basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIORSERTIFIKAAT-EKSAMEN

WISKUNDE V2

2017

PUNTE: 150

TYD: 3 uur

Hierdie vraestel bestaan uit 13 bladsye, 1 inligtingsblad en 'n antwoordeboek van 27 bladsye.

INSTRUKSIES EN INLIGTING

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

1. Hierdie vraestel bestaan uit 11 vrae.
2. Beantwoord AL die vrae in die ANTWOORDEBOEK wat verskaf word.
3. Dui ALLE berekeninge, diagramme, grafieke ensovoorts wat jy in die beantwoording van die vrae gebruik duidelik aan.
4. Antwoorde alleenlik sal nie noodwendig volpunte verdien nie.
5. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, 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

'n IT-maatskappy skryf programme vir toeps ('apps'). Die tyd (in uur) wat dit neem om die programme te skryf en die koste (in duisende rand) daarvan word in die tabel hieronder getoon.

TYD GENEEM (IN UUR)	5	7	5	8	10	13	15	20	18	25	23
KOSTE (IN DUISENDE RAND)	10	10	15	12	20	25	28	32	28	40	30

1.1 Bepaal die vergelyking van die kleinstekwadrate-regressielyn. (3)

1.2 Gebruik die vergelyking van die kleinstekwadrate-regressielyn om die koste, in rand, van 'n toep wat 16 uur sal neem om te skryf, te voorspel. (2)

1.3 Bereken die korrelasiekoëffisiënt van die data. (1)

1.4 Vir elke toep wat die maatskappy skryf, is daar 'n koste wat onafhanklik is van die aantal uur wat dit neem om die toep te skryf. Bereken hierdie koste (in rand). (2)

[8]

VRAAG 2

Die kommissie, in duisende rand, wat die verkoopmense van 'n sekere maatskappy in 'n sekere maand verdien, word in die tabel hieronder getoon.

KOMMISSIE VERDIEN (IN DUISENDE RAND)	**FREKWENSIE**
$20 < x \leq 40$	7
$40 < x \leq 60$	6
$60 < x \leq 80$	8
$80 < x \leq 100$	10
$100 < x \leq 120$	4

2.1 Skryf die modale klas van die data neer. (1)

2.2 Voltooi die kumulatiewefrekwensie-kolom in die tabel wat in die ANTWOORDEBOEK gegee word. (2)

2.3 Skets 'n ogief (kumulatiewefrekwensie-kromme) om die data voor te stel op die rooster wat in die ANTWOORDEBOEK gegee word. (4)

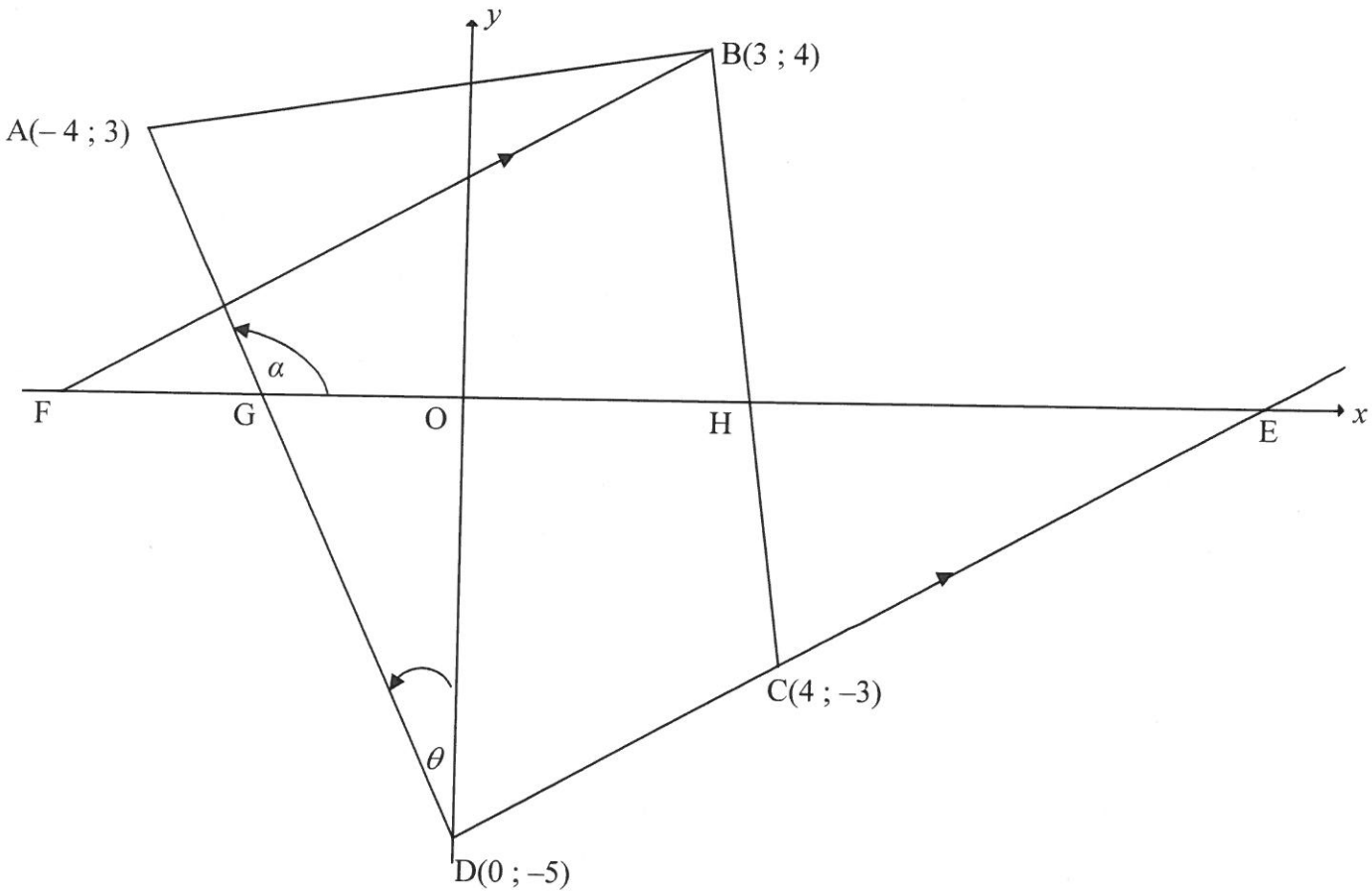
2.4 'n Verkoopsman ontvang 'n bonus as sy kommissie vir die maand meer as R90 000 is. Bereken hoeveel verkoopsmense vir hierdie maand bonusse ontvang het. (2)

