basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NASIONALE SENIOR SERTIFIKAAT

GRAAD 10

WISKUNDE V2

NOVEMBER 2018

PUNTE: 100

TYD: 2 uur

Hierdie vraestel bestaan uit 9 bladsye en 'n 12 bladsy-antwoordeboek.

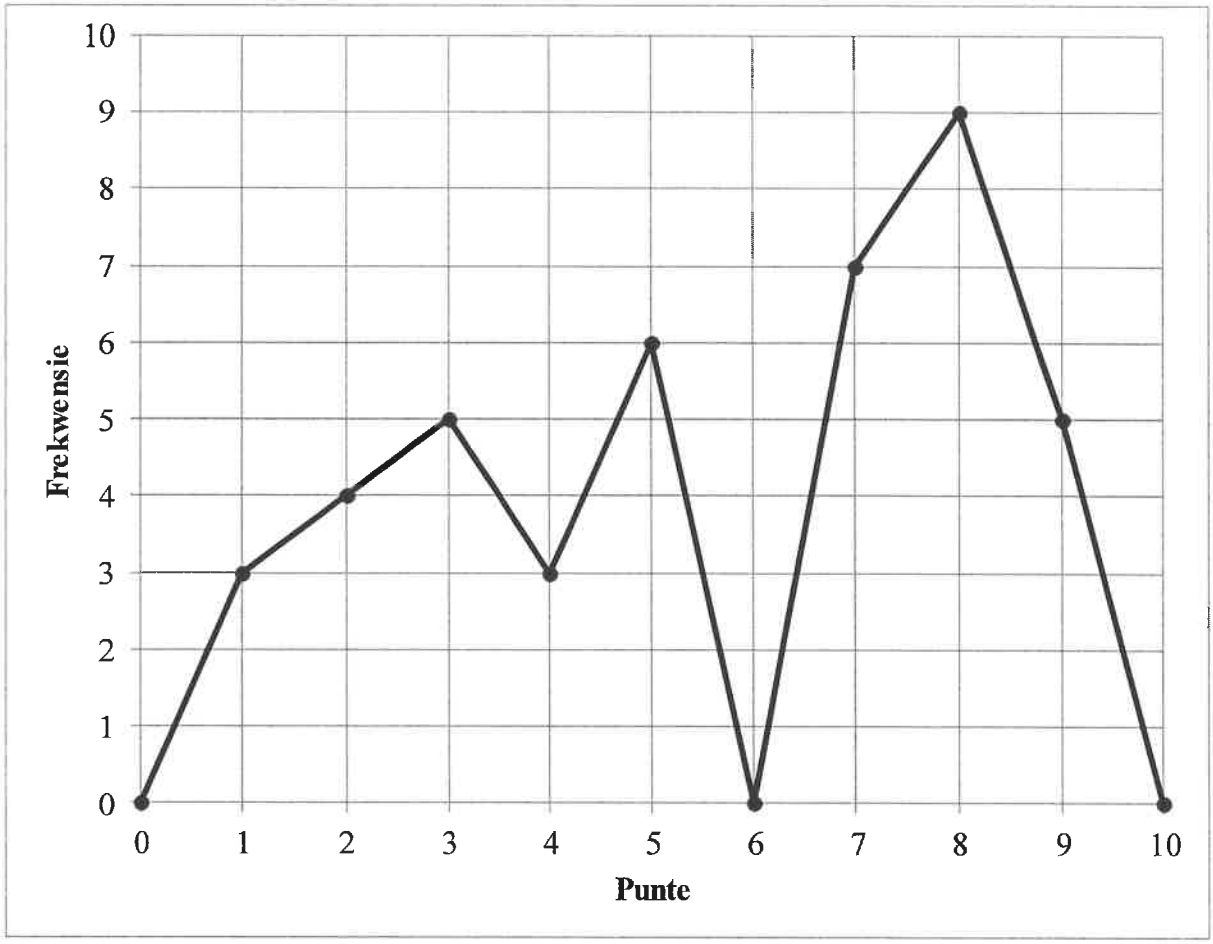
INSTRUKSIES EN INLIGTING

Lees die volgende instruksies aandagtig deur voordat jy die vrae beantwoord.

1. Hierdie vraestel bestaan uit AGT vrae.
2. Beantwoord AL die vrae in die SPESIALE ANTWOORDEBOEK wat verskaf word.
3. Dui ALLE berekeninge, diagramme, grafieke, ens. wat jy gebruik het om die antwoorde te bepaal, duidelik aan.
4. Slegs antwoorde sal NIE noodwendig volpunte verdien NIE.
5. Rond antwoorde tot TWEE desimale plekke af, tensy anders aangedui.
6. Diagramme is NIE noodwendig volgens skaal geteken NIE.
7. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, tensy anders aangedui.
8. Skryf netjies en leesbaar.

VRAAG 1

Die lyngrafiek hieronder toon toetspunte uit 10 wat deur 'n graad 10-klas behaal is.



1.1 Voltooi die frekwensiekolom in die tabel wat in die ANTWOORDEBOEK verskaf is. (2)

1.2 Hoeveel leerders het die toets geskryf? (1)

1.3 Bereken die:

1.3.1 Variasiewydte vir die data (2)

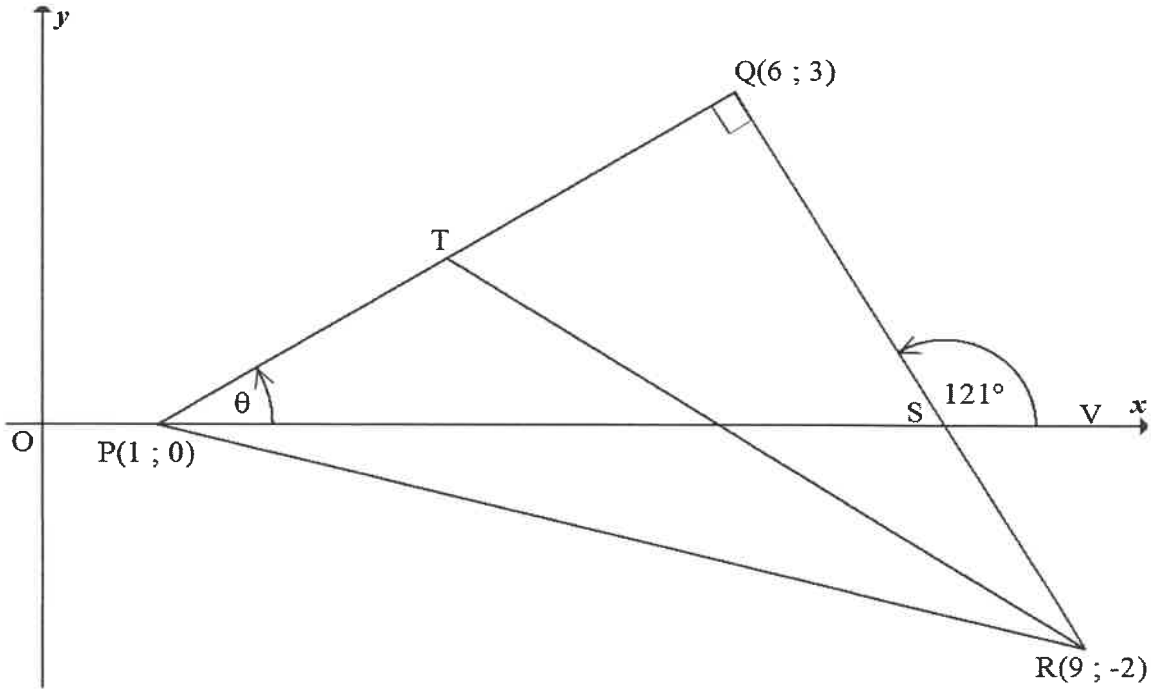
1.3.2 Gemiddeld vir die toets (3)

