



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIORSERTIKAAT-EKSAMEN/ NASIONALE SENIORSERTIFIKAAT-EKSAMEN

WISKUNDE V2

2022

PUNTE: 150

TYD: 3 uur

Hierdie vraestel bestaan uit 14 bladsye en 1 inligtingsblad.

INSTRUKSIES EN INLIGTING

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

1. Hierdie vraestel bestaan uit 10 vrae.
2. Beantwoord AL die vrae in die SPESIALE ANTWOORDEBOEK wat verskaf word.
3. Dui ALLE berekeninge, diagramme, grafieke, ens. wat jy in die beantwoording van die vrae gebruik, duidelik aan.
4. Slegs antwoorde sal NIE noodwendig volpunte verdien NIE.
5. Jy kan 'n goedgekeurde wetenskaplike sakrekenaar gebruik (nieprogrammeerbaar en niegrafies), tensy anders vermeld.
6. Indien nodig, rond antwoorde tot TWEE desimale plekke af, tensy anders vermeld.
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

Die tabel hieronder toon die massa (in kg) van skooltasse van 80 leerders.

MASSA (in kg)	FREKWENSIE
$5 < m \leq 7$	6
$7 < m \leq 9$	18
$9 < m \leq 11$	21
$11 < m \leq 13$	19
$13 < m \leq 15$	11
$15 < m \leq 17$	4
$17 < m \leq 19$	1

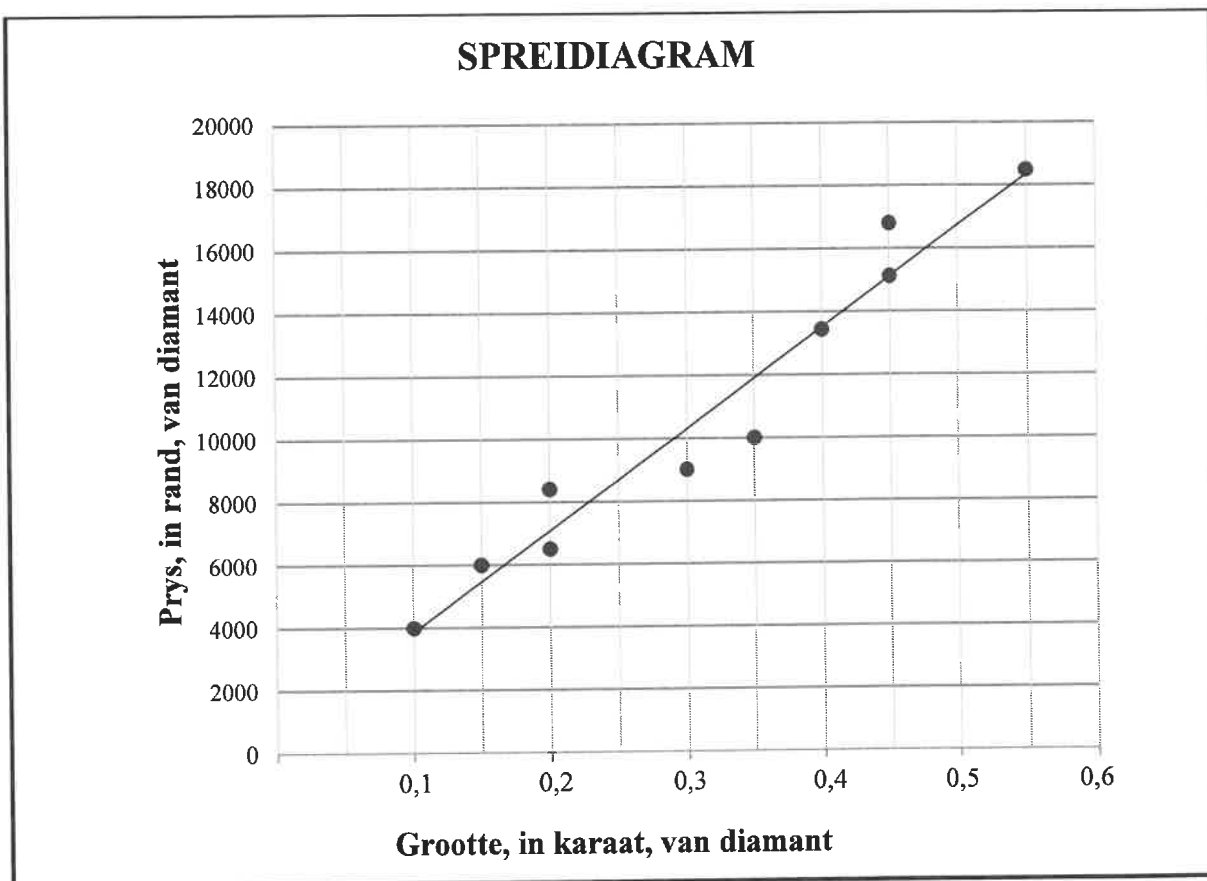
- 1.1 Skryf die modale klas van die data neer. (1)
- 1.2 Voltooi die kumulatiewefrekwensie-kolom in die tabel in die ANTWOORDEBOEK. (2)
- 1.3 Skets 'n kumulatiewefrekwensie-grafiek (ogief) vir die gegewe data op die rooster wat in die ANTWOORDEBOEK verskaf word. (3)
- 1.4 Gebruik die grafiek om die mediaanmassa vir hierdie data te bepaal. (2)
- 1.5 Die internasionale riglyn vir die massa van 'n skooltas is dat dit nie 10% van 'n leerder se liggaamsmassa moet oorskry nie.
- 1.5.1 Bereken die benaderde gemiddelde massa van die skooltasse. (2)
- 1.5.2 Daar is gevind dat die gemiddelde massa van hierdie groep leerders 80 kg is. Met verwysing na gemiddelde massa, voldoen hierdie skooltasse aan die internasionale riglyn? Motiveer jou antwoord. (2)

[12]

VRAAG 2

Die tabel hieronder toon die grootte (in karaat) en die prys (in rand) van 10 diamante wat deur 'n diamanthandelaar verkoop is. Hierdie inligting word ook in die spreidiagram hieronder getoon. Die kleinstekwadrate-regressielyn is getrek.

Grootte, in karaat, van diamant (x)	0,1	0,15	0,2	0,2	0,3	0,35	0,4	0,45	0,45	0,55
Prys, in rand, van diamant (y)	4 000	6 000	6 500	8 400	9 000	10 000	13 440	15 120	16 800	18 480

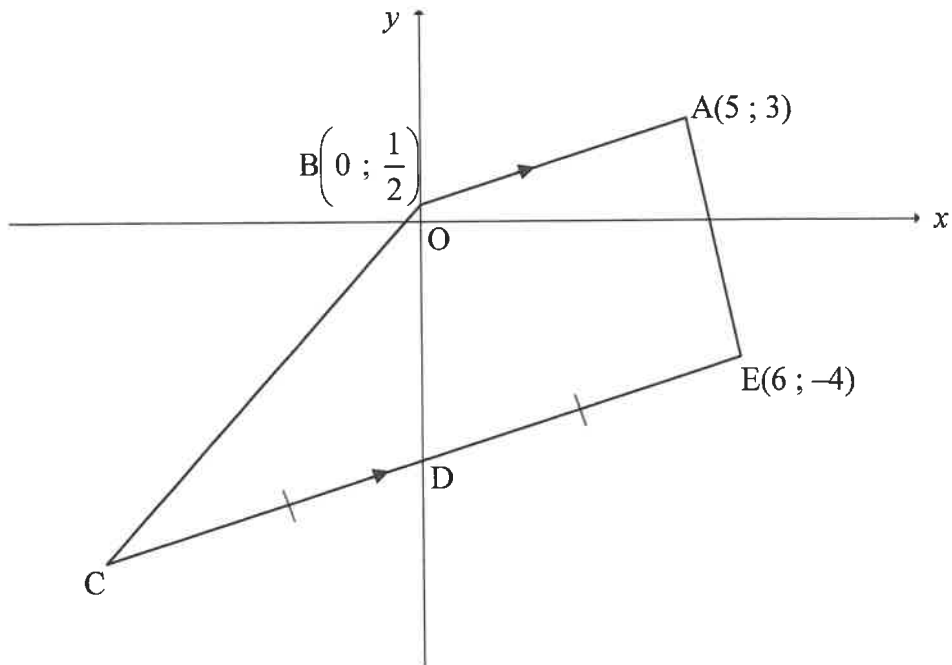


- 2.1 Bepaal die vergelyking van die kleinstekwadrate-regressielyn vir die data. (3)
- 2.2 As die handelaar 'n diamant verkoop het wat 0,25 karaat groot is, voorspel die verkoopprys van die diamant in rand. (2)
- 2.3 Bereken die gemiddelde prysverhoging per 0,05 karaat van die diamante. (2)
- 2.4 Daar is later vasgestel dat die prys van die 0,35 karaat diamant verkeerd aangeteken is. Die korrekte prys is R11 500. Wanneer die datastel reggestel word, raak die korrelasie tussen die grootte en die prys van hierdie diamante sterker. Verduidelik die rede hiervoor deur na die gegewe spreidiagram te verwys. (1)

[8]

VRAAG 3

In die diagram is $A(5; 3)$, $B\left(0; \frac{1}{2}\right)$, C en $E(6; -4)$ die hoekpunte van 'n trapesium met $BA \parallel CE$. D is die y -afsnit van CE en $CD = DE$.

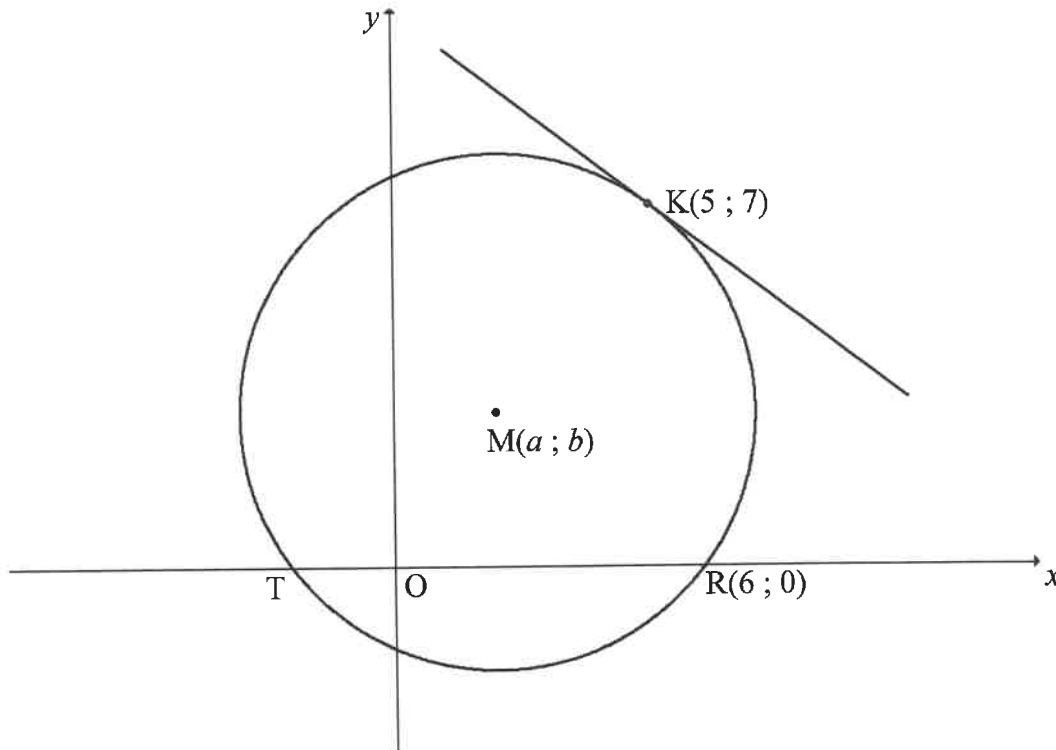


- 3.1 Bereken die gradiënt van AB . (2)
- 3.2 Bepaal die vergelyking van CE in die vorm $y = mx + c$. (3)
- 3.3 Bereken die:
- 3.3.1 Koördinate van C (3)
- 3.3.2 Oppervlakte van vierhoek $ABCD$ (4)
- 3.4 As punt K die refleksie van E in die y -as is:
- 3.4.1 Skryf die koördinate van K neer (2)
- 3.4.2 Bereken die:
- (a) Omtrek van $\triangle KEC$ (4)
- (b) Grootte van \hat{KCE} (3)

[21]

VRAAG 4

In die diagram is die sirkel met middelpunt $M(a; b)$ geskets. T en $R(6; 0)$ is die x -afsnitte van die sirkel. 'n Raaklyn is aan die sirkel by $K(5; 7)$ getrek.