2.5 Bepaal die benaderde gemiddelde kommissie wat die verkoopsmense vir hierdie maand verdien het, korrek tot die naaste duisend rand. (3)

[12]

VRAAG 3

In die diagram is ABCD 'n vierhoek met hoekpunte A(– 4 ; 3), B(3 ; 4), C(4 ; –3) en D(0 ; –5). DC verleng sny die x-as by E, BC sny die x-as by H en AD sny die x-as by G. F is 'n punt op die x-as sodanig dat BF || DE. $A\hat{G}O = \alpha$ en $A\hat{D}O = \theta$.



3.1 Bereken die gradiënt van DC. (2)

3.2 Bewys dat AD ⊥ DC. (3)

3.3 Toon, met berekeninge, dat ΔABC 'n gelykbenige driehoek is. (4)

3.4 Bepaal die vergelyking van BF in die vorm $y = mx + c$. (3)

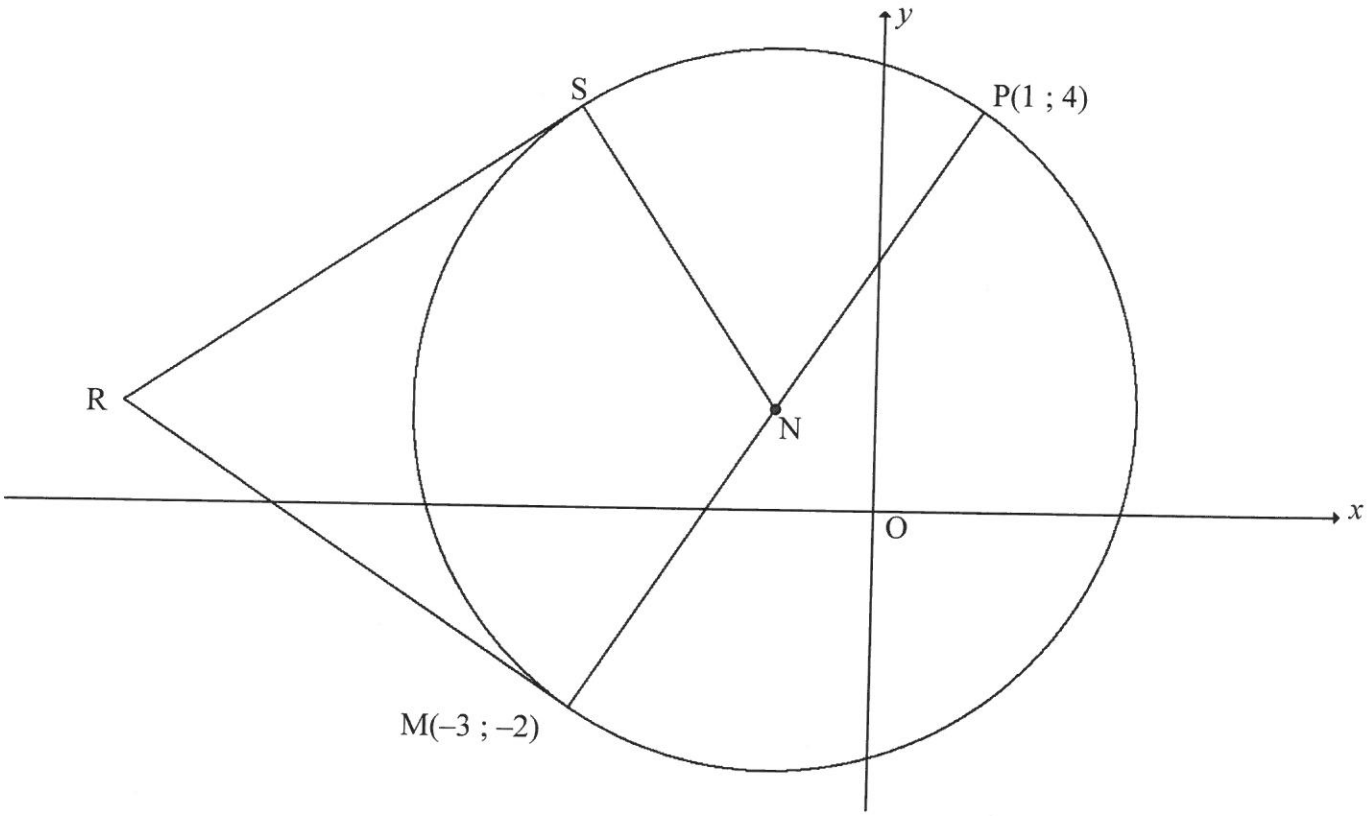
3.5 Bereken die grootte van θ. (3)

