1 = 57,17...°$ ✓ II: reject $\theta < 90°$

$\therefore \theta = 32,82...$

$= 33°$ nearest °

(5)

[9]

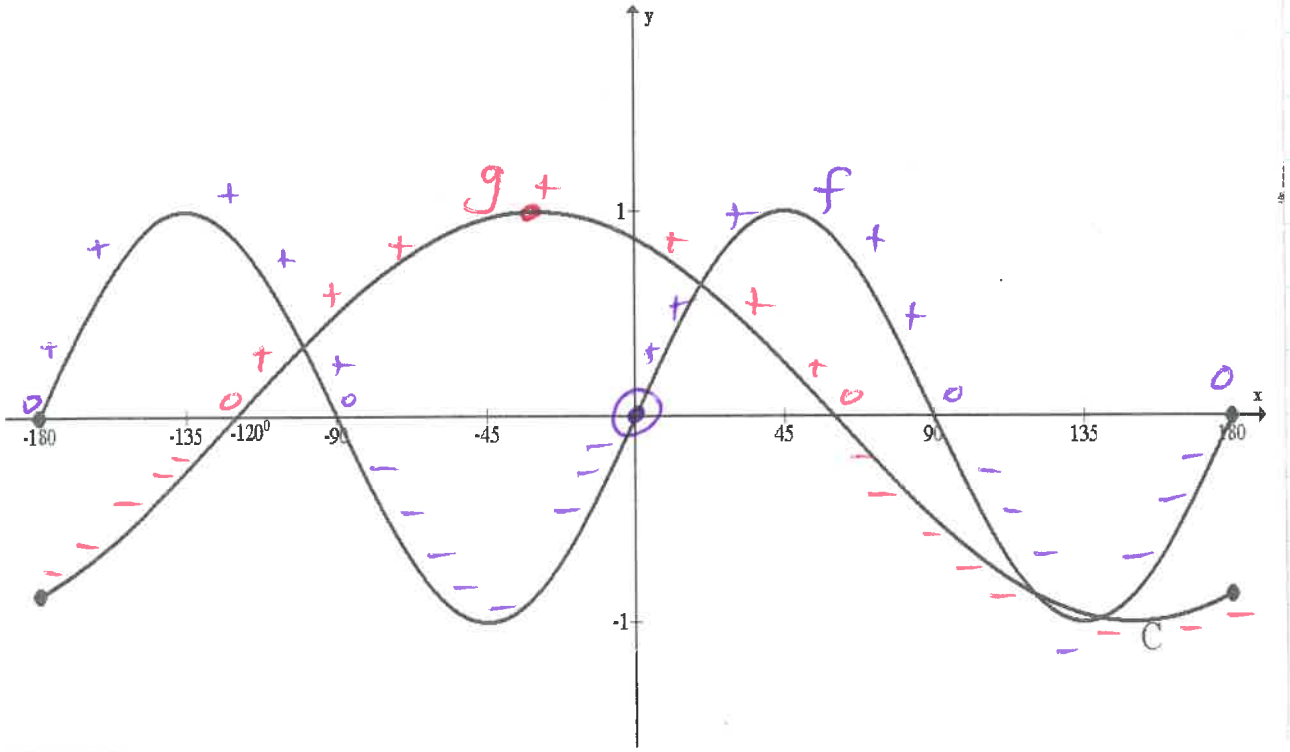
1

3

5

8

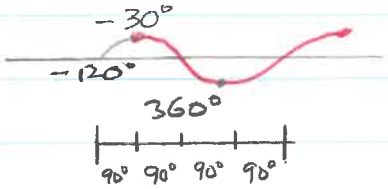
The sketch graphs of $f(x) = \sin ax$ and $g(x) = \cos(x - b)$ is given below.



8.1. f: $180° = \frac{360°}{a}$

$a = 2$

g:



+Cos

$\therefore$ start $x = -120° + 90°$

$= -30°$

$x + 30° = 0$

$x - b$

$-b = 30°$

$b = -30°$

$f(x) = \sin bx$ $\quad g(x) = \cos(x + 30°)$

8.2. x_c : $-30° + 180°$ ½ wave

$= 150°$

$y_c = \cos(150° + 30°)$

$= \cos 180°$

$= -1$

$\therefore$ $c(150°; -1)$

8.3. $f(x) \cdot g(x) \geq 0$

$y_f \cdot y_g \quad \overset{+}{0}$

$x < 0$

$x = -180°$ or $x \in [-120°; -90°]$

8.4. $y \leftarrow 30° \quad \therefore \quad f \rightarrow 30°$

$x \rightarrow x - 30°$

$\therefore$ $y = \sin 2(x - 30°)$

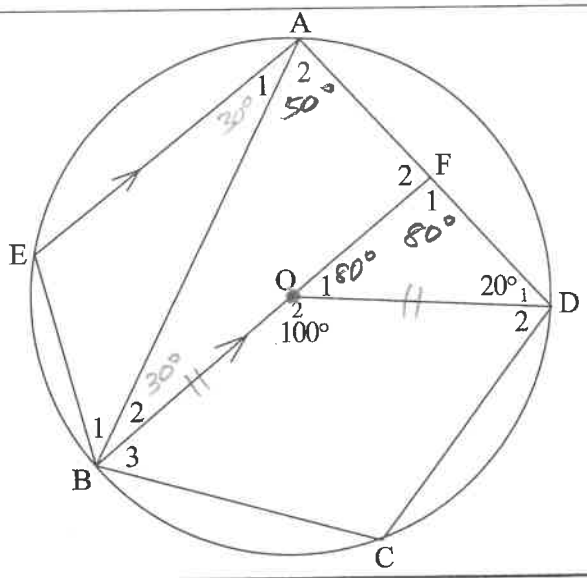
OR

$y = \sin a(x - 30°)$

QUESTION 8/*VRAAG 8*

8.1	$a = 2$ ✓ $\quad b = -30°$ ✓	(2)
8.2	$C(150°; -1)$ ✓ ✓	(2)
8.3	$x = -180°$ or $x \in [-120°; -90°]$ ✓A ✓ int ✓ not°	(3)
8.4	$f: y = \sin 2(x - 30°)$ ✓	(1)
		[8]