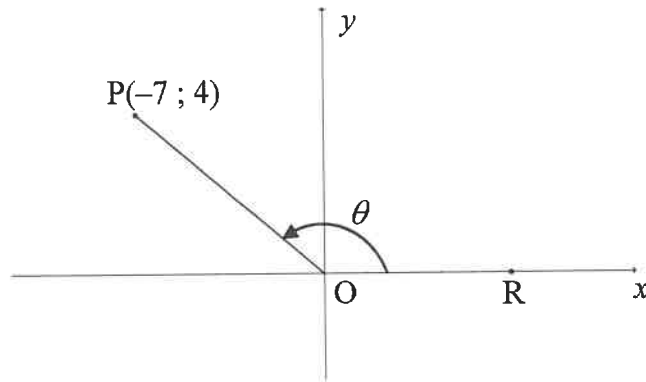


- 4.1 M is 'n punt op die lyn $y = x + 1$.
- 4.1.1 Skryf b in terme van a . (1)
- 4.1.2 Bereken die koördinate van M. (5)
- 4.2 As $(2; 3)$ die koördinate van M is, bereken die lengte van:
- 4.2.1 Die radius van die sirkel (2)
- 4.2.2 TR (2)
- 4.3 Bepaal die vergelyking van die raaklyn aan die sirkel by K. Skryf jou antwoord in die vorm $y = mx + c$. (5)
- 4.4 'n Horisontale lyn word as 'n raaklyn aan die sirkel M by die punt $N(c; d)$ getrek, waar $d < 0$.
- 4.4.1 Skryf die koördinate van N neer. (2)
- 4.4.2 Bepaal die vergelyking van die sirkel met middelpunt N wat deur T gaan. Skryf jou antwoord in die vorm $(x - a)^2 + (y - b)^2 = r^2$. (3)

[20]

VRAAG 5

- 5.1 In die diagram hieronder is $P(-7; 4)$ 'n punt in die Kartesiese vlak. R is 'n punt op die positiewe x -as sodanig dat stomphoek $\hat{P}OR = \theta$.



Bereken, sonder die gebruik van 'n sakrekenaar, die:

- 5.1.1 Lengte OP (2)
- 5.1.2 Waarde van:
- (a) $\tan \theta$ (1)
- (b) $\cos(\theta - 180^\circ)$ (2)
- 5.2 Bepaal die algemene oplossing van: $\sin x \cos x + \sin x = 3 \cos^2 x + 3 \cos x$ (7)
- 5.3 Gegee die identiteit: $\frac{\sin 3x}{1 - \cos 3x} = \frac{1 + \cos 3x}{\sin 3x}$
- 5.3.1 Bewys die identiteit hierbo gegee. (3)
- 5.3.2 Bepaal die waardes van x , in die interval $x \in [0^\circ; 60^\circ]$, waarvoor die identiteit ongedefinieerd sal wees. (3)

[18]

VRAAG 6

- 6.1 Vereenvoudig, **sonder die gebruik van 'n sakrekenaar**, die volgende uitdrukking tot 'n enkele trigonometriese term:

$$\frac{\sin 10^\circ}{\cos 440^\circ} + \tan(360^\circ - \theta) \cdot \sin 2\theta \quad (6)$$

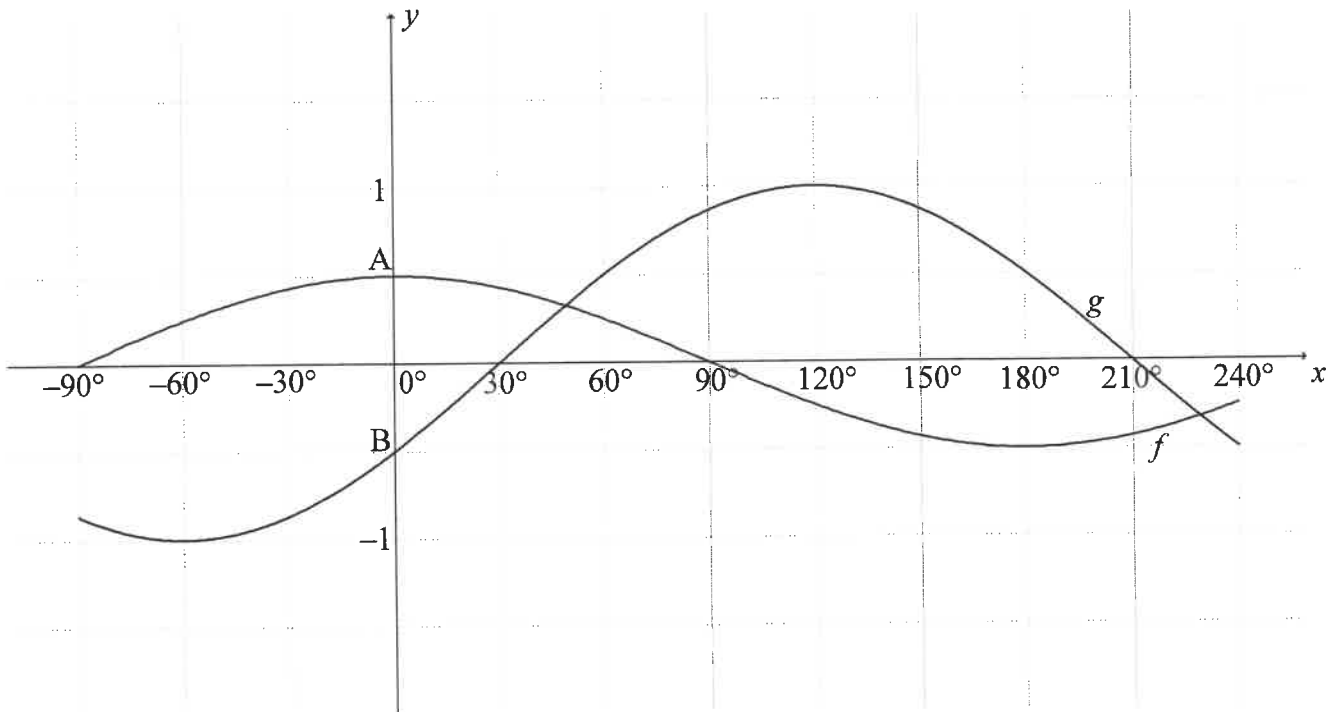
- 6.2 Gegee: $\sin(60^\circ + 2x) + \sin(60^\circ - 2x)$

6.2.1 Bereken die waarde van k as $\sin(60^\circ + 2x) + \sin(60^\circ - 2x) = k \cos 2x$. (3)

6.2.2 As $\cos x = \sqrt{t}$, bepaal, **sonder die gebruik van 'n sakrekenaar**, die waarde van $\tan 60^\circ [\sin(60^\circ + 2x) + \sin(60^\circ - 2x)]$ in terme van t . (3)
[12]

VRAAG 7

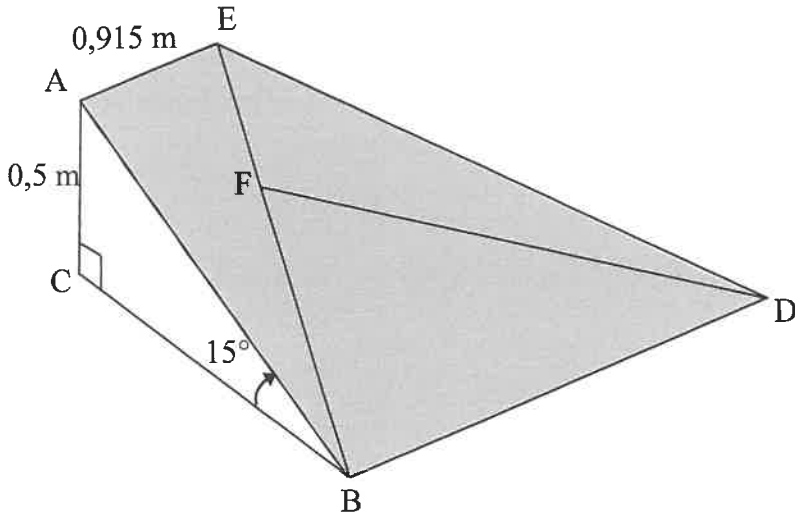
In die diagram hieronder is die grafieke van $f(x) = \frac{1}{2} \cos x$ en $g(x) = \sin(x - 30^\circ)$ vir die interval $x \in [-90^\circ; 240^\circ]$ geskets. A en B is onderskeidelik die y -afsnitte van f en g .



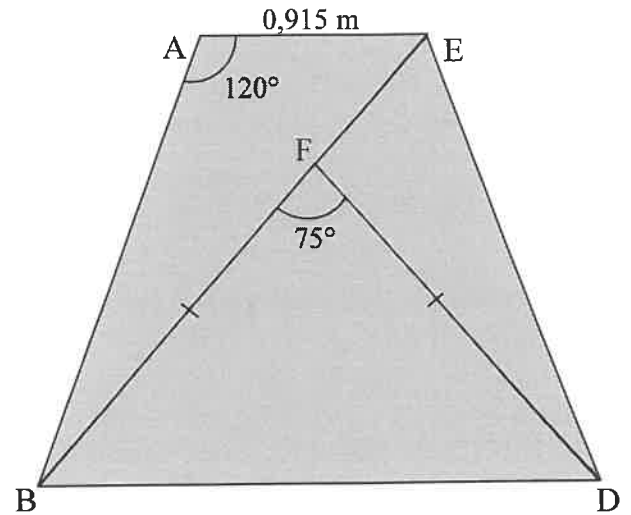
- 7.1 Bepaal die lengte van AB. (2)
- 7.2 Skryf die waardeversameling van $3f(x) + 2$ neer. (2)
- 7.3 Lees vanaf die grafieke 'n waarde van x waarvoor $g(x) - f(x) = \frac{\sqrt{3}}{2}$. (2)
- 7.4 Vir watter waardes van x , in die interval $x \in [-90^\circ; 240^\circ]$, is:
- 7.4.1 $f(x) \cdot g(x) > 0$ (2)
- 7.4.2 $g'(x - 5^\circ) > 0$ (2)
- [10]**

VRAAG 8

FIGUUR I toon 'n oprit wat na die ingang van 'n gebou lei. B, C en D lê op dieselfde horisontale vlak. Die loodregte hoogte (AC) van die oprit is 0,5 m en die hoogtehoek vanaf B na A is 15° . Die ingang van die gebou (AE) is 0,915 m wyd.



FIGUUR I

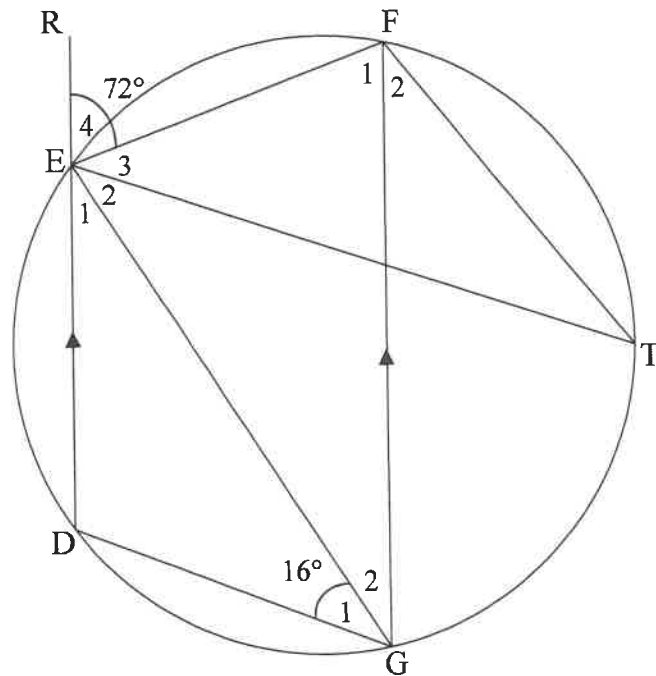


FIGUUR II (boaansig)

- 8.1 Bereken die lengte van AB. (2)
 - 8.2 Figuur II toon die boaansig van die oprit. Die oppervlak van die bokant van die oprit word in drie driehoeke verdeel, soos in die diagram getoon.
Indien $\hat{BAE} = 120^\circ$, bereken die lengte van BE. (3)
 - 8.3 Bereken die oppervlakte van $\triangle BFD$ as $\hat{BFD} = 75^\circ$, $BF = FD$ en $BF = \frac{5}{7}BE$. (3)
- [8]**

VRAAG 9

9.1 In die diagram is DEFG 'n koordevierhoek met $DE \parallel GF$. DE word na R verleng. T is nog 'n punt op die sirkel. EG, FT en ET word getrek. $\hat{E}_4 = 72^\circ$ en $\hat{G}_1 = 16^\circ$.