1.4 Bepaal die mediaan vir die data. (3)

1.5 Teken 'n mond-en-snordiagram (boksplot) vir die data. (3)
[14]

VRAAG 2

In the diagram hieronder is P(1 ; 0), Q(6 ; 3) en R (9; –2) die hoekpunte van 'n driehoek sodat PQ = QR en PQ ⊥ QR. T is 'n punt op PQ sodat T die middelpunt van PQ is. S is die snypunt van RQ en die x-as. V is 'n punt op die x-as sodat $Q\hat{S}V = 121°$. $Q\hat{P}S = \theta$



2.1 Bepaal die:

2.1.1 Lengte van PQ. Laat jou antwoord in wortelvorm. (2)

2.1.2 Gradiënt van PQ (2)

2.1.3 Koördinate van T (2)

2.2 Bereken die:

2.2.1 Oppervlakte van ΔQTR (3)

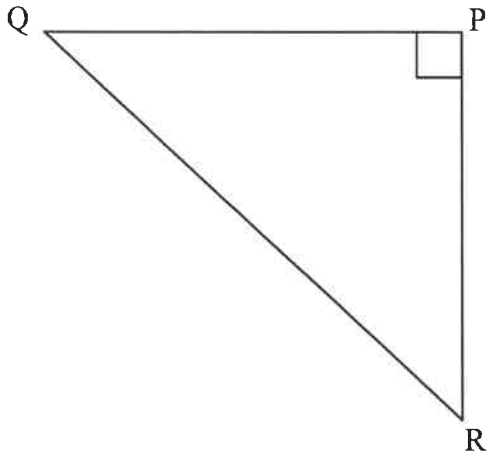
2.2.2 Grootte van θ, met redes (2)

2.2.3 Koördinate van S (3)

2.3 Bepaal, met redes, die gradiënt van die lyn deur T en die middelpunt van PR. (3)
[17]

VRAAG 3

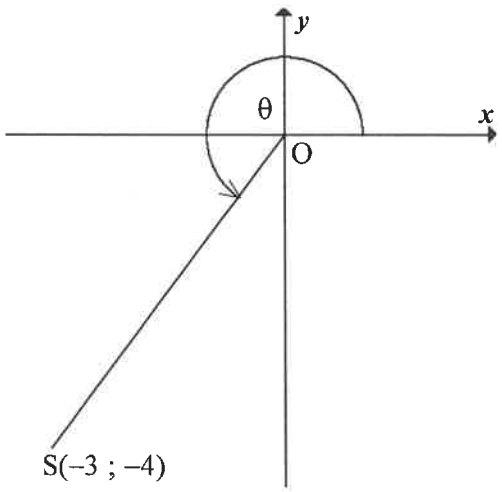
3.1 In die diagram hieronder is ΔQPR 'n reghoekige driehoek met $Q\hat{P}R = 90°$.



3.1.1 Gebruik die skets om die verhouding van tan(90°–R) te bepaal. (1)

3.1.2 Skryf die trigonometriese verhouding neer wat aan $\frac{QR}{QP}$ gelyk is. (1)

3.2 S(–3 ; –4) is 'n punt op die Cartesiese vlak sodat OS 'n hoek van θ met die positiewe x-as maak.



Bereken die volgende SONDER om 'n sakrekenaar te gebruik:

3.2.1 Die lengte van OS (2)

3.2.2 Die waarde van $\sec\theta + \sin^2\theta$ (3)

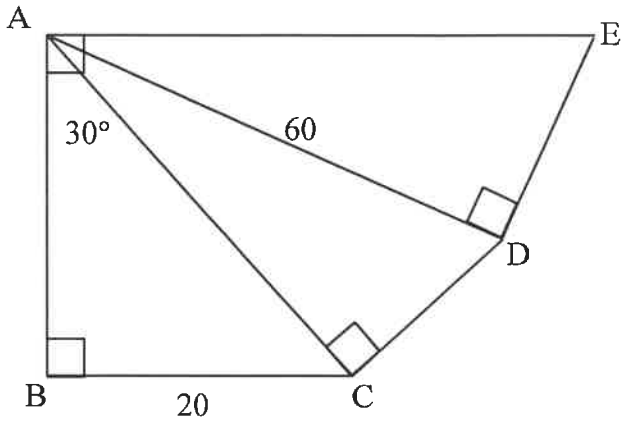
3.3 Bepaal die waarde van die volgende SONDER om 'n sakrekenaar te gebruik:

$$\frac{\text{cosec } 45°}{\sin 90°.\tan 60°}$$ (4)

[11]

VRAAG 4

4.1 In die diagram hieronder is ABC, ACD en ADE reghoekige driehoeke. $B\hat{A}E = 90°$ en $B\hat{A}C = 30°$. BC = 20 eenhede en AD = 60 eenhede.



Bereken die:

4.1.1 Lengte van AC (2)

4.1.2 Grootte van $C\hat{A}D$ (2)

4.1.3 Lengte of DE (3)

4.2 Los op vir x, korrek tot EEN desimale plek, waar $0° \leq x \leq 90°$:

4.2.1 $\tan x = 2{,}01$ (2)

4.2.2 $5\cos x + 2 = 4$ (3)

4.2.3 $\dfrac{\text{cosec}\, x}{2} = 3$ (3)

[15]

VRAAG 5

5.1 Beskou die funksie $f(x) = -3\tan x$.

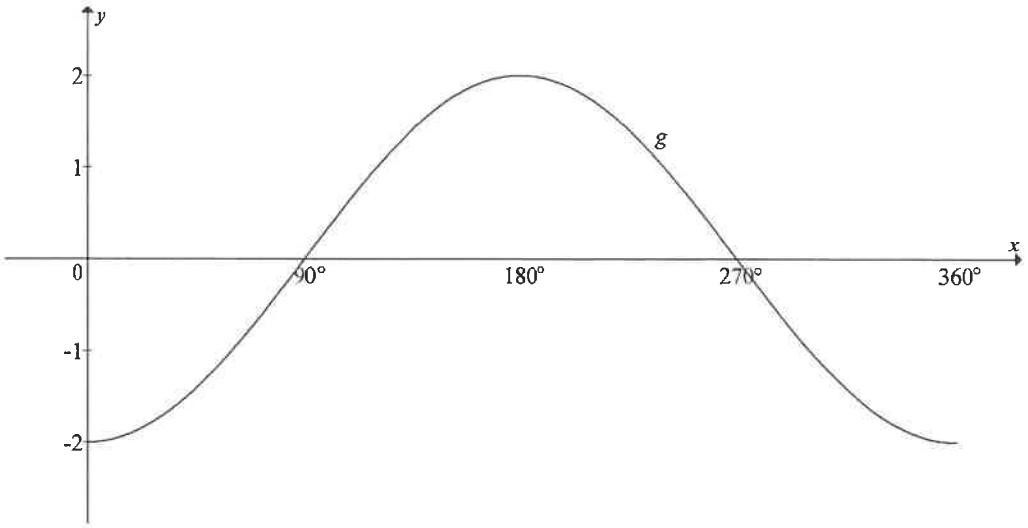
5.1.1 Skets, op die rooster wat in die ANTWOORDEBOEK verskaf word, die grafiek van f vir $0° \leq x \leq 360°$. Toon duidelik AL die snypunte en asimptote. (3)

5.1.2 Skryf gevolglik of andersins neer die:

(a) Periode van f (1)

(b) Vergelyking van h indien h die refleksie van f om die x-as is (1)

5.2 Die grafiek van $g(x) = a.\cos b\theta$ is hieronder geskets.



5.2.1 Skryf die waardes van a en b neer. (2)

5.2.2 Gebruik die grafiek om die waarde(s) van x, waarvoor $g(x) > 0$, te bepaal. (1)

5.2.3 Bepaal die waardeversameling van h indien h die beeld van g is indien g TWEE eenhede na onder geskuif word. (2)

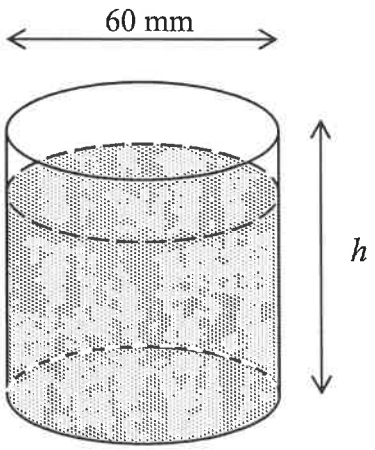
5.2.4 Bepaal, met gebruik van die grafiek, die waarde van:

$$-2(\cos 0° + \cos 1° + \cos 2° + ... + \cos 358° + \cos 359° + \cos 360°)$$ (2)

[12]

VRAAG 6

Die diagram hieronder toon 'n beker met 'n volume van 117π cm^3 en 'n binnemiddellyn van 60 mm. Ignoreer die dikte van die beker.