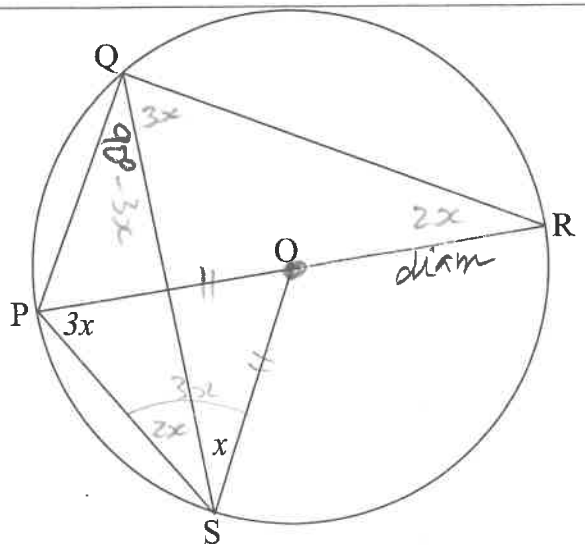
QUESTION 9/*VRAAG 9*



9.1

	Statement *Stelling*	Reason/*Rede*
9.1.1	$\hat{A}_2 = 50°$	∠ @ centre = 2 × ∠ @ circumf ✓R
9.1.2	$\hat{O}_1 = 80°$	∠'s on str line = 180° ✓R
9.1.3	$\hat{F}_1 = 80°$	ext ∠ Δ (OR) sum ∠'s in Δ = 180° ✓R
9.1.4	$\hat{A}_1 = 30°$	corr ∠'s =, EA ∥ BF ✓R
9.1.5	$\hat{B}_2 = 30°$	alt ∠'s =, EA ∥ BF ✓R

(5)



9.2.1 $S\hat{Q}R = 3x$ ✓S ✓R ∠'s in same ⊙ Segm = (2) 2

9.2.2 $P\hat{Q}R = 90°$ ✓S ✓R ∠ in semi ⊙ = 90°
$\therefore P\hat{Q}S = 90° - 3x$ ✓S (3) 3

9.2.3 $OP = OS$ radii
$\therefore P\hat{S}O = 3x$ ✓S ✓R ∠'s opp = sides
$\therefore P\hat{S}Q = 2x$ ✓S $3x - x$ (3) 3

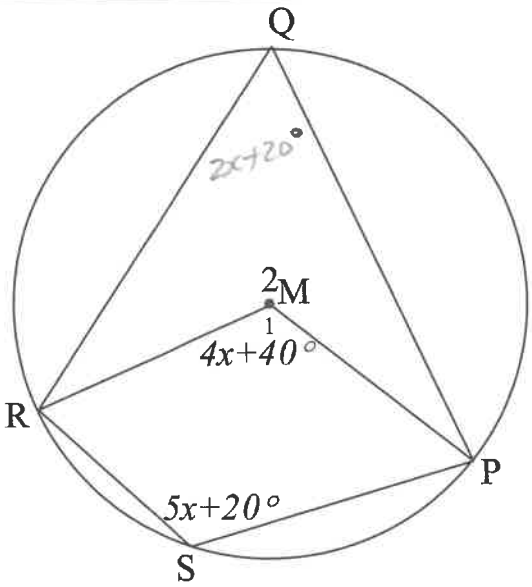
9.2.4 $P\hat{R}Q = 2x$ ✓S ✓R ∠'s in same ⊙ segm = (2) 2

9.2.5 $Q\hat{P}R = 90° - 2x$ ✓S ✓R sum ∠'s in $\Delta = 180°$ (2) 2

[17]

QUESTION 10/*VRAAG 10*

10.1



$4x + 40° = 2.\hat{Q}$ ✓P ^ at centre = 2 ^ @ circumf

$2x + 20° = \hat{Q}$ ✓S ÷ 2

✓SR

$2x + 20° + 5x + 20° = 180°$ opp ^'s cyclic quad = 180°

$7x = 140°$

$x = 20°$ ✓

$\therefore \hat{Q}$

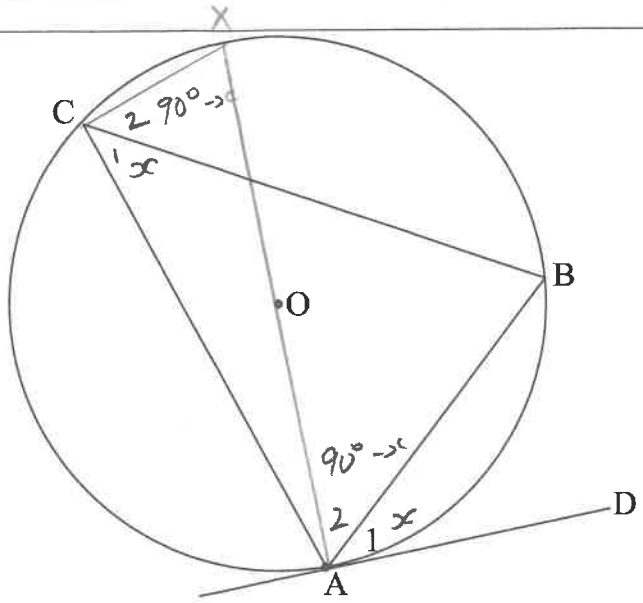
$= 2(20°) + 20°$

$= 60°$ ✓

5

(5)

10.2



✓ constr

Let $\hat{A}_1 = x$

$\therefore \hat{A}_2 = 90° - x$ ✓S ✓R tan ⊥ rad

$\therefore \hat{C}_2 = 90° - x$ ✓SR ∠'s in same ⊙ segm =

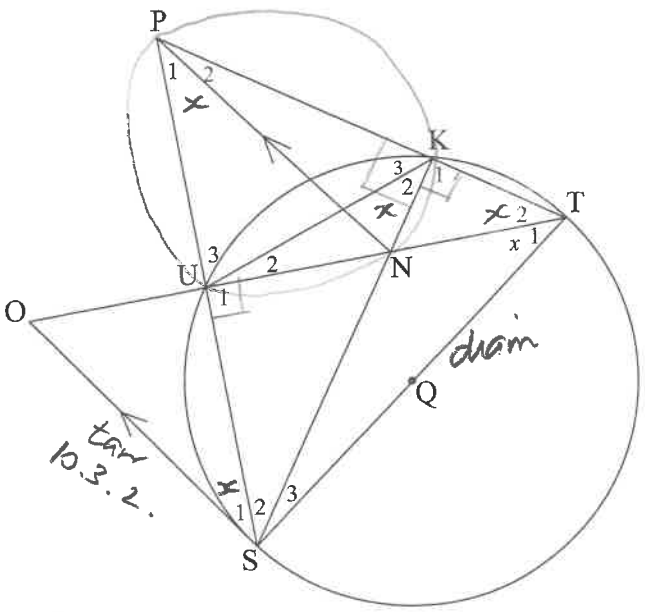
$\therefore \hat{C}_1 = x$ ✓S ✓R ∠ in semi ⊙ = 90°