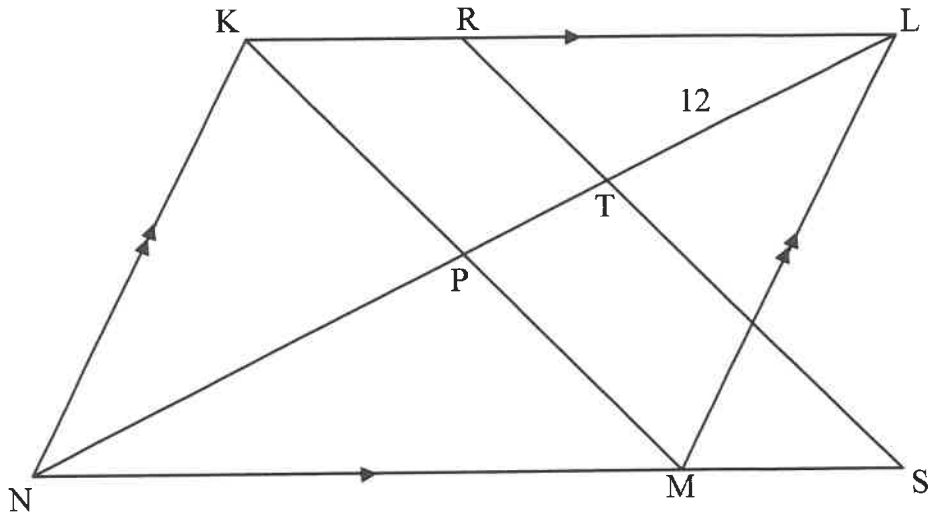
Bepaal, met redes, die grootte van die volgende hoeke:

9.1.1 \hat{DGF} (2)

9.1.2 \hat{T} (2)

9.1.3 \hat{GEF} (2)

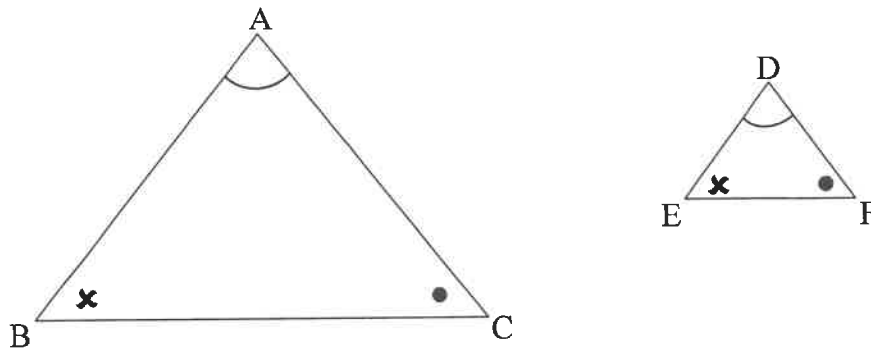
- 9.2 In die diagram sny die hoeklyne van parallellogram KLMN by P. NM is verleng na S. R is 'n punt op KL en RS sny PL by T.
 $NM : MS = 4 : 1$, $NL = 32$ eenhede en $TL = 12$ eenhede.



- 9.2.1 Bepaal, met redes, die waarde van die verhouding $NP : PT$ in eenvoudigste vorm. (4)
- 9.2.2 Bewys, met redes, dat $KM \parallel RS$. (2)
- 9.2.3 As $NM = 21$ eenhede, bepaal, met redes, die lengte van RL . (4)
- [16]

VRAAG 10

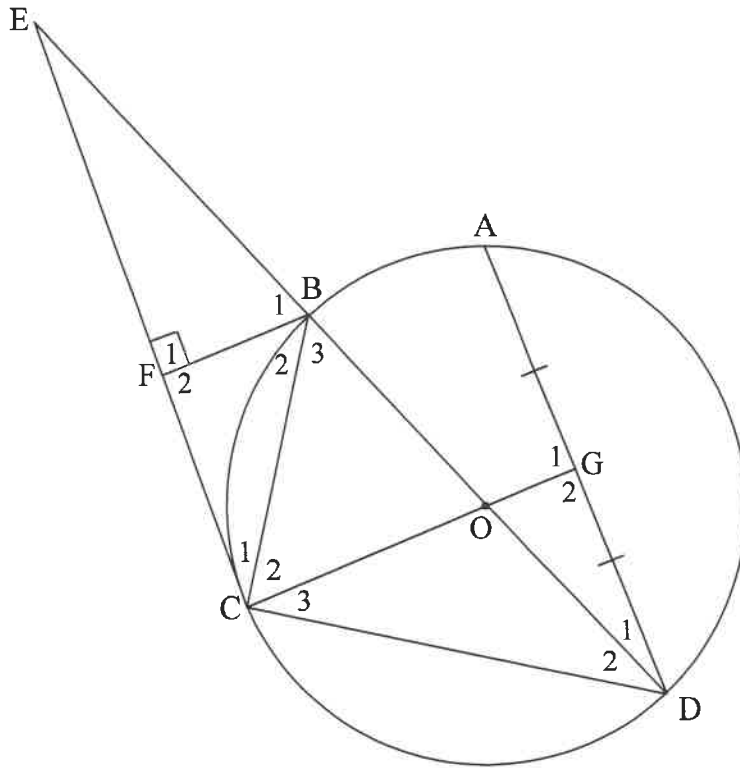
10.1 In die diagram is $\triangle ABC$ en $\triangle DEF$ geskets sodanig dat $\hat{A} = \hat{D}$, $\hat{B} = \hat{E}$ en $\hat{C} = \hat{F}$.



Gebruik die diagram in die ANTWOORDEBOEK om die stelling te bewys wat beweer dat as twee driehoeke gelykhoekig is, dan is die ooreenstemmende sye in dieselfde verhouding, d.i. $\frac{AB}{DE} = \frac{AC}{DF}$.

(6)

- 10.2 In die diagram is O die middelpunt van 'n sirkel wat deur A , B , C en D gaan. EC is 'n raaklyn aan die sirkel by C . Middellyn DB word verleng om die raaklyn EC by E te ontmoet. F is 'n punt op EC sodanig dat $BF \perp EC$. Radius CO word verleng om AD by G te halveer. BC en CD is getrek.



- 10.2.1 Bewys, met redes, dat:
- (a) $FB \parallel CG$ (3)
 - (b) $\triangle FCB \parallel \triangle CDB$ (5)
- 10.2.2 Gee 'n rede waarom $\hat{G}_1 = 90^\circ$. (1)
- 10.2.3 Bewys, met redes, dat $CD^2 = CG \cdot DB$. (5)
- 10.2.4 Bewys vervolgens dat $DB = CG + FB$. (5)

[25]

TOTAAL: 150

INLIGTINGSBLAD

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

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

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

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

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

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

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

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

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

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

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

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

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

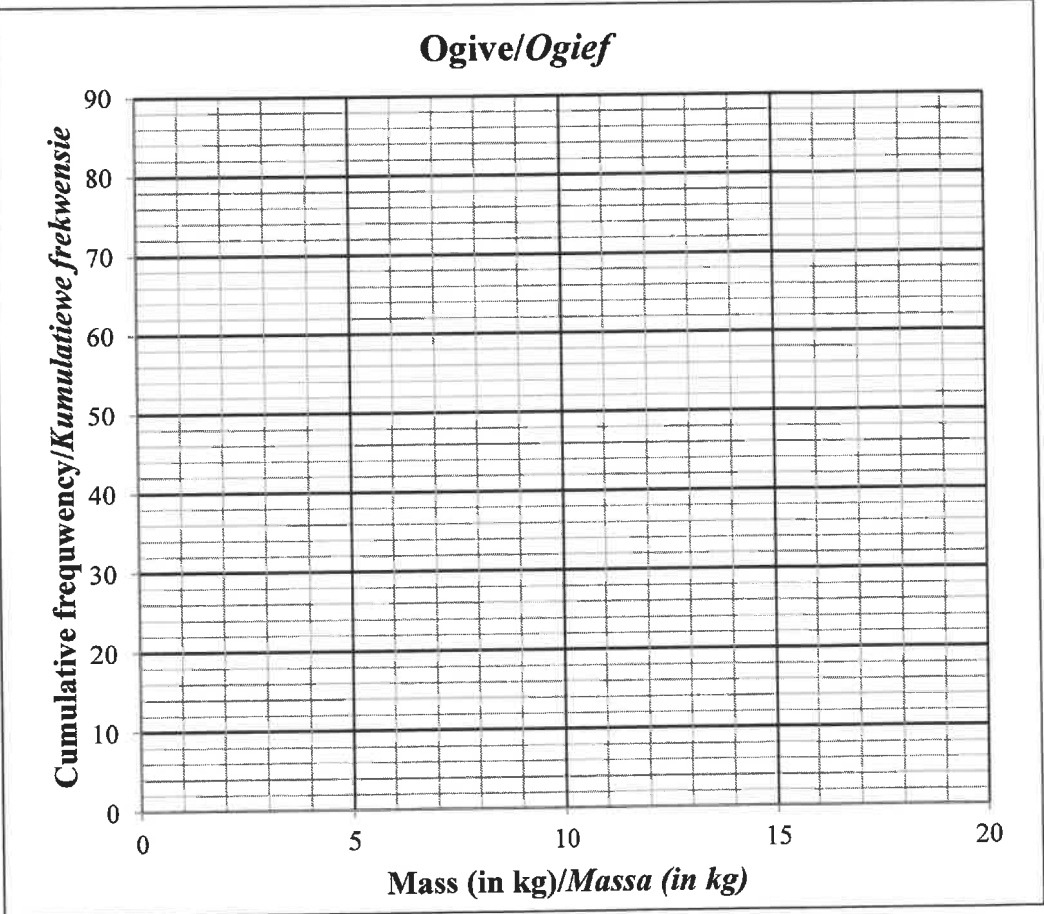
$$P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$$

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

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

PLEASE FOLLOW THESE INSTRUCTIONS CAREFULLY	VOLG ASSEBLIEF HIERDIE INSTRUKSIES NOUKEURIG
1. Clearly write your examination number and centre number in the space provided and attach your barcode label in the space provided.	1. <i>Skryf jou eksamennommer en sentrumnummer duidelik in die ruimtes verskaf en plak jou stafieskodeplakker in die ruimte verskaf.</i>
2. Remember that your own name (or the name of your school) may NOT appear anywhere on or in this answer book.	2. <i>Onthou dat jou eie naam (of die naam van jou skool) NIE op of in hierdie antwoordeboek mag voorkom NIE.</i>
3. Answer ALL questions in the spaces provided.	3. <i>Beantwoord ALLE vrae in die ruimtes wat verskaf is.</i>
4. NO pages may be torn from this answer book.	4. <i>GEEN bladsye mag uit hierdie antwoordeboek geskeur word NIE.</i>
5. Read the instructions printed on your timetable carefully as well as any other instructions which may be given in each question paper.	5. <i>Lees die instruksies, wat op jou eksamenrooster gedruk is, sorgvuldig deur, asook enige ander instruksies wat op elke vraestel gegee word.</i>
6. Candidates may NOT retain an answer book or remove it from the examination room.	6. <i>GEEN antwoordeboek mag deur die kandidaat behou of uit die eksamenlokaal verwyder word NIE.</i>
7. Answers must be written in black/blue ink as distinctly as possible. Do NOT write in the margins.	7. <i>Skryf die antwoorde so duidelik moontlik met swart/blou ink. Laat die kantlyne oop.</i>
8. Write the numbers of the questions you have answered on the front cover of the answer book where marks are to be recorded.	8. <i>Skryf die nommers van die vrae wat jy beantwoord het op die voorblad van die antwoordeboek waar die punte aangebring word.</i>
9. If you require additional space for your answers: 9.1 Use the additional space provided at the end of the answer book. 9.2 When answering a question in the additional space, clearly indicate the question number in the column on the LHS. 9.3 Rule off after each answer.	9. <i>In geval jy bykomende ruimte benodig vir jou antwoorde:</i> 9.1 <i>Gebruik die bykomende ruimte wat aan die einde van die antwoordeboek verskaf word.</i> 9.2 <i>As 'n vraag in die bykomende ruimte beantwoord word, dui duidelik die vraagnommer in die kolom aan die LK aan.</i> 9.3 <i>Trek 'n lyn na elke antwoord.</i>
10. Draw a neat line through any work/rough work that must not be marked.	10. <i>Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie.</i>

QUESTION/VRAAG 1

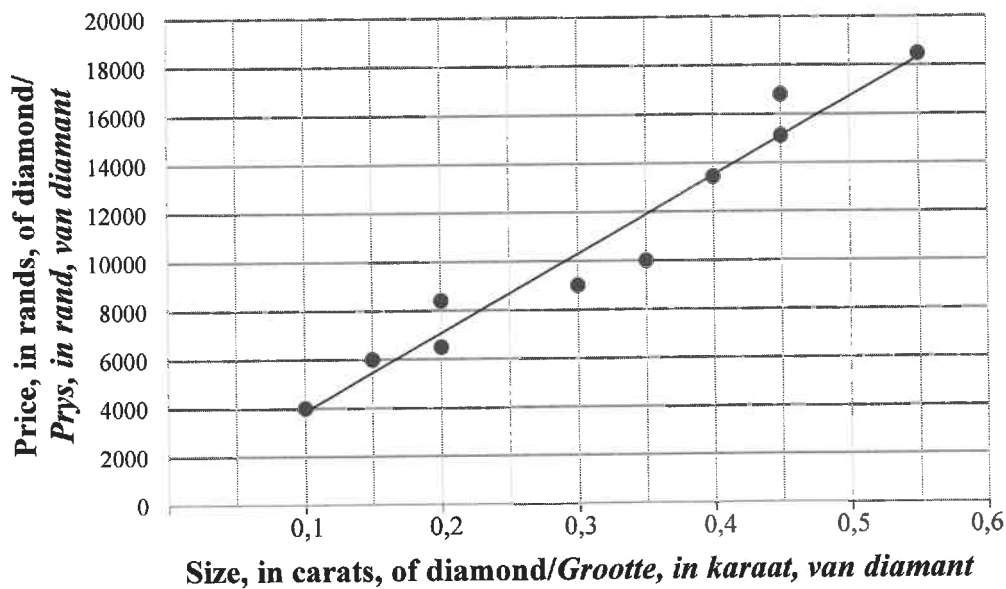
	Solution/Oplissing	Marks Punte																								
1.1		(1)																								
1.2	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th data-bbox="400 533 667 678">MASS (in kg)/ MASSA (in kg)</th> <th data-bbox="667 533 933 678">FREQUENCY/ FREKWENSIE</th> <th data-bbox="933 533 1219 678">CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE</th> </tr> </thead> <tbody> <tr> <td data-bbox="400 678 667 734">$5 < m \leq 7$</td> <td data-bbox="667 678 933 734">6</td> <td data-bbox="933 678 1219 734"></td> </tr> <tr> <td data-bbox="400 734 667 790">$7 < m \leq 9$</td> <td data-bbox="667 734 933 790">18</td> <td data-bbox="933 734 1219 790"></td> </tr> <tr> <td data-bbox="400 790 667 846">$9 < m \leq 11$</td> <td data-bbox="667 790 933 846">21</td> <td data-bbox="933 790 1219 846"></td> </tr> <tr> <td data-bbox="400 846 667 902">$11 < m \leq 13$</td> <td data-bbox="667 846 933 902">19</td> <td data-bbox="933 846 1219 902"></td> </tr> <tr> <td data-bbox="400 902 667 958">$13 < m \leq 15$</td> <td data-bbox="667 902 933 958">11</td> <td data-bbox="933 902 1219 958"></td> </tr> <tr> <td data-bbox="400 958 667 1014">$15 < m \leq 17$</td> <td data-bbox="667 958 933 1014">4</td> <td data-bbox="933 958 1219 1014"></td> </tr> <tr> <td data-bbox="400 1014 667 1093">$17 < m \leq 19$</td> <td data-bbox="667 1014 933 1093">1</td> <td data-bbox="933 1014 1219 1093"></td> </tr> </tbody> </table>	MASS (in kg)/ MASSA (in kg)	FREQUENCY/ FREKWENSIE	CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE	$5 < m \leq 7$	6		$7 < m \leq 9$	18		$9 < m \leq 11$	21		$11 < m \leq 13$	19		$13 < m \leq 15$	11		$15 < m \leq 17$	4		$17 < m \leq 19$	1		(2)
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1.3	<p style="text-align: center;">Ogive/Ogief</p> 	(3)																								