3.6 Bepaal die vergelyking van die sirkel, met die middelpunt as die oorsprong en wat deur die punt C gaan, in die vorm $x^2 + y^2 = r^2$. (2)

[17]

VRAAG 4

In die diagram is N die middelpunt van die sirkel. M(–3 ; –2) en P(1 ; 4) is punte op die sirkel. MNP is die middellyn van die sirkel. Die raaklyne wat vanaf punt R, buite die sirkel, na sirkel N getrek word, ontmoet die sirkel onderskeidelik by S en M.



4.1 Bepaal die koördinate van N. (3)

4.2 Bepaal die vergelyking van die sirkel in die vorm $(x-a)^2+(y-b)^2=r^2$. (4)

4.3 Bepaal die vergelyking van die raaklyn RM in die vorm $y = mx + c$. (5)

4.4 As dit gegee word dat die lyn wat S met M verbind, loodreg op die x-as is, bepaal die koördinate van S. (2)

4.5 Bepaal die koördinate van R, die gemeenskaplike uitwendige punt waarvandaan beide die raaklyne aan die sirkel getrek is. (4)

4.6 Bereken die oppervlakte van RSNM. (4)

[22]

VRAAG 5

5.1 Gegee: $\sin A = 2p$ en $\cos A = p$

5.1.1 Bepaal die waarde van $\tan A$. (2)

5.1.2 **Sonder die gebruik van 'n sakrekenaar**, bepaal die waarde van p, as $A \in [180° ; 270°]$. (3)

5.2 Bepaal die algemene oplossing van $2\sin^2 x - 5\sin x + 2 = 0$ (6)

5.3 5.3.1 Brei $\sin(x + 300°)$ uit deur 'n toepaslike saamgesteldehoek-formule te gebruik. (1)

5.3.2 **Sonder die gebruik van 'n sakrekenaar**, bepaal die waarde van $\sin(x + 300°) - \cos(x - 150°)$. (5)