$\therefore \hat{A} = \hat{C}_1$ both = x

6

(6)

10.3



10.3.1

SR ✓ SR ✓

$\hat{U}_1 = \hat{K}_1 = 90°$ ∠ in semi ⊙ = 90°

$\hat{K}_2 + \hat{K}_3 = 90°$ SR ✓ ∠'s on str line = 180°

$\therefore \hat{K}_2 + \hat{K}_3 = \hat{U}_1$ ✓S both = 90°

∴ PUNK is a cyclic quad ✓R conv ext ∠ cyclic quad

5

(5)

10.3.2

$\hat{K}_2 = x$ ✓S ✓R ∠'s in same ⊙ segm =

$\hat{P}_1 = x$ ✓SR ∠'s in same ⊙ segm =

$\hat{S}_1 = x$ ✓SR alt ∠'s = , PN // OS

$\therefore \hat{T}_1 = \hat{S}_1$ ✓S both = x

∴ SO is tan ⊙ KUST ✓R conv ∠ tan chord =

6

(6)

10.3.3	$\hat{T}_2 = x$ ✓S given bisected	
	$\therefore \hat{S}_1 = \hat{T}_2$ ✓S both $= x$	
	$\therefore$ POST is a ✓R cons $\angle$'s in same	
	cyclic quad ⊙ segment	
		(3)
		[25]
	TOTAL/*TOTAAL*:	**150**

3

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NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

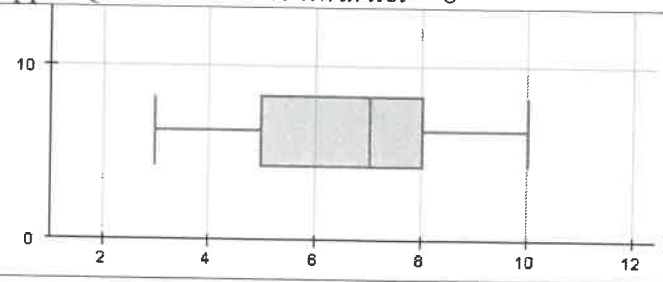
NOVEMBER 2021

MATHEMATICS P2/*WISKUNDE V2*
MARKING GUIDELINE/*NASIENRIGLYN*

MARKS/*PUNTE*: 150

This marking guideline consists of 16 pages./
Hierdie nasienriglyn bestaan uit 16 bladsye.

QUESTION 1/*VRAAG 1*

1.1	$\bar{x} = 6,4$	✓ answer / *antwoord*	(1)
1.2	Min/*Min* = 3; Max./*Maks.* = 10; Lower Quartile/*Onderste kwartiel* = 5; Median/*Mediaan* = 7; Upper Quartile/*Boonste kwartiel* = 8	✓ for both min. and max. *vir beide min. en maks.* ✓ for the rest / *vir die res*	(2)
1.3		✓ for the box / *vir die mond* ✓ whiskers / *snorre*	(2)
1.4	Skewed to the left, mean is smaller than the median **OR** longer rectangle on the left. *Skeef na links, Gemiddelde is kleiner as mediaan **OF** langer reghoek op linkerkant.*	✓ answer / *antwoord* ✓ reason / *rede*	(2)
1.5	Standard deviation/*Standaardafwyking* = 2, 01	✓✓ answer / *antwoord*	(2)
1.6	Slept well, if bigger than 8,61. / *Het goed geslaap, indien groter as 8,61.* Answer 1 learner./ *Antwoord 1 leerder*	✓ 8,61 ✓ answer / *antwoord*	(2)
			[11]

QUESTION 2/*VRAAG 2*

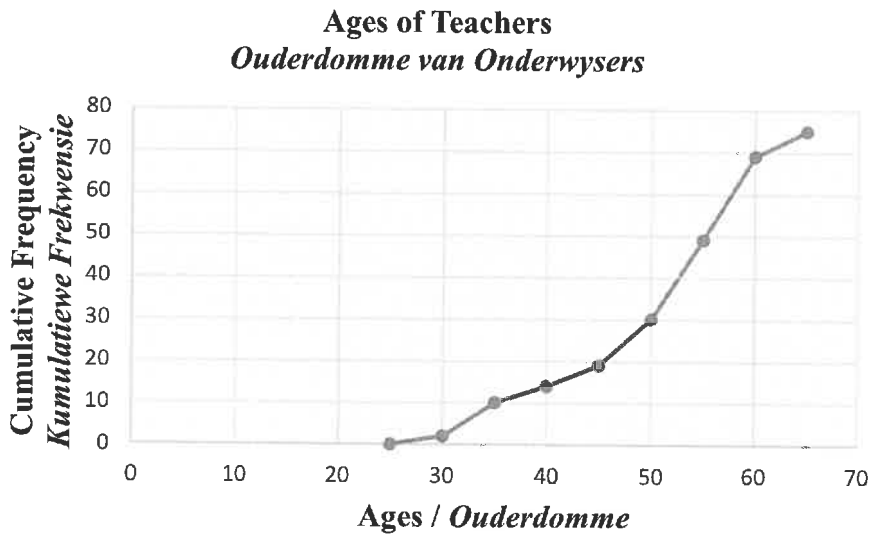
2.1

Age *Ouderdom*	**Frequency** *Frekwensie*	**Cumulative Frequency** *Kumulatiewe Frekwensie*
$25 < A \leq 30$	2	2
$30 < A \leq 35$	8	10
$35 < A \leq 40$	4	14
$40 < A \leq 45$	5	19
$45 < A \leq 50$	11	30
$50 < A \leq 55$	19	49
$55 < A \leq 60$	20	69
$60 < A \leq 65$	6	75

✓ for first 4 *vir eerste 4*
✓ last 4 *laaste 4*

(2)

2.2



✓ start point *beginpunt*
✓ end point *eindpunt*
✓✓ shape *vorm*

(4)

2.3 Median / *Mediaan* = 52 (Accept/*Aanvaar* 51 – 53)

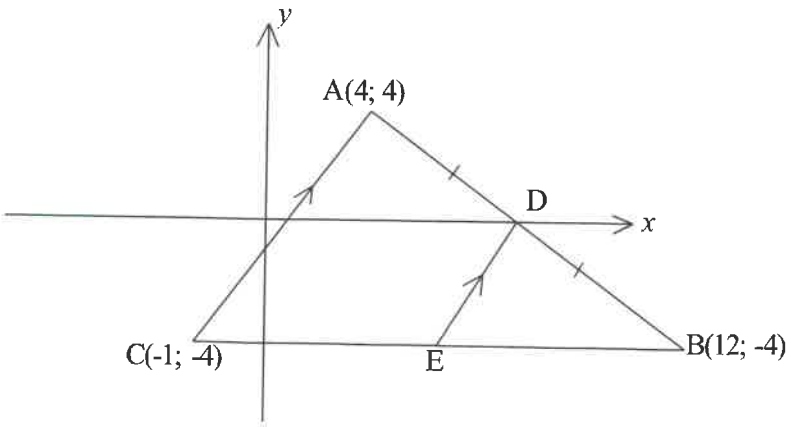
✓✓ answer / *antwoord* (2)

