



GAUTENG PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENGSE DEPARTEMENT VAN ONDERWYS
VOORBEREIDENDE EKSAMEN
2022

10612

WISKUNDE

VRAESTEL 2

TYD: 3 uur

PUNTE: 150

14 bladsye + 1 inligtingsblad en 'n antwoordboek van 24 bladsye

WISKUNDE: Vraestel 2



10612A

X10



INSTRUKSIES EN INLIGTING

Lees die volgende instruksies aandagtig deur voordat die vraestel beantwoord word:

1. Hierdie vraestel bestaan uit 10 vrae.
2. Beantwoord AL die vrae in die ANTWOORDBOEK wat voorsien is.
3. Dui ALLE berekeninge, diagramme, grafieke ensovoorts wat jy in die beantwoording van die vrae gebruik, duidelik aan.
4. Slegs antwoorde sal NIE noodwendig volpunte verdien NIE.
5. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar (nie-programmeerbaar en nie-grafies) gebruik, tensy anders aangedui.
6. Indien nodig, rond antwoorde tot TWEE desimale plekke af, tensy anders aangedui.
7. Diagramme is NIE noodwendig volgens skaal geteken NIE.
8. 'n Inligtingsblad met formules is aan die einde van die vraestel ingesluit.
9. Skryf netjies en leesbaar.

VRAAG 1

Mev. Molefe besluit om die effektiwiteit van haar aanlynklasse te ondersoek. Sy verdeel die Graad 12's regverdig op in Graad 12A en Graad 12B. Graad 12A het fisies (van aangesig-tot-aangesig) klas bygewoon, terwyl Graad 12B aanlynklasse bygewoon het. Beide klasse is deur Mev. Molefe vir dieselfde tydspanne onderrig.

Die onderstaande tabel toon die onderrigtyd spandeer (in ure) en die gemiddelde uitslae behaal deur die leerlinge in hul weeklikse toetse as persentasies (%).

ONDERRIGTYD SPANDEER (in ure)	2	8	4	6	12	10	11
GEMIDDELDE UITSLAE VAN 12A (as %)	42	62	48	52	64	63	67
GEMIDDELDE UITSLAE VAN 12B (as %)	9	63	45	47	61	64	62

- 1.1 Bepaal die vergelyking van die kleinste-kwadrates-regressielyn van Graad 12A. (3)
- 1.2 Skryf die korrelasie koëffisiënt neer van Graad 12A se uitslae ten opsigte van die onderrigtyd spandeer. (1)
- 1.3 Lewer kommentaar op die korrelasie tussen die onderrigtyd spandeer en die gemiddelde uitslae van Graad 12A. (1)
- 1.4 Die vergelyking van die kleinste-kwadrates-regressielyn van Graad 12B is $y = 15,74 + 4,54x$. Bereken die verskil van die uitslag deur elke klas behaal indien Mev. Molefe die gemiddelde tyd spandeer het om 'n spesifieke afdeling te voltooi. (3)
- 1.5 Identifiseer die uitskieter in Graad 12B. (1)
- 1.6 Gee 'n geldige rede vir hierdie uitskieter. (1)

[10]

VRAAG 2

Formule 1 (F1) wedrenbestuurders moet hoë G-kragte teen uiterste hoër temperature verduur. Hulle neig om naby aan 4 kg na afloop van elke wedren te verloor.

- 2.1 Die onderstaande tabel toon die totale gewigsverlies aan van 40 verskillende wedrenbestuurders, na afloop van een wedren.

GEWIGSVERLIES INTERVAL (IN GRAM)	AANTAL BESTUURDERS
$0 \leq w < 500$	1
$500 \leq w < 1\,000$	2
$1\,000 \leq w < 1\,500$	3
$1\,500 \leq w < 2\,000$	8
$2\,000 \leq w < 2\,500$	6
$2\,500 \leq w < 3\,000$	15
$3\,000 \leq w < 3\,500$	5
Totaal	40

- 2.1.1 Skryf die modaleklas van die data neer. (1)

- 2.1.2 Bereken die geskatte gemiddelde gewigsverlies van die wedrenbestuurders. (3)

- 2.2 'n Maand later, na 'n tweede wedren, word data van die gewigsverlies versamel. Die hoeveelheid gewigsverlies in wedren 2 was k gram meer as in wedren 1. Dit word gegee dat die maksimum waarde op die ogief deur wedren 2, voorgestel word as (3 504 ; 40) en dat die grafiek gegrond word by (4 ; 0).

- 2.2.1 Skets die ogief (kumulatiewe frekwensiegrafiek) wat wedren 2 voorstel in die ANTWOORDBOEK. (4)

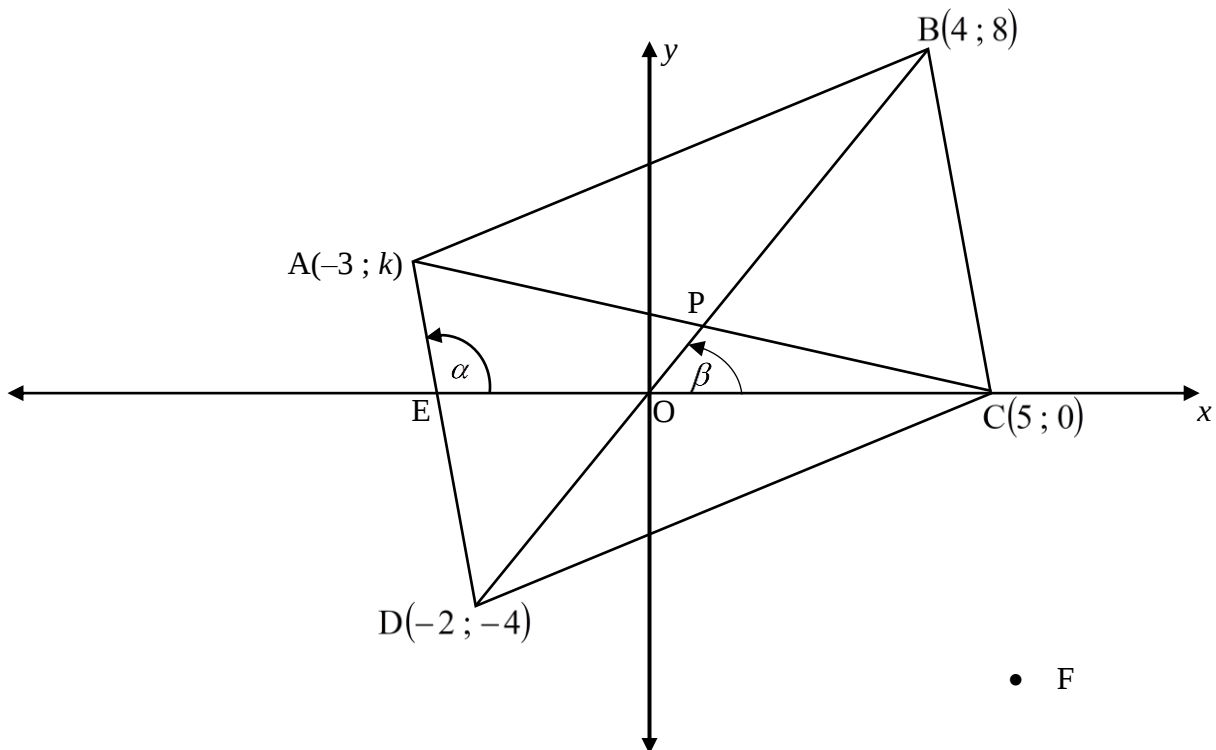
- 2.2.2 Hoe sal die omvang van wedren 2 vergelyk met die omvang van wedren 1? (1)

- 2.2.3 Bepaal die gemiddelde gewigsverlies van wedren 2. (2)

[11]

VRAAG 3

In die onderstaande diagram is $A(-3; k)$, $B(4; 8)$, $C(5; 0)$ en $D(-2; -4)$ die hoekpunte van parallellogram ABCD. Diagonale AC en BD halveer mekaar by P. Die inklinasiehoeke van AD en BD is α en β onderskeidelik. AD sny die x-as by E. F is 'n punt in die vierde kwadrant.

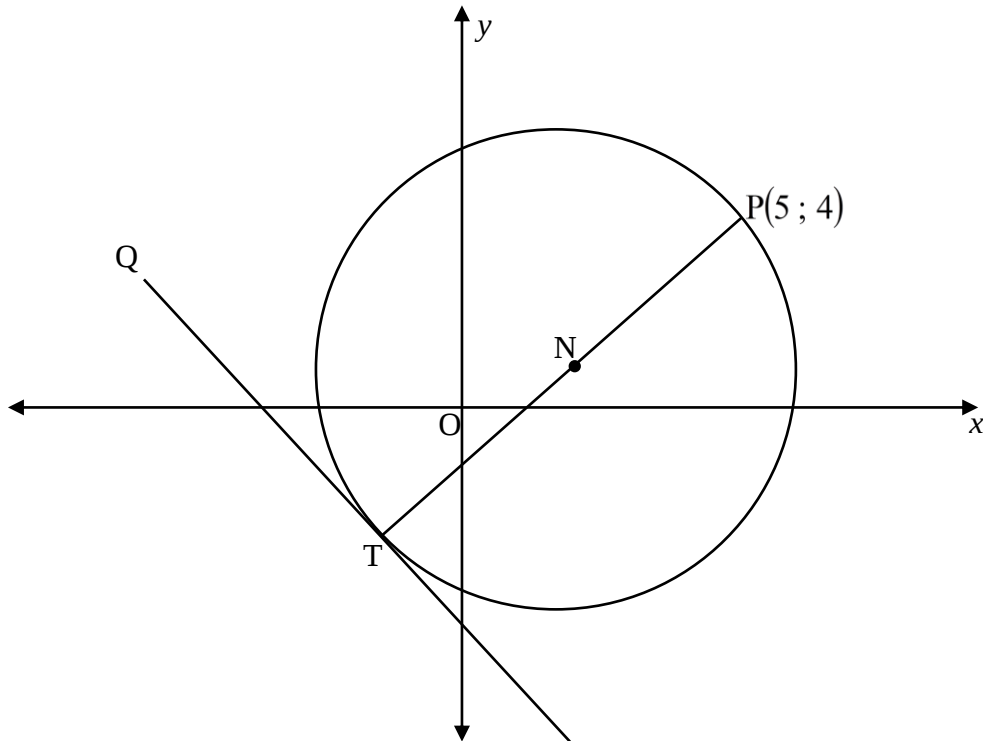


- 3.1 Bepaal die gradiënt van BC. (2)
- 3.2 Indien die afstand tussen punte $A(-3; k)$ en $B(4; 8)$, $\sqrt{65}$ is, bereken die waarde van k . (4)
- 3.3 Bewys deur analitiese meetkunde te gebruik, dat $BP \perp AC$. (3)
- 3.4 Bereken die koördinate van F indien dit gegee word dat ACFD 'n parallellogram is. (2)
- 3.5 Bereken die grootte van $\hat{E}DO$ (korrek tot EEN desimale plek). (6)
- 3.6 Bereken die oppervlakte van $\triangle ADC$. (4)

[21]

VRAAG 4

In die onderstaande diagram is die vergelyking van die sirkel met middelpunt N gegee as $x^2 + y^2 - 4x - 2y - 13 = 0$. QT is 'n raaklyn aan die sirkel by T. TNP is die middellyn van die sirkel. Punt $P(5; 4)$ lê op die sirkel.

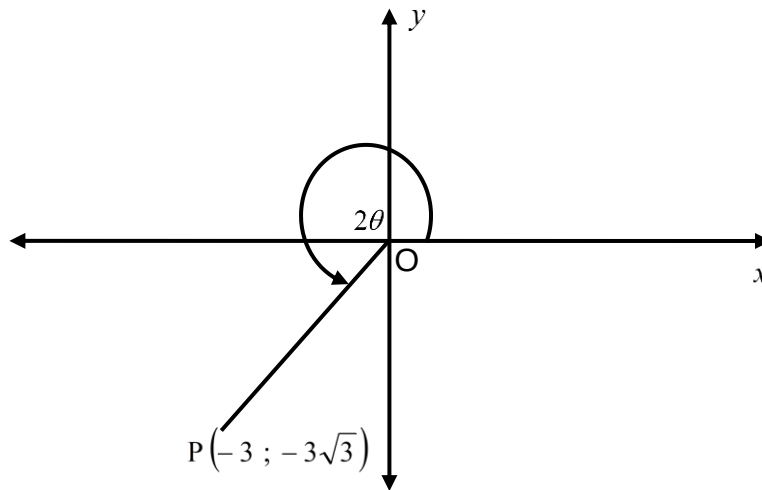


- 4.1 Skryf die vergelyking van die sirkel in die vorm $(x-a)^2 + (y-b)^2 = r^2$. (3)
- 4.2 Skryf die koördinate van N asook die lengte van NT neer. (2)
- 4.3 Bepaal die vergelyking van raaklyn QT in die vorm $y = mx + c$. (6)
- 4.4 Die sirkel met middelpunt $S(a; b)$ raak die sirkel met middelpunt N uitwendig by T. QT is 'n raaklyn aan beide sirkels. Indien $NS = 3NT$, bepaal die koördinate van S. (7)

[18]

VRAAG 5

5.1 In die onderstaande diagram word punt $P(-3; -3\sqrt{3})$ en inspringende hoek 2θ getoon.



Bepaal, **sonder die gebruik van 'n sakrekenaar**, die waarde van:

5.1.1 $\cos 2\theta$ (3)

5.1.2 $\sin \theta$ (3)

5.2 Vereenvoudig die volgende uitdrukking:

$\cos^2(180^\circ + x) + \cos(-x) \cdot \tan x \cdot \cos(90^\circ + x)$ (6)

5.3 Beskou die vergelyking $5 \tan \theta - 6 \cos \theta = 0$:

5.3.1 Toon aan dat die vergelyking herskryf kan word as $6 \sin^2 \theta + 5 \sin \theta - 6 = 0$. (3)

5.3.2 Bepaal die algemene oplossing van $5 \tan \theta - 6 \cos \theta = 0$. (5)

5.4 Bewys dat:

$\cos(2\alpha + 77^\circ) \cos(\alpha + 407^\circ) - \sin(\alpha + 47^\circ) \sin(2\alpha + 283^\circ) = \cos(\alpha + 30^\circ)$ (5)

5.5 Los op vir α en β :

$\sin(3\alpha - \beta) = \frac{1}{\sqrt{2}}$ indien $3\alpha - \beta \in [90^\circ; 270^\circ]$