	Solution/Oplissing	Marks Punte
1.4		(2)
1.5.1		(2)
1.5.2		(2)
		[12]

QUESTION/VRAAG 2

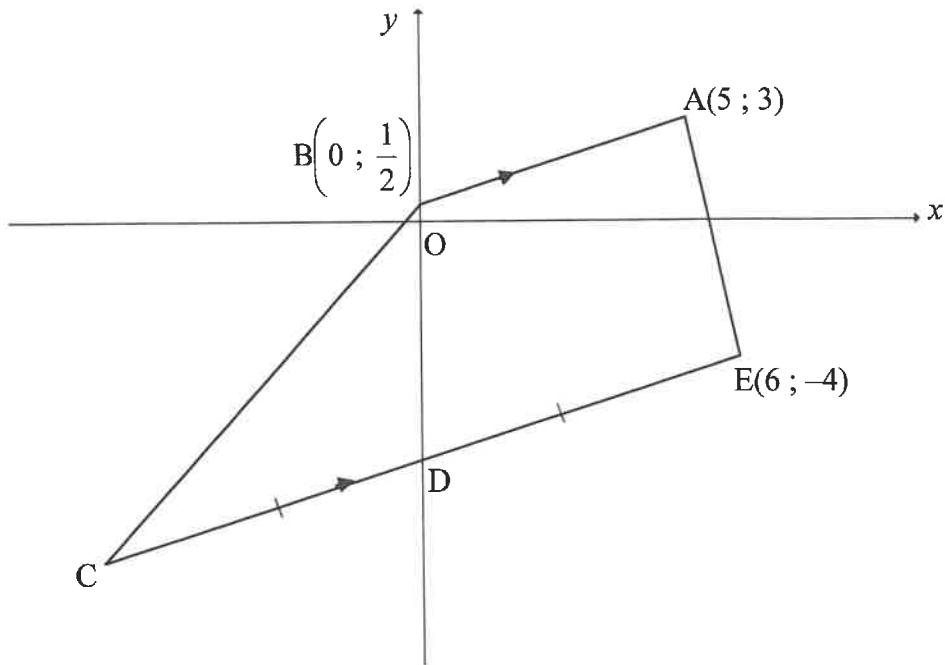
Size, in carats, of diamond (x)/ Grootte, in karaat, van diamant (x)	0,1	0,15	0,2	0,2	0,3	0,35	0,4	0,45	0,45	0,55
Price, in rands, of diamond (y)/ Prys, in rand, van diamant (y)	4 000	6 000	6 500	8 400	9 000	10 000	13 440	15 120	16 800	18 480

SCATTER PLOT / SPREIDIAGRAM



	Solution/Oplissing	Marks Punte
2.1		(3)
2.2		(2)
2.3		(2)
2.4		(1)
		[8]

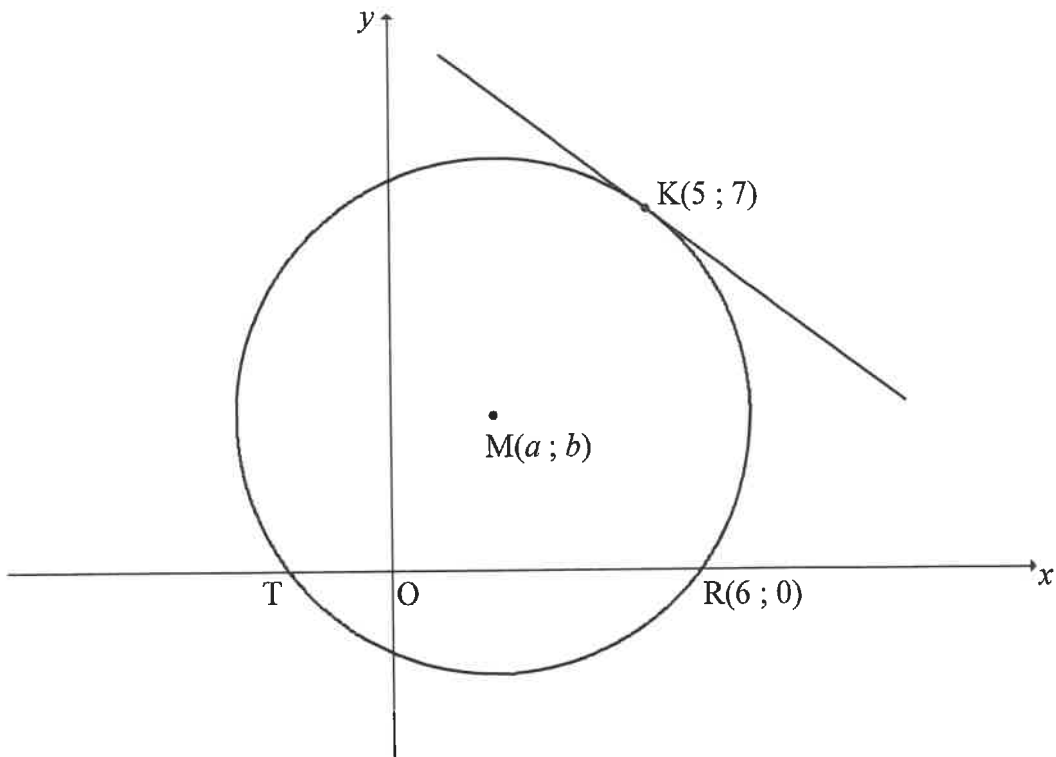
QUESTION/VRAAG 3



	Solution/Oplissing	Marks Punte
3.1		(2)
3.2		(3)
3.3.1		(3)

	Solution/Oplissing	Marks Punte
3.3.2		(4)
3.4.1		(2)
3.4.2(a)		(4)
3.4.2(b)		(3)
		[21]

QUESTION/VRAAG 4

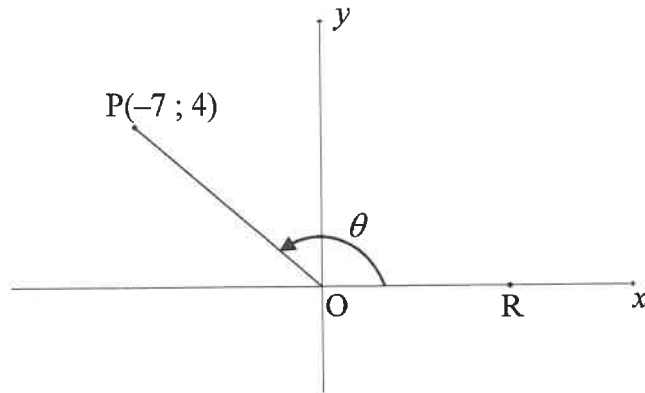


	Solution/Oplissing	Marks Punte
4.1.1		(1)
4.1.2		
		(5)

	Solution/Oplissing	Marks Punte
4.2.1		(2)
4.2.2		(2)
4.3		(5)
4.4.1		(2)
4.4.2		(3)
		[20]

QUESTION/VRAAG 5

5.1



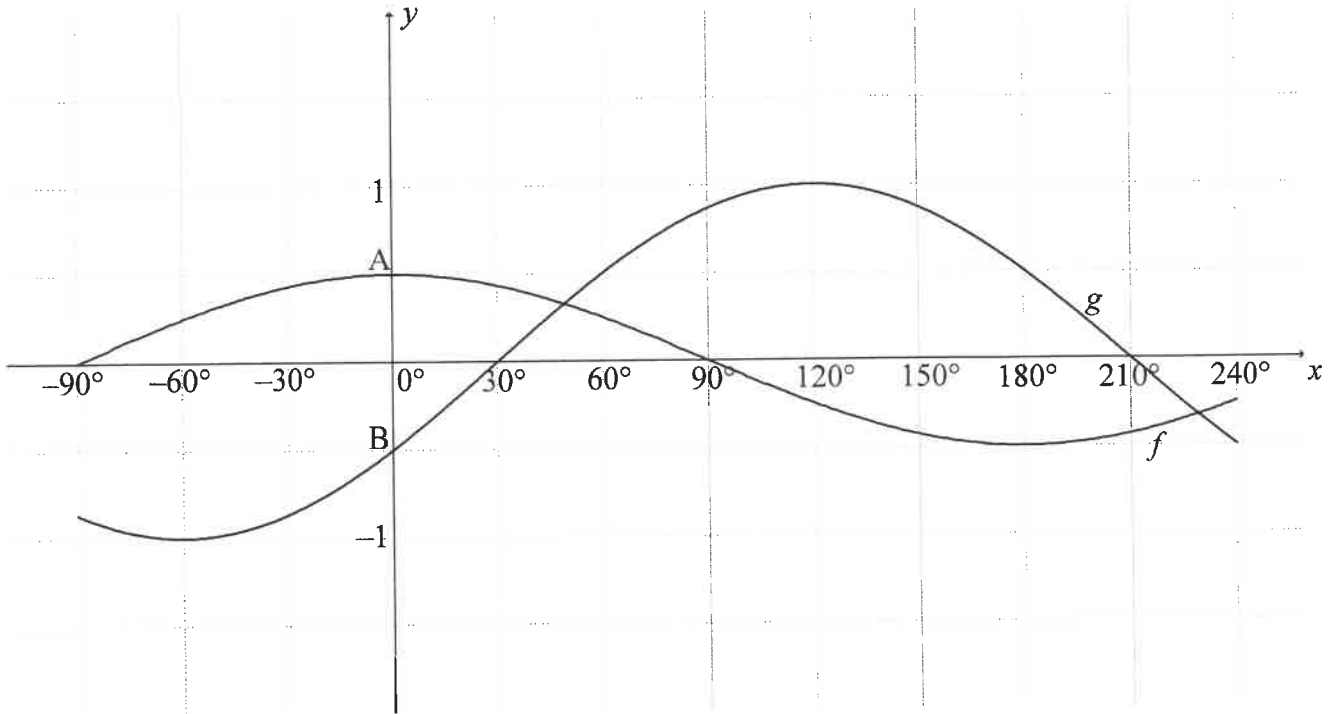
	Solution/Oplissing	Marks Punte
5.1.1		(2)
5.1.2(a)		(1)
5.1.2(b)		(2)
5.2		(7)

	Solution/Oplissing	Marks Punte
5.3.1		(3)
5.3.2		(3)
		[18]

QUESTION/VRAAG 6

	Solution/Oplissing	Marks Punte
6.1		(6)
6.2.1		(3)
6.2.2		(3)
		[12]

QUESTION/VRAAG 7



	Solution/Oplissing	Marks Punte
7.1		(2)
7.2		(2)
7.3		(2)
7.4.1		(2)
7.4.2		(2)
		[10]