5.4 Bewys die identiteit: $\dfrac{\tan x + 1}{\sin x \tan x + \cos x} = \sin x + \cos x.$ (5)

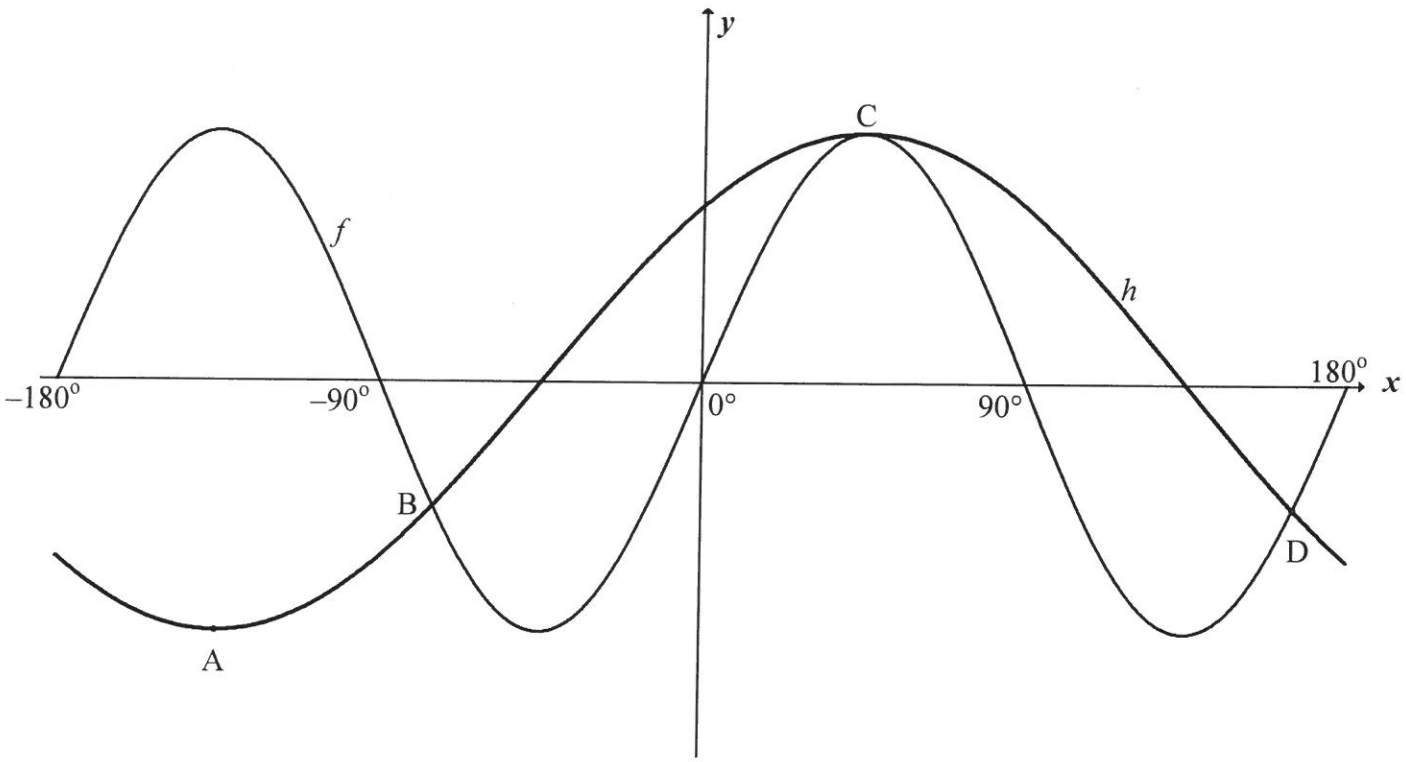
5.5 Beskou: $\sin x + \cos x = \sqrt{1 + k}$

5.5.1 Bepaal k as 'n enkele trigonometriese verhouding. (3)

5.5.2 Bepaal vervolgens die maksimum waarde van $\sin x + \cos x$. (2)
[27]

VRAAG 6

In die diagram is die grafieke van $f(x)=\sin 2x$ en $h(x)=\cos(x-45°)$ vir die interval $x\in[-180°\ ;\ 180°]$. A$(-135°\ ;\ -1)$ is 'n minimum punt op grafiek h en C$(45°\ ;\ 1)$ is 'n maksimum punt op beide grafieke. Die twee grafieke sny by B, C en D$\left(165°;-\frac{1}{2}\right)$.



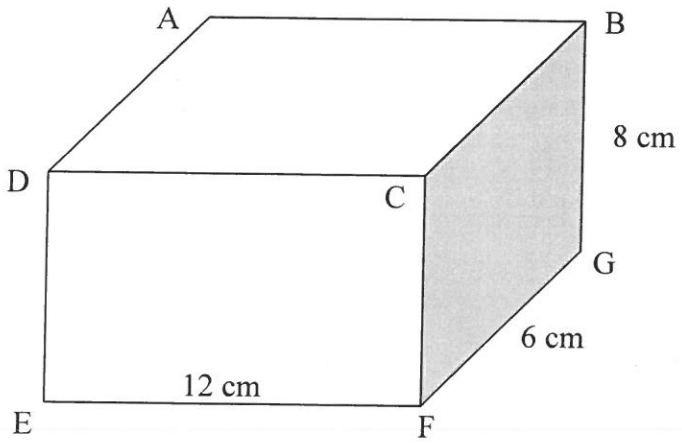
6.1 Skryf die periode van f neer. (1)