Bereken die:

6.1 Hoogte van die beker (3)

6.2 Totale buite-oppervlakte van die water wat aan die beker raak indien die beker 80% met water gevul is. (4)

[7]

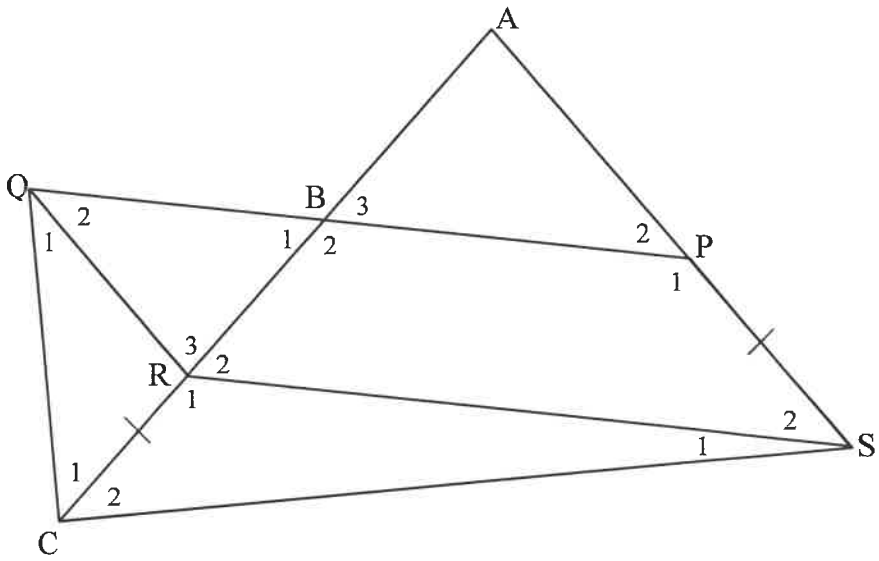
Gee redes vir ALLE meetkundestellings in VRAAG 7 en 8.

VRAAG 7

7.1 Voltooi die stelling sodat dit WAAR is:

Die lyn wat vanaf die middelpunt van die een sy van 'n driehoek getrek word, parallel aan die tweede sy, … (1)

7.2 ACS is 'n driehoek. P is 'n punt op AS en R is 'n punt op AC sodat PSRQ 'n parallelogram is. PQ sny AC by B sodanig dat B die middelpunt van AR is. QC word verbind. Net so is CR = PS, $\hat{C}_1 = 50°$ en BP = 60 mm.

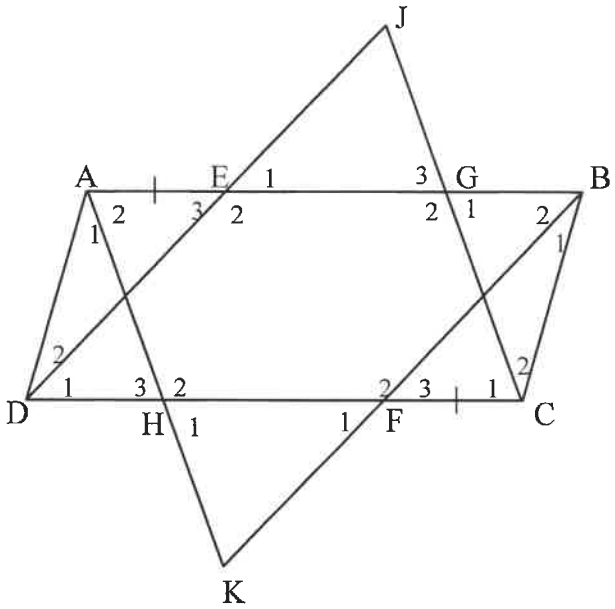


7.2.1 Bereken die grootte van $\hat{A}$. (5)

7.2.2 Bepaal die lengte van QP. (3)
[9]

VRAAG 8

8.1 ABCD is 'n parallelogram. E en F is punte onderskeidelik op AB en DC sodat AE = CF. DE word verleng na J en CJ word getrek. BF word verleng na K en AK word getrek.

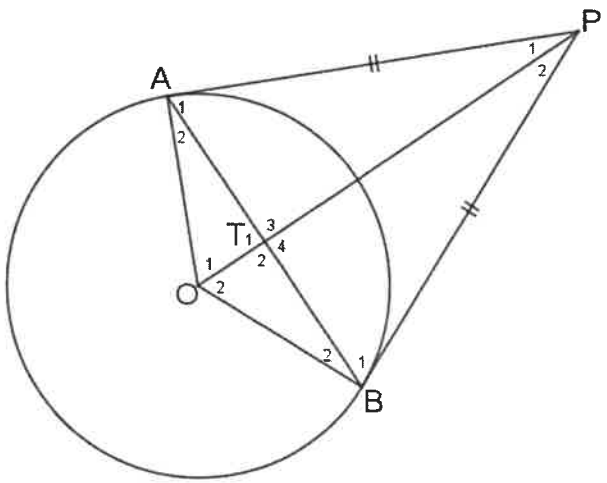


Bewys dat:

8.1.1 DJ || BK (5)

8.1.2 $\hat{E}_1 = \hat{F}_1$ (4)

8.2 In die diagram hieronder is O die middelpunt van die sirkel. A en B lê op die omtrek van die sirkel. AP = BP.



Bewys dat:

8.2.1 AT = BT (5)

8.2.2 $O\hat{T}A = 90^\circ$ (1)

[15]

TOTAAL: 100

NAME OF LEARNER: *NAAM VAN LEERDER:*	
CLASS: *KLAS:*	

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

MATHEMATICS P2/*WISKUNDE V2*

GRADE/*GRAAD* 10

NOVEMBER 2018

SPECIAL ANSWER BOOK
SPESIALE ANTWOORDEBOEK

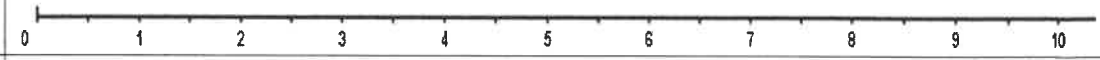
QUESTION *VRAAG*	MARK *PUNT*			INITIAL *PARAAF*	MODERATION *MODERERING*			INITIAL *PARAAF*
1								
2								
3								
4								
5								
6								
7								
8								
TOTAL *TOTAAL* (100)								

This answer book consists of 12 pages.
Hierdie antwoordeboek bestaan uit 12 bladsye.