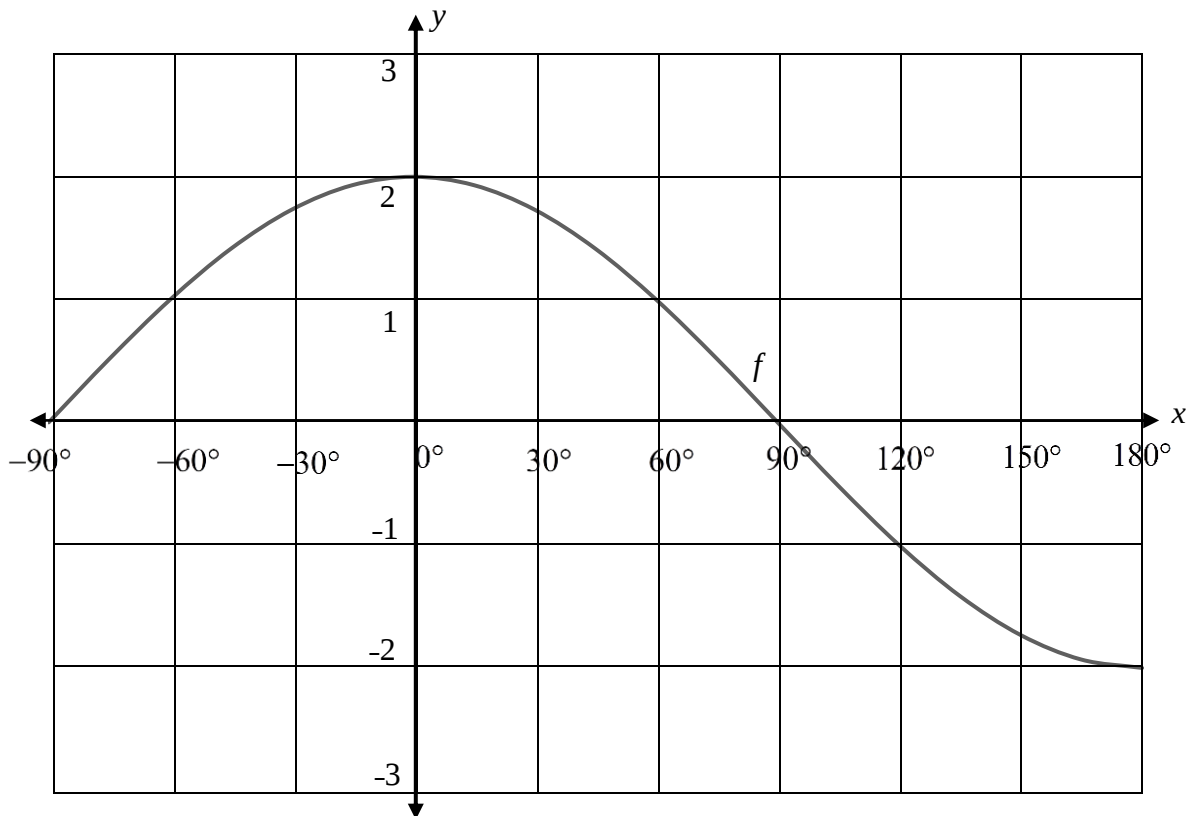
$\tan(2\alpha + \beta) = \frac{1}{\sqrt{3}}$ indien $2\alpha + \beta \in [90^\circ; 270^\circ]$

(4)

[29]

VRAAG 6

In die onderstaande diagram is die grafiek van $f(x) = 2\cos x$ vir die interval $x \in [-90^\circ; 180^\circ]$ geskets.

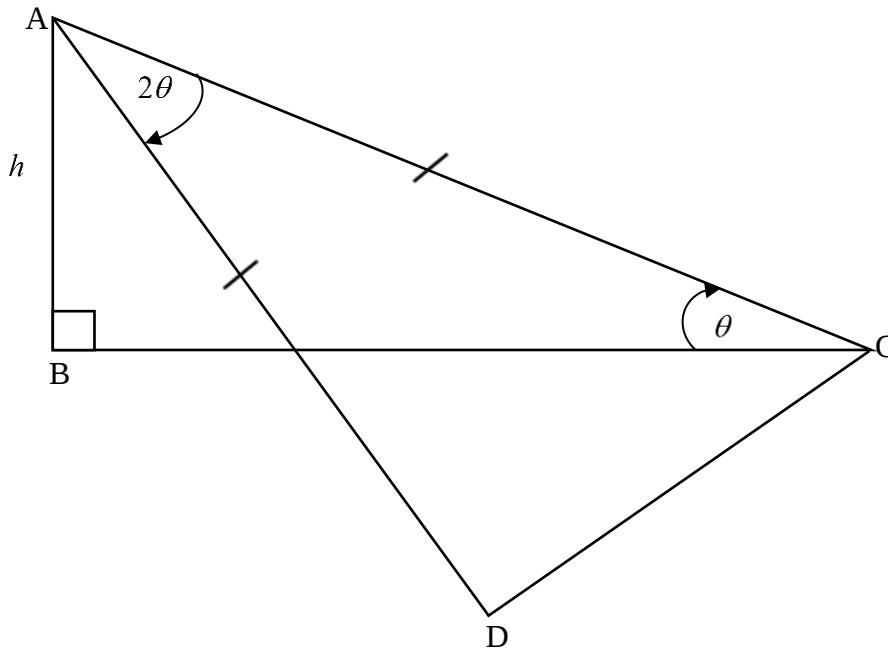


- 6.1 Skets die grafiek van $g(x) = -\tan \frac{3}{2}x$ vir die interval $x \in [-90^\circ; 180^\circ]$ op die rooster wat in die ANTWOORDBOEK voorsien is. Toon duidelik ALLE asimptotes, afsnitte met die asse en die eindpunt(e) van die grafiek aan. (4)
- 6.2 Bepaal die periode van g . (2)
- 6.3 Skryf die waardes van x neer, in die interval $x \in [-90^\circ; 180^\circ]$ waarvoor f dalend is. (2)
- 6.4 Gebruik die grafiek van g om te bepaal vir watter waarde(s) van x sal $g(x) \geq 1$ vir $x \in [-90^\circ; 180^\circ]$. (4)
- 6.5 Die funksie h word verkry deur die grafiek van g , 30° na regs te transleer. Skryf die vergelyking van h neer. (2)

[14]

VRAAG 7

In die diagram hieronder is AB 'n mas wat deur twee kables by C en D geanker is. B, C en D is in dieselfde horisontale vlak. Die hoogte van die mas is h en die hoogtehoek vanaf C na die bopunt van die mas, A, is θ . $\hat{CAD} = 2\theta$ en $AC = AD$.



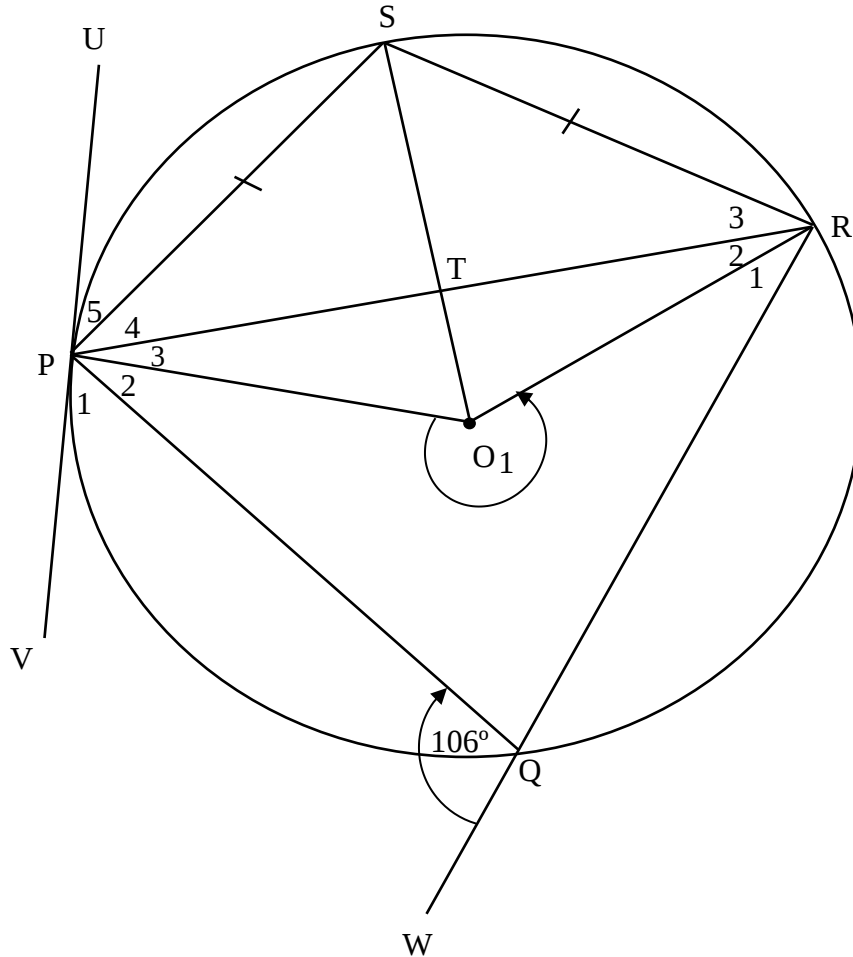
Bepaal CD, die afstand tussen die twee ankerpunte in terme van h .

(7)
[7]

VRAAG 8

8.1 In die onderstaande diagram is punte P, Q, R en S is punte op die sirkel met middelpunt O. UV is 'n raaklyn aan die sirkel by P. PR en OS sny by T en RQ word verleng na W.

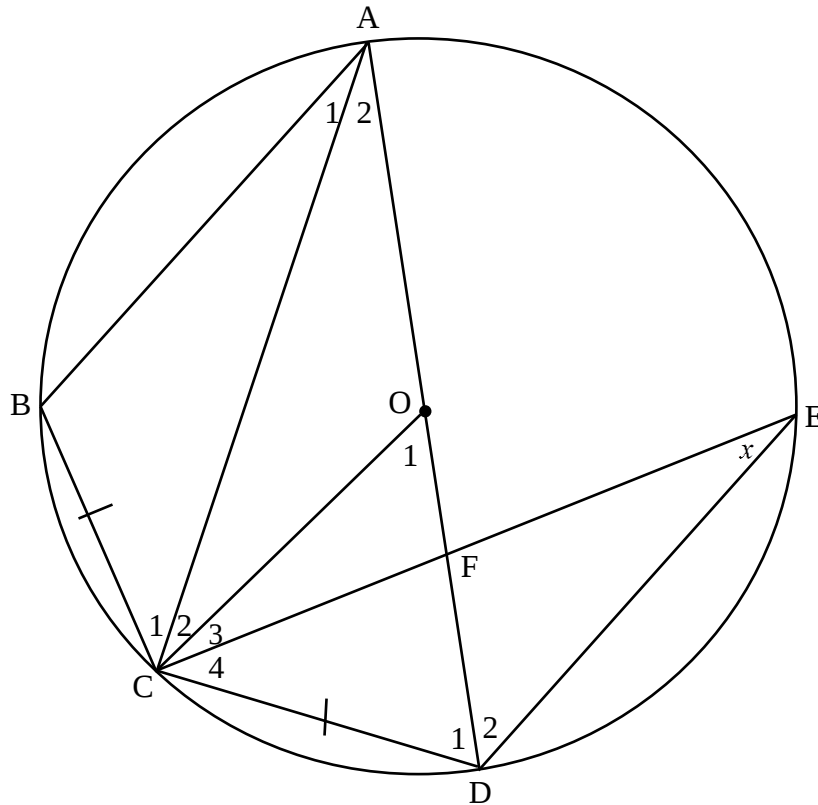
$PQW = 106^\circ$ en $SP = SR$.



Bereken, met redes, die grootte van die volgende hoeke:

- | | | |
|-------|-------------|-----|
| 8.1.1 | $\hat{P}SR$ | (2) |
| 8.1.2 | $\hat{R}_3$ | (3) |
| 8.1.3 | $\hat{P}_5$ | (2) |
| 8.1.4 | $\hat{O}_1$ | (2) |
| 8.1.5 | $\hat{P}_3$ | (2) |

- 8.2 In die diagram hieronder is A, B, C, D en E punte op die sirkel met middelpunt O. AC, OC en ED is getrek. Koorde BC = CD. Gestel $\angle CED = x$.

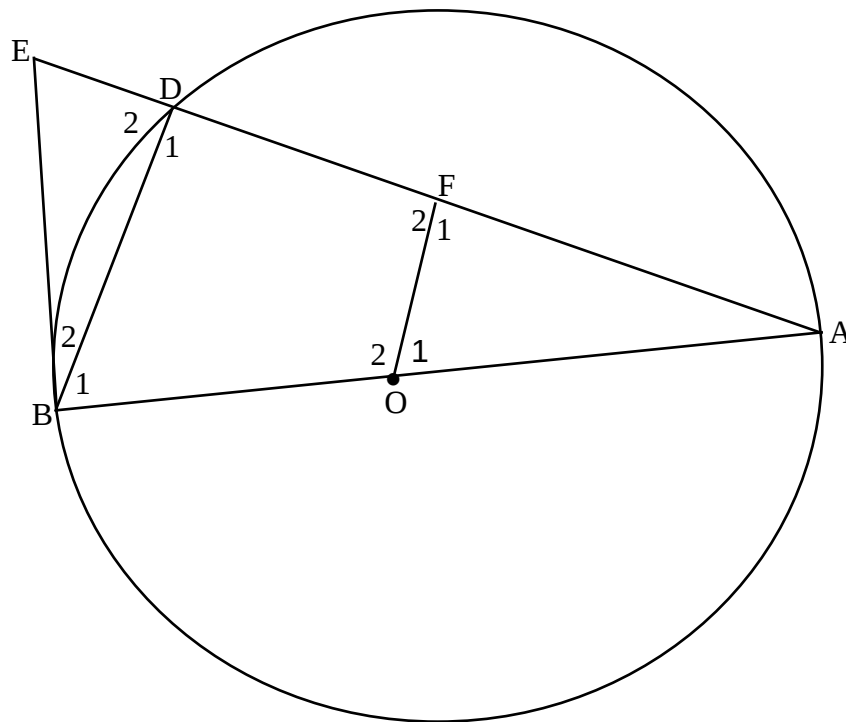


- 8.2.1 Bepaal, met redes, twee ander hoeke wat gelyk is aan x . (2)
- 8.2.2 Bepaal $\angle ABC$ in terme van x . (3)
- 8.2.3 Bewys dat $AB \parallel CO$. (3)

[19]

VRAAG 9

BOA is die middellyn van die sirkel met middelpunt O in die diagram hieronder. BE is 'n raaklyn aan die sirkel by B en EA sny die sirkel by D. F is die middelpunt van AD.