6.2 Bepaal die x-koördinaat van B. (1)

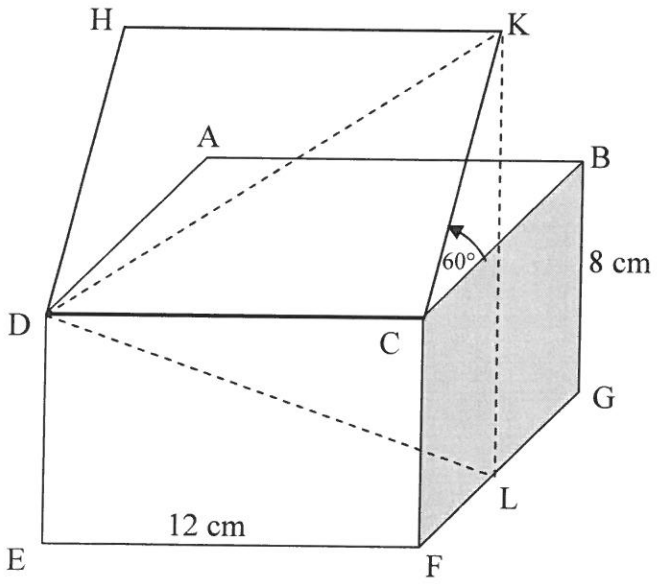
6.3 Gebruik die grafieke om $2\sin x.\cos x\le\frac{1}{\sqrt{2}}(\cos x+\sin x)$ vir die interval $x\in[-180°\ ;\ 180°]$ op te los. Toon ALLE bewerkings. (4)
[6]

VRAAG 7

'n Reghoekige boks met 'n deksel ABCD word in Figuur (i) hieronder gegee. Die deksel word met 'n hoek van 60° oopgemaak tot by posisie HKCD, soos in die FIGUUR (ii) hieronder getoon. EF = 12 cm, FG = 6 cm en BG = 8 cm.



FIGUUR (I)



FIGUUR (II)

7.1 Skryf die lengte van KC neer. (1)

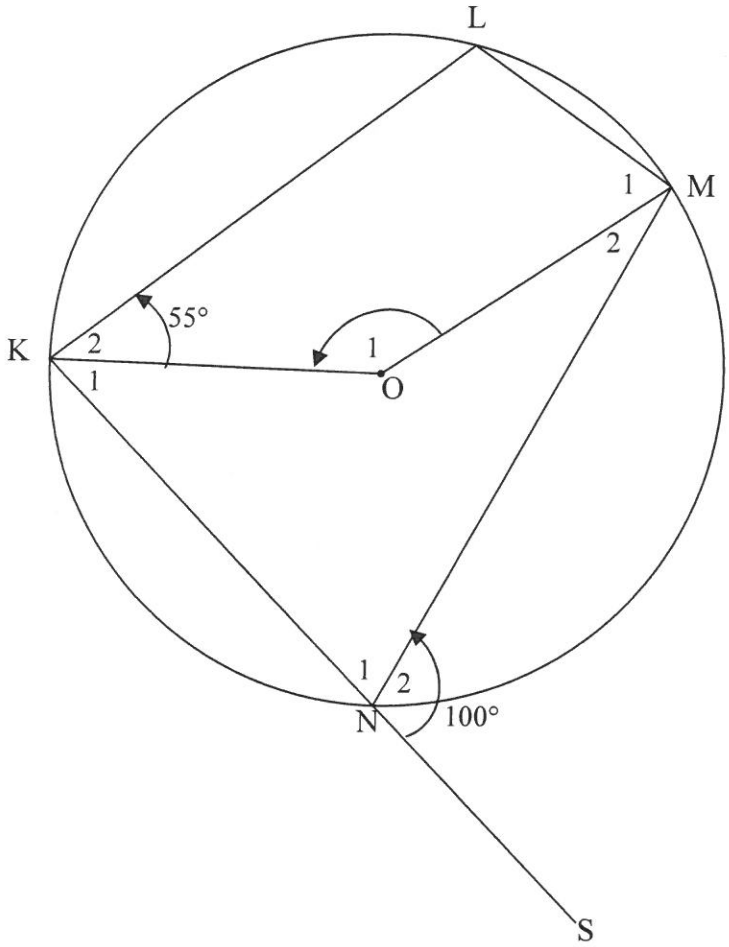
7.2 Bepaal KL, die loodregte hoogte van K, bokant die basis van die boks. (3)

7.3 Bepaal vervolgens die waarde van $\frac{\sin K\hat{D}L}{\sin D\hat{L}K}$. (4)

[8]

VRAAG 8

In die diagram is O die middelpunt van sirkel KLMN en KO en OM is verbind. Koord KN is verleng na S. $\hat{K}_2 = 55°$ en $\hat{N}_2 = 100°$.