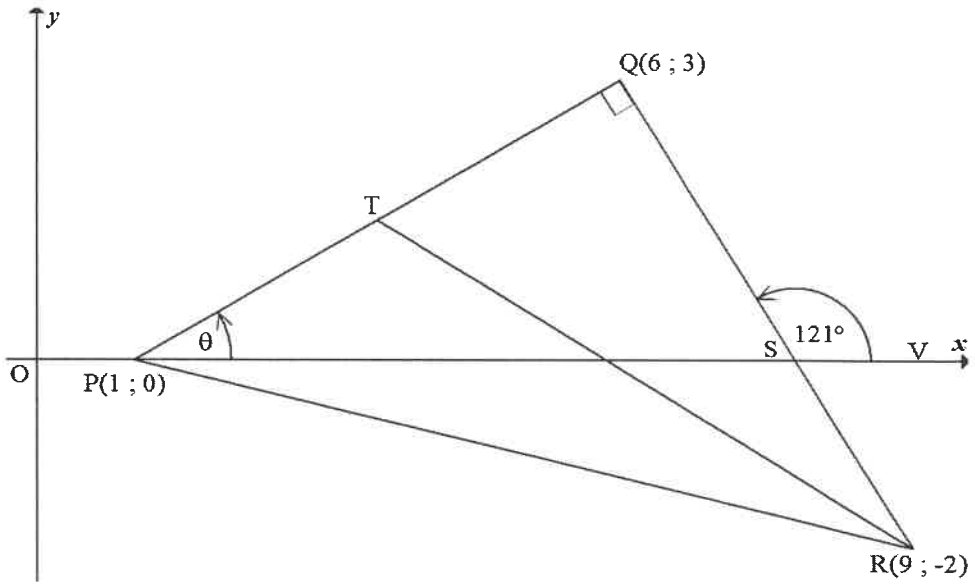
QUESTION/*VRAAG* 1

	Solution/*Oplossing*	**Marks** ***Punte***
1.1		(2)
1.2		(1)
1.3.1		(2)
1.3.2		(3)

MARKS OBTAINED/ ***PUNTE BEHAAL***	**FREQUENCY/** ***FREKWENSIE***
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

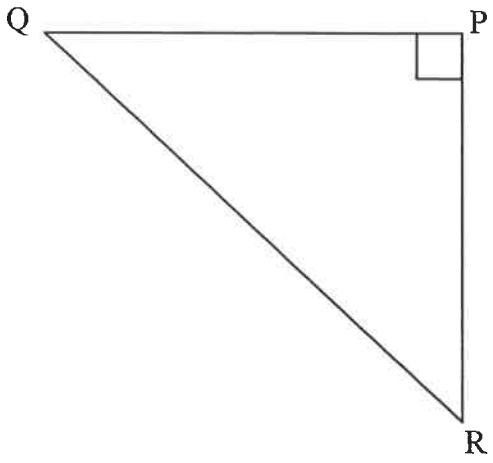
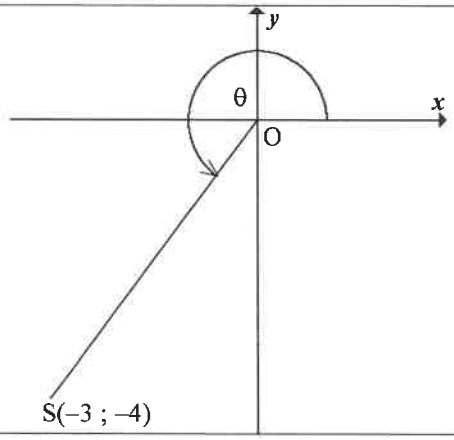
1.4		(3)
1.5		(3)
		[14]

QUESTION/*VRAAG* 2

Solution/*Oplossing*	**Marks** *Punte*
	
2.1.1	(2)
2.1.2	(2)

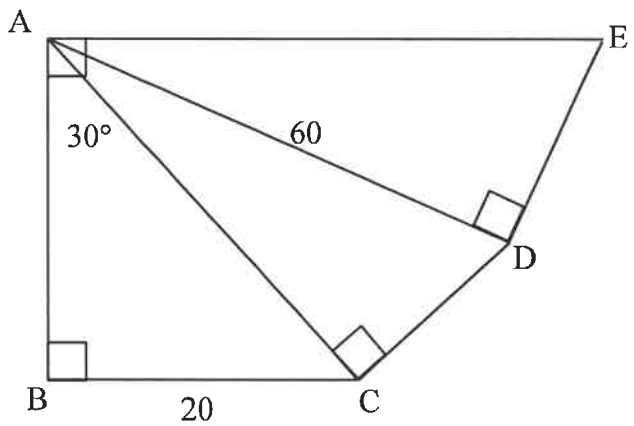
2.1.3		(2)
2.2.1		(3)
2.2.2		(2)
2.2.3		(3)
2.3		(3)
		[17]

QUESTION/*VRAAG* 3

	Solution/*Oplossing*	**Marks** ***Punte***
		
3.1.1		(1)
3.1.2		(1)
3.2		
3.2.1		(2)
3.2.2		(3)

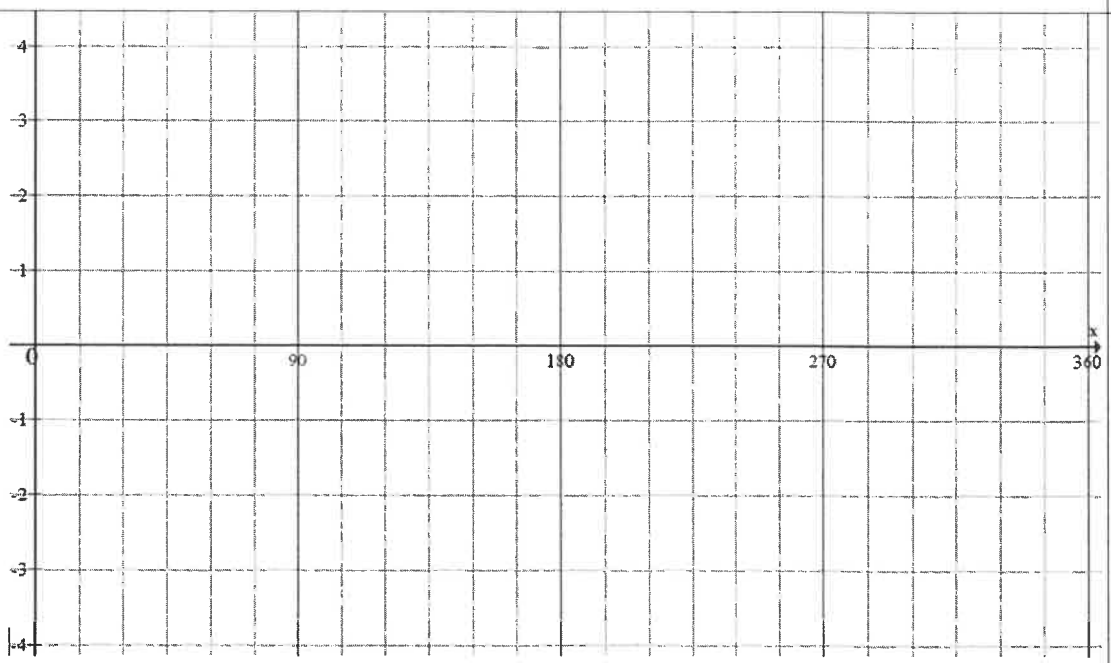
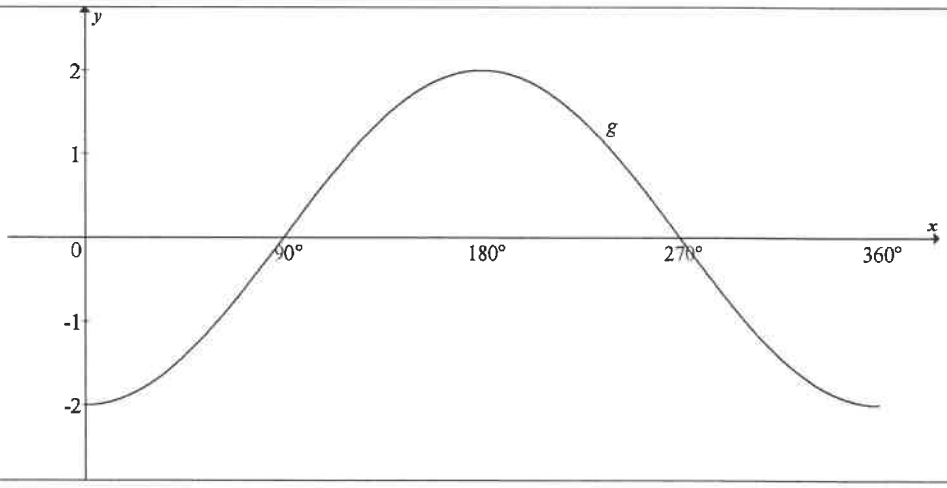
3.3		(4)
		[11]

QUESTION/*VRAAG* 4

	Solution/*Oplossing*	**Marks** ***Punte***
		
4.1.1		(2)
4.1.2		(2)
4.1.3		(3)