2.4 Percentage / *Persentasie* $= \frac{75-57}{75} = \frac{18}{75} = 24\%$

✓ calculation / *berekening*
✓ answer / *antwoord* (2)

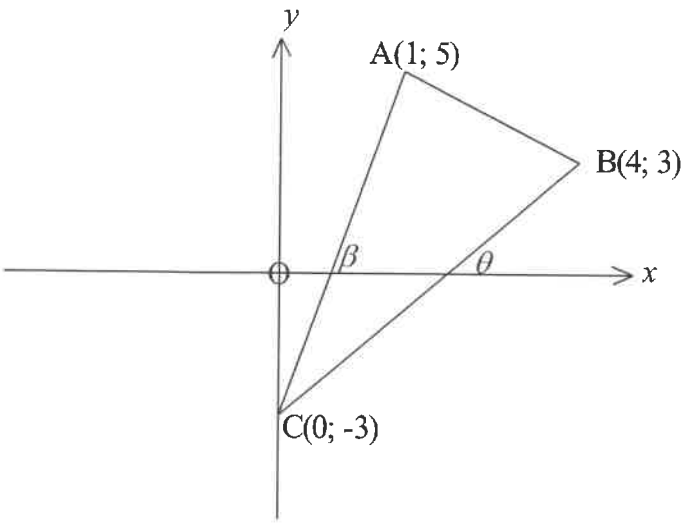
[10]

QUESTION 3/*VRAAG 3*



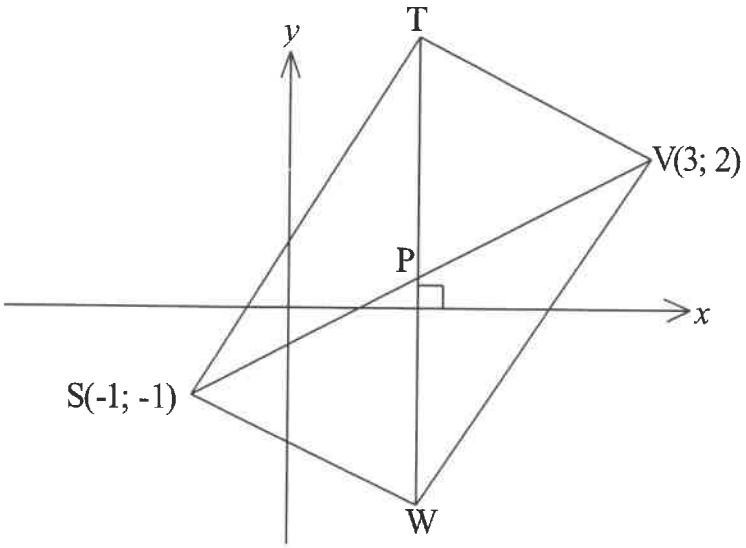
3.1	$AB = \sqrt{(12-4)^2 + (-4-4)^2}$ AB = 11,31 units / *eenhede*		✓ substitution / *vervanging* ✓ answer / *antwoord*	(2)
3.2	$D\left(\frac{4+12}{2}; \frac{4-4}{2}\right)$ $= D(8; 0)$		✓ substitution / *vervanging* ✓ answer / *antwoord*	(2)
3.3	$m = \frac{4-(-4)}{4-(-1)} = \frac{8}{5}$ $y = mx + c$ $0 = \frac{8}{5} \times 8 + c$ $c = -\frac{64}{5}$ $\therefore y = \frac{8}{5}x - \frac{64}{5}$	$m = \frac{4-(-4)}{4-(-1)} = \frac{8}{5}$ $y - y_1 = m(x - x_1)$ $y - 0 = \frac{8}{5}(x - 8)$ $y = \frac{8}{5}x - \frac{64}{5}$	✓ gradient / *gradiënt* ✓ substitution / *vervanging* ✓ y-intercept / *y-afsnit* ✓ answer / *antwoord*	(4)
3.4	$y = \frac{8}{5}x - \frac{64}{5}$ $-4 = \frac{8}{5}x - \frac{64}{5}$ $\therefore x = \frac{11}{5}$ $E\left(\frac{11}{2}; -4\right)$ **OR / *OF*** $E\left(\frac{11}{2}; -4\right)$ ~~(Midpoint Theorem) / (*Middelpunt-Stelling*)~~ line through midpoint ∥ to 2nd side		✓ substitution -4 *vervanging -4* ✓ value of x *waarde van x* ✓ coordinates of E *koördinate van* E **OR / *OF*** ✓ x – value / *waarde* ✓ y – value / *waarde* ✓ reason / *rede*	(3)
				[11]

QUESTION 4/*VRAAG 4*



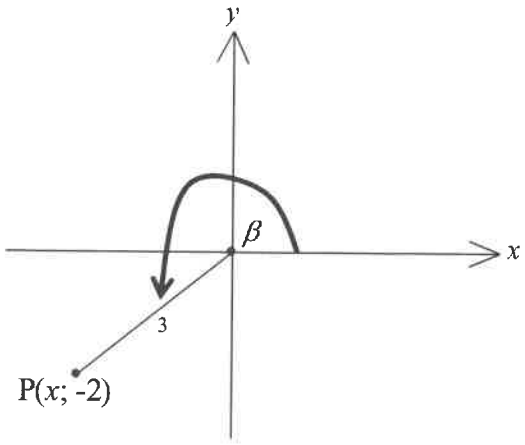
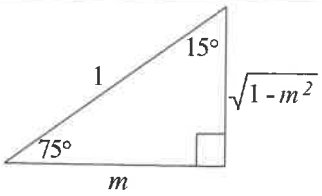
4.1	D(-3; -1)		✓ x-coordinate / *koördinaat* ✓ y-coordinate / *koördinaat*	(2)
4.2	$FC = \sqrt{(8-0)^2+(p+3)^2} = 12$ $64+p^2+6p+9=144$ $p^2+6p-71=0$ Using the quadratic formula: $p=5,94$ or $p=-11,94$ $p=6$ or $p=-12$		✓ substitution into the formula and equating to 12 *vervanging in die formule en stel gelyk aan 12* ✓ squaring both sides *kwadreer albei kante* ✓ standard form/*standaardvorm* ✓ $p=6$ ✓ $p=-12$	(5)
4.3	$m_{BC} = \frac{3-(-3)}{4-0} = \frac{3}{2}$ $\therefore \tan\theta = \frac{3}{2}$ $\therefore \theta = 56,31°$	$\tan\beta = 8$ $\therefore \beta = 82,87°$ $\therefore A\hat{C}B = 82,87° - 56,3°$ $\therefore A\hat{C}B = 26,56°$	✓ gradient of BC ✓ $\tan\theta = \frac{3}{2}$ ✓ for θ ✓ for β ✓ for $A\hat{C}B$	(5)
				[12]