Bepaal, met redes, die grootte van die volgende:

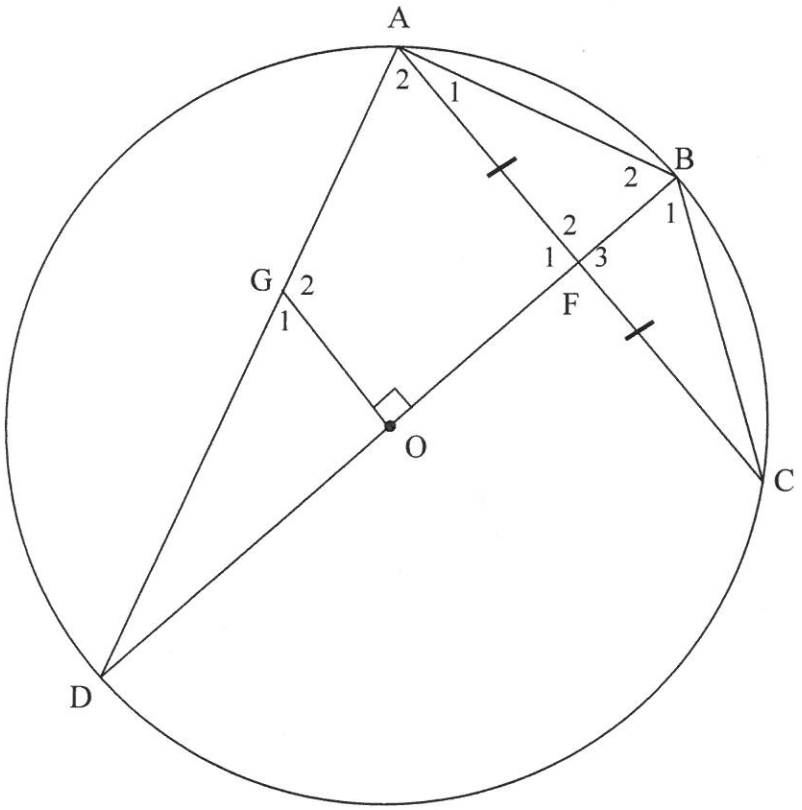
8.1 $\hat{L}$ (2)

8.2 $\hat{O}_1$ (3)

8.3 $\hat{M}_1$ (2)
[7]

VRAAG 9

In die diagram is O die middelpunt van sirkel ABCD en BOD is 'n middellyn. F, die middelpunt van koord AC, lê op BOD. G is 'n punt op AD sodat GO⊥DB.



9.1 Gee 'n rede waarom:

9.1.1 $D\hat{A}B = 90°$ (1)

9.1.2 AGOB 'n koordevierhoek is (1)

9.2 Bewys dat:

9.2.1 AC || GO (3)

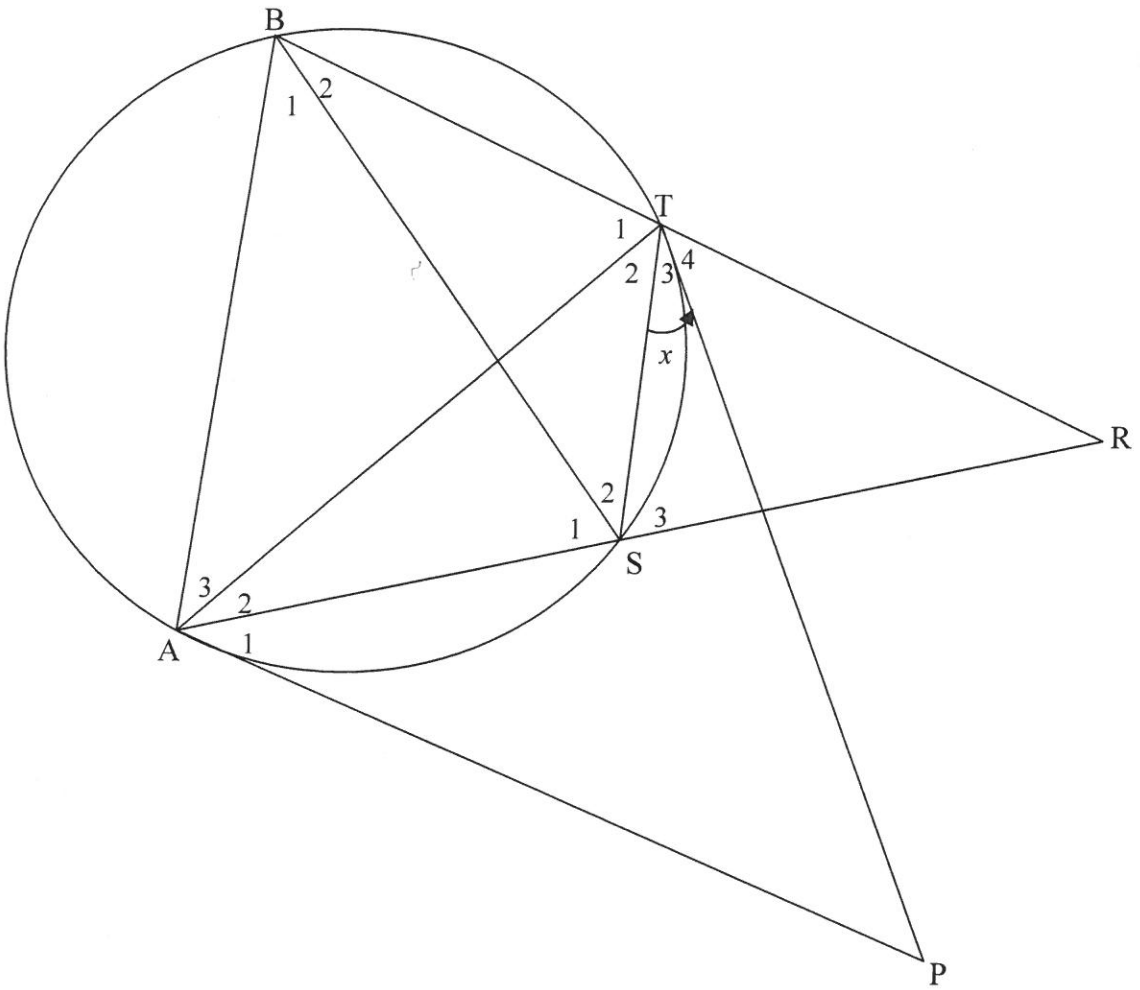
9.2.2 $\hat{G}_1 = \hat{B}_1$ (4)