9.1 Bewys met redes dat:

9.1.1 OBEF 'n koordevierhoek is. (3)

9.1.2 $\triangle ADB \parallel \triangle BDE$. (3)

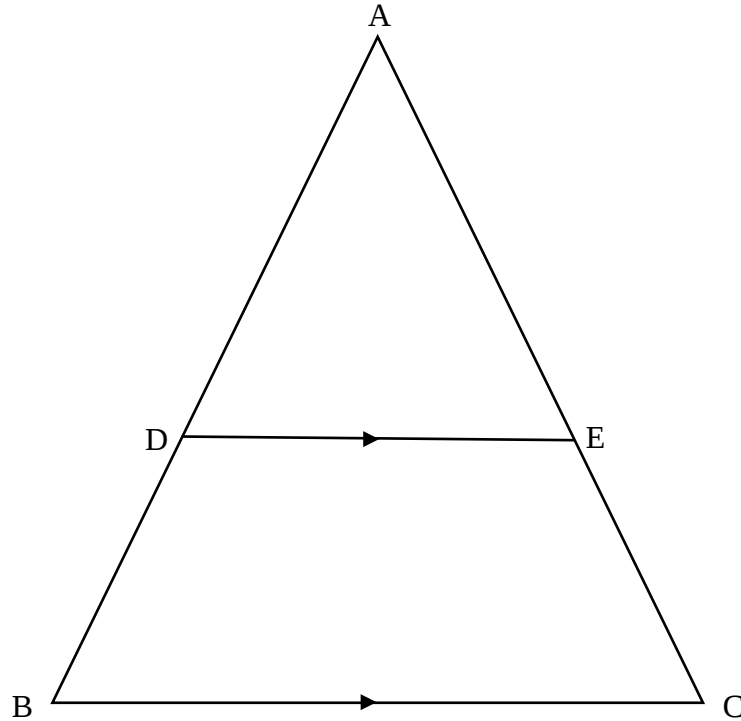
9.1.3 OB 'n raaklyn aan die sirkel is wat deur die punte B, D en E gaan. (2)

9.2 Bewys dat: $OF^2 = \frac{AD \times DE}{4}$ (3)
[11]

VRAAG 10

- 10.1 In die diagram is $\triangle ABC$ geteken. D is 'n punt op AB en E is 'n punt op AC sodat $DE \parallel BC$.

Gebruik die diagram om die stelling te bewys wat verklaar dat $\frac{AD}{DB} = \frac{AE}{EC}$.

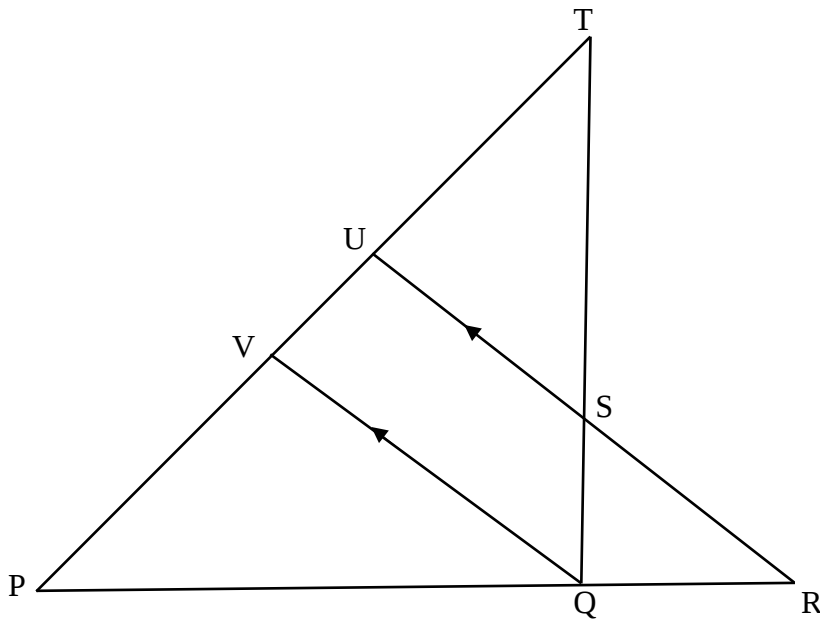


(5)

- 10.2 In die diagram is $\triangle TPQ$ geskets. PQ en US word verleng om in R te ontmoet. UR en TQ sny by S. $SU \parallel QV$.

$$\frac{TU}{UP} = \frac{2}{5} \text{ en } 3QS = 2ST.$$

Bereken met redes $\frac{PQ}{QR}$.



(5)
[10]

TOTAAL: 150

INLIGTINGSBLAD

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1} ; r \neq 1$$

$$S_\infty = \frac{a}{1 - r} ; -1 < r < 1$$

$$F = \frac{x[(1+i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2} ab \cdot \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \cos \alpha \cdot \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \cos \alpha \cdot \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2 \sin \alpha \cdot \cos \alpha$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

**GAUTENG PROVINCE**EDUCATION
REPUBLIC OF SOUTH AFRICA**PREPARATORY EXAMINATION - Answer Book**
VOORBEREIDENDE EKSAMEN - Antwoordboek**2022**

CANDIDATE'S NAME KANDIDAAT SE NAAM													
DATE DATUM	2	0	2	2	0	9	1	2	BOOK NUMBER BOEKNOMMER		OF VAN		BOOKS BOEKE
TEACHER ONDERWYSER									PAPER NUMBER VRAESTELNOMMER	2			
SUBJECT NAME VAKNAAM		MATHEMATICS/WISKUNDE (10612)											

This answer book consists of 24 pages./Hierdie antwoordboek bestaan uit 24 bladsye.

MARKER/NASIENER			MODERATOR'S INITIALS IN RELEVANT BLOCK MODERATORPARAAF IN BETROKKE BLOKKIE						
Question Vraag	Marks Punte	Marker's Code & Initials Nasiener se kode & paraaf	Marks Punte						
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
		TOTAL TOTAAL							

RE-MARK/RE-CHECK HERNASIEN/HERKONTROLEER		
Question Vraag	Marks Punte	Initials Paraaf
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
TOTAL TOTAAL		

READ INSTRUCTIONS ON THE NEXT PAGE.
LEES INSTRUKSIES OP VOLGENDE BLADSY.

FOLLOW THESE INSTRUCTIONS CAREFULLY	VOLG HIERDIE INSTRUKSIES NOUKEURIG
1. Answer ALL questions in the spaces provided. 2. No pages may be torn from this answer book. 3. Candidates may not retain an answer book or remove it from the examination room. Answer books must be returned to the invigilator at the end of the examination session. 4. Answers must be written in black/blue ink as distinctly as possible. Do not write in the margins. 5. Indicate the questions you have answered by drawing a circle around the relevant numbers on the front cover of the answer book where marks are to be recorded. 6. Rule-off neatly through any work/rough work that must not be marked. 7. In the event that you use the additional space provided: 7.1 Write down the number of the question. 7.2 Leave a line and rule-off after your answer.	1. Beantwoord ALLE vrae in die ruimtes wat voorsien is. 2. Geen bladsye mag uit hierdie antwoordboek geskeur word nie. 3. Geen antwoordboek mag deur kandidate behou of uit die eksamenlokaal verwyder word nie. Antwoordboeke moet aan die toesighouer terugbesorg word aan die einde van die eksamensessie. 4. Skryf die antwoorde so duidelik moontlik met swart/blou ink. Moenie in die kantlyn skryf nie. 5. Dui die vrae wat jy beantwoord het aan op die voorblad van die antwoordboek waar die punte aangebring word, deur 'n kringetjie te trek om die nommers van die vrae wat jy beantwoord het. 6. Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie. 7. Indien jy die bykomende ruimte wat voorsien word, gebruik: 7.1 Skryf die nommer van die vraag neer. 7.2 Laat 'n lyn oop en trek 'n lyn na jou antwoord.

QUESTION/VRAAG 1

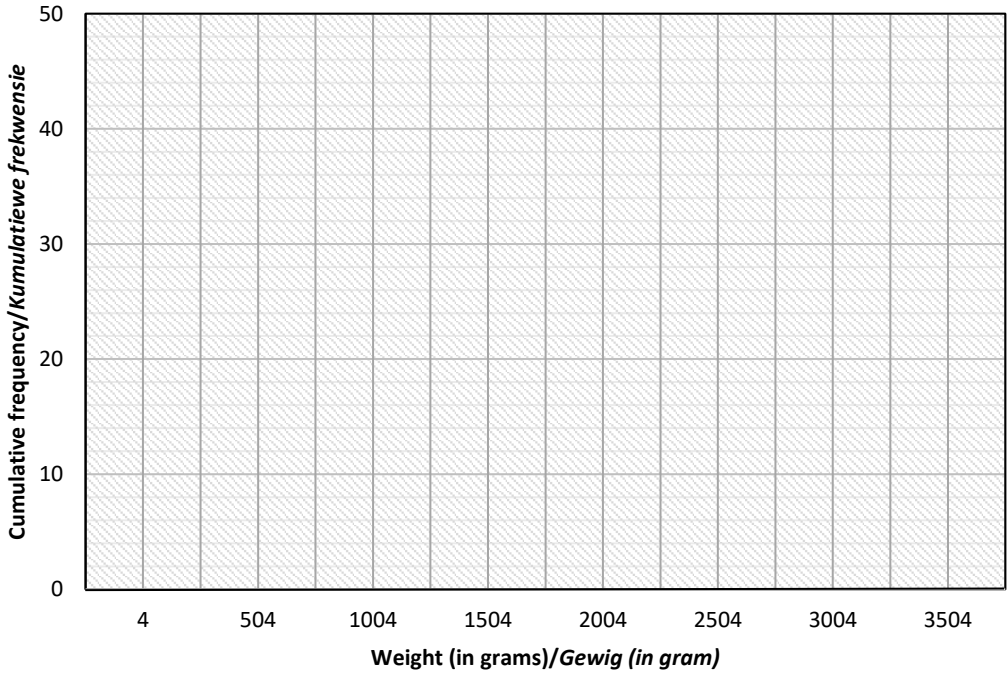
TIME SPENT TEACHING (in hours)/ ONDERRIGTYD SPANDEER (in ure)	2	8	4	6	12	10	11
AVERAGE RESULT OF 12A (as %)/ GEMIDDELDE UITSLAE VAN 12A (as %)	42	62	48	52	64	63	67
AVERAGE RESULT OF 12B (as %)/ GEMIDDELDE UITSLAE VAN 12B (as %)	9	63	45	47	61	64	62

	Solution/Oplossing	Marks/ Punte
1.1		(3)
1.2		(1)
1.3		(1)
1.4		(3)
1.5		(1)
1.6		(1)
		[10]

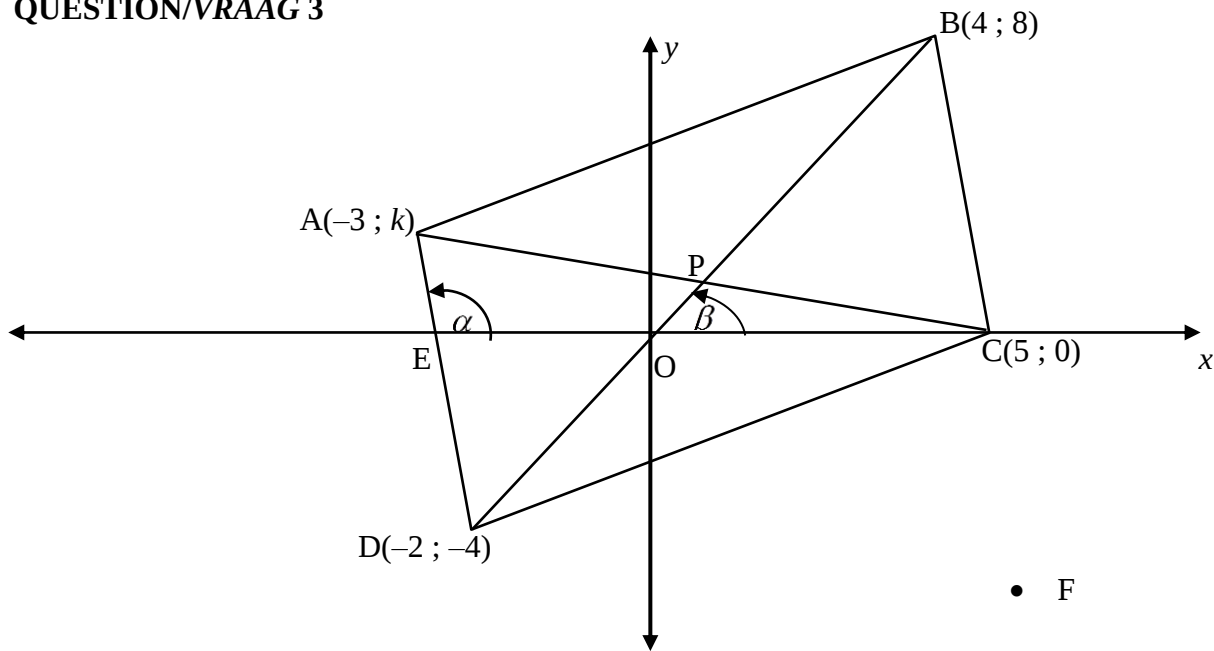
QUESTION/VRAAG 2

INTERVAL OF WEIGHT LOST (IN GRAMS)/ <i>GEWIGSVERLIES INTERVAL</i> (IN GRAM)	NUMBER OF DRIVERS/ AANTAL BESTUURDERS
$0 \leq w < 500$	1
$500 \leq w < 1\,000$	2
$1\,000 \leq w < 1\,500$	3
$1\,500 \leq w < 2\,000$	8
$2\,000 \leq w < 2\,500$	6
$2\,500 \leq w < 3\,000$	15
$3\,000 \leq w < 3\,500$	5
Total/Totaal	40

	Solution/Oplossing	Marks/ Punte
2.1.1		(1)
2.1.2		(3)

2.2.1	Cumulative Frequency Curve (Ogive)/ Kumulatiewe Frekwensiekurve (Ogief) 	(4)
	Solution/Oplossing	Marks/ Punte
2.2.2		
		(1)
2.2.3		
		(2)
		[11]

QUESTION/VRAAG 3

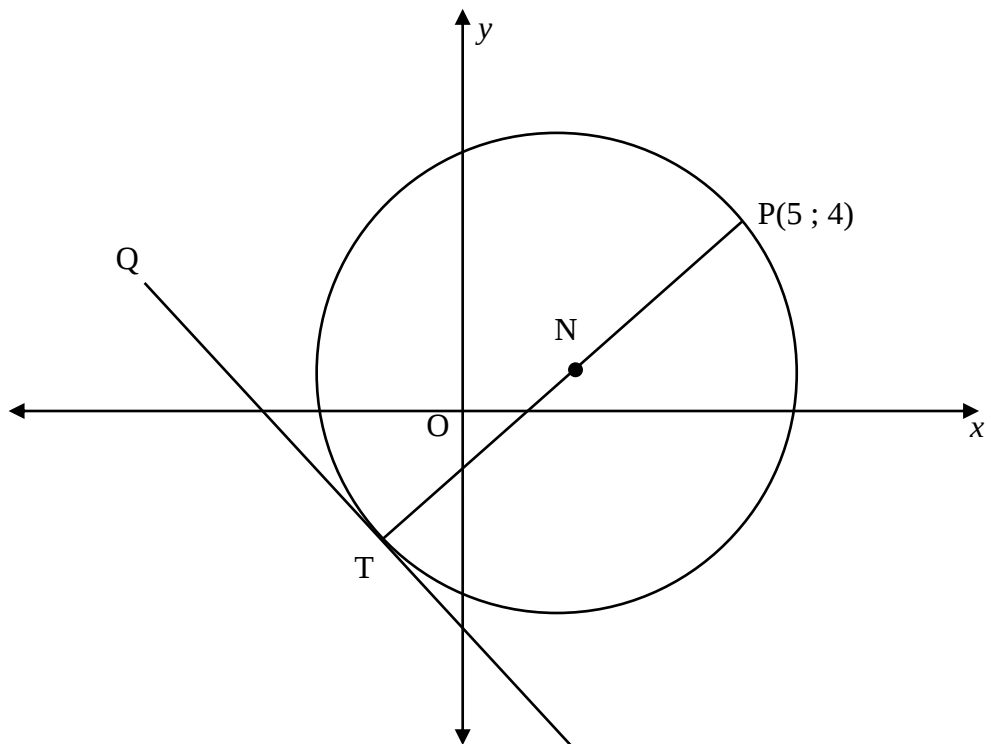


	Solution/Oplossing	Marks/ Punte
3.1		(2)
3.2		(4)