QUESTION 5/*VRAAG 5*



	$P\left(\frac{-1+3}{2};\frac{-1+2}{2}\right)$ $=P\left(1;\frac{1}{2}\right)$ $SV=\sqrt{(3+1)^2+(2+1)^2}$ SV = 5 units / eenhede TW = 5 units / eenhede (diagonals of a rectangle) (hoeklyne van 'n reghoek) T(1; 3) W(1; -2)	✓ coordinates of P *koördinate van P* ✓ substitution / *vervanging* ✓ for/*vir* SV ✓ for/*vir* TW ✓ coordinates of T *koördinate van* T ✓ coordinates of W *koördinate van* W	(6)
			[6]

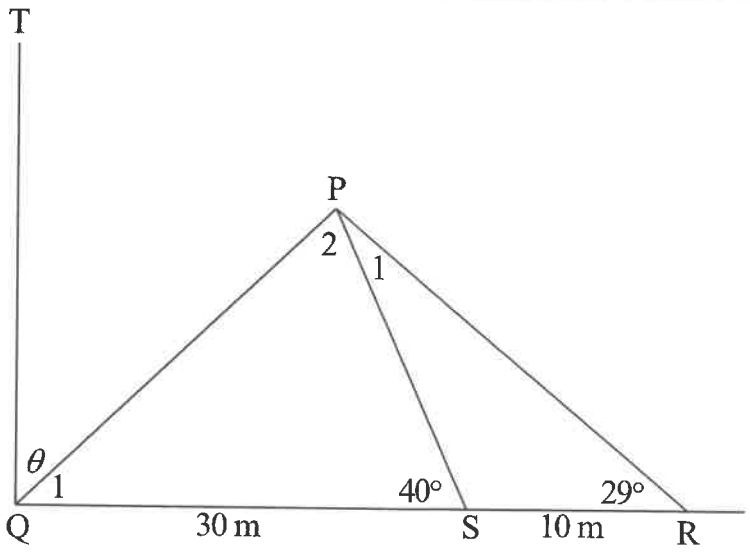
QUESTION 6/*VRAAG 6*

6.1	$\sin\beta = -\frac{2}{3}$  $x^2 = (3)^2 - (-2)^2$ $x = -\sqrt{5}$ $\therefore 1 + \tan^2\beta$ $= 1 + \left(\frac{-2}{-\sqrt{5}}\right)^2$ $= \frac{9}{5}$	✓ for solving for sin *oplos vir* sin ✓ sketch in the correct quad *skets in die korrekte kwadrant* ✓ value of *x*/ *waarde van x* ✓ substitution / *vervanging* ✓ answer / *antwoord*	(5)
6.2	 		
6.2.1	$\cos^2 105°$ $= \left[\cos(180° - 75)\right]^2$ $= (-\cos 75°)^2$ $= m^2$	✓ for/vir - cos 75° ✓ for/vir m^2	(2)
6.2.2	$\sin 15°$ $= \cos 75°$ $= m$	✓ for/vir cos 75° ✓ for/vir *m*	(2)
6.2.3	$\tan 15° = \frac{m}{\sqrt{1-m^2}}$ **OR / *OF*** $\tan 15° = \frac{\sin 15°}{\cos 15°} = \frac{\cos 75°}{\sin 75°} = \frac{m}{\sqrt{1-m^2}}$	✓✓ for correct answer only *vir korrekte antwoord* (accuracy / *akkuraatheid*)	(2)

6.3.1	$\dfrac{\cos(180°-k).\sin(k-90°)-1}{\tan^2(540°+k).\sin(90°+k).\cos(-k)}$ $=\dfrac{-\cos k.-\cos k-1}{\tan^2 k.\cos k.\cos k}$ $=\dfrac{\cos^2 k-1}{\dfrac{\sin^2 k}{\cos^2 k}.\cos^2 k}$ $=\dfrac{-\sin^2 k}{\sin^2 k}$ $=-1$	✓ for/*vir* $-\cos k$ ✓ for/*vir* $-\cos k$ ✓ for/*vir* $\tan^2 k$ ✓ for/*vir* $\cos k$ ✓ for/*vir* $\cos k$ ✓ for changing $\tan^2 k$ *vir verandering van* $\tan^2 k$ ✓ for answer / *vir antwoord*	(7)
6.3.2	$\tan^2 k.\cos^2 k=0$ $\tan^2 k=0$ or/*of* $\cos^2 k=0$ $\tan k=0$ or/*of* $\cos k=0$ $\therefore k=0°$ or/*of* $k=90°$ or/*of* $k=180°$ or/*of* $k=270$ or/*of* $k=360°$	✓ $\tan^2 k.\cos^2 k=0$ $\tan^2 k=0$ or/*of* $\cos^2 k=0$ ✓✓ $\tan k=0$ or/*of* $\cos k=0$ ✓ $k=0°$; $k=90°$ ✓ $k=180°$; $k=270°$ ✓ $k=360°$	(6)
6.4	$\dfrac{1+\sin\theta}{1-\sin\theta}-\dfrac{1-\sin\theta}{1+\sin\theta}=\dfrac{4\tan\theta}{\cos\theta}$ LHS/*LK* $=\dfrac{1+\sin\theta}{1-\sin\theta}-\dfrac{1-\sin\theta}{1+\sin\theta}$ $=\dfrac{1+2\sin\theta+\sin^2\theta-1+2\sin\theta-\sin^2\theta}{(1-\sin\theta)(1+\sin\theta)}$ $=\dfrac{4\sin\theta}{1-\sin^2\theta}$ $=\dfrac{4\sin\theta}{\cos^2\theta}$ $=\dfrac{4\tan\theta}{\cos\theta}=$ RHS/*RK*	✓ for/*vir* LCD/*KGD* ✓ for/*vir* $1+2\sin\theta+\sin^2\theta$ ✓ for/*vir* $-1+2\sin\theta-\sin^2\theta$ ✓ for/*vir* $\dfrac{4\sin\theta}{1-\sin^2\theta}$ ✓ for/*vir* $\cos^2\theta$	(5)