9.3 As gegee word dat $FB = \frac{2}{5}r$, waar r die radius van die sirkel is, bepaal, met redes, die verhouding van $\frac{DG}{DA}$. (3)

[12]

VRAAG 10

In die diagram is PA en PT raaklyne aan die sirkel by A en T onderskeidelik. B en S is punte op die sirkel sodat BT verleng en AS verleng by R ontmoet en BR = AR. BS, AT en TS word getrek. $\hat{T}_3 = x$.



10.1 Gee 'n rede waarom $\hat{T}_3 = \hat{A}_2 = x$. (1)

10.2 Bewys dat:

10.2.1 AB || ST (5)

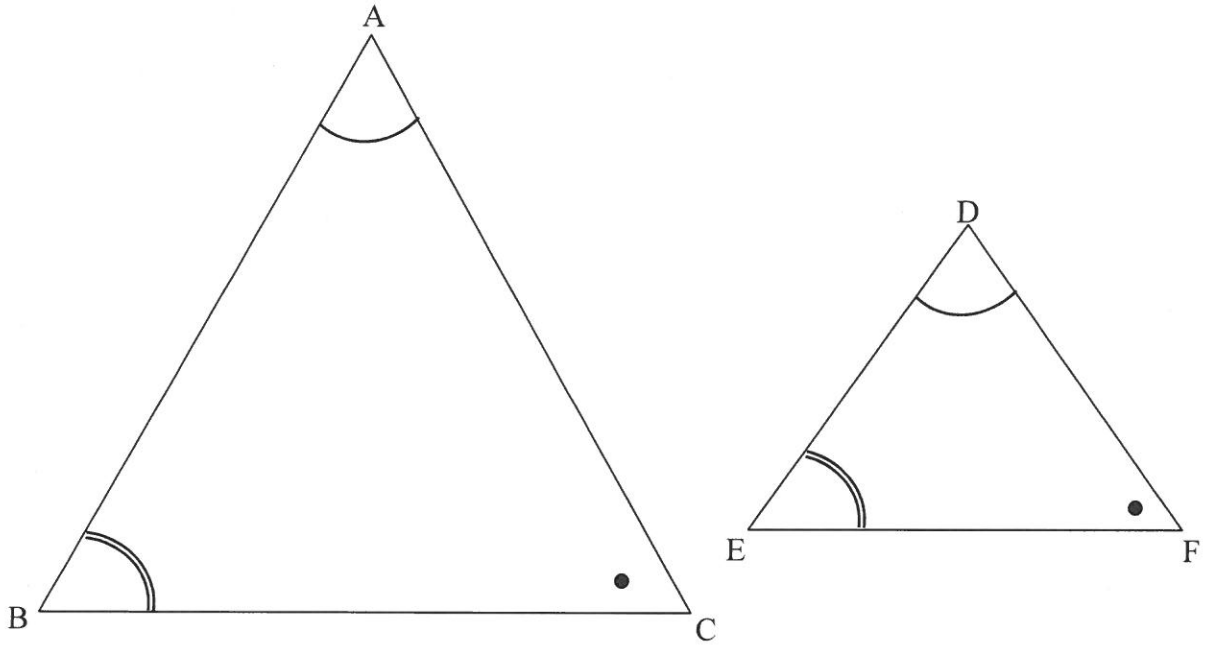
10.2.2 $\hat{T}_4 = \hat{A}_1$ (5)

10.2.3 RTAP 'n koordevierhoek is (2)

[13]