	Solution/Oplossing	Marks/ Punte
3.3		(3)
3.4		(2)
3.5		(6)

	Solution/Oplissing	Marks/ Punte
3.6		
		(4)
		[21]

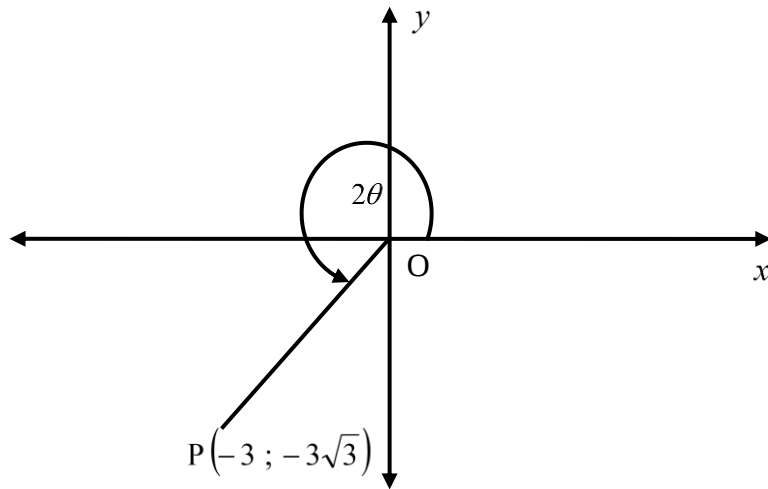
QUESTION/VRAAG 4



	Solution/Oplossing	Marks/ Punte
4.1		(3)
4.2		(2)
4.3		

	Solution/Oplissing	Marks/ Punte
4.3 (contd./ verv.)		
		(6)
4.4		
		(7)
		[18]

QUESTION/VRAAG 5

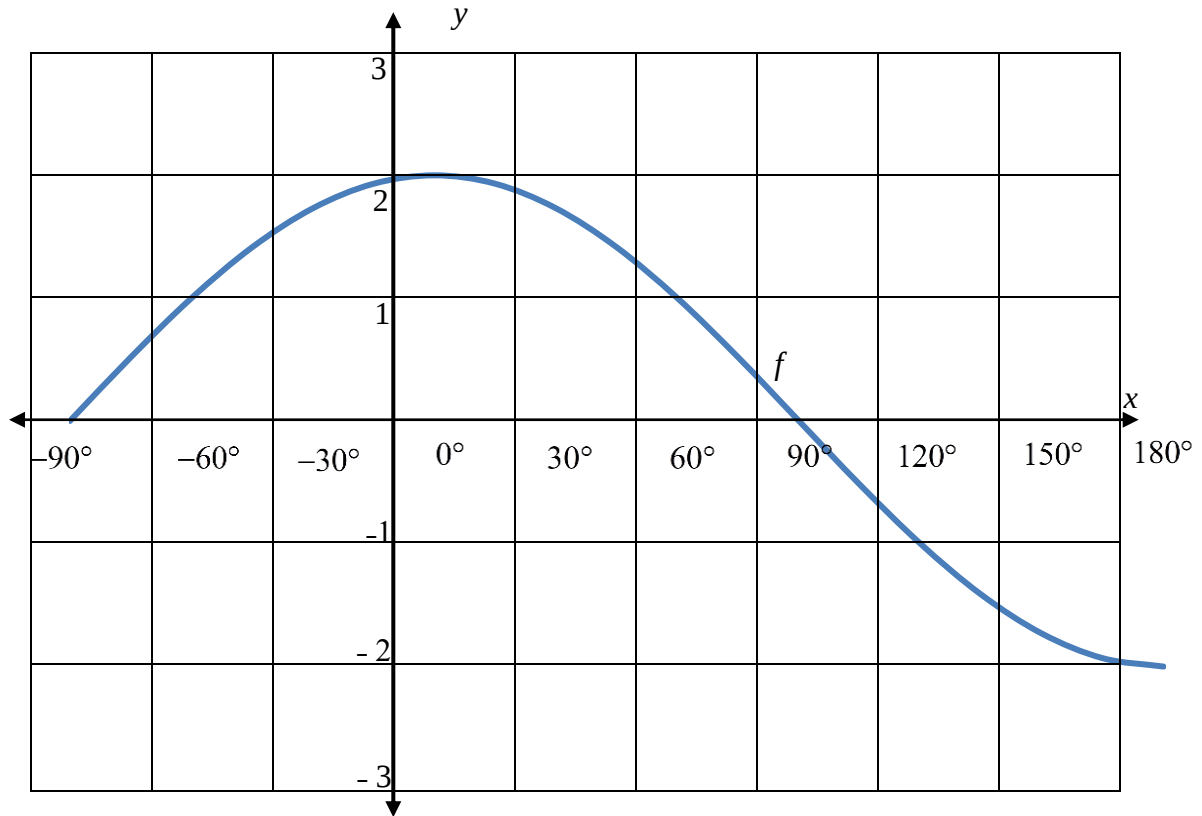


	Solution/Oplossing	Marks/ Punte
5.1.1		(3)
5.1.2		(3)
5.2		(6)

	Solution/Oplossing	Marks/ Punte
5.3.1		(3)
5.3.2		(5)
5.4		(5)

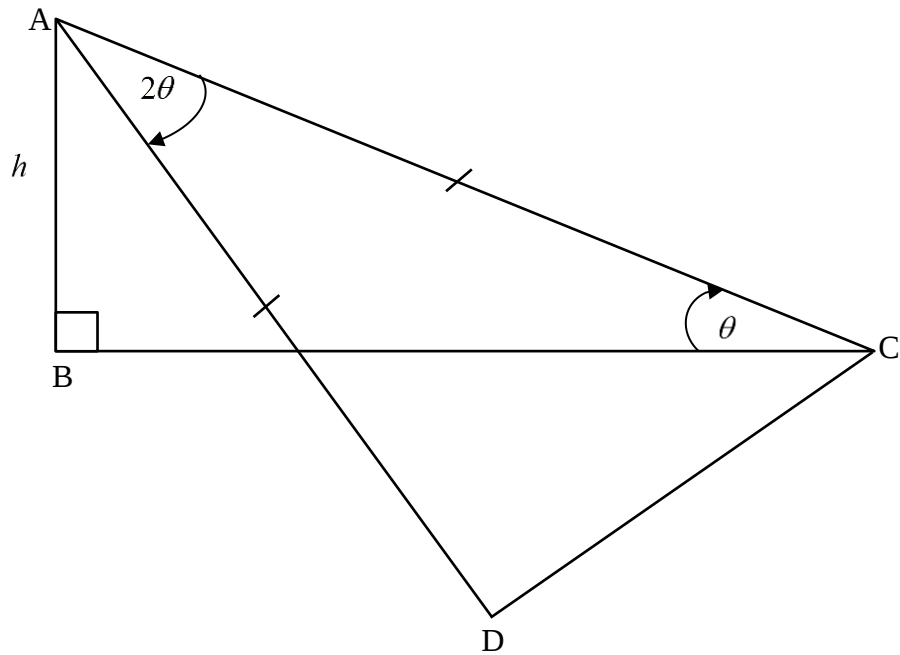
	Solution/Oplossing	Marks/ Punte
5.5		
		(4)
		[29]

QUESTION/VRAAG 6



	Solution/Oplossing	Marks/ Punte
6.1	See graph above/Sien grafiek bo	(4)
6.2		(2)
6.3		(2)
6.4		(4)
6.5		(2)
		[14]

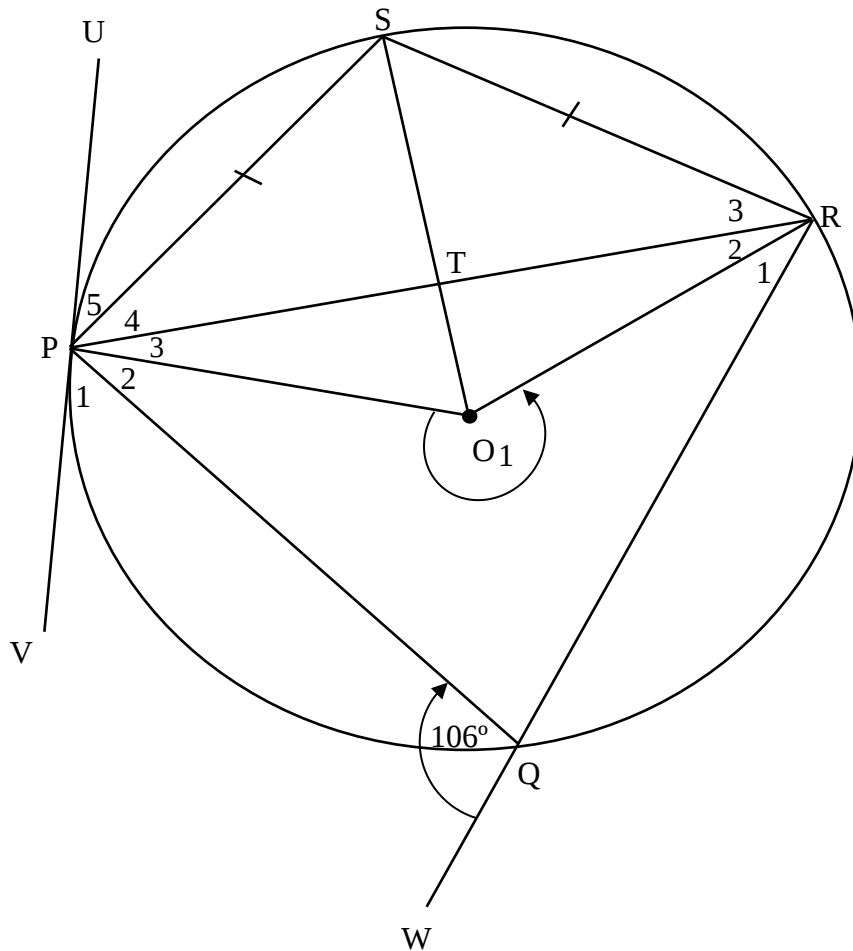
QUESTION/VRAAG 7



	Solution/Oplossing	Marks/ Punte

QUESTION/VRAAG 8

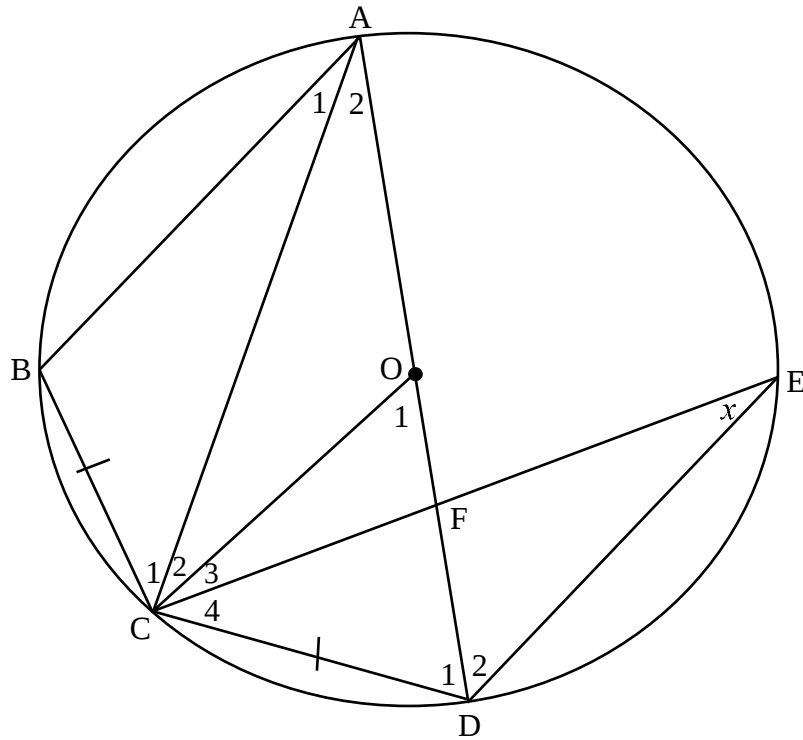
8.1



	Solution/Oplossing	Marks/ Punte
8.1.1		(2)
8.1.2		(3)
8.1.3		(2)

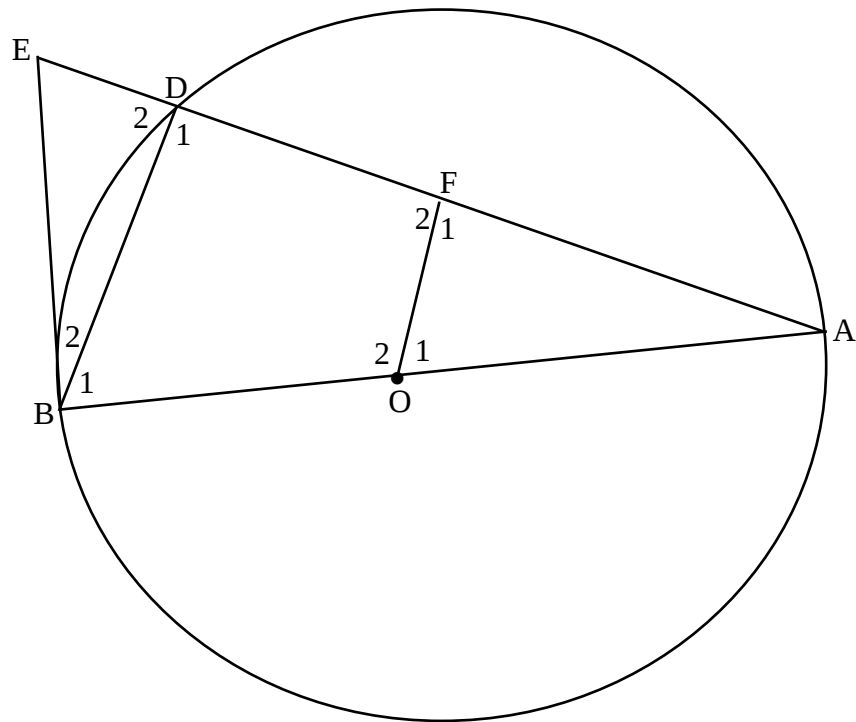
	<i>Solution/Oplossing</i>	<i>Marks/ Punte</i>
8.1.4		(2)
8.1.5		(2)

8.2



	Solution/Oplossing	Marks/ Punte
8.2.1		(2)
8.2.2		(3)
8.2.3		(3)
		[19]