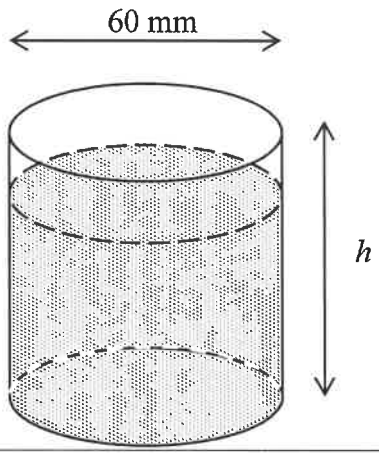
4.2.1		(2)
4.2.2		(3)
4.2.3		(3)
		[15]

QUESTION/*VRAAG* 5

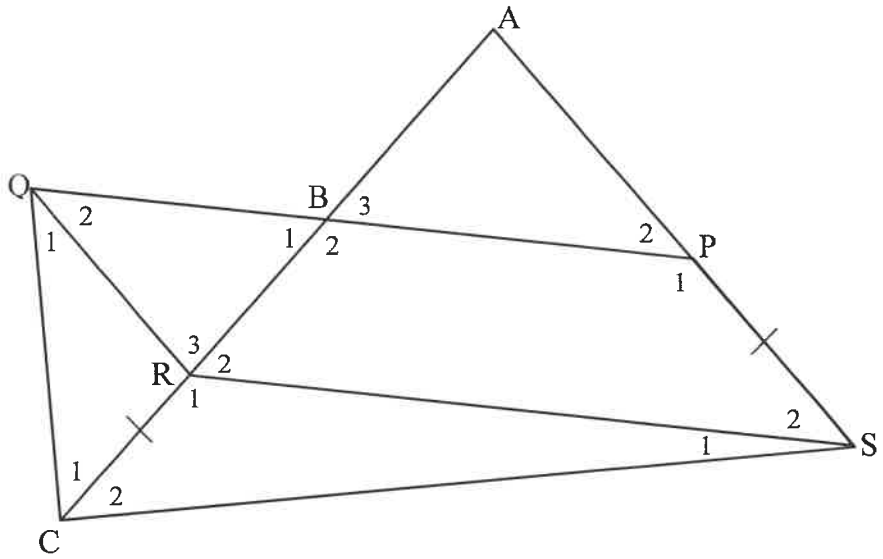
	Solution/*Oplossing*	**Marks** ***Punte***
5.1.1		(3)
5.1.2 (a)		(1)
5.1.2 (b)		(1)
5.2		
5.2.1		(2)
5.2.2		(1)

5.2.3		(2)
5.2.4		(2)
		[12]

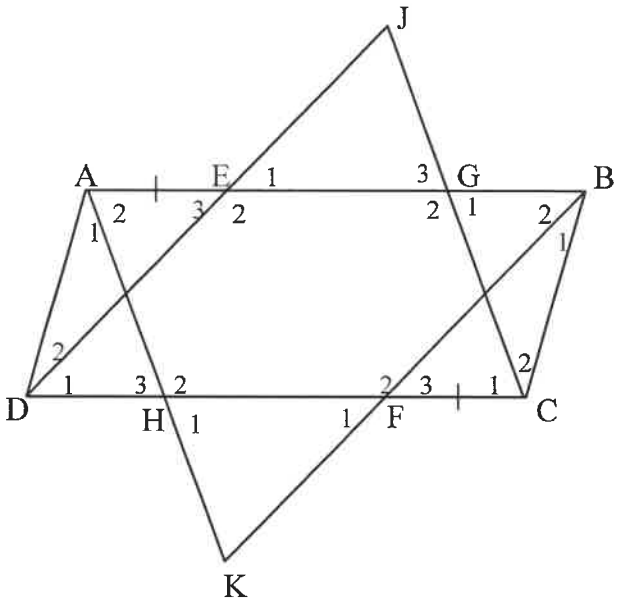
QUESTION/*VRAAG* 6

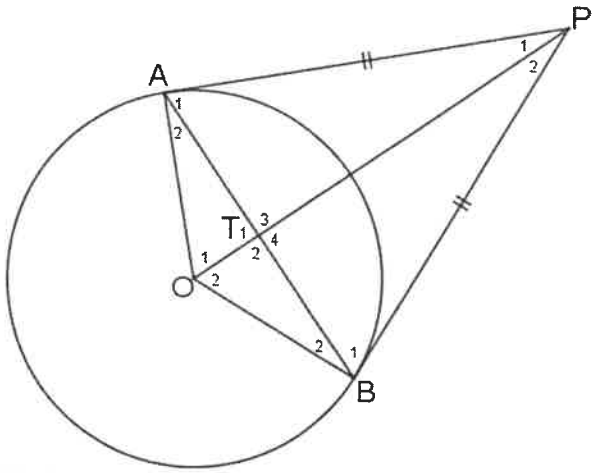
	Solution/*Oplossing*	**Marks** ***Punte***
		
6.1		(3)
6.2		(4)
		[7]

QUESTION/*VRAAG* 7

	Solution/*Oplossing*	**Marks** ***Punte***
7.1		(1)
7.2		
7.2.1		(5)
7.2.2		(3)
		[9]

QUESTION/*VRAAG* 8

	Solution/*Oplossing*	**Marks** ***Punte***
8.1		
8.1.1		(5)
8.1.2		(4)

8.2		
8.2.1		(5)
8.2.2		(1)
		[15]

TOTAL/*TOTAAL*: 100

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 10

MATHEMATICS P2/*WISKUNDE V2*

NOVEMBER 2018

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 100

These marking guidelines consist of 13 pages.
Hierdie nasienriglyne bestaan uit 13 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 guidelines.
- 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 nasienriglyne van toepassing.*
- *Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.*

QUESTION/*VRAAG* 1

1.1

Marks/*Punte*	Frequency/*Frekwensie*
0	0
1	3
2	4
3	5
4	3
5	6
6	0
7	7
8	9
9	5
10	0

2 marks:
all 11 values correct

1 mark:
5 – 10 values correct

0 marks:
0 – 4 values correct
(2)

1.2

42 learners/*leerders*

✓answer/*antwoord*
(1)

1.3.1

Range/*Variasiewydte*
$= 9 - 1$
$= 8$

Answer only: 2/2 marks

✓max = 9 and min = 1
✓answer/*antwoord*
(2)

1.3.2

$$\bar{x} = \frac{(1\times3)+(2\times4)+(3\times5)+(4\times3)+(5\times6)+(7\times7)+(8\times9)+(9\times5)}{42}$$
$$= \frac{234}{42}$$
$$= 5,57$$

Answer only: 3/3 marks

✓ sum of (frequencies × values)
✓÷ *n*
✓answer/*antwoord*
(3)

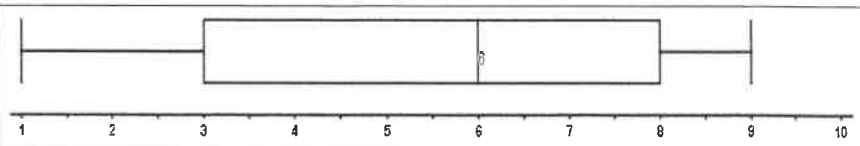
1.4

Position of the median/*Posisie van die mediaan* $= \frac{n+1}{2}$
$= 21,5^{th/de}$ position/*posisie*
$Q_2 = \frac{5+7}{2}$
$= 6$

Answer only: 3/3 marks

✓ identification of 5 and 7
✓$\frac{5+7}{2}$
✓answer/*antwoord*
(3)

1.5



✓ Q_1
✓ Q_3
✓ rest of the box
(3)

[14]