QUESTION/VRAAG 8

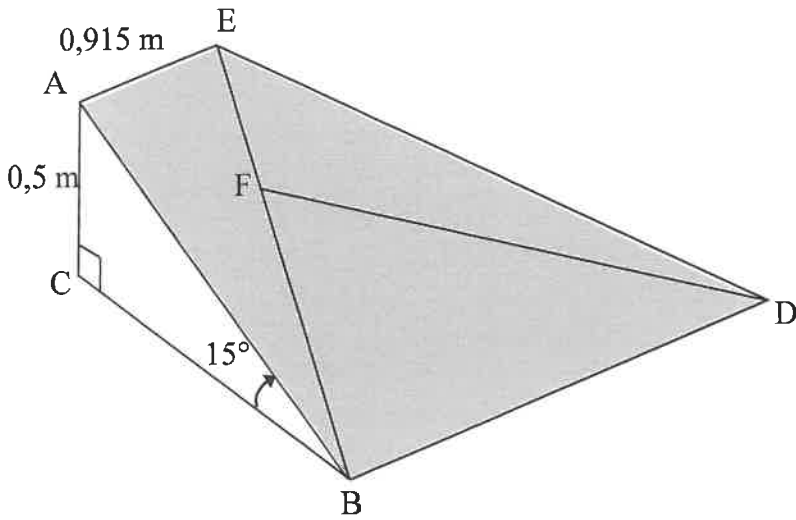


FIGURE I/FIGUUR I

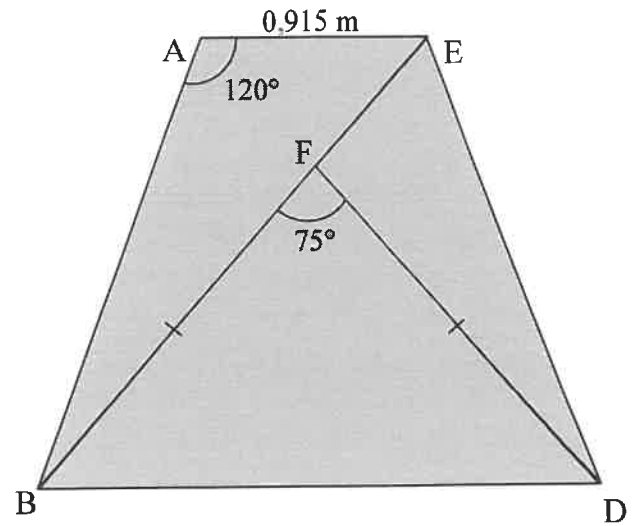


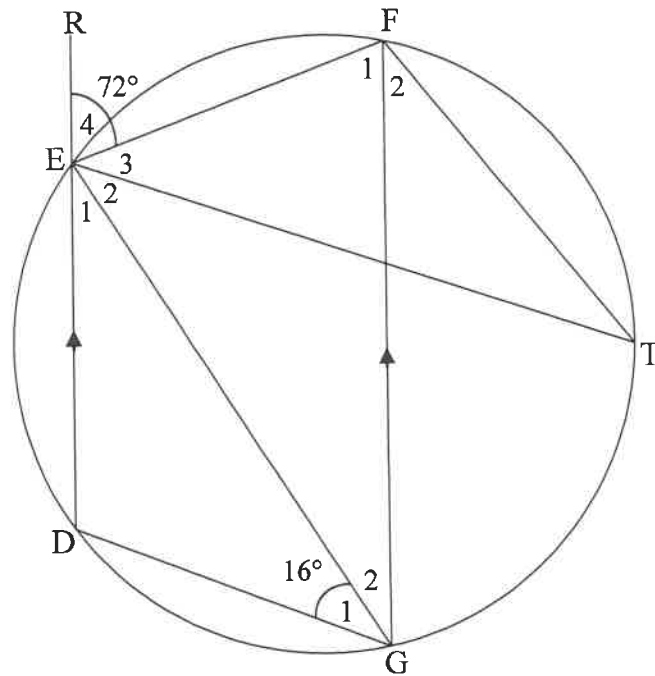
FIGURE II (top view)/FIGUUR II (boeaansig)

	Solution/Oplissing	Marks Punte
8.1		(2)
8.2		(3)
8.3		(3)
		[8]

Give reasons for your statements in QUESTIONS 9 en 10.
 Gee redes vir jou bewerings in VRAAG 9 en 10.

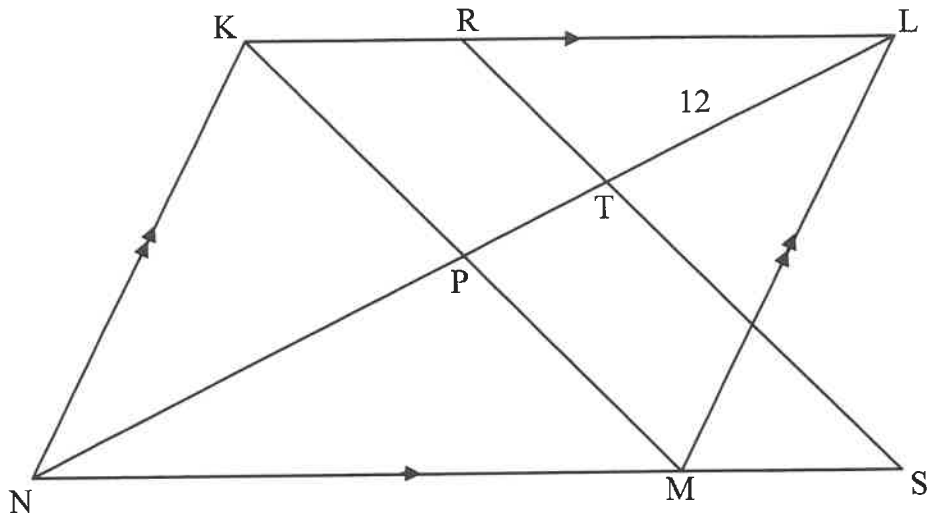
QUESTION/VRAAG 9

9.1



	Solution/Oplissing	Marks Punte
9.1.1		(2)
9.1.2		(2)
9.1.3		(2)

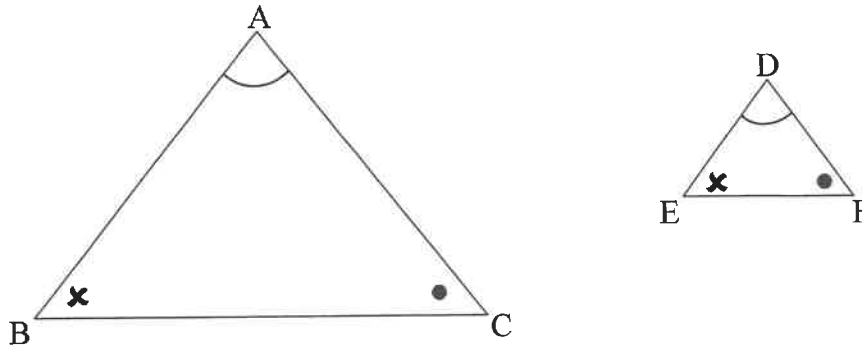
9.2



	Solution/Oplissing	Marks Punte
9.2.1		(4)
9.2.2		(2)
9.2.3		(4)
		[16]

QUESTION/VRAAG 10

10.1



	Solution/Oplissing	Marks Punte
10.1		

(6)

	Solution/Oplissing	Marks Punte
10.2.1(b)		(5)
10.2.2		(1)
10.2.3		(5)
10.2.4		(5)
		[25]



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
SENIORSERTIFIKAAT-EKSAMEN
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

MATHEMATICS P2/WISKUNDE V2

MARKING GUIDELINES/NASIENRIGLYNE

2022

**MARKS: 150
PUNTE: 150**

**These marking guidelines consist of 20 pages./
Hierdie nasienriglyne bestaan uit 20 bladsye.**

NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate has crossed out an attempt at an answer and 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, merk die doodgetrekte poging.
- Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.
- Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.

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

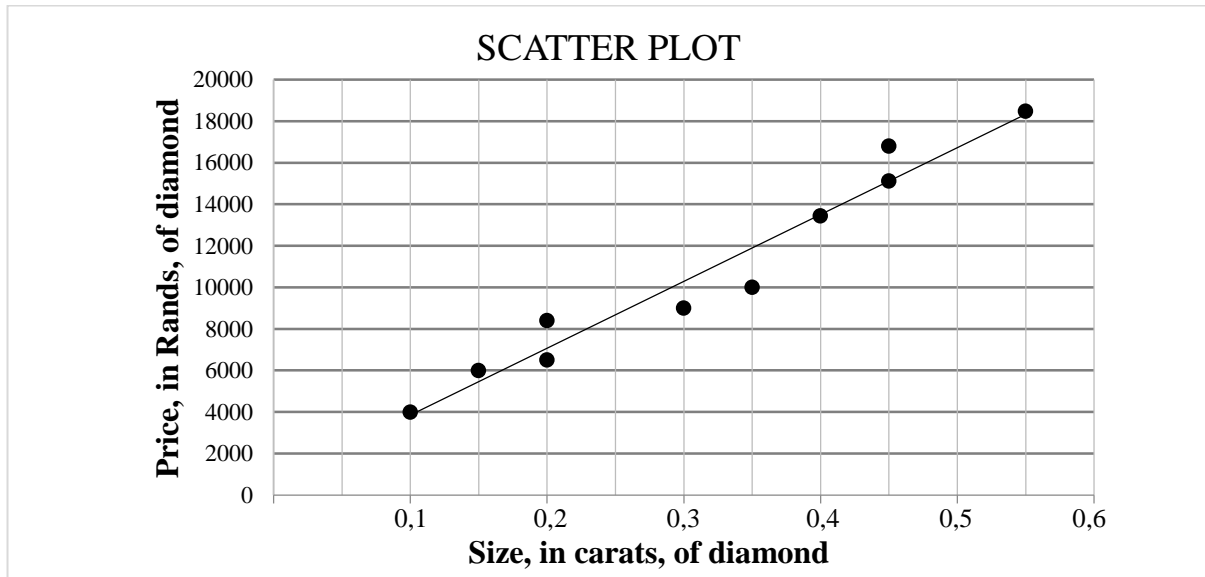
QUESTION/VRAAG 1

1.1	Modal class: $9 < m \leq 11$	✓ answer (1)																								
1.2	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Mass (in kg)</th> <th style="text-align: center;">Frequency</th> <th style="text-align: center;">Cumulative frequency</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$5 < m \leq 7$</td> <td style="text-align: center;">6</td> <td style="text-align: center;">6</td> </tr> <tr> <td style="text-align: center;">$7 < m \leq 9$</td> <td style="text-align: center;">18</td> <td style="text-align: center;">24</td> </tr> <tr> <td style="text-align: center;">$9 < m \leq 11$</td> <td style="text-align: center;">21</td> <td style="text-align: center;">45</td> </tr> <tr> <td style="text-align: center;">$11 < m \leq 13$</td> <td style="text-align: center;">19</td> <td style="text-align: center;">64</td> </tr> <tr> <td style="text-align: center;">$13 < m \leq 15$</td> <td style="text-align: center;">11</td> <td style="text-align: center;">75</td> </tr> <tr> <td style="text-align: center;">$15 < m \leq 17$</td> <td style="text-align: center;">4</td> <td style="text-align: center;">79</td> </tr> <tr> <td style="text-align: center;">$17 < m \leq 19$</td> <td style="text-align: center;">1</td> <td style="text-align: center;">80</td> </tr> </tbody> </table>	Mass (in kg)	Frequency	Cumulative frequency	$5 < m \leq 7$	6	6	$7 < m \leq 9$	18	24	$9 < m \leq 11$	21	45	$11 < m \leq 13$	19	64	$13 < m \leq 15$	11	75	$15 < m \leq 17$	4	79	$17 < m \leq 19$	1	80	✓ adding ✓ 80 (2)
Mass (in kg)	Frequency	Cumulative frequency																								
$5 < m \leq 7$	6	6																								
$7 < m \leq 9$	18	24																								
$9 < m \leq 11$	21	45																								
$11 < m \leq 13$	19	64																								
$13 < m \leq 15$	11	75																								
$15 < m \leq 17$	4	79																								
$17 < m \leq 19$	1	80																								
1.3		✓ grounding (5 ; 0) ✓ points ✓ shape (3)																								
1.4	Median mass: 10,5 kg	✓✓ answer (2)																								
1.5.1	$\bar{x} = \frac{(6 \times 6 + 18 \times 8 + 21 \times 10 + 19 \times 12 + 11 \times 14 + 4 \times 16 + 1 \times 18)}{80}$ $= \frac{854}{80}$ $= 10,68$ <div style="border: 1px solid black; display: inline-block; padding: 2px 10px; margin-top: 10px;">Answer only 2/2</div>	✓ 854 ✓ answer (2)																								
1.5.2	Learners' bags are heavier than the stipulated international guideline. Estimated mean = 10,68 kg 10% of 80 kg = 8 kg 10,68 kg > 8 kg	✓ answer ✓ 8 kg (2)																								

	<p>OR/ OF</p> <p>Learners' bags are heavier than the stipulated international guideline.</p> $\text{Estimated mean} = \frac{10,68}{80} \times 100$ $= 13,35\%$ $13,35\% > 10\%$	<p>✓ answer</p> <p>✓ 13,35%</p> <p>(2)</p>
[12]		