QUESTION/VRAAG 9

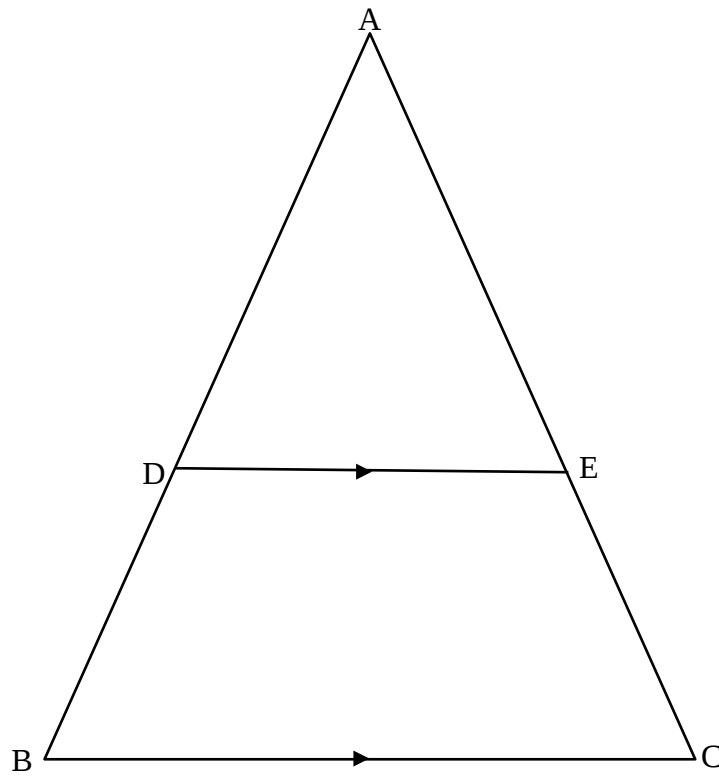


	Solution/Oplissing	Marks/ Punte
9.1.1		(3)
9.1.2		(3)

	<i>Solution/Oplissing</i>	Marks/ <i>Punte</i>
9.1.3		(2)
9.2		(3)
		[11]

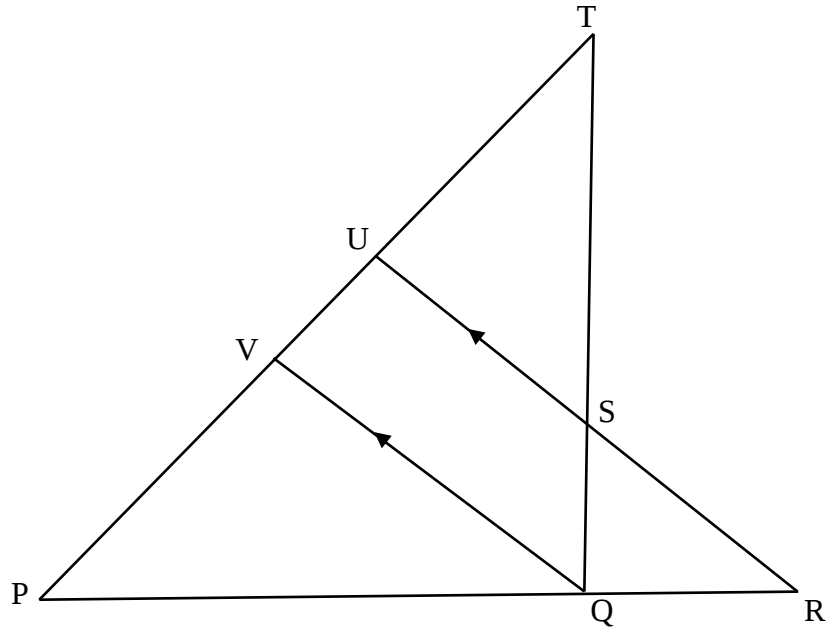
QUESTION/VRAAG 10

10.1



	Solution/Oplissing	Marks/ Punte
10.1		(5)

10.2



	Solution/Oplossing	Marks/ Punte
10.2		
		(5)
		[10]

[illegible]

[illegible]

TOTAL/TOTAAL: 150

END/EINDE



X10

10612X



WISKUNDE: V2 ANTWOORDEBOEK

This answer book consists of 24 pages./Hierdie antwoordboek bestaan uit 24 bladsye.

SUBJECT NAME VAKNAAM		MATHEMATICS/WISKUNDE (10612)											
TEACHER ONDERWYSER													
DATE DATUM		2	0	2	2	0	9	1	2	BOOK NUMBER BOEKNOMMER		OF VAN	BOOKS BOEKE
CANDIDATE'S NAME KANDIDAAT SE NAAM													
PAPER NUMBER VRAESTELNOMMER		2											

PREPARATORY EXAMINATION - Answer Book
VOORBEREIDENDE EKSAMEN - Antwoordboek
2022



GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION/ VOORBEREIDENDE EKSAMEN

2022

MARKING GUIDELINES/ NASIENRIGLYNE

(10612)

MATHEMATICS (PAPER 2)/WISKUNDE (VRAESTEL 2)

26 pages/bladsye

NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate has crossed-out an attempt of a question and has not redone the question, mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:

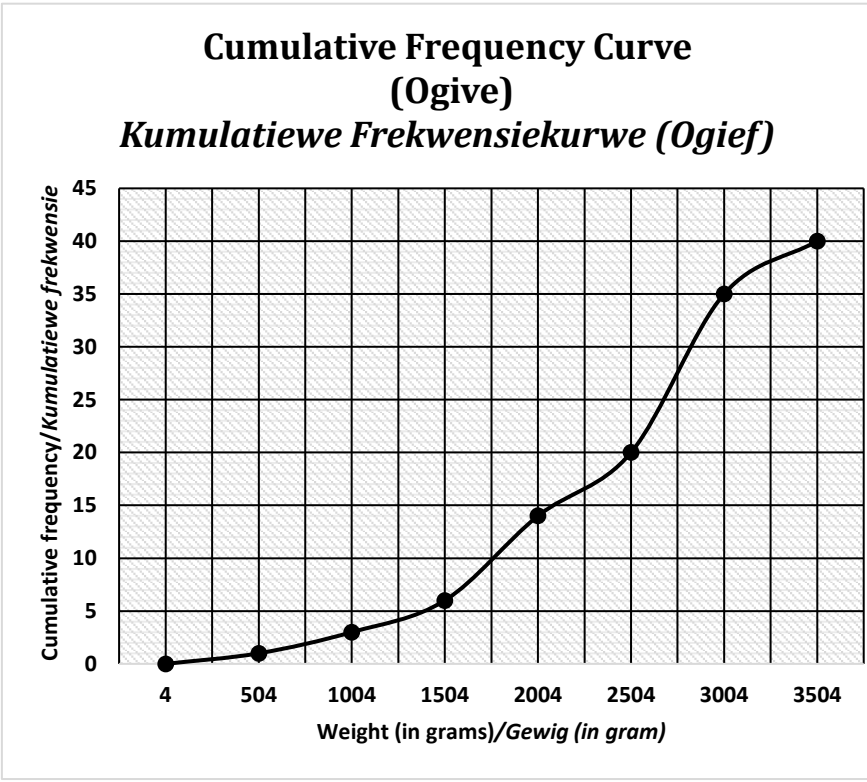
- As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.
- Aannames van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat NIE.

GEOMETRY/MEETKUNDE	
S	A mark for a correct statement (A statement mark is independent of a reason.)
	<i>'n Punt vir 'n korrekte bewering</i> <i>('n Punt vir 'n bewering is onafhanklik van die rede.)</i>
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	<i>'n Punt vir 'n korrekte rede</i> <i>('n Punt word slegs vir die rede toegeken as die bewering korrek is.)</i>
S/R	Award a mark if the statement AND the reason are both correct.
	<i>(Ken 'n punt toe as beide die bewering EN die rede korrek is.)</i>

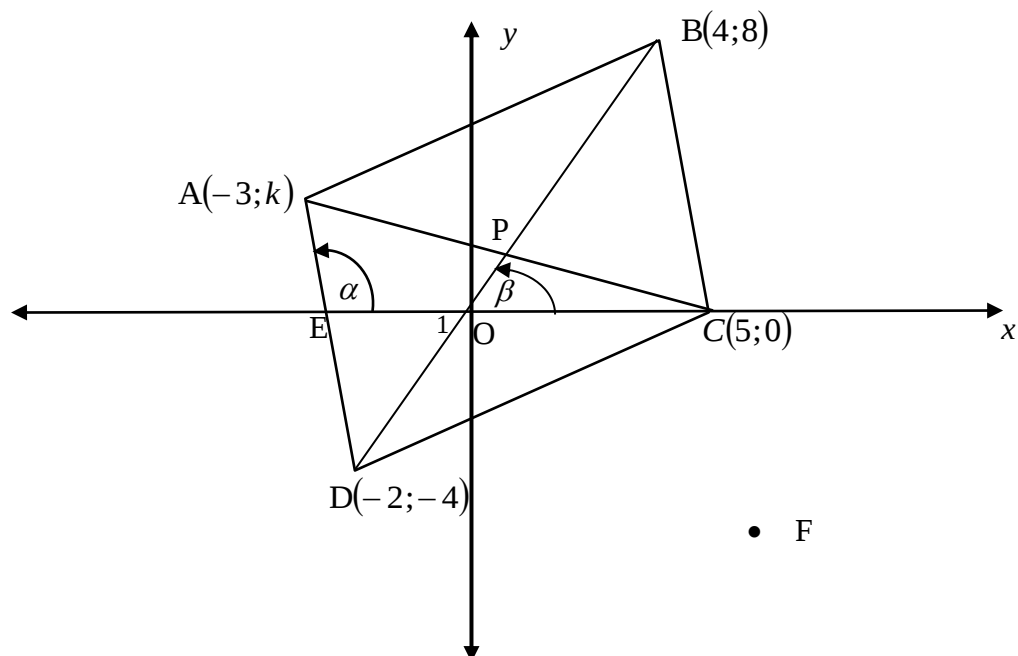
QUESTION/VRAAG 1

1.1	$a = 38,26$ $b = 2,46$ $\hat{y} = 38,26 + 2,46x$ NOT allowed to round to Units , but may round off to 3 decimal or 1 decimal place Mag NIE afrond tot Ene nie, maar mag afrond tot 3 desimale of 1 desimale plek	✓ $a = 38,26$ ✓ $b = 2,46$ ✓ $\hat{y} = 38,26 + 2,46x$ answer only full marks/ antwoord alleenlik volpunte	(3)
1.2	$r = 0,97$	✓ answer/antwoord	(1)
1.3	Very strong positive correlation/ <i>Baie sterk positiewe korrelasie</i>	✓ srong positive/ <i>sterk positief</i>	(1)
1.4	$\bar{x} = (2+8+4+6+12+10+11) \div 7 = 7,57$ $y = [38,26 + 2,46(7,57)] - [15,74 + 4,54 (7,57)]$ $y = 6,77$ The difference is/ <i>Die verskil is</i> 6,77%	✓ $\bar{x} = 7,57$ ✓ substitute/vervang 7,57 ✓ answer/antwoord (% not necessary to indicate/ % nie nodig om aan te dui)	(3)
1.5	(2;9) OR/OF $x = 2; y = 9$	✓ answer/antwoord ✓ answer/antwoord	(1)
1.6	Lack of attendance by online learner/ <i>Gebrek aan bywoning van aanlyn leerling</i> OR/OF Section taught may have been difficult to grasp online/ <i>Afdeling wat onderrig was, was moeilik om te verstaan met aanlynklas</i> OR/OF Poor connectivity/ <i>Slegte verbinding</i> OR/OF Lack of resources/ <i>Gebrek aan hulpbronne</i> OR/OF Insufficient ICT skills/ <i>Onvoldoende Rekenaarvaardighede</i>	✓ any valid answer/enige geldige antwoord	(1)
			[10]

QUESTION/VRAAG 2

2.1.1	$2500 \leq w < 3000$	✓ answer/antwoord	(1)
2.1.2	$\frac{250(1)+750(2)+1\,250(3)+1\,750(8)+2\,250(6)+2\,750(15)+3\,250(5)}{40}$ estimated/geskatte $\bar{x} = \frac{90\,500}{40}$ $= 2\,262,5 \text{ grams/gram}$ If numerator is correct and denominator is incorrect 1/3 If numerator is incorrect and denominator is correct 2/3 (CA) <i>Indien teller korrek is en noemer is verkeerd 1/3</i> <i>Indien teller verkeerd is en noemer is korrek 2/3 (CA)</i>	✓ 90 500 ✓ 40 ✓ answer/antwoord	(3)
2.2.1	Cumulative Frequency Curve (Ogive) <i>Kumulatiewe Frekwensiekurwe (Ogief)</i> 	✓ grounding point/ <i>gegronde punt</i> (4 ; 0) and/en (3 504 ; 40) ✓ shape/vorm (if ruler is used to connect points, NO mark for shape/ <i>indien liniaal</i> <i>gebruik word om</i> <i>punte te verbind</i> <i>GEEN punt vir</i> <i>vorm</i> ✓✓ (1 mistake - 1 mark; 2 mistakes - no mark/1 fout – 1 punt; 2 foute – geen punte)	(4)
2.2.2	It will not deviate./it will remain the same. <i>Dit sal nie afwyk nie./dit sal dieselfde bly.</i>	✓ answer/antwoord	(1)
2.2.3 CA from /van 2.1.2	$2\,262,5 + 4$ $= 2\,266,5 \text{ grams/gram}$	✓ addition of 4/4 <i>bygetel</i> ✓ answer/antwoord	(2)
			[11]

QUESTION/VRAAG 3



3.1	$m_{BC} = \frac{8-0}{4-5}$ $m_{BC} = -8$	✓ correct substitution into gradient formula (swop x and y around 0/2)/korrekte vervanging in gradiënt formule (ruil x en y om 0/2/ ✓ answer/antwoord	(2)
3.2	$AB = \sqrt{65} = \sqrt{(-3-4)^2 + (k-8)^2}$ $65 = 49 + k^2 - 16k + 64$ $k^2 - 16k + 48 = 0$ $(k-4)(k-12) = 0$ $k = 4 \text{ or/of } k = 12$ $\therefore k = 4$ OR/OF $AB = \sqrt{65} = \sqrt{(-3-4)^2 + (k-8)^2}$ $65 = 49 + (k-8)^2$ $(k-8)^2 = 16$ $k-8 = \pm 4$ $k = 4 \text{ or/of } k = 12$ $\therefore k = 4$	✓ substitute A and B into distance formula/vervang A en B in die afstandformule ✓ standard form/standaardvorm ✓ factors/faktore ✓ $k = 4$ ✓ substitute A and B into distance formula/vervang A en B in die afstandformule ✓ isolate square/isoleer kwadraat ✓ square root both sides/vierkantswortel weerskante ✓ $k = 4$	(4)