QUESTION/*VRAAG* 2

2.1.1	$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(1-6)^2 + (0-3)^2}$ Answer only: 2/2 marks $= \sqrt{25+9}$ $= \sqrt{34}$	✓subst./*verv.* ✓answer/*antwoord* (2)
2.1.2	$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{3-0}{6-1}$ Answer only: 2/2 marks $= \frac{3}{5}$	✓subst./*verv.* ✓answer/*antwoord* (2)
2.1.3	$x_T = \frac{x_1 + x_2}{2}$ $y_T = \frac{y_1 + y_2}{2}$ $= \frac{1+6}{2}$ $= \frac{0+3}{2}$ $= \frac{7}{2}$ $= \frac{3}{2}$ $T\left(\frac{7}{2}; \frac{3}{2}\right)$	✓*x*-value/*x-waarde* ✓*y*-value/*y-waarde* (2)
2.2.1	$QR = QP = \sqrt{34}$ $QT = \frac{1}{2}PQ$ **OR/*OF*** $QT = \frac{1}{2}\sqrt{34}$ $QT = \sqrt{\left(\frac{7}{2}-6\right)^2 + \left(\frac{3}{2}-3\right)^2}$ $QT = \frac{\sqrt{34}}{2}$ Area of $\Delta QTR = \frac{1}{2}(QR)(QT)$ $= \frac{1}{2}(\sqrt{34})\left(\frac{1}{2}.\sqrt{34}\right)$ $= \frac{17}{2} = 8{,}5$ sq units/eenhede **OR/*OF***	✓ $QR = \sqrt{34}$ ✓ $QT = \frac{1}{2}\sqrt{34}$ ✓answer/*antwoord* (3)

	$QR = QP = \sqrt{34}$ Area of $\Delta QTR = \frac{1}{2}$ Area of ΔQPR $= \frac{1}{2}\left(\frac{1}{2}.QR.QP\right)$ $= \frac{1}{2}\times\frac{1}{2}.(\sqrt{34})\left(\sqrt{34}\right)$ $= \frac{17}{2}$ sq units/eenhede	✓ $QR = \sqrt{34}$ ✓ $\frac{1}{2}\sqrt{34}$ ✓answer/*antwoord* (3)
2.2.2	$\theta = 121^\circ - 90^\circ$ (ext $\angle$ Δ/*buitehoek van* Δ) $= 31^\circ$ **OR/*OF*** $Q\hat{S}P = 59^\circ$ ($\angle$ str line/*hoek op reguitlyn*) $\theta = 31^\circ$ ($\angle$ sum Δ/*binnehoek van* Δ)	✓ reason ✓answer/*antwoord* (2) ✓ $\angle$ sum Δ/*binnehoek van* Δ ✓ answer/*antwoord* (2)
2.2.3	$\cos\theta = \frac{PQ}{PS}$ **OR/*OF*** $\sin Q\hat{S}P = \frac{PQ}{PS}$ $\cos 31^\circ = \frac{\sqrt{34}}{PS}$ **OR/*OF*** $\sin 59^\circ = \frac{\sqrt{34}}{PS}$ $PS = \frac{\sqrt{34}}{\cos 31^\circ}$ **OR/*OF*** $PS = \frac{\sqrt{34}}{\sin 59^\circ}$ $PS = 6{,}80$ $PS = 6{,}80$ $S(6{,}8 + 1; 0)$ $S(7{,}8\ ;\ 0)$ **OR/*OF*** $m_{QR} = -\frac{5}{3}$ $\frac{3-0}{6-x} = -\frac{5}{3}$ $9 = -30 + 5x$ $x = 7{,}8$ **OR/*OF*** $m_{QR} = -\frac{5}{3}$ Equation of QR $y - 3 = -\frac{5}{3}(x-6)$ $y = -\frac{5}{3}x + 13$ $0 = -\frac{5}{3}x + 13$ $x = 7{,}8$ $S(7{,}8\ ;\ 0)$	✓ $\cos\theta = \frac{PQ}{PS}$ or/*of* $\sin Q\hat{S}P = \frac{PQ}{PS}$ ✓ *x*-value/*x-waarde* ✓ *y*-value/*y-waarde* (3) ✓ $m_{QR} = m_{QS}$ ✓ $y = 0$ ✓ *x*-value/*x-waarde* (3) ✓ equation of QR/*verhouding van QR* ✓ $y = 0$ ✓ *x*-value/*x-waarde*

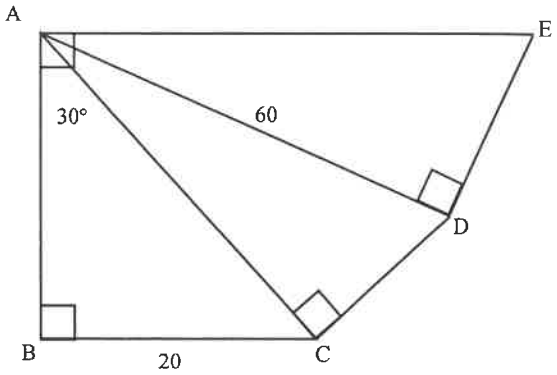
		(3)
2.3	$m_{QR}=\frac{3-(-2)}{6-(9)}$ $=-\frac{5}{3}$ $m_{T-\text{midpoint}}=m_{\text{QR}}$ (Midpoint Theorem) $m_{T-\text{midpoint}}=-\frac{5}{3}$ **OR/*OF*** Midpoint PR$\left(\frac{9+1}{2};\frac{-2+0}{2}\right)$ Midpoint PR$(5;-1)$ $m_{T\ and/en\ PR}=\frac{\frac{3}{2}-(-1)}{\frac{7}{2}-(5)}$ $=-\frac{5}{3}$	✓ m_{QR} ✓ $m_{T-\text{midpoint}}=m_{\text{QR}}$ ✓Midpoint theorem/ *Middelpunt-stelling* (3) ✓midpoint of PR ✓ subst ✓answer (3)
		[17]

QUESTION/*VRAAG* 3

3.1.1	$\tan(90^\circ - \text{R})=\frac{\text{PR}}{\text{QP}}$ OR/*OF* $\frac{q}{r}$	✓answer/*antwoord* (1)
3.1.2	sec Q **OR/*OF*** cosec R **OR/*OF*** cosec (90° – Q) **OR/*OF*** sec (90° – R)	✓ answer/*antwoord* (1) ✓ answer/*antwoord* (1) ✓ answer/*antwoord* (1) ✓ answer/*antwoord* (1)
3.2.1	OS $=\sqrt{(-3)^2+(-4)^2}$ (Pythagoras) $=5$ Answer only: 2/2 marks	✓subst./*verv.* ✓answer/*antwoord* (2)

3.2.2	$\sec\theta + \sin^2\theta$ $= -\frac{5}{3} + \left(-\frac{4}{5}\right)^2$ $= -\frac{5}{3} + \frac{16}{25}$ $= -\frac{77}{75}$	✓$-\frac{5}{3}$ ✓$-\frac{4}{5}$ ✓answer/*antwoord* (3)
3.3	$\frac{\text{cosec } 45°}{\sin 90°.\tan 60°}$ $= \frac{\frac{1}{\sin 45°}}{(1).(\sqrt{3})}$ $= \frac{2}{\sqrt{2}} \div \sqrt{3}$ $= \frac{2}{\sqrt{2}} \times \frac{1}{\sqrt{3}}$ $= \frac{2}{\sqrt{6}}$ **OR/*OF*** $\frac{\text{cosec } 45°}{\sin 90°.\tan 60°}$ $= \frac{\frac{1}{\sin 45°}}{(1).(\sqrt{3})}$ $= \frac{\sqrt{2}}{\sqrt{3}}$	If the answer is left as $\frac{\sqrt{6}}{3}$ and no other rationalisation working is shown: max 3/4 marks ✓ $\frac{2}{\sqrt{2}}$ ✓ 1 ✓ $\sqrt{3}$ ✓answer/*antwoord* (4) ✓ $\sqrt{2}$ ✓ 1 ✓ $\sqrt{3}$ ✓answer/*antwoord* (4)
		[11]