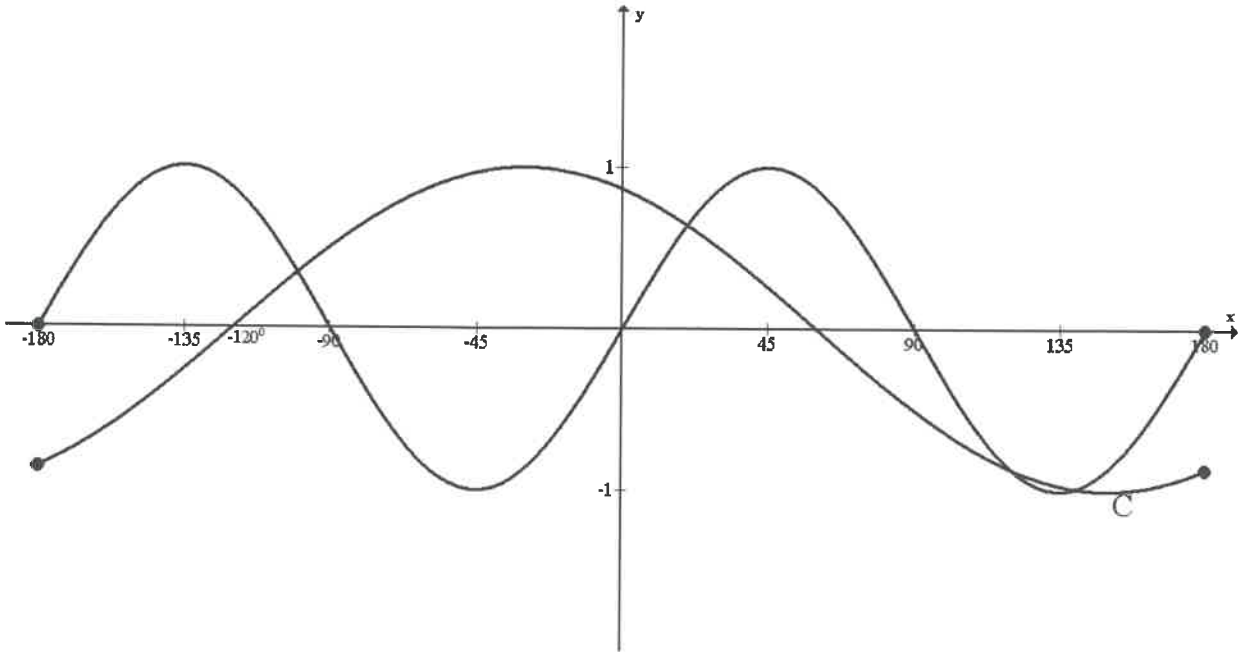
6.5	$6\sin^2\theta+\cos\theta=4$ $6(1-\cos^2\theta)+\cos\theta=4$ $6-6\cos^2\theta+\cos\theta-4=0$ $-6\cos^2\theta+\cos\theta+2=0$ $6\cos^2\theta-\cos\theta-2=0$ $(3\cos\theta-2)(2\cos\theta+1)=0$ $\cos\theta=\frac{2}{3}$ or/*of* $\cos\theta=-\frac{1}{2}$ $\theta=48{,}19°+360°.k$ or/*of* $\theta=311{,}81°+360°.k$ OR/*OF* $\theta=120°+360°.k$ or/*of* $\theta=240°+360°.k$ where/*waar* $k\in Z$	✓ for/*vir* $1-\cos^2\theta$ ✓ for the two general solutions/ *vir die twee algemene oplossings* ✓ for standard form/ *vir standaardvorm* ✓ for factors / *vir faktore* ✓ for the other two general solutions/ *vir die ander twee algemene oplossings* ✓ for answers of $\cos\theta=\frac{2}{3}$ *vir antwoorde van* $\cos\theta=\frac{2}{3}$ ✓ for answers of $\cos\theta=-\frac{1}{2}$ *vir antwoorde van* $\cos\theta=-\frac{1}{2}$	(7)
6.6	$p=\tan A+\sin A$ and/*en* $q=\tan A-\sin A$ $pq=(\tan A+\sin A)(\tan A-\sin A)$ $pq=\tan^2 A-\sin^2 A$ $pq=\frac{\sin^2 A}{\cos^2 A}-\sin^2 A$ $pq=\frac{\sin^2 A-\sin^2 A.\cos^2 A}{\cos^2 A}$ $pq=\frac{\sin^2 A(1-\cos^2 A)}{\cos^2 A}$ $pq=\tan^2 A.\sin^2 A$	✓ for substitution *vir vervanging* ✓ for multiplication *vir vermenigvuldiging* ✓ for changing $\tan^2 A$ *vir verandering van* $\tan^2 A$ ✓ for the numerator *vir die teller* ✓ for the common factor *vir die gemene faktor*	(5)
			[41]

QUESTION 7/*VRAAG 7*



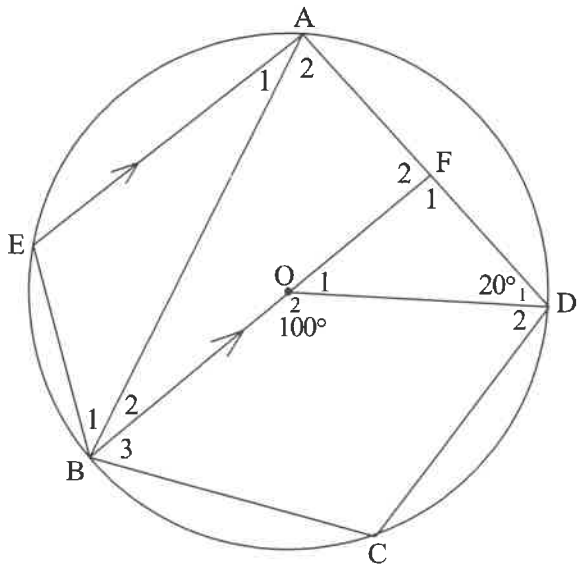
7.1	Exterior angle of a triangle / *Buitehoek van 'n driehoek*	✓ answer / *antwoord*	(1)
7.2	$\frac{PS}{\sin 29°} = \frac{10}{\sin 11°}$ $PS = \frac{10.\sin 29°}{\sin 11°}$ $PS = 25{,}41$ m	✓ for sub. in sine rule *vir verv. in sinus-reël* ✓✓ for the answer *vir die antwoord*	(3)
7.3	$PQ^2 = (30)^2 + (25{,}41)^2 - 2\times 30\times 25{,}41\times\cos 40°$ $PQ = 19{,}44$ m $\frac{\sin Q_1}{25{,}41} = \frac{\sin 40°}{19{,}44}$ $\sin Q_1 = \frac{25{,}41\times\sin 40°}{19{,}44}$ $\therefore \hat{Q}_1 = 57{,}16°$ $\therefore \theta = 32{,}8°$ $= 33°$ nearest $°$	✓ for sub. in the cosine rule *verv. in die cosinus-reël* ✓ for the answer PQ *vir die antwoord* PQ ✓ for using the sine rule *vir gebruik van die sinus-reël* ✓ for/*vir* $\hat{Q}_1$ ✓ for/*vir* θ	(5)
			[9]