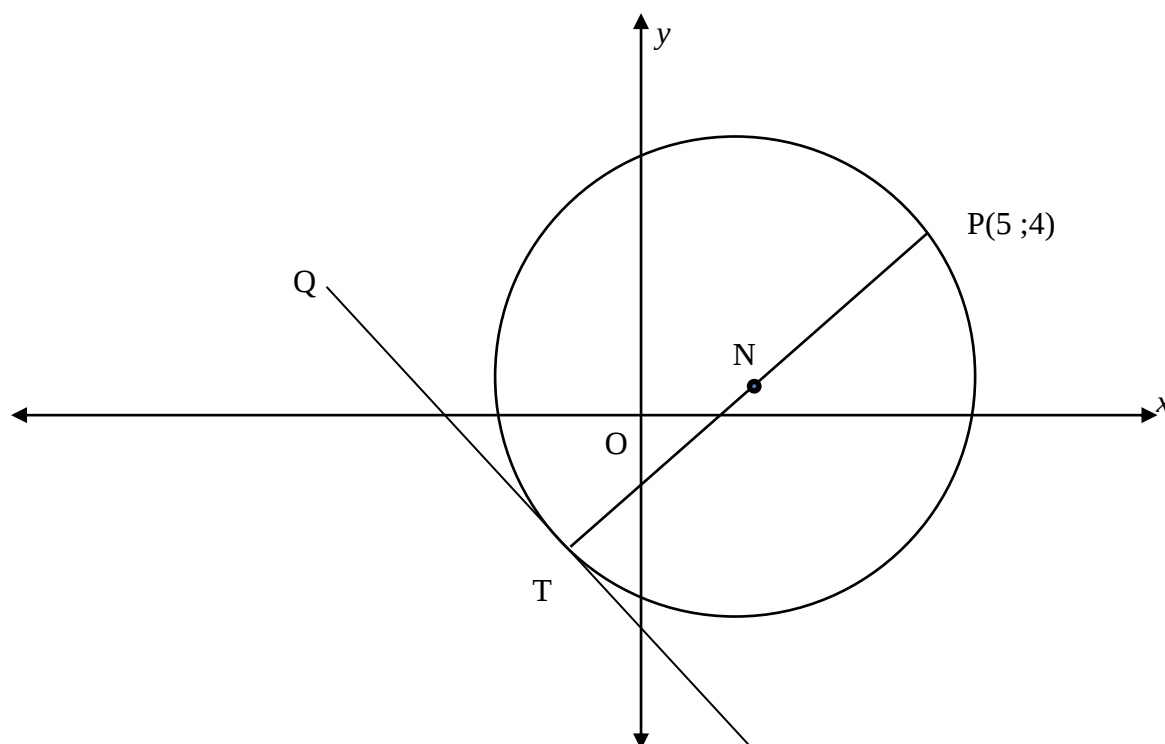
3.3	$m_{BD} = \frac{8 - (-4)}{4 - (-2)} = 2$ $m_{AC} = \frac{4 - 0}{-3 - 5} = -\frac{1}{2}$ $\therefore m_{BD} \times m_{AC} = 2 \times -\frac{1}{2} = -1$ $\therefore BP \perp AC$ OR/OF Coordinates of P = Midpoint of AC = Midpoint of BD/ <i>Koördinate van P = Middelpunt van AC = Middelpunt van BD</i> $= \left(\frac{-3+5}{2}; \frac{4+0}{2} \right) = \left(\frac{-2+4}{2}; \frac{-4+8}{2} \right)$ $= (1; 2)$ $m_{BP} = \frac{8-2}{4-1} = 2$ $m_{AC} = \frac{4-0}{-3-5} = -\frac{1}{2}$ $\therefore m_{BP} \times m_{AC} = 2 \times -\frac{1}{2} = -1$ $\therefore BP \perp AC$	$\checkmark m_{BD} = 2$ $\checkmark m_{AC} = -\frac{1}{2}$ $\checkmark m_{BD} \times m_{AC} = -1$ (must show the multiplication/ <i>moet die vermenigvuldiging aandui</i>)	(3)
3.4	Midpoint of AF = Midpoint of DC/ <i>Middelpunt van AF = Middelpunt van DC</i> $\frac{x+(-3)}{2} = \frac{-2+5}{2} \text{ and/en } \frac{y+4}{2} = \frac{-4+0}{2}$ $x = 6 \text{ and/en } y = -8$ $\therefore F(6; -8)$ Answer Only: Full Marks/Antwoord alleenlik: Volpunte OR/OF Method: Translation/Metode: Translasie <i>A → D:</i> $(x; y) \rightarrow (x+1; y-8)$ $\therefore$ by symmetry/as simmetrie: $C \rightarrow F$: $C(5; 0) \rightarrow F(5+1; 0-8)$ $\therefore F(6; -8)$ Answer Only: Full Marks/Antwoord alleenlik: Volpunte	$\checkmark x - \text{coordinate/}$ $x - \text{koördinaat}$ $\checkmark y - \text{coordinate/}$ $y - \text{koördinaat}$	(2)

3.5	ONLY QUESTION (3.5) IN PAPER WHERE LEARNER WILL BE PENALISED FOR INCORRECT ROUNDING ENIGSTE VRAAG (3.5) IN VRAESTEL WAAR LEERLING GEPENALISEER WORD VIR VERKEERDE AFRONDING $m_{AD} = m_{BC} = -8$ $\tan \alpha = m_{AD}$ $\tan \alpha = -8$ $\alpha = 180^\circ - \tan^{-1}(8)$ $= 180^\circ - 82,87^\circ$ $= 97,13^\circ$ $\tan \beta = m_{BD} = 2$ $\beta = 63,43^\circ$ $\hat{O}_1 = 63,43^\circ$ (vert.opp. $\angle$s/regoorst.$\angle$e) $\hat{E}\hat{D}\hat{O} = \alpha - \beta$ (ext. $\angle$ of Δ/buite $\angle$ van Δ) $= 97,13^\circ - 63,43^\circ$ $= 33,7^\circ$ OR/OF In $\triangle APD$, $\hat{A}\hat{P}\hat{D} = 90^\circ$ $AP = 2\sqrt{5}$ $PD = 3\sqrt{5}$ $\tan \hat{E}\hat{D}\hat{O} = \frac{AP}{PD}$ $\tan \hat{E}\hat{D}\hat{O} = \frac{2\sqrt{5}}{3\sqrt{5}}$ $\hat{E}\hat{D}\hat{O} = 33,69 \approx 33,7^\circ$ (rounded off to ONE decimal place/<i>rond af tot EEN desimale plek</i>) OR/OF In $\triangle APD$, $\hat{A}\hat{P}\hat{D} = 90^\circ$ $AP = 2\sqrt{5}$ & $AD = \sqrt{65}$ $\sin \hat{E}\hat{D}\hat{O} = \frac{AP}{AD}$ $\sin \hat{E}\hat{D}\hat{O} = \frac{2\sqrt{5}}{\sqrt{65}}$ $\hat{E}\hat{D}\hat{O} = 33,69 \approx 33,7^\circ$ (rounded off to ONE decimal place/<i>rond af tot EEN desimale plek</i>) OR/OF	✓ $m_{AD} = -8$ ✓ $\tan \alpha = -8$ ✓ $\alpha = 97,13^\circ$ ✓ $\beta = 63,43^\circ$ ✓ $\alpha - \beta$ ✓ answer/antwoord ✓ $\hat{A}\hat{P}\hat{D} = 90^\circ$ ✓ $AP = 2\sqrt{5}$ ✓ $PD = 3\sqrt{5}$ ✓ trig ratio/ trig verhouding ✓ substitution/ vervangings ✓ answer/antwoord ✓ $\hat{A}\hat{P}\hat{D} = 90^\circ$ ✓ $AP = 2\sqrt{5}$ ✓ $AD = \sqrt{65}$ ✓ trig ratio/ trig verhouding ✓ substitution/ vervangings ✓ answer/antwoord	
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In $\triangle APD$ $\hat{A}PD = 90^\circ$ $PD = 3\sqrt{5}$ $AD = \sqrt{65}$ $\cos \hat{E}DO = \frac{PD}{AD}$ $\cos \hat{E}DO = \frac{3\sqrt{5}}{\sqrt{65}}$ $\hat{E}DO = 33,69 \approx 33,7^\circ$ (rounded off to ONE decimal place/<i>rond af tot EEN desimale plek</i>) OR/OF In $\triangle ABD$ $BD = 6\sqrt{5}$ $AD = \sqrt{65}$ $\cos \hat{E}DO = \frac{AD^2 + BD^2 - AB^2}{2(AD)(BD)}$ $\cos \hat{E}DO = \frac{(\sqrt{65})^2 + (6\sqrt{5})^2 - (\sqrt{65})^2}{2(\sqrt{65})(6\sqrt{5})} = \frac{3}{\sqrt{13}}$ $\hat{E}DO = 33,69 \approx 33,7^\circ$ (rounded off to ONE decimal place/<i>rond af tot EEN desimale plek</i>)	✓ $\hat{A}PD = 90^\circ$ ✓ $PD = 3\sqrt{5}$ ✓ $AD = \sqrt{65}$ ✓ trig ratio/trig verhouding ✓ substitution/ vervanging ✓ answer/antwoord ✓ $BD = 6\sqrt{5}$ ✓ $AD = \sqrt{65}$ ✓ cosine rule/ kosinusreël ✓ substitution/ vervanging ✓ $\frac{3}{\sqrt{13}}$ ✓ answer/antwoord	(6)

3.6	$AC = \sqrt{(5 - (-3))^2 + (0 - 4)^2} = \sqrt{80} = 4\sqrt{5}$ $DP = \sqrt{(-2 - 1)^2 + (-4 - 2)^2} = \sqrt{45} = 3\sqrt{5}$ $\text{Area of/van } \triangle ADC = \frac{1}{2} AC \times DP$ $\therefore \text{Area of/van } \triangle ADC = \frac{1}{2} (4\sqrt{5}) \times (3\sqrt{5})$ $= 30 \text{ square units/vierkante eehede}$ OR/OF ABCD is a rhombus, because the diagonals bisect perpendicularly and all sides are equal. <i>ABCD is 'n ruit, want die hoeklyne halveer mekaar reghoekig en al die sye is ewe lank.</i> $\therefore \hat{CDO} = \hat{EDO} \quad (\text{diags of rhombus bisect } \angle\text{s of rhombus/diag van ruit halveer die } \angle\text{e van die ruit})$ $\therefore \hat{ADC} = 2 \times 33,7^\circ = 67,4^\circ$ $\text{Area of/van } \triangle ADC = \frac{1}{2} \times AD \times DC \times \sin \hat{ADC}$ $\therefore \text{Area of/van } \triangle ADC = \frac{1}{2} \times (\sqrt{65}) \times (\sqrt{65}) \times \sin(67,4^\circ)$ $= 30 \text{ square units/vierkante eenhede}$	✓ length of AC/ <i>lengte van AC</i> ✓ length of DP/ <i>lengte van DP</i> ✓ correct substitution into formula/ <i>korrekte</i> vervanging in formule ✓ answer/antwoord	
		✓ $\hat{CDO} = \hat{EDO}$ ✓ $\hat{ADC} = 67,4^\circ$ ✓ substitution into formula/ vervanging in formule ✓ answer/antwoord	(4)
			[21]

QUESTION/VRAAG 4



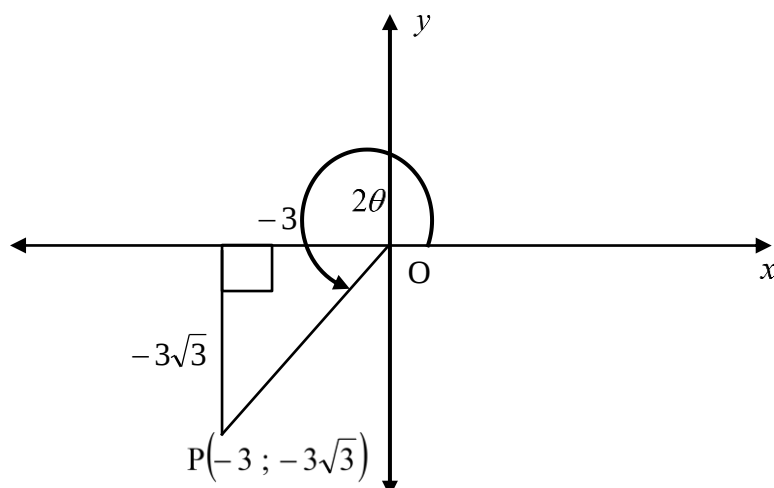
4.1	$x^2 + y^2 - 4x - 2y - 13 = 0$ $x^2 - 4x + 4 + y^2 - 2y + 1 = 13 + 4 + 1$ $(x-2)^2 + (y-1)^2 = 18$	Answer only: Full marks/ Antwoord alleenlik: Volpunte	✓ completing the square/vierkants-voltooiing ✓ $(x-2)^2 + (y-1)^2$ ✓ RHS/RK	(3)
4.2	N(2;1) $NT = \sqrt{18} = 3\sqrt{2}$ OR/OF 2,24		✓ both x and y correct/ <i>albei x en y korrek</i> CA from/van 4.1 ✓ length of NT/lengte van NT	(2)
4.3	Midpoint of TNP/Middelpunt van TNP, N(2;1) $\frac{x_T + 5}{2} = 2$ and/en $\frac{y_T + 4}{2} = 1$ T(-1;-2) OR/OF Method: Translation/Metode: Translasie P → N: $(x; y) \rightarrow (x-3; y-3)$ $\therefore N \rightarrow T$: $N(2;1) \rightarrow T(2-3; 1-3)$ $\therefore T(-1;-2)$		✓ x – value/waarde ✓ y – value/waarde ✓ x – value/waarde ✓ y – value/waarde	

	$m_{NT} = \frac{1 - (-2)}{2 - (-1)} = \frac{3}{3} = 1$ $m_{NT} \times m_{QT} = -1$ $\therefore m_{QT} = -1$ $y - (-2) = -1[x - (-1)]$ $y + 2 = -1(x + 1)$ $y = -x - 3$ OR/OF $y = -x + c$ $-2 = -1(-1) + c$ $c = -3$ $y = -x - 3$ <i>radius $\perp$ tangent</i> <i>radius $\perp$ raaklyn</i>	$\checkmark m_{NT} = 1$ $\checkmark m_{QT} = -1$ $\checkmark$ substitute/vervang m and/en $T(-1; -2)$ CA from/van 4.3 $\checkmark y = -x - 3$	(6)
4.4	$NS = 3NT$ $NS^2 = 9NT^2$ $(a - 2)^2 + (b - 1)^2 = 9(\sqrt{18})^2 = 162 \dots\dots\dots (1)$ $NT \perp QT$ and/en $ST \perp QT \quad \therefore m_{ST} = m_{NT} = 1$ $\frac{b + 2}{a + 1} = 1$ $b + 2 = a + 1$ $b = a - 1 \dots\dots\dots (2)$ <i>Substitute (2) into (1)/vervang (2) in (1)</i> $(a - 2)^2 + (a - 1 - 1)^2 = 162$ $(a - 2)^2 + (a - 2)^2 = 162$ $2(a - 2)^2 = 162$ $(a - 2)^2 = 81$ $\therefore a - 2 = 9 \quad \text{or/of} \quad a - 2 = -9$ $a = 11 \quad \text{or/of} \quad a = -7$ But/maar $a < 0$ $\therefore a = -7$ $b = (-7) - 1 = -8$ $S(-7; -8)$ OR/OF	$\checkmark$ equation/vergelyking $\checkmark m_{ST} = m_{NT} = 1$ $\checkmark \frac{b + 2}{a + 1} = 1$ $\checkmark b = a - 1$ $\checkmark$ substitution/ vervang $\checkmark a = -7$ $\checkmark b = -8$	