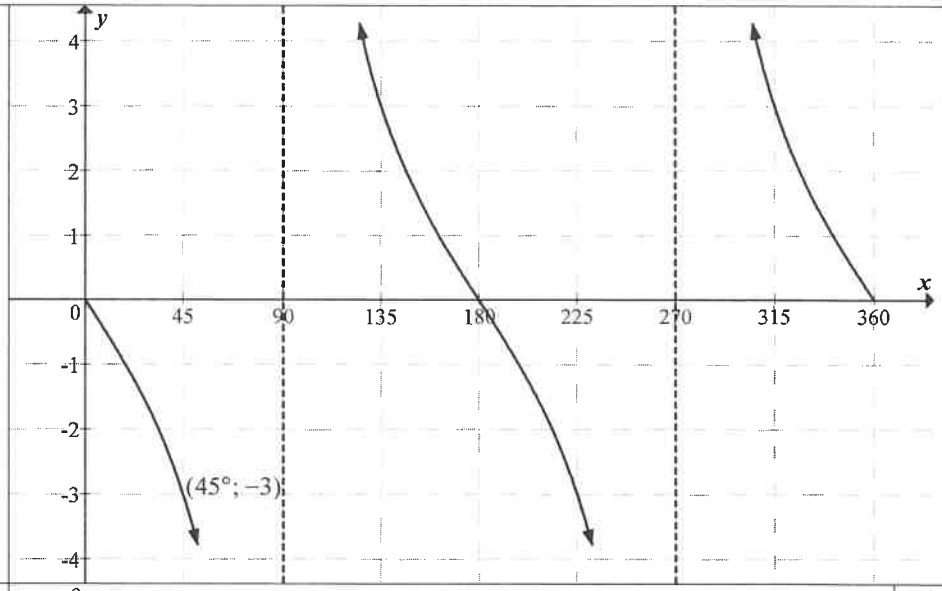
QUESTION/*VRAAG* 4



4.1.1	$\sin 30^\circ = \frac{20}{AC}$ $AC = \frac{20}{\sin 30^\circ}$ $AC = 40$ **OR/*OF*** $\cos 60^\circ = \frac{20}{AC}$ $AC = \frac{20}{\cos 60^\circ}$ $AC = 40$	**OR/*OF*** **OR/*OF***	$\text{cosec } 30^\circ = \frac{AC}{20}$ $AC = \frac{20}{\sin 30^\circ}$ $AC = 40$ $\sec 60^\circ = \frac{AC}{20}$ $AC = \frac{20}{\cos 60^\circ}$ $AC = 40$	✓ $\sin 30^\circ = \frac{20}{AC}$ or $\text{cosec } 30^\circ = \frac{AC}{20}$ ✓answer/*antwoord* (2) ✓ $\cos 60^\circ = \frac{20}{AC}$ or $\sec 60^\circ = \frac{AC}{20}$ ✓answer/*antwoord* (2)
4.1.2	$\cos C\hat{A}D = \frac{AC}{60}$ $\cos C\hat{A}D = \frac{40}{60}$ $C\hat{A}D = 48{,}19^\circ$		✓ $\cos C\hat{A}D = \frac{AC}{60}$ ✓answer/*antwoord* (2)
4.1.3	$D\hat{A}E = 90^\circ - (30^\circ + C\hat{A}D)$ $D\hat{A}E = 90^\circ - (30^\circ + 48{,}19^\circ)$ $= 11{,}81^\circ$ $\tan 11{,}81^\circ = \frac{DE}{60}$ $DE = 60\tan 11{,}81^\circ$ $DE = 12{,}55$		✓ $D\hat{A}E = 11{,}8^\circ$ ✓ $\tan 11{,}81^\circ = \frac{DE}{60}$ ✓answer/*antwoord* (3)

4.2.1	$\tan x = 2,01$ $x = 63,5^\circ$	If the rounding is incorrect: max 1/2 marks	✓✓answer/*antwoord* (2)
4.2.2	$5\cos x + 2 = 4$ $5\cos x = 2$ $\cos x = \frac{2}{5}$ $x = 66,4218...^\circ$ $x = 66,4^\circ$		✓$5\cos x = 2$ ✓$\cos x = \frac{2}{5}$ ✓answer/*antwoord* (3)
4.2.3	$\frac{\text{cosec } x}{2} = 3$ $\text{cos ec } x = 6$ $\frac{1}{\sin x} = 6$ $\sin x = \frac{1}{6}$ $x = 9,6^\circ$		✓$\text{cosec } x = 6$ ✓$\sin x = \frac{1}{6}$ ✓answer/*antwoord* (3)
			[15]

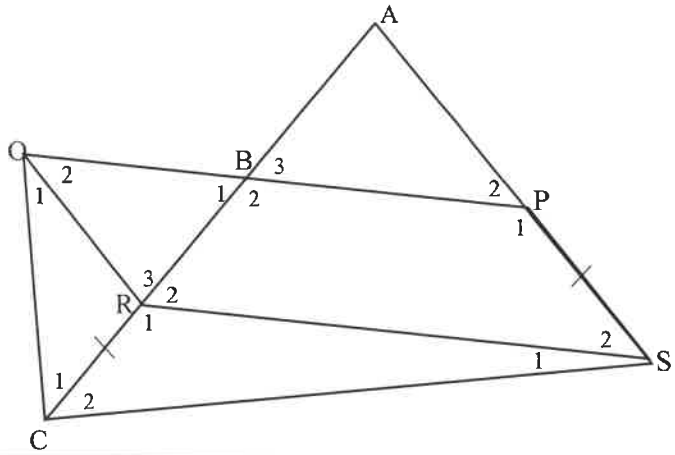
QUESTION/*VRAAG* 5

5.1.1		✓ Tan graph passing through (45°; –3) or (135°; 3) or (225°; –3) or (315°; 3) ✓ *x*-intercepts/ *x-snypunte* ✓ both asymptotes/ *albei asimptote* (3)
5.1.2(a)	180°	✓answer/*antwoord* (1)
5.1.2(b)	$h(x) = 3\tan x$	✓answer/*antwoord* (1)
5.2.1	$a = -2$ $b = 1$	✓a ✓b (2)
5.2.2	$90^{\circ} < x < 270^{\circ}$ **OR/*OF*** $x \in (90^{\circ}; 270^{\circ})$	✓answer/*antwoord* (1)
5.2.3	$-4 \le y \le 0$ **OR/*OF*** $y \in [-4; 0]$	✓critical values/*kritieke waardes* ✓notation/*notasie* (2)
5.2.4	$-2(\cos 0° + \cos 1° + \cos 2° + ... + \cos 358° + \cos 359° + \cos 360°)$ $= -2(1)$ $= -2$	✓✓answer/*antwoord* (2)
		[12]

QUESTION/*VRAAG* 6

6.1	$r = 3$ cm $V = \pi r^2 h$ $117\pi = \pi(3)^2 h$ $h = 13\,cm$			✓$r = 3$ cm ✓subst./*verv.* ✓answer/*antwoord* (3)
6.2	TSA/TBO $= \pi r^2 + 2\pi rh$ $= \pi(3)^2 + 2\pi(3)(13) \times 0{,}8$ $= 224{,}31\,\text{cm}^2$	**OR/*OF***	TSA/TBO $= \pi r^2 + 2\pi rh$ $= \pi(3)^2 + 2\pi(3)(10{,}4)$ $= 224{,}31\,\text{cm}^2$	✓$\pi r^2 + 2\pi rh$ ✓subst./*verv.* ✓80% of height/*van hoogte* ✓answer (4)
				[7]