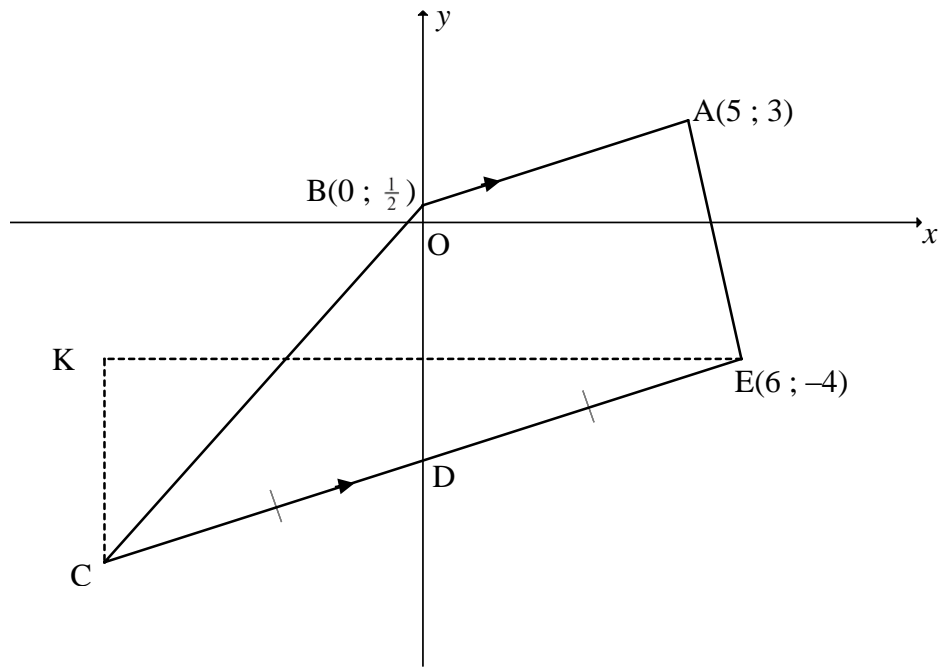
QUESTION/VRAAG 2

Size, in carats, of diamond (x)	0,1	0,15	0,2	0,2	0,3	0,35	0,4	0,45	0,45	0,55
Price, in rands, of diamond (y)	4 000	6 000	6 500	8 400	9 000	10 000	13 440	15 120	16 800	18 480



2.1	$a = 634,382\dots$ $b = 32\,189,263\dots$ $\hat{y} = 634,38 + 32189,26x$	✓ a ✓ b ✓ equation	Answer only 3/3 (3)
2.2	$\hat{y} = 634,38 + 32189,26(0,25)$ $= R8\,681,70$ OR/OF $\hat{y} = R8\,681,70$ (if using calculator)	✓ substitution ✓ answer	(2)
2.3	Average price increase = $R \frac{32189,26}{20}$ per 0,05 carat $= R1\,609,46$ per 0,05 carat OR/OF Average price increase = $0,05 \times 32\,189,26$ $= R1\,609,46$ per 0,05 carat OR/OF at 0,3: $\hat{y} = R10\,291,16$ \therefore Average price increase = $10\,291,16 - 8\,681,70$ $= R1\,609,46$ per 0,05 carat	✓ divide gradient by 20 ✓ answer (2) ✓ multiply gradient by 0,05 ✓ answer (2) ✓ Estimated price of a 0,3 carat diamond ✓ answer (2)	Answer only 2/2 (2)
2.4	The point (0,35 ; 11500) is closer to the least squares regression line.	✓ reason	(1)
			[8]

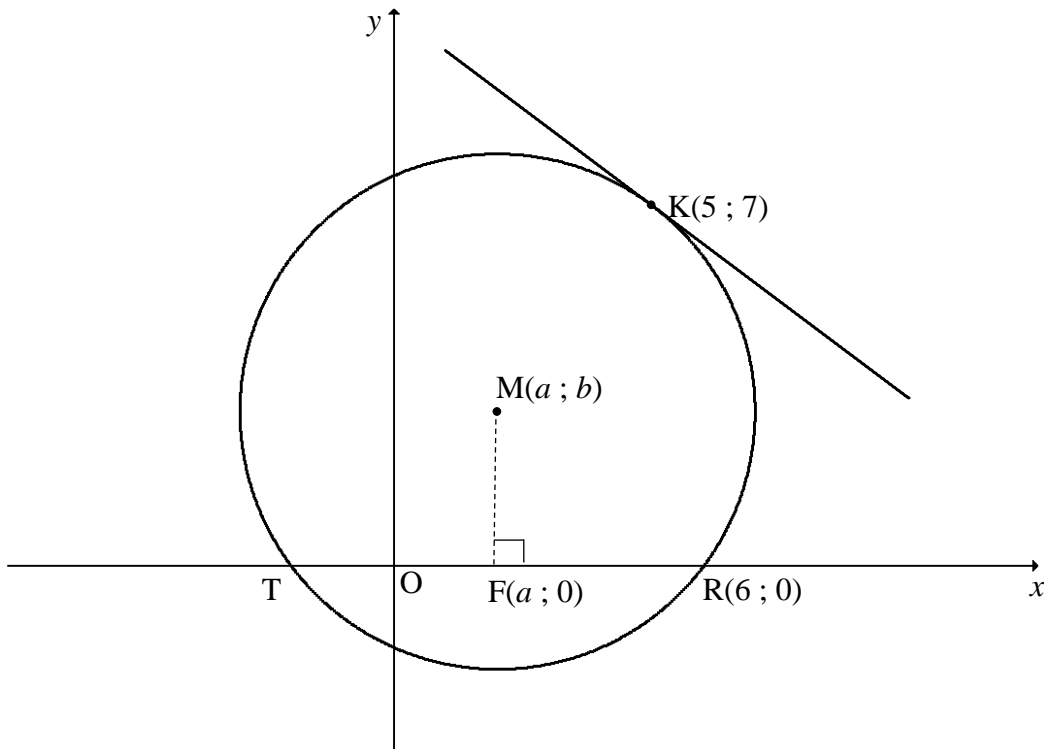
QUESTION/VRAAG 3



<p>3.1</p>	$m_{AB} = \frac{3 - \frac{1}{2}}{5 - 0}$ $m_{AB} = \frac{1}{2}$ <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 100px;">Answer only 2/2</div>	<p>✓ substitution</p> <p>✓ answer</p> <p style="text-align: right;">(2)</p>
<p>3.2</p>	$m_{CE} = m_{BA} = \frac{1}{2}$ $-4 = \frac{1}{2}(6) + c \quad \text{OR/OF} \quad y - (-4) = \frac{1}{2}(x - 6)$ $c = -7$ $y = \frac{1}{2}x - 7$	<p>✓ gradient</p> <p>✓ substitution of E</p> <p>✓ answer</p> <p style="text-align: right;">(3)</p>
<p>3.3.1</p>	<p>D(0 ; -7)</p> $\frac{x_C + 6}{2} = 0 \qquad \frac{y_C + (-4)}{2} = -7$ $x_C = -6 \qquad y_C = -10$ <p>C(-6 ; -10)</p> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 100px;">Answer only 3/3</div>	<p>✓ D(0 ; -7)</p> <p>✓ $x_C = -6$</p> <p>✓ $y_C = -10$</p> <p style="text-align: right;">(3)</p>
<p>3.3.2</p>	$\text{Area } \Delta BCD = \frac{1}{2}(7,5)(6)$ $= 22,5$ $\text{Area } \Delta ABD = \frac{1}{2}(7,5)(5)$ $= 18,75$ $\text{Area ABCD} = 22,5 + 18,75 = 41,25 \text{ units}^2$	<p>✓ subst of correct base and height into the area formula</p> <p>✓ area $\Delta BCD = 22,5$</p> <p>✓ area $\Delta ABD = 18,75$</p> <p>✓ answer</p> <p style="text-align: right;">(4)</p>

3.4.1	K(-6 ; -4)	✓ $x_K = -6$ ✓ $y_K = -4$ (2)
3.4.2a	KC = 6 units; KE = 12 units; $CE = \sqrt{(6)^2 + (12)^2}$ [Pythagoras] $CE = \sqrt{180} = 6\sqrt{5} = 13,42$ Perimeter $\Delta KEC = 6 + 12 + \sqrt{180}$ $= 31,42 \text{ units}$	✓ KC = 6 units ✓ KE = 12 units ✓ CE ✓ answer (4)
3.4.2b	$\tan \hat{KCE} = \frac{KE}{KC} = \frac{12}{6} = 2$ $\hat{KCE} = 63,43^\circ$ <p>OR/OF</p> $\sin \hat{KCE} = \frac{KE}{CE} = \frac{12}{\sqrt{180}} = \frac{2\sqrt{5}}{5}$ $\hat{KCE} = 63,43^\circ$ <p>OR/OF</p> $m_{CE} = \frac{1}{2}$ $\tan \theta = \frac{1}{2}$ $\theta = 26,57^\circ$ $\hat{KCE} = 90^\circ - 26,57^\circ$ $\hat{KCE} = 63,43^\circ$ <p>OR/OF</p> $KE^2 = KC^2 + CE^2 - 2(KC)(CE)\cos\hat{KCE}$ $(12)^2 = (6)^2 + (\sqrt{180})^2 - 2(6)(\sqrt{180})(\cos\hat{KCE})$ $\cos \hat{KCE} = \frac{\sqrt{5}}{5}$ $\hat{KCE} = 63,43^\circ$	✓ trig ratio ✓ $\tan \hat{KCE} = 2$ ✓ answer (3)
		✓ trig ratio ✓ $\sin \hat{KCE} = \frac{12}{\sqrt{180}}$ ✓ answer (3)
		✓ $\tan \theta = \frac{1}{2}$ ✓ $\theta = 26,57^\circ$ ✓ answer (3)
		✓ substitution into cosine rule ✓ trig ratio ✓ answer (3)
		[21]

QUESTION/VRAAG 4

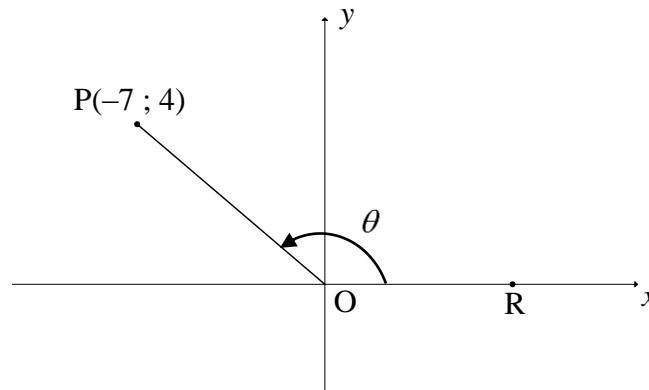


4.1.1	$y = x + 1$ $b = a + 1$	✓ $b = a + 1$ (1)
4.1.2	$MR^2 = MK^2$ $(a - 6)^2 + (b - 0)^2 = (a - 5)^2 + (b - 7)^2$ $(a - 6)^2 + (a + 1)^2 = (a - 5)^2 + (a + 1 - 7)^2$ $a^2 + 2a + 1 = a^2 - 10a + 25$ $12a = 24$ $a = 2$ $b = 3$ $\therefore M(2 ; 3)$	✓ equating radii / solving simultaneously ✓ substitution $b = a + 1$ ✓ $12a = 24$ ✓ $a = 2$ ✓ $b = 3$ (5)
4.2.1	$(6 - 2)^2 + (0 - 3)^2 = r^2$ $r = 5$ OR/OF $(2 - 5)^2 + (3 - 7)^2 = r^2$ $r = 5$	✓ substitution R and M ✓ $r = 5$ (2) ✓ substitution K and M ✓ $r = 5$ (2)

Answer only 2/2

<p>4.2.2</p>	<p>T(-2 ; 0) TR = 8 units [line from centre \perp to chord]</p> <p>OR/OF</p> <p>M(2 ; 3) F(a ; 0) FR = 4 units TR = 8 units [line from centre \perp to chord]</p> <p>OR/OF</p> <p>$(x-2)^2 + (0-3)^2 = 25$ $x^2 - 4x + 4 + 9 = 25$ $x^2 - 4x - 12 = 0$ $(x-6)(x+2) = 0$ $x = 6$ or $x = -2$ TR = 8 units</p> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only 2/2</div>	<p>✓ T(-2 ; 0) ✓ answer (2)</p> <p>✓ 4 units ✓ answer (2)</p> <p>✓ x values ✓ answer (2)</p>
<p>4.3</p>	<p>$m_{\text{radius}} = \frac{7-3}{5-2}$ $m_{\text{radius}} = \frac{4}{3}$ $m_{\text{tangent}} = -\frac{3}{4}$</p> <p>$7 = -\frac{3}{4}(5) + c$ OR/OF $y - 7 = -\frac{3}{4}(x - 5)$ $c = \frac{43}{4}$ $y = -\frac{3}{4}x + \frac{43}{4}$ $y = -\frac{3}{4}x + \frac{43}{4}$</p>	<p>✓ substitution ✓ $m_{\text{radius}} = \frac{4}{3}$ ✓ $m_{\text{tangent}} = -\frac{3}{4}$ ✓ substitution ✓ answer (5)</p>
<p>4.4.1</p>	<p>N(2 ; -2)</p>	<p>✓ $x_N = 2$ ✓ $y_N = -2$ (2)</p>
<p>4.4.2</p>	<p>$(-2-2)^2 + (0+2)^2 = r^2$ $r^2 = 20$ $(x-2)^2 + (y+2)^2 = 20$</p>	<p>✓ substitution ✓ $r^2 = 20$ ✓ answer (3)</p>
		<p>[20]</p>