$(a+1)^2 + (b+2)^2 = 72 \dots\dots (2)$ Substitute (1) into (2) / <i>vervang (1) in (2)</i> $(a+1)^2 + (a-1+2)^2 = 72$ $2a^2 + 4a - 70 = 0$ $a^2 + 2a - 35 = 0$ $(a+7)(a-5) = 0$ $a = -7$ or/of $a = 5$ $a = -7$ and/en $b = (-7) - 1 = -8$ $S(-7; -8)$	$2(a+1)^2 = 72$ $(a+1)^2 = 36$ $a+1 = -6$ or/of $a+1 = 6$ $a = -7$ or/of $a = 5$ $a = -7$ $b = -7 - 1 = -8$ $S(-7; -8)$	✓ equation/ (2) <i>vergelyking (2)</i> ✓ substitution/ <i>vervang</i> ✓ ✓ coordinates/ <i>koördinate</i>	
OR/OF 	✓ diagram ✓ ✓ $(2; -2)$ ✓ ✓ $(2; -8)$ ✓ ✓ $S(-7; -8)$		
OR/OF $\frac{x_T - x_N}{x_S - x_N} = \frac{y_T - y_N}{y_S - y_N} = \frac{1}{3}$ $\frac{-3}{a-2} = \frac{-3}{b-1} = \frac{1}{3}$ $a-2 = -9$ $a = -7$ $b-1 = -9$ $b = -8$ $S(-7; -8)$	✓ dividing of a line segment into a given ratio/ <i>verdeel</i> <i>lynsegment in</i> <i>gegewe verhouding</i> ✓ ✓ substitution/ <i>vervang</i> ✓ equation/ <i>vergelyking</i> ✓ $a = -7$ ✓ equation/ <i>vergelyking</i> ✓ $b = -8$		(7)
			[18]

QUESTION/VRAAG 5

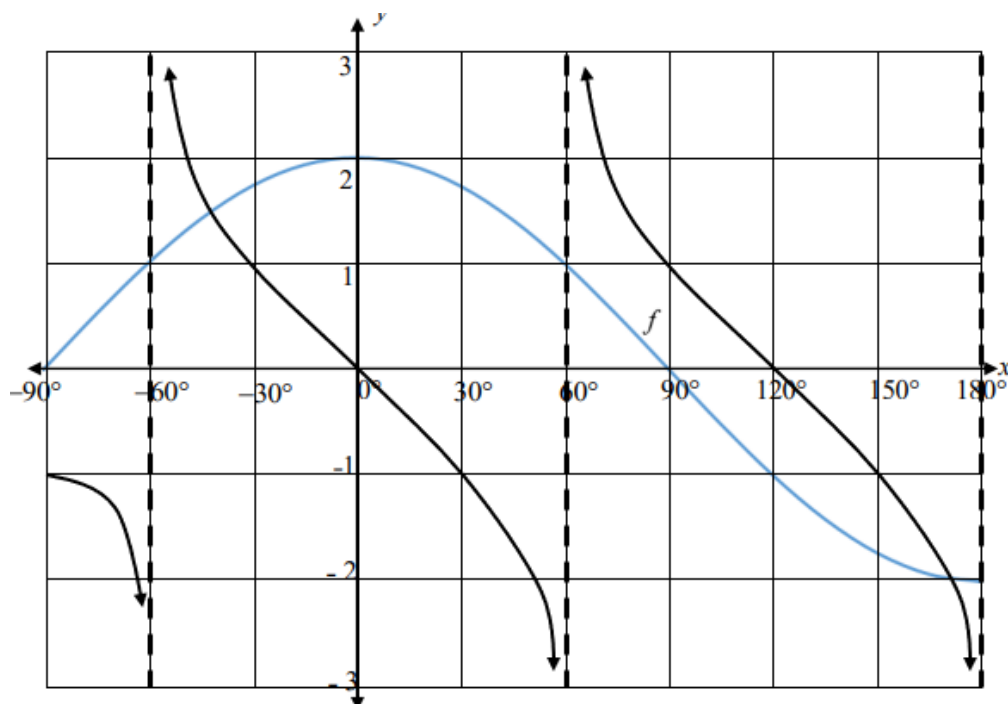
5.1



5.1.1	$OP^2 = (-3)^2 + (-3\sqrt{3})^2$ $OP = 6$ $\cos 2\theta = \frac{-3}{6} = -\frac{1}{2}$	✓ Pythagoras ✓ $OP = 6$ ✓ $\cos 2\theta = -\frac{1}{2}$	(3)
5.1.2	$\cos 2\theta = 1 - 2\sin^2 \theta$ $\therefore 2\sin^2 \theta = 1 - \cos 2\theta$ $\therefore \sin^2 \theta = \frac{1 - \cos 2\theta}{2}$ $= \frac{1 - \left(-\frac{1}{2}\right)}{2}$ $= \frac{3}{4}$ $\therefore \sin \theta = \frac{\sqrt{3}}{2}$ OR/OF $-\frac{1}{2} = 1 - 2\sin^2 \theta$ $\therefore -\frac{3}{2} = -2\sin^2 \theta$ $\therefore \sin^2 \theta = \frac{3}{4}$ $\therefore \sin \theta = \frac{\sqrt{3}}{2}$	✓ double angle identity/ <i>dubbelhoekidentiteit</i> ✓ correct substitution/ <i>korrekte vervanging</i> ✓ answer/antwoord ✓ $-\frac{1}{2} = 1 - 2\sin^2 \theta$ ✓ simplification/ <i>vereenvoudiging</i> ✓ answer/antwoord	(3)

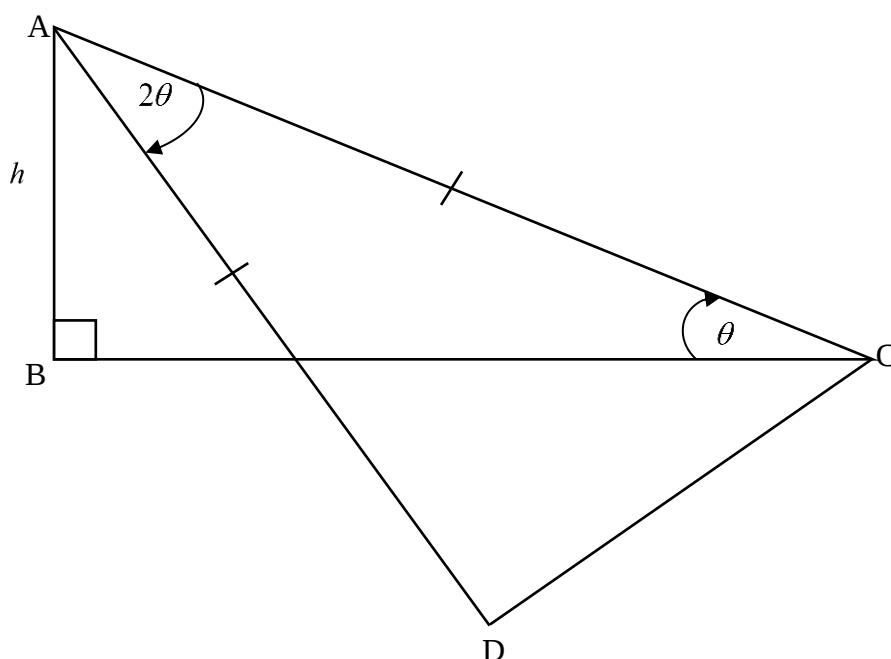
5.2	$\cos^2(180^\circ + x) + \cos(-x) \cdot \tan x \cdot \cos(90^\circ + x)$ $= \cos^2 x + \cos x \cdot \tan x \cdot (-\sin x)$ $= \cos^2 x + \cos x \cdot \frac{\sin x}{\cos x} \cdot (-\sin x)$ $= \cos^2 x - \sin^2 x$ $= \cos 2x$	$\checkmark \cos^2 x$ $\checkmark \cos x$ $\checkmark -\sin x$ $\checkmark \frac{\sin x}{\cos x}$ $\checkmark \cos^2 x - \sin^2 x$ $\checkmark \cos 2x$	(6)
5.3.1	$5 \tan \theta - 6 \cos \theta = 0$ $5 \left(\frac{\sin \theta}{\cos \theta} \right) - 6 \cos \theta = 0$ $5 \sin \theta - 6 \cos^2 \theta = 0$ $5 \sin \theta - 6(1 - \sin^2 \theta) = 0$ $5 \sin \theta - 6 + 6 \sin^2 \theta = 0$ $6 \sin^2 \theta + 5 \sin \theta - 6 = 0$	$\checkmark \tan \theta = \frac{\sin \theta}{\cos \theta}$ $\checkmark$ multiplying by $\cos \theta$ / vermenigvuldiging met $\cos \theta$ $\checkmark \cos^2 \theta = 1 - \sin^2 \theta$	(3)
5.3.2	$6 \sin^2 \theta + 5 \sin \theta - 6 = 0$ $(3 \sin \theta - 2)(2 \sin \theta + 3) = 0$ $\sin \theta = \frac{2}{3}$ or/of $\sin \theta = -\frac{3}{2}$ no solution/ geen oplossing $\theta = 41,81^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ or/of $\theta = 138,19^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$	$\checkmark$ factors (must indicate)/faktore (moet aandui) $\checkmark$ both values of $\sin \theta$ / albei waardes van $\sin \theta$ $\checkmark$ no solution/geen oplossing $\checkmark \theta = 41,81^\circ$ or/of $138,19^\circ$ $\checkmark + k \cdot 360^\circ; k \in \mathbb{Z}$	(5)
5.4	This question has been removed from the question paper. Do not mark this question. <i>Hierdie vraag is uit die vraestel verwyder. Moenie hierdie vraag merk nie.</i>		(0)
5.5	$\sin(3\alpha - \beta) = \frac{1}{\sqrt{2}}$ ref/verwys $\angle = 45^\circ$ $3\alpha - \beta = 180^\circ - 45^\circ$ $3\alpha - \beta = 135^\circ \dots\dots\dots(1)$ $\tan(2\alpha + \beta) = \frac{1}{\sqrt{3}}$ ref/verwys $\angle = 30^\circ$ $2\alpha + \beta = 180^\circ + 30^\circ$ $2\alpha + \beta = 210^\circ \dots\dots\dots(2)$ $5\alpha = 345^\circ$ (1)+(2) $\alpha = 69^\circ$ $\beta = 72^\circ$	$\checkmark 3\alpha - \beta = 135^\circ$ $\checkmark 2\alpha + \beta = 210^\circ$ $\checkmark \alpha = 69^\circ$ $\checkmark \beta = 72^\circ$	(4)
			[24]

QUESTION/VRAAG 6



6.1	See the graph above/ <i>Sien bostaande grafiek</i>	✓ asymptotes/asimptote ✓ $x=0^\circ$; $x=120^\circ$ ✓ shape/vorm ✓ $(-90^\circ; -1)$ or/of $(90^\circ; 1)$	(4)
6.2	Period of/Periode van $g = \frac{180^\circ}{1,5} = 120^\circ$ Answer only: Full marks/ Antwoord alleenlik: Volpunte	✓ method/metode ✓ answer/antwoord	(2)
6.3	$x \in (0^\circ; 180^\circ)$ OR/OF $0^\circ < x < 180^\circ$ If values are incorrect 0/2 Indien waardes verkeerd is 0/2	✓ values/waardes ✓ notation/notasie	(2)
6.4 CA from graph/ vanaf grafiek	$x \in (-60^\circ; -30^\circ]$ OR/OF $-60^\circ < x \leq -30^\circ$ or $x \in (60^\circ; 90^\circ]$ OR/OF $60^\circ < x \leq 90^\circ$ If values are incorrect 0/4 Indien waardes verkeerd is 0/4	✓ both values/albei waardes $-60^\circ; -30^\circ$ ✓ notation/notasie ✓ both values/albei waardes $60^\circ; 90^\circ$ ✓ notation/notasie	(4)
6.5	$h(x) = g(x - 30^\circ)$ $= -\tan\left[\frac{3}{2}(x - 30^\circ)\right]$ $= -\tan\left(\frac{3}{2}x - 45^\circ\right)$	$\checkmark \checkmark \frac{3}{2}(x - 30^\circ)$	(2)
			[14]