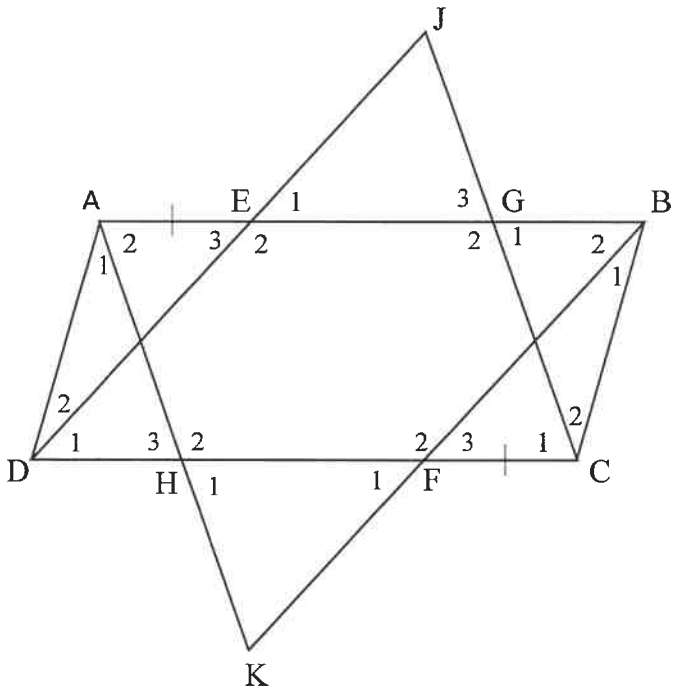
QUESTION/*VRAAG* 7

7.1	Bisects the third side/*Halveer die derde sy*	✓answer/*antwoord* (1)
7.2		

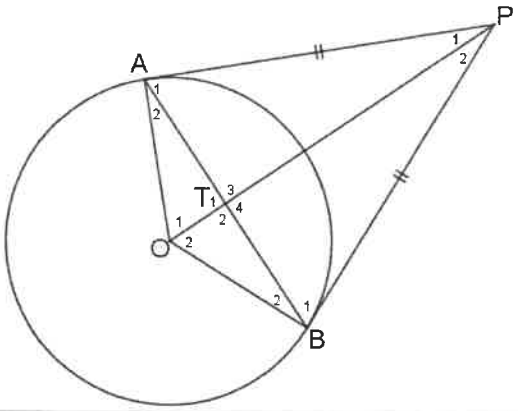
7.2.1	CR = PS (given)
	PS = QR (opp sides //m =)
	CR = QR
	$\hat{Q}_1 = \hat{C}_1 = 50°$ (∠s opp = sides)
	$\hat{R}_3 = 100°$ (ext ∠ Δ)
	$\hat{A} = 100°$ (alt ∠s; QR || AS)
		✓ CR = QR
		✓ $\hat{Q}_1 = \hat{C}_1 = 50°$
		✓ $\hat{R}_3 = 100°$
		✓ $\hat{A} = 100°$
		✓ Reason (5)

7.2.2	AP = PS (line from midpoint // to one side of triangle)
	RS = 120 (midpoint theorem)
	QP = 120 (opp sides //m =)
	OR/*OF*
	In ΔQBR and ΔPBA
	1. $\hat{R}_3 = \hat{A}$ (proven) or (alt ∠s; QR || QS)
	2. $\hat{B}_1 = \hat{B}_3$ (vert opp ∠s)
	3. BR = BA (given)
	ΔQBR ≡ ΔPBA (∠∠S)
	QB = BP = 60 (≡ Δs)
	QP = 120
	Answer only: 1/3 marks
		✓ AP = PS
		✓ Reason
		✓ QP = 120 (3)
		✓ ΔQBR ≡ ΔPBA
		✓ QB = BP
		✓ QP = 120 (3)

		[9]

QUESTION/*VRAAG* 8		
		
8.1.1	AB = DC AE + EB = DF + FC (opp sides of a parallelogram equal) AE = CF (given) ∴ EB = DF DF ∥ EB (opp sides parallelogram parallel) EDFB is a parallelogram (one pair opp sides = and ∥) ∴ ED ∥ FB ∴ DJ ∥ BK **OR/*OF*** In ΔAED and ΔCFB 1. FC = AE (given) 2. $\hat{C}_1 + \hat{C}_2 = \hat{A}_1 + \hat{A}_2$ (opp ∠ ∥m =) 3. BC = AD (opp sides ∥m =) ΔAED ≡ ΔCFB (S∠S) $\hat{E}_3 = \hat{F}_3$ (≡ Δs) $\hat{E}_3 = \hat{D}_1$ (alt ∠s; AB ∥ DC) $\hat{F}_3 = \hat{D}_1$ DJ ∥ BK (corres ∠s =)	✓ S/R ✓ EB = DF ✓ S/R ✓ R ✓ ED ∥ FB (5) ✓ ΔAED ≡ ΔCFB ✓ $\hat{E}_3 = \hat{F}_3$ ✓ S/R ✓ $\hat{F}_3 = \hat{D}_1$ ✓ R (5)

	OR/*OF* In ΔAED and ΔCFB 1. FC = AE (given) 2. $\hat{C}_1 + \hat{C}_2 = \hat{A}_1 + \hat{A}_2$ (opp ∠ ‖m =) 3. BC = AD (opp sides ‖m =) ΔAED ≡ ΔCFB (S∠S) DE = FB (≡ Δs) AB = DC AE + EB = DF + FC (opp sides of a parallelogram equal) AE = CF (given) ∴ EB = DF EDFB is a parallelogram (both pairs opp sides =) DE ‖ FB (opp sides ‖m ‖) DJ ‖ KB	✓ ΔAED ≡ ΔCFB ✓ DE = FB ✓ S/R ✓ EB = DF ✓ Reason
8.1.2	$\hat{E}_1 = \hat{D}_1$ (corres. ∠'s, AB‖DC) $\hat{F}_1 = \hat{D}_1$ (alt. ∠'s, DE‖FB) $\therefore \hat{E}_1 = \hat{F}_1$ **OR/*OF*** $\hat{E}_3 = \hat{D}_1$ (alt. ∠'s, AB‖DC) $\hat{F}_1 = \hat{D}_1$ (alt. ∠'s, DE‖FB) $\therefore \hat{E}_3 = \hat{F}_1$ $\hat{E}_3 = \hat{E}_1$ (vert. opp. ∠'s) $\therefore \hat{E}_1 = \hat{F}_1$ **OR/*OF*** $\hat{E}_1 = \hat{D}_1$ (corres ∠'s, AB‖DC) $\hat{F}_3 = \hat{D}_1$ (corres ∠'s, DE‖FB) $\therefore \hat{E}_3 = \hat{F}_1$ $\hat{F}_3 = \hat{F}_1$ (vert. opp. ∠'s) $\therefore \hat{E}_1 = \hat{F}_1$ **OR/*OF*** EDFB is a parallelogram (proven in 8.1.1) $\hat{E}_2 = \hat{F}_2$ (opp ∠s ‖m =) $\hat{E}_1 = \hat{F}_1$ (∠s on straight line)	✓S ✓R ✓S ✓R (4) ✓ S ✓ R ✓ S ✓ S/R (4) ✓ S ✓ R ✓ S ✓ S/R (4) ✓S ✓R ✓S ✓R (4)

8.2		
8.2.1	AP = BP (given) OA = OB (radii) OAPB is a kite (two pairs adj sides =) AT = TB (one diag of kite bisects the other) **OR/*OF*** In ΔOAP and ΔOBP 1. AP = BP (given) 2. OA = OB (radii) 3. OP is common ∴ ΔOAP ≡ ΔOBP (SSS) $\hat{O}_1 = \hat{O}_2$ (≡ Δs) In ΔOAT and ΔOBT 1. $\hat{O}_1 = \hat{O}_2$ (≡ Δs) 2. OA = OB (radii) 3. OT is common ∴ ΔOAT ≡ ΔOBT (S∠S) AT = TB (≡ Δs) $\hat{P}_1 = \hat{P}_2$ (≡ Δs) In ΔPAT and ΔPBT 1. $\hat{P}_1 = \hat{P}_2$ (≡ Δs) 2. AP = PB (given) 3. PT is common ΔPAT ≡ ΔPBT (S∠S)	✓ S ✓ OA = OB ✓ OAPB is a kite/*'n vlieër* ✓ two pairs adj sides = ✓ reason/*rede* (5) ✓ AP = BP ✓ OA = OB ✓ $\hat{O}_1 = \hat{O}_2$ or $\hat{P}_1 = \hat{P}_2$ (≡ Δs) ✓ ∴ ΔOAT ≡ ΔOBT or ΔPAT ≡ ΔPBT ✓ ≡ Δs (5)
8.2.2	$O\hat{T}A = 90°$ (properties of a kite) **OR/*OF*** $O\hat{T}A = O\hat{T}B$ (ΔOTA ≡ ΔOTB) but: $O\hat{T}A + O\hat{T}B = 180^\circ$ (∠s on a str.line) ∴ $O\hat{T}A = 90^\circ$	✓ R (1) ✓ R (1)
		[15]

TOTAL/*TOTAAL*: 100