QUESTION 8 / *VRAAG 8*

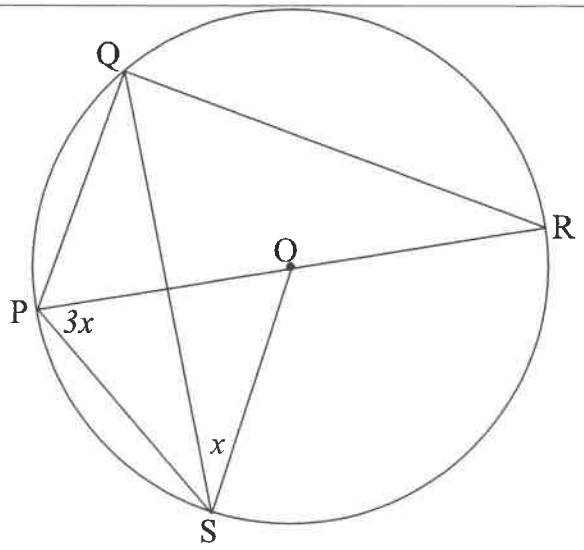


8.1	$a = 2 \quad b = -30°$	✓ for/*vir* a ✓ for/*vir* b	(2)
8.2	C(150°; -1)	✓ for/*vir* 150° ✓ for/*vir* -1	(2)
8.3	$-120° \leq x \leq -90°$ or $x = -180°$	✓ for/*vir* $-120°$ ✓ for/*vir* $-90°$ ✓ for correct notation *vir korrekte notasie*	(3)
8.4	$f(x) = \sin 2(x - 30°)$	✓ for correct answer *vir korrekte antwoord*	(1)
			[8]

QUESTION 9/*VRAAG 9*

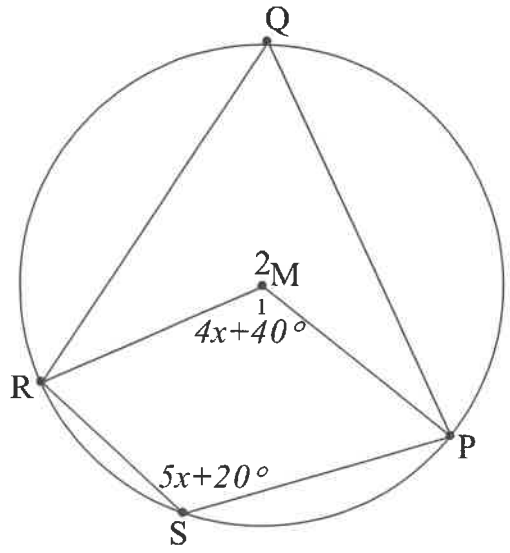


9.1.1	< at centre = 2 x angle at the circumference *Middelpunts ∠ = 2 × Omtreks ∠*	✓ for the answer *vir die antwoord*	(1)
9.1.2	<'s on a straight line *∠'e op 'n reguitlyn*	✓ for the answer *vir die antwoord*	(1)
9.1.3	Exterior angle of a triangle / <'s of a triangle *Buitehoek van 'n driehoek / ∠e van 'n driehoek*	✓ for the answer *vir die antwoord*	(1)
9.1.4	$\hat{A} = \hat{F}_1$; corresponding angles = ; EA∥BOF *ooreenkomstige ∠e = ; EA || BOF*	✓ for the answer *vir die antwoord*	(1)
9.1.5	alternate angles = ; EA∥BOF *verwisselende hoeke = ; EA || BOF*	✓ for the answer *vir die antwoord*	(1)