QUESTION/VRAAG 5



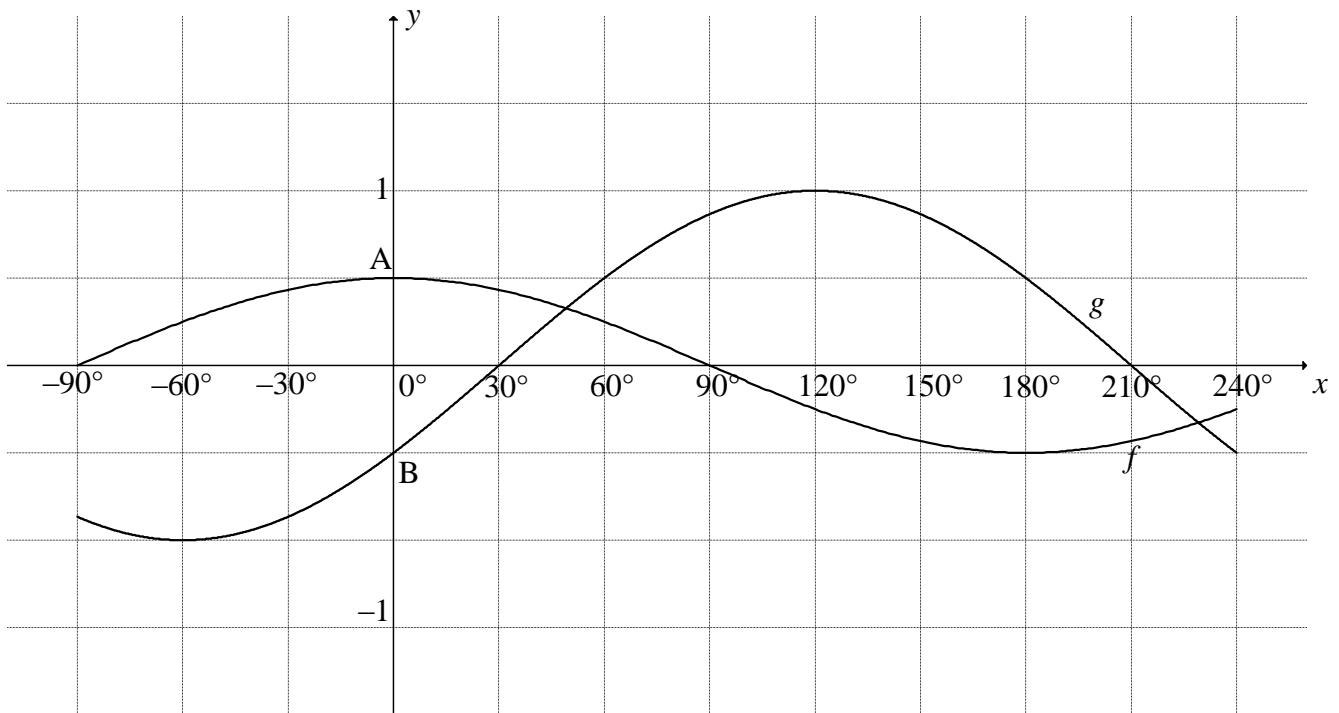
5.1.1	$OP = \sqrt{(-7)^2 + (4)^2}$ $= \sqrt{65}$ <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 200px;">Answer only 2/2</div>	✓ substitution ✓ answer (2)
5.1.2(a)	$\tan \theta = \frac{4}{-7}$	✓ answer (1)
5.1.2(b)	$\cos(\theta - 180^\circ) = -\cos \theta$ $= \frac{7}{\sqrt{65}}$	✓ reduction ✓ answer (2)
5.2	$\sin x \cos x + \sin x = 3 \cos^2 x + 3 \cos x$ $\sin x \cos x + \sin x - 3 \cos^2 x - 3 \cos x = 0$ $\sin x(\cos x + 1) - 3 \cos x(\cos x + 1) = 0$ $(\cos x + 1)(\sin x - 3 \cos x) = 0$ $\cos x = -1 \qquad \text{or} \qquad \sin x = 3 \cos x$ $\qquad \qquad \qquad \tan x = 3$ $x = 180^\circ + k.360^\circ \quad \text{or} \qquad x = 71,57^\circ + k.180^\circ ; k \in Z$ <p>OR/OF</p> $\sin x \cos x + \sin x = 3 \cos^2 x + 3 \cos x$ $\sin x \cos x + \sin x - 3 \cos^2 x - 3 \cos x = 0$ $\sin x(\cos x + 1) - 3 \cos x(\cos x + 1) = 0$ $(\cos x + 1)(\sin x - 3 \cos x) = 0$ $\cos x = -1 \qquad \text{or} \qquad \sin x = 3 \cos x$ $\qquad \qquad \qquad \tan x = 3$ $x = 180^\circ + k.360^\circ \quad \text{or} \qquad x = 71,57^\circ + k.360^\circ \quad \text{or}$ $\qquad \qquad \qquad x = 251,57^\circ + k.360^\circ ; k \in Z$	✓ RHS = 0 ✓ grouping ✓ factors ✓ both equations ✓ $x = 180^\circ$ ✓ $x = 71,57^\circ$ ✓ $+ k.180^\circ ; k \in Z$ (7)

<p>5.3.1</p>	$\begin{aligned} \text{LHS} &= \frac{\sin 3x}{1 - \cos 3x} \times \frac{1 + \cos 3x}{1 + \cos 3x} \\ &= \frac{(\sin 3x)(1 + \cos 3x)}{(1 - \cos 3x)(1 + \cos 3x)} \\ &= \frac{(\sin 3x)(1 + \cos 3x)}{1 - \cos^2 3x} \\ &= \frac{(\sin 3x)(1 + \cos 3x)}{\sin^2 3x} \\ &= \frac{1 + \cos 3x}{\sin 3x} \\ &= \text{RHS} \end{aligned}$ <p>OR/OF</p> $\begin{aligned} \text{LHS} &= \frac{\sin 3x}{1 - \cos 3x} \times \frac{\sin 3x}{\sin 3x} \\ &= \frac{\sin^2 3x}{\sin 3x(1 - \cos 3x)} \\ &= \frac{1 - \cos^2 3x}{\sin 3x(1 - \cos 3x)} \\ &= \frac{(1 - \cos 3x)(1 + \cos 3x)}{\sin 3x(1 - \cos 3x)} \\ &= \frac{1 + \cos 3x}{\sin 3x} \\ &= \text{RHS} \end{aligned}$	<p>✓ multiply by “1”</p> <p>✓ $1 - \cos^2 3x$</p> <p>✓ square identity</p> <p>(3)</p> <p>✓ multiply by “1”</p> <p>✓ square identity</p> <p>✓ factors</p> <p>(3)</p>
<p>5.3.2</p>	<p>undefined when $\sin 3x = 0$ and $1 - \cos 3x = 0$ $3x = 0^\circ$ or $3x = 180^\circ$ and $3x = 0^\circ$ or $3x = 360^\circ$ $x = 0^\circ$ or $x = 60^\circ$</p>	<p>✓ $\sin 3x = 0$ and $1 - \cos 3x = 0$ ✓ 0° ✓ 60°</p> <p>(3)</p>
<p>[18]</p>		

QUESTION/VRAAG 6

<p>6.1</p>	$\frac{\sin 10^\circ}{\cos 440^\circ} + \tan(360^\circ - \theta) \cdot \sin 2\theta$ $= \frac{\cos 80^\circ}{\cos 80^\circ} - \tan \theta (2 \sin \theta \cos \theta)$ $= 1 - \frac{\sin \theta}{\cos \theta} (2 \sin \theta \cos \theta)$ $= 1 - 2 \sin^2 \theta$ $= \cos 2\theta$	<p>✓ $-\tan \theta$ ✓ $\cos 80^\circ$ ✓ co-ratio ✓ double angle</p> <p>✓ quotient identity</p> <p>✓ answer</p> <p>(6)</p>
<p>6.2.1</p>	$\sin(60^\circ + 2x) + \sin(60^\circ - 2x) = k \cos 2x$ $(\sin 60^\circ \cos 2x + \cos 60^\circ \sin 2x) + (\sin 60^\circ \cos 2x - \cos 60^\circ \sin 2x) = k \cos 2x$ $2 \sin 60^\circ \cos 2x = k \cos 2x$ $2 \left(\frac{\sqrt{3}}{2} \right) \cos 2x = k \cos 2x$ $\therefore k = \sqrt{3}$	<p>✓ both expansions correct</p> <p>✓ special \angles</p> <p>✓ answer</p> <p>(3)</p>
<p>6.2.2</p>	$\tan 60^\circ [\sin(60^\circ + 2x) + \sin(60^\circ - 2x)]$ $= \tan 60^\circ [k \cos 2x]$ $= \sqrt{3} (\sqrt{3} \cos 2x)$ $= 3(2 \cos^2 x - 1)$ $= 3(2(\sqrt{t})^2 - 1)$ $= 6(\sqrt{t})^2 - 3$ $= 6t - 3$	<p>✓ special \angle</p> <p>✓ double \angles</p> <p>✓ answer i.t.o t</p> <p>(3)</p>
<p>[12]</p>		

QUESTION/VRAAG 7



7.1	$A\left(0; \frac{1}{2}\right) \quad B\left(0; -\frac{1}{2}\right)$ $AB = \frac{1}{2} - \left(-\frac{1}{2}\right)$ $= 1 \text{ unit}$	✓ y-values ✓ answer Answer only 2/2 (2)
7.2	Range of $f: y \in \left[-\frac{1}{2}; \frac{1}{2}\right]$ Range of $3f(x) + 2: y \in \left[\frac{1}{2}; 3\frac{1}{2}\right]$ OR/OF $\frac{1}{2} \leq y \leq 3\frac{1}{2}$	✓ critical values ✓ answer (2)
7.3	$x = 90^\circ$	✓✓ $x = 90^\circ$ (2)
7.4.1	$x \in (30^\circ; 90^\circ) \cup (210^\circ; 240^\circ]$ OR/OF $30^\circ < x < 90^\circ$ or $210^\circ < x \leq 240^\circ$	✓ $x \in (30^\circ; 90^\circ)$ ✓ $(210^\circ; 240^\circ]$ ✓ $30^\circ < x < 90^\circ$ ✓ $210^\circ < x \leq 240^\circ$ (2)
7.4.2	$x \in (-55^\circ; 125^\circ)$ OR/OF $-55^\circ < x < 125^\circ$	✓ critical values ✓ answer ✓ critical values ✓ answer (2)

[10]

QUESTION/VRAAG 8

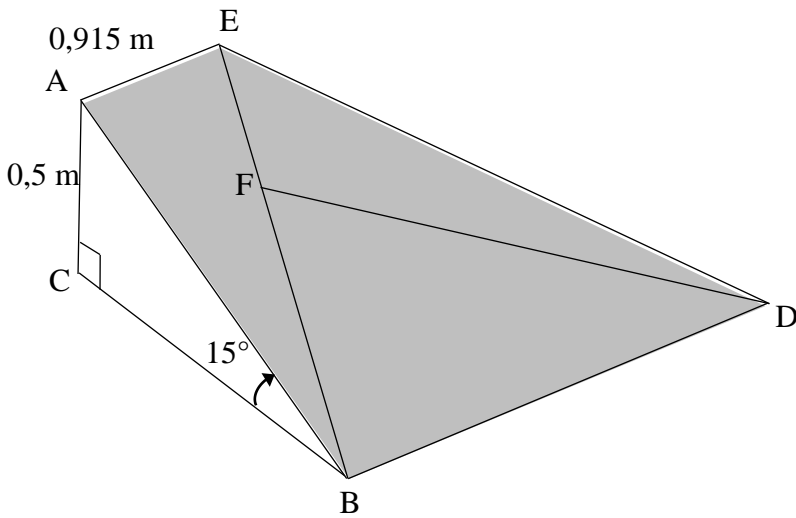


FIGURE I

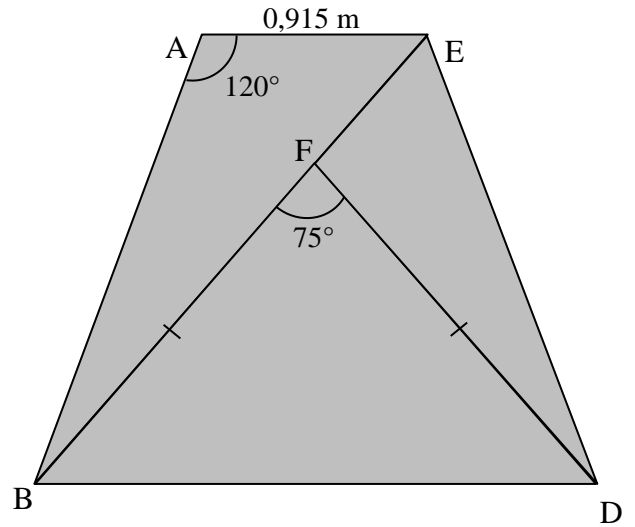
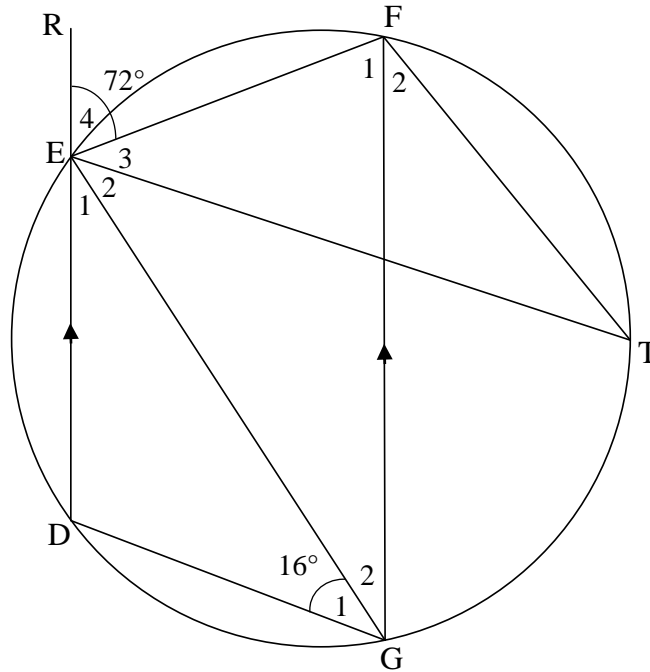