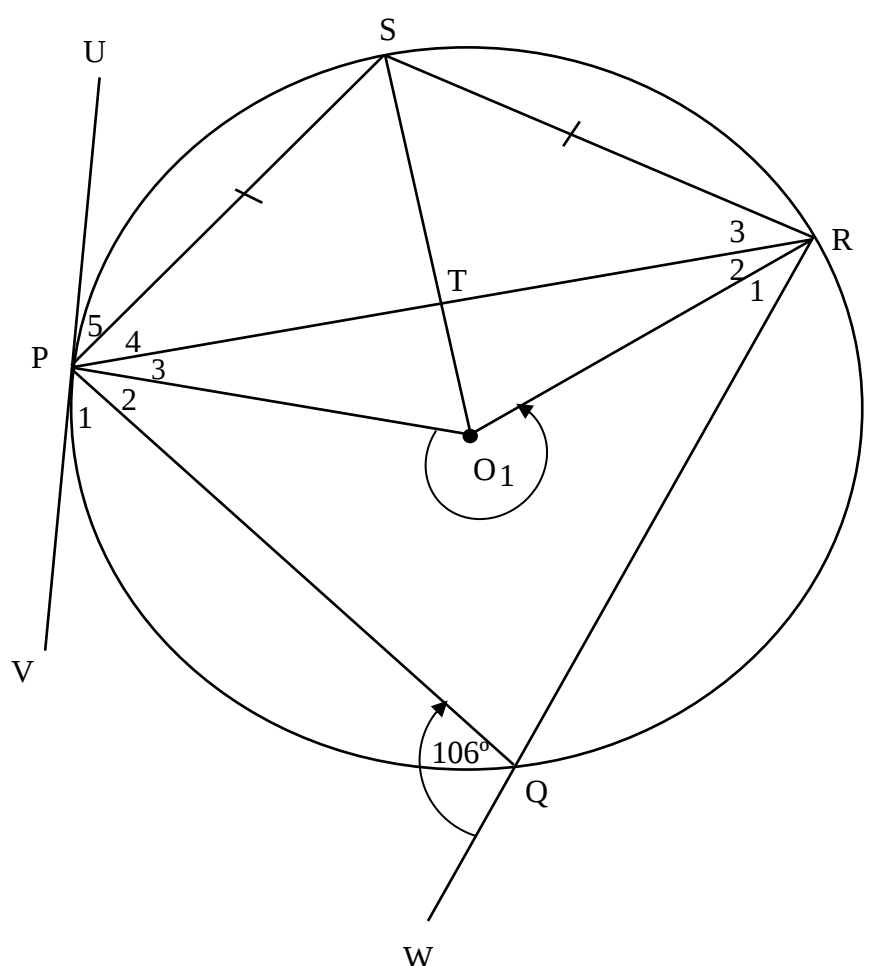
QUESTION/VRAAG 7



In $\triangle ABC$: $\sin \theta = \frac{h}{AC}$ $\therefore AC = \frac{h}{\sin \theta}$ In $\triangle ACD$: $AC = AD$ $\hat{A}DC = \hat{A}CD = \frac{180^\circ - 2\theta}{2}$ [$\angle$s opp.=sides; $\angle$s of $\triangle = 180^\circ$] [$\angle$e teenoor = sye; som vd $\angle$ van $\triangle = 180^\circ$] $\therefore \hat{A}DC = 90^\circ - \theta$ $\frac{CD}{\sin 2\theta} = \frac{AC}{\sin(90^\circ - \theta)}$ $CD = \frac{AC \cdot \sin 2\theta}{\sin(90^\circ - \theta)}$ $= \frac{h}{\sin \theta} \times \frac{2 \sin \theta \cdot \cos \theta}{\cos \theta}$ $= 2h$ OR/OF	✓ AC in terms of h and θ / AC in terme van h en θ ✓ $\hat{A}DC = 90^\circ - \theta$ ✓ correct subst. into sine rule/ korrekte vervanging in sinusreël ✓ CD as subject/CD as onderwerp ✓ $\sin 2\theta = 2 \sin \theta \cos \theta$ ✓ $\sin(90^\circ - \theta) = \cos \theta$ ✓ answer/antwoord	
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In $\triangle ABC$: $\sin \theta = \frac{h}{AC}$ $\therefore AC = \frac{h}{\sin \theta}$ In $\triangle ACD$: $AC = AD$ $CD^2 = AC^2 + AD^2 - 2AC \cdot AD \cos 2\theta$ $CD^2 = \left(\frac{h}{\sin \theta}\right)^2 + \left(\frac{h}{\sin \theta}\right)^2 - 2\left(\frac{h}{\sin \theta}\right)^2 \cos 2\theta$ $CD^2 = \frac{h^2}{\sin^2 \theta} + \frac{h^2}{\sin^2 \theta} - 2\frac{h^2}{\sin^2 \theta} (1 - 2\sin^2 \theta)$ $CD^2 = 2\frac{h^2}{\sin^2 \theta} - 2\frac{h^2}{\sin^2 \theta} + 4h^2$ $CD^2 = 4h^2$ $CD = 2h$	✓ AC in terms of h and θ / AC in terme van h en θ ✓ $AC = CD$ ✓ correct subst. into cosine rule/ korrekte vervanging in kosinusreël ✓ $\cos 2\theta = 1 - 2\sin^2 \theta$ ✓ multiplication/ vermenigvuldiging ✓ simplification/ vereenvoudiging ✓ answer/antwoord	(7)
		[7]

QUESTION/VRAAG 8

					
8.1.1	$\hat{P}\hat{S}R = 106^\circ$	ext. $\angle$ of cyclic quad/buite $\angle$ van kvh.	✓S ✓R	(2)	
8.1.2	$\hat{P}_4 = \hat{R}_3$ $\hat{R}_3 = \frac{180^\circ - 106^\circ}{2}$ $\hat{R}_3 = 37^\circ$	$\angle^s$ opposite = sides/ $\angle^e$ teenoor = sye OR/OF equal chords; equal $\angle^s$ /gelyke koorde; gelyke $\angle^e$ sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek	✓S/R ✓S ✓S	(3)	
8.1.3	$\hat{P}_5 = \hat{R}_3 = 37^\circ$	tan chord theorem/raaklyn koordstelling	✓S ✓R	(2)	
8.1.4	$\hat{O}_1 = 212^\circ$	$\angle$ centre = $2 \times \angle$ at circumference/ middelpunts $\angle = 2 \times$ omtreks $\angle$	✓R ✓S	(2)	

8.1.5	$\hat{P}_3 + \hat{P}_4 + \hat{P}_5 = 90^\circ$ $\hat{P}_3 = 90^\circ - 37^\circ - 37^\circ = 16^\circ$ OR/OF $\hat{P}\hat{O}R = 148^\circ$ $\hat{P}_3 = \hat{R}_2 = 16^\circ$	radius $\perp$ tangent/ <i>radius $\perp$ raaklyn</i> $\angle$'s around a point/ $\angle$ 'e om 'n punt $\angle$'s opposite radii/ $\angle$ 'e teenoor radiusse	$\checkmark R$ $\checkmark \hat{P}_3 = 16^\circ$ $\checkmark R$ $\checkmark \hat{P}_3 = 16^\circ$	(2)
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8.2			
8.2.1	$\hat{A}_2 = \hat{E} = x$ $\hat{E} = \hat{A}_1 = \hat{A}_2 = x$ OR/OF $\hat{C}_2 = \hat{A}_2 = x$ $\angle^s$ in the same segment/ $\angle^e$ in dies. segment = chords subtend = $\angle^s$ /gelyke koorde onderspan gelyke $\angle^e$ $\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse Learner MUST first determine $\hat{A}_2$ in order to get the mark for $\hat{C}_2$ Leerling MOET eers $\hat{A}_2$ bepaal, om die punt vir $\hat{C}_2$ te verdien	✓ S/R ✓ S/R ✓ S/R	(2)
8.2.2	$\hat{C}_2 + \hat{C}_3 + \hat{C}_4 = 90^\circ$ $\hat{D}_1 = 90^\circ - x$ $\hat{A}\hat{B}\hat{C} = 90^\circ + x$ $\angle^s$ in a semi circle/ $\angle^e$ in semi sirkel sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek opposite $\angle^s$ of cyclic quad/oorst $\angle^e$ v kvh OR/OF $\hat{O}_1 = 2x$ $\hat{D}_1 = 90^\circ - x$ $\hat{A}\hat{B}\hat{C} = 90^\circ + x$ $\angle$ centre = $2 \times \angle$ at circumference/ middelpunts $\angle = 2 \times$ omtreks $\angle$ sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek opposite $\angle^s$ of cyclic quad/oorst $\angle^e$ v kvh	✓ S/R ✓ S ✓ S/R ✓ S/R ✓ S ✓ S/R	(3)
8.2.3	$\hat{C}_3 + \hat{C}_4 = 90^\circ - x$ $\hat{A}_2 = \hat{C}_2 = x$ $\therefore \hat{A}_1 = \hat{C}_2 = x$ $\therefore AB \parallel CO$ $\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse $\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse alternate $\angle^s$ =/verwis. $\angle^e$ gelyk OR/OF	✓ S/R ✓ S/R ✓ R	(3)

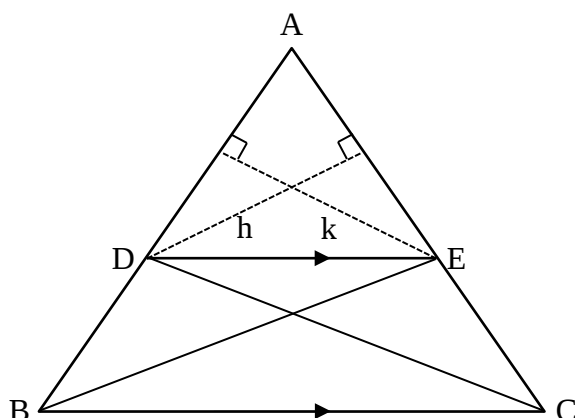
	$\hat{C}_3 + \hat{C}_4 = 90^\circ - x$ $\hat{A}_1 + \hat{A}_2 = \hat{O}_1 = 2x$ $\therefore AB \parallel CO$	$\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse $\angle$ centre = $2 \times \angle$ at circ./ <i>middelpunt</i> $\angle = 2 \times$ <i>omtrek</i> $\angle$ corresponding $\angle^s$ =/ooreenkomst. $\angle^e$ gelyk	✓S/R ✓S/R ✓R	
				[19]

QUESTION/VRAAG 9

9.1.1	$\hat{F}_2 = 90^\circ$ $\hat{B}_1 + \hat{B}_2 = 90^\circ$ $\therefore \hat{F}_2 + \hat{B} = 180^\circ$ OBEF is a cyclic quad/ <i>OBEF is 'n</i> <i>koordevierhoek</i> $\hat{F}_1 = 90^\circ$ $\hat{B}_1 + \hat{B}_2 = 90^\circ$ $\therefore \hat{F}_1 = \hat{B}$	line from centre to midpoint of chord/ <i>lyn v middelpunt na middelpunt v koord</i> radius $\perp$ tangent/radius $\perp$ raaklyn opp. $\angle^s$ are supplementary/ converse of opp. $\angle^s$ of a cyclic quad/ <i>oorst. $\angle^e$ is supplementêr/omgekeerde v</i> <i>oorst $\angle^e$ v kvh</i> OR/OF line from centre to midpoint of chord/ <i>lyn v middelpunt na middelpunt v koord</i> radius $\perp$ tangent/radius $\perp$ raaklyn ext. $\angle$ = interior opposite $\angle$ / converse of exterior. $\angle$ of a cyclic quad/ <i>$\angle$ = oorst binne $\angle^e$/omgekeerde van buite</i> <i>$\angle$ van kvh</i>	$\checkmark$ S/R $\checkmark$ S/R $\checkmark$ R $\checkmark$ S/R $\checkmark$ S/R $\checkmark$ R	(3)

9.1.2	$\hat{D}_1 = 90^\circ$ $\hat{D}_2 = 90^\circ$ In $\triangle ADB$ and/en $\triangle BDE$ $\hat{A} = \hat{B}_2$ $\hat{D}_1 = \hat{D}_2$ $\hat{B}_1 = \hat{E}$ $\triangle ADB \parallel \triangle BDE$	$\angle$ in a semi circle/ $\angle$ in semisirkel Adj. sup. $\angle^s$ /aangrensde suppl. $\angle^e$ tan chord theorem/raaklyn koordstelling proved/reeds bewys sum of $\angle^s$ in $\triangle$ /som vd $\angle^e$ v $\triangle$ $\angle\angle\angle$ OR/OF	$\checkmark$ S/R $\checkmark$ S $\checkmark$ R $\checkmark$ S/R $\checkmark$ S $\checkmark$ R	
	$\hat{D}_1 = 90^\circ$ $\hat{D}_2 = 90^\circ$ In $\triangle ADB$ and/en $\triangle BDE$ $\hat{A} = \hat{B}_2$ $\hat{D}_1 = \hat{D}_2$ $\triangle ADB \parallel \triangle BDE$	$\angle$ in a semi circle/ $\angle$ in semisirkel Adj. sup. $\angle^s$ /aangrensde suppl. $\angle^e$ tan chord theorem/raaklyn koordstelling proved/reeds bewys $\angle\angle\angle$	$\checkmark$ S/R $\checkmark$ S $\checkmark$ R	(3)
	9.1.3 $\hat{B}_1 = \hat{E}$ $\therefore OB$ is a tangent/ $\therefore OB$ is 'n raaklyn	3rd $\angle$ in $\triangle$, $\triangle ADB \parallel \triangle BDE$ converse of tan chord theorem/ omgekeerde raaklyn koordstelling	$\checkmark$ S $\checkmark$ R	(2)
9.2	$\frac{AD}{BD} = \frac{BD}{DE}$ $BD^2 = AD \times DE$ but/maar $BD = 2OF$ $BD^2 = 4OF^2$ $4OF^2 = AD \times DE$ $OF^2 = \frac{AD \times DE}{4}$	$\triangle ADB \parallel \triangle BDE$ midpoint theorem/middelpuntstelling	$\checkmark$ S $\checkmark$ S/R $\checkmark$ S	
				(3)
				[11]

QUESTION/VRAAG 10



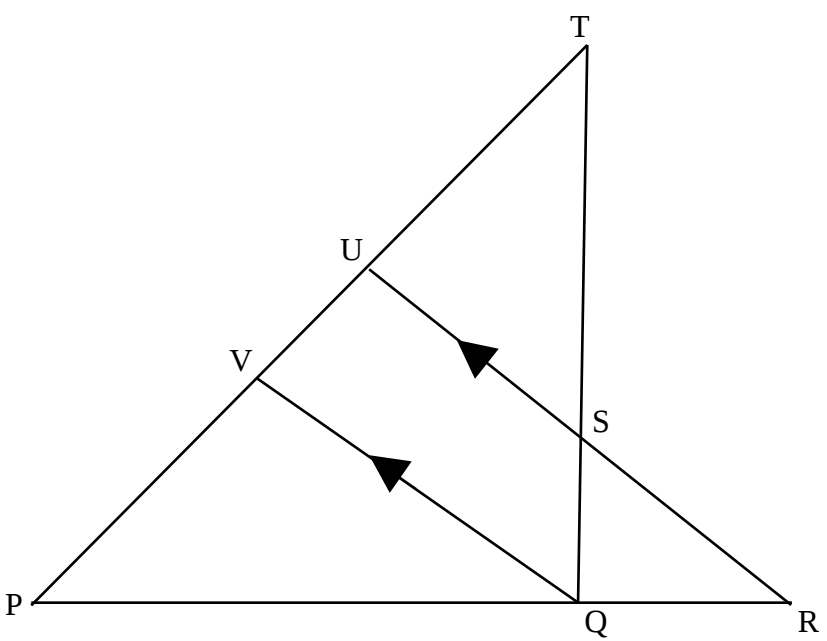
Construction must be in words or indicated on sketch. No construction – 0/5 for question.

90° must be mentioned or indicated – if not 4/5

Konstruksie moet op skets aangedui wees, of in woorde. Geen konstruksie – 0/5 vir vraag.

90° moet genoem word of aangedui wees – indien nie 4/5

10.1	Construction: Join DC and BE and perpendicular heights k and h Konstruksie: Verbind DC en BE en loodregte hoogtes k en h $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\frac{1}{2} \cdot AD \cdot k}{\frac{1}{2} \cdot DB \cdot k} = \frac{AD}{DB}$ $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC} = \frac{\frac{1}{2} \cdot AE \cdot h}{\frac{1}{2} \cdot EC \cdot h} = \frac{AE}{EC}$ Area $\triangle DEB$ = Area $\triangle DEC$ same base, same height/ dies. basis, dies. hoogte $\therefore \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC}$ $\therefore \frac{AD}{DB} = \frac{AE}{EC}$	✓ construction/ konstruksie ✓S ✓S ✓S/R ✓S	(5)
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10.2	$\frac{QS}{ST} = \frac{VU}{UT}$ $\frac{2}{3} = \frac{VU}{2}$ $VU = \frac{4}{3}$ $PV = 5 - \frac{4}{3} = \frac{11}{3}$ $\frac{PV}{VU} = \frac{PQ}{QR}$ $\frac{PQ}{QR} = \frac{11}{3} \div \frac{4}{3}$ $\frac{PQ}{QR} = \frac{11}{4}$ Proportion theorem, RU QV/ line one side of Δ/eweredigheids stelling RU QV/lyn een sy van Δ Proportion theorem, RU QV/ line one side of Δ/eweredigheids stelling RU QV/lyn een sy van Δ	✓ S/R ✓ $VU = \frac{4}{3}$ ✓ $PV = \frac{11}{3}$ ✓ S ✓ S	(5) [10]

TOTAL/TOTAAL: 145

The mark out of 145 must be converted to a mark out of 150.
 Die punt uit 145 moet herlei word na 'n punt uit 150.