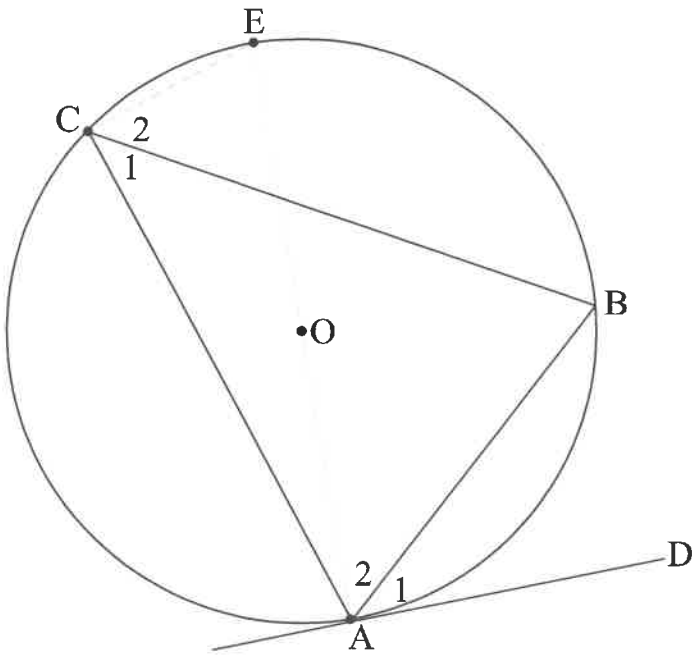


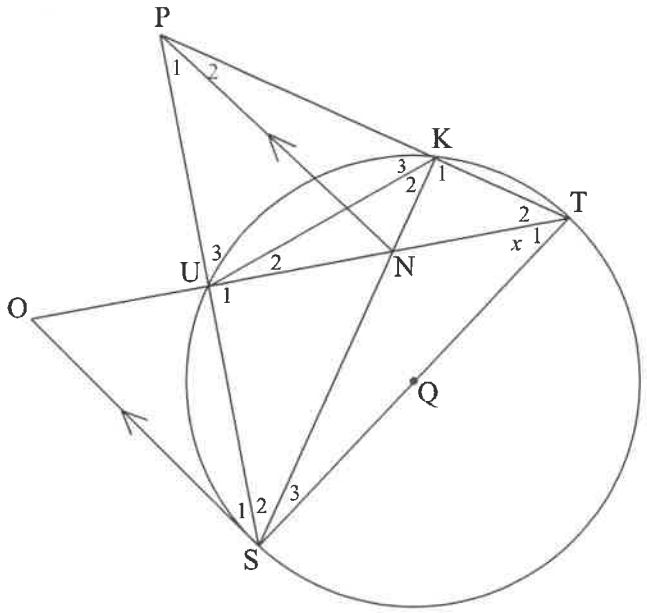
9.2.1	$S\hat{Q}R = 3x$ (<s in the same segment) (*∠e in dieselfde segment*)	✓ S ✓ R	(2)
9.2.2	$\hat{Q} = 90°$ (<s in a semi-circle) (*∠e in 'n halwe-sirkel*) $\therefore P\hat{Q}S = 90° - 3x$	✓ S ✓ R ✓ answer / *antwoord*	(3)
9.2.3	$P\hat{S}O = 3x$ (<s opposite equal sides) (*∠e teenoor gelyke sye*) $\therefore P\hat{S}Q = 2x$ ($Q\hat{S}O = x$)	✓ S ✓ R ✓ answer / *antwoord*	(3)
9.2.4	$P\hat{R}Q = 2x$ (<s in the same segment) (*∠e in dieselfde segment*)	✓ S ✓ R	(2)
9.2.5	$Q\hat{P}R = 180° - (2x + 90°)$ (<s of a triangle) (*∠e van 'n driehoek*) $= 90° - 2x$	✓ S and/*en* R ✓ answer / *antwoord*	(2)
			[17]

QUESTION 10/*VRAAG 10*



10.1	$\hat{Q} = 2x + 20°$ (< at the centre = 2 × angle at the circumf.) (*Middelpunts∠ = 2 × Omtrekshoek*) $\therefore 2x + 20° + 5x + 20° = 180°$ (opp. <s of a c.q.) (*teenoorst. ∠e van 'n k.v*) $7x + 40° = 180°$ $7x = 140°$ $\therefore x = 20°$ $\therefore \hat{Q} = 60°$ **OR / *OF*** $\hat{M}_2 = 360° - (4x + 40°)$ (<s around a point) (*∠e rondom 'n punt*) $= 320° - 4x$ $320° - 4x = 2(5x + 20°)$ (< at the centre) / (*Middelpunts ∠*) $320° - 4x = 10x + 40°$ $14x = -280°$ $\therefore x = 20°$ $\therefore \hat{Q} = 60°$	✓ for/*vir* S ✓ for/*vir* R ✓ for S and R *vir* S *en* R ✓ for simplifying *vereenvoudiging* ✓ the answer *die antwoord* ✓ for S and R *vir* S *en* R ✓ for the answer *vir die antwoord* ✓ for S and R *vir* S *en* R ✓ for simplifying *vereenvoudiging* ✓ for the answer *vir die antwoord*	(5)

10.2			
	Construct diameter AE and join C to E. Label $\hat{C}_1$, $\hat{C}_2$ and $\hat{A}_2$ $\hat{C}_1 + \hat{C}_2 = 90°$ (< in a semi - circle) $\hat{A}_1 + \hat{A}_2 = 90°$ (tan $\perp$ rad) But $\hat{C}_2 = \hat{A}_2$ (<s in the same segment) $\therefore \hat{A}_1 = \hat{C}_1$	✓ for construction ✓ for S ✓ for R ✓ for S ✓ for R ✓ for S and R	
	Teken Middellyn AE *en verbind* C *aan* E. *Merk* $\hat{C}_1$, $\hat{C}_2$ *en* $\hat{A}_2$ $\hat{C}_1 + \hat{C}_2 = 90°$ ($\angle$ *in 'n halwe-sirkel*) $\hat{A}_1 + \hat{A}_2 = 90°$ (*raaklyn* $\perp$ *radius*) *Maar* $\hat{C}_2 = \hat{A}_2$ ($\angle$*e in dieselfde segment*) $\therefore \hat{A}_1 = \hat{C}_1$	✓ *vir konstruksie* ✓ *vir* S ✓ *vir* R ✓ *vir* S ✓ *vir* R ✓ *vir* S *en* R	(6)



10.3.1	$\hat{U}_1 = 90°$ (<s in a semi - circle) (*∠e in 'n halwe - sirkel*) $\hat{K}_1 = 90°$ (<s in a semi - circle) (*∠e in 'n halwe - sirkel*) $\hat{K}_3 + \hat{K}_2 = 90°$ (<s on a straight line) (*∠e op 'n reguitlyn*) $\therefore \hat{U}_1 = \hat{K}_2 + \hat{K}_3 = 90°$ $\therefore$ PUNK is a c.q. (conv. exterior < of a c.q) PUNK *is 'n k.v* (*omgekeerde Buite∠ van k.v*)	✓ for/*vir* S and/*en* R ✓ for/*vir* S and/*en* R ✓ for/*vir* S and/*en* R ✓ for/*vir* S ✓ for/*vir* R	(5)
10.3.2	$\hat{T}_2 = x$ (TO bisects S$\hat{T}$P) / (TO halveer S$\hat{T}$P) $\hat{T}_1 = \hat{K}_2 = x$ (<s in the same segment) *(∠e in dieselfde segment)* $\hat{K}_2 = \hat{P}_1 = x$ (<s in the same segment) (*∠e in dieselfde segment*) $\hat{P}_1 = \hat{S}_1 = x$ (alt. <s; PN ∥ OS) / *(Verw. ∠e ; PN* ∥ OS) $\therefore \hat{S}_1 = \hat{T}_1 = x$ $\therefore$ SO is a tangent (conv. tan-chord theorem) *SO is 'n raaklyn (omgekeerde raaklyn-koord stelling)*	✓ for S /*vir* S/✓ and/*en* R ✓ for S /*vir* S /and/*en* R ✓ S and/*en* R ✓ for conclusion *vir gevolgtrekking* ✓ for R /*vir* R	(6)
10.3.3	$\hat{T}_1 = \hat{T}_2 = x$ (proven/*bewys*) $\hat{S}_1 = \hat{T}_2 = x$ (proven/*bewys*) $\therefore$ POST is a c.q. (conv. <s in the same segment) POST *is 'n k.v.* (*omgekeerde ∠e in dieselfde segment*)	✓ for/*vir* S and/*en* R ✓ for S /*vir* S and/*en* R ✓ for R/*vir* R	(3)
			[25]

TOTAL/*TOTAAL*: 150