FIGURE II (top view)

8.1	$\frac{0,5}{AB} = \sin 15^\circ$ $AB = \frac{0,5}{\sin 15^\circ}$ $AB = 1,93 \text{ m}$ <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 200px;">Answer only 2/2</div>	✓ trig ratio ✓ answer <div style="text-align: right;">(2)</div>
8.2	$BE^2 = AB^2 + AE^2 - 2(AB)(AE)\cos \hat{BAE}$ $BE^2 = (1,93)^2 + (0,915)^2 - 2(1,93)(0,915)(\cos 120^\circ)$ $BE = 2,52 \text{ m}$	✓ correct use of cosine rule ✓ substitution ✓ answer <div style="text-align: right;">(3)</div>
8.3	$BF = FD = \frac{5}{7}(2,52) = 1,80 \text{ m}$ $\text{Area } \triangle BFD = \frac{1}{2}(BF)(FD)\sin \hat{BFD}$ $= \frac{1}{2}(1,8)(1,8)(\sin 75^\circ)$ $= 1,56 \text{ m}^2$	✓ BF ✓ correct substitution into the area rule ✓ answer <div style="text-align: right;">(3)</div>
[8]		

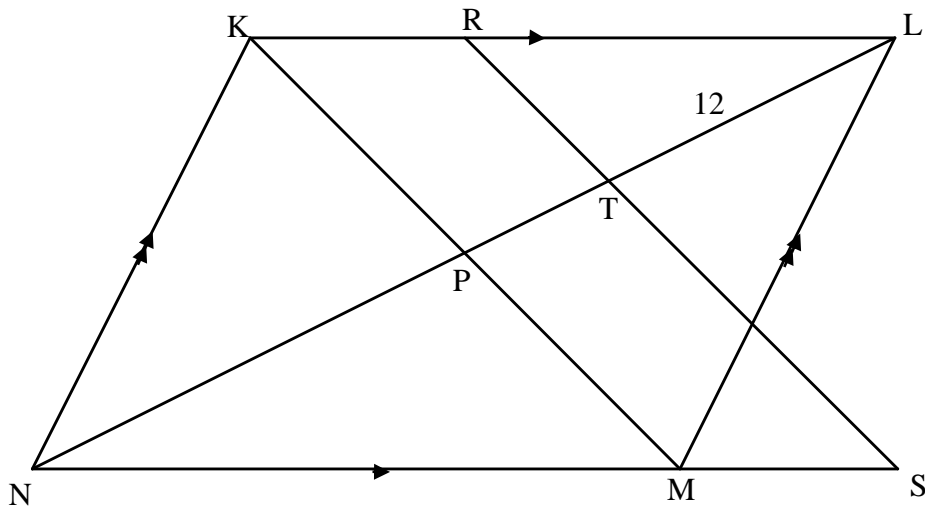
QUESTION/VRAAG 9

9.1



9.1.1	$\hat{DGF} = \hat{E}_4 = 72^\circ$ [ext \angle of cyclic quad/ <i>buite \angle v kvh</i>]	✓ S ✓ R (2)
9.1.2	$\hat{G}_2 = 72^\circ - 16^\circ = 56^\circ$ $\hat{T} = \hat{G}_2 = 56^\circ$ [\angle s in the same seg/ \angle e in dies. \odot segment]	✓ S ✓ S / R (2)
9.1.3	$\hat{F}_1 = \hat{E}_4 = 72^\circ$ [alt \angle s; DE \parallel GF / <i>verw. \anglee; DE \parallel GF</i>] $\therefore \hat{GEF} = 52^\circ$ [sum of \angle s in Δ / \angle e van Δ] OR/OF $\hat{E}_1 = 56^\circ$ [alt \angle s; DE \parallel GF / <i>verw. \anglee; DE \parallel GF</i>] $\therefore \hat{GEF} = 52^\circ$ [\angle s on a str. line/ \angle e op 'n reguitlyn]	✓ S / R ✓ S (2) ✓ S / R ✓ S (2)

9.2

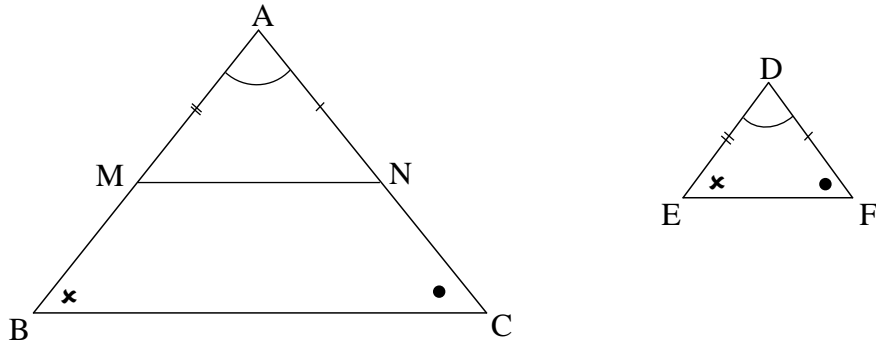


<p>9.2.1</p>	<p>NP = PL = 16 [diag of $\parallel m$ / hoeklyne van $\parallel m$] PT = 4 NP : PT = 16 : 4 = 4 : 1</p>	<p>✓ S ✓ R ✓ S ✓ answer (4)</p>
<p>9.2.2</p>	<p>NM : MS = 4 : 1 NP : PT = NM : MS KM \parallel RS [line divides two sides of Δ in prop / Lyn verdeel 2 sye v Δ eweredig] OR/OF [converse prop theorem / omgekeerde lyn \parallel een sy v Δ]</p>	<p>✓ S ✓ R (2)</p>
<p>9.2.3</p>	<p>$\frac{RL}{KL} = \frac{TL}{LP}$ [prop theorem; KM \parallel RS OR line \parallel one side of Δ / Lyn \parallel een sy v Δ] $RL = \frac{12 \times 21}{16}$ = 15,75</p>	<p>✓ S ✓ R ✓ S ✓ answer (4)</p>

	<p>OR / OF</p> <p>NM : MS = 4 : 1</p> <p>KR = MS = 5,25 [opp side of \parallel^m / teenoorst. sye van \parallel^m]</p> <p>KL = NM = 21</p> <p>RL + 5,25 = 21</p> <p>RL = 15,75</p>	<p>✓ S ✓ R</p> <p>✓ S</p> <p>✓ answer</p> <p>(4)</p>
[16]		

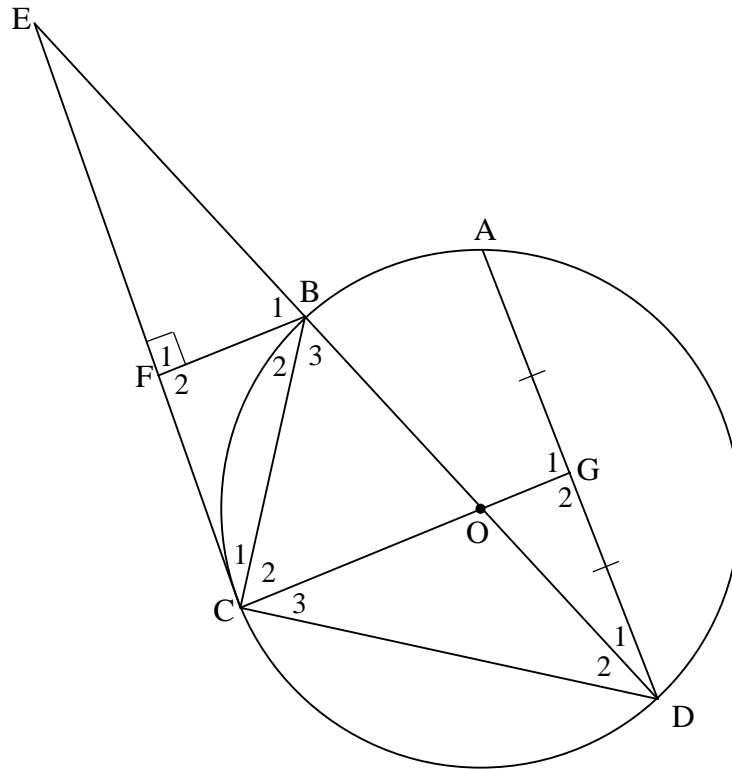
QUESTION/VRAAG 10

10.1



<p>10.1</p>	<p>Constr: Let M and N lie on AB and AC respectively such that AM = DE and AN = DF. Draw MN.</p> <p>Proof: In $\triangle AMN$ and $\triangle DEF$</p> <p>AM = DE [Constr / <i>Konstruksie</i>] AN = DF [Constr / <i>Konstruksie</i>] $\hat{A} = \hat{D}$ [Given / <i>Gegee</i>] $\therefore \triangle AMN \cong \triangle DEF$ [<i>s, \angle, s</i>] $\therefore \hat{AMN} = \hat{E} = \hat{B}$ MN \parallel BC [corresp \angle's are equal/ <i>ooreenk. \angle e gelyk</i>] $\frac{AB}{AM} = \frac{AC}{AN}$ [line \parallel one side of \triangle OR/OF prop theorem; MN \parallel BC / <i>Lyn \parallel een sy v \triangle</i>] $\therefore \frac{AB}{DE} = \frac{AC}{DF}$ [AM=DE and AN=DF]</p>	<p>✓Constr</p> <p>✓S ✓R</p> <p>✓S /R</p> <p>✓S ✓R</p> <p>(6)</p>
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10.2



<p>10.2.1(a)</p>	<p>$\hat{F}\hat{C}O = 90^\circ$ [tan \perp radius / raaklyn \perp radius] $\hat{F}_1 = 90^\circ$ [BF \perp EC] $\therefore \hat{F}\hat{C}O = \hat{F}_1 = 90^\circ$ FB \parallel CG [corresp \angles = / ooreenk. \angle gelyk]</p>	<p>\checkmark S / R \checkmark S \checkmark R (3)</p>
<p>10.2.1(b)</p>	<p>In $\triangle FCB$ and $\triangle CDB$ $\hat{B}\hat{C}D = 90^\circ$ [\angle in semi-circle / $\angle \frac{1}{2} \odot$] $\hat{F}_2 = 90^\circ$ [BF \perp EC] $\therefore \hat{F}_2 = \hat{B}\hat{C}D = 90^\circ$ $\hat{C}_1 = \hat{D}_2$ [tan chord theorem / \angle tussen rkl en koord] $\hat{B}_2 = \hat{B}_3$ [sum of \angles in Δ / \anglee van Δ] $\therefore \triangle FCB \parallel \triangle CDB$ OR/OF In $\triangle FCB$ and $\triangle CDB$ $\hat{B}\hat{C}D = 90^\circ$ [\angle in semi-circle / $\angle \frac{1}{2} \odot$] $\hat{F}_2 = 90^\circ$ [BF \perp EC] $\therefore \hat{F}_2 = \hat{B}\hat{C}D = 90^\circ$ $\hat{C}_1 = \hat{D}_2$ [tan chord theorem / \angle tussen rkl en koord] $\therefore \triangle FCB \parallel \triangle CDB$ [\angle, \angle, \angle]</p>	<p>\checkmark S / R \checkmark S \checkmark S \checkmark R \checkmark S \checkmark S / R \checkmark S \checkmark S \checkmark R \checkmark R (5)</p>

10.2.2	$\hat{G}_1 = 90^\circ$ [line from centre to midpt of chord / midpt. \odot ; midpt. koord]	✓ R (1)
10.2.3	In ΔGCD and ΔCDB $\hat{G}_2 = \hat{B}CD = 90^\circ$ $\hat{C}_3 = \hat{D}_2$ [∠s opp equal sides / ∠e teenoor gelyke sye] $G\hat{D}C = \hat{B}_3$ [sum of ∠s in Δ / ∠e van Δ] $\therefore \Delta GCD \parallel \Delta CDB$ [∠,∠,∠] $\therefore \frac{CD}{DB} = \frac{CG}{CD}$ [∥ ∆s] $\therefore CD^2 = CG \cdot DB$	✓ identifying Δ s ✓ S ✓ S / R ✓ S OR ✓ R ✓ S (5)
10.2.4	$\frac{BC}{DB} = \frac{FB}{BC}$ [$\Delta FCB \parallel \Delta CDB$] $\therefore BC^2 = DB \cdot FB$ $CD^2 + BC^2 = CG \cdot DB + DB \cdot FB$ $DB^2 = DB(CG + FB)$ $DB = CG + FB$	✓ S ✓ R ✓ S ✓ sum ✓ $DB^2 = CD^2 + BC^2$ (5)
		[25]

TOTAL/TOTAAL: 150