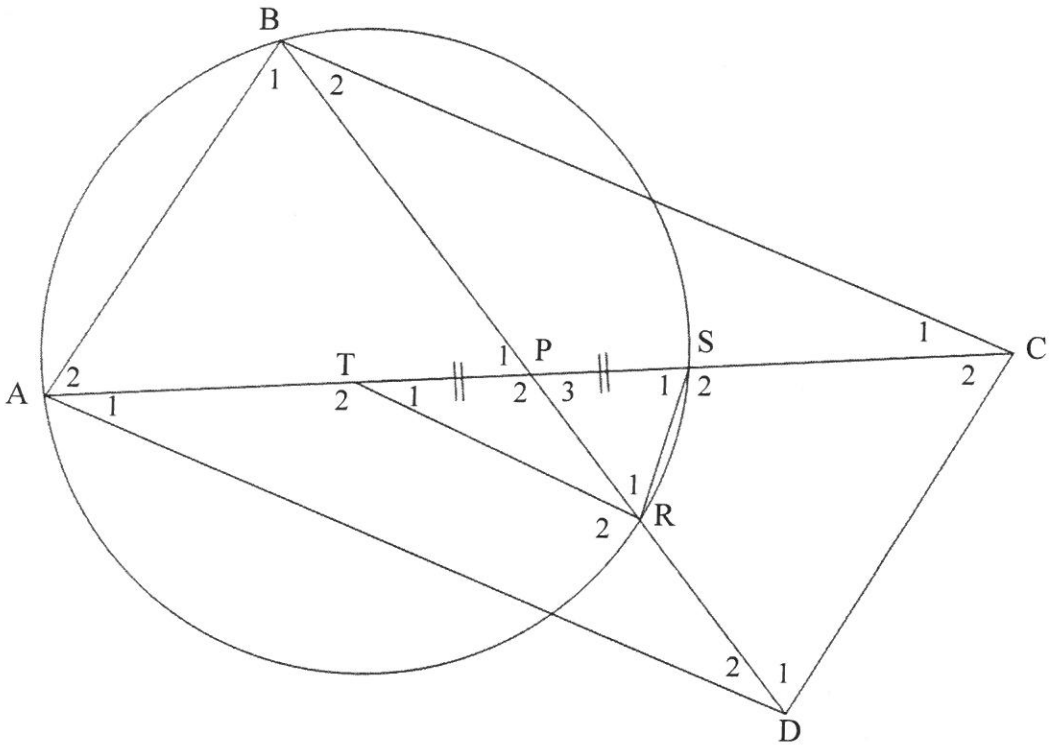
VRAAG 11

11.1 In die diagram is ΔABC en ΔDEF geskets met $\hat{A} = \hat{D}$, $\hat{B} = \hat{E}$ en $\hat{C} = \hat{F}$.



Bewys die stelling wat beweer dat as twee driehoeke, ΔABC en ΔDEF, gelykhoekig is, dan is $\frac{DE}{AB} = \frac{DF}{AC}$. (6)

11.2 In die diagram is ABCD 'n parallelogram met A en B op die sirkel. Die hoeklyne BD en AC sny by P. PC en PD sny die sirkel by S en R onderskeidelik. T is 'n punt op AP sodat TP = PS. TR word geteken/getrek.



11.2.1 Bewys dat:

(a) AT = SC (2)

(b) ΔPSR ||| ΔPBA (5)

11.2.2 As verder gegee word dat $\frac{PR}{PA} = \frac{TR}{AD}$, bewys dat:

(a) ΔRPT ||| ΔAPD (3)

(b) ATRD 'n koordevierhoek is (2)

[18]

TOTAAL: 150

INLIGTINGSBLAD

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

$$A = P(1 + ni) \qquad A = P(1 - ni) \qquad A = P(1 - i)^n \qquad A = P(1 + i)^n$$

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

$$T_n = ar^{n-1} \qquad S_n = \frac{a(r^n - 1)}{r - 1} \;;\; r \neq 1 \qquad S_\infty = \frac{a}{1 - r} \;;\; -1 < r < 1$$

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

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

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \mathrm{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

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

In ΔABC:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

$$\text{oppervlakte } \Delta ABC = \frac{1}{2}ab.\sin C$$

$$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta \qquad \sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$$

$$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta \qquad \cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$$

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

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

$$\mathrm{P(A)} = \frac{n(\mathrm{A})}{n(\mathrm{S})} \qquad \mathrm{P(A\ of\ B) = P(A) + P(B) - P(A\ en\ B)}$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$

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Candidate Barcode Sticker/*Kandidaat-stafiekodeplakker*

SENIOR CERTIFICATE EXAMINATIONS/ *SENIORSERTIFIKAAT-EKSAMEN*

MATHEMATICS P2/*WISKUNDE V2*

ANSWER BOOK/*ANTWOORDEBOEK*

Sequence No. on mark sheet
Volgnommer op puntestaat

CENTRE NUMBER *SENTRUMNOMMER*													
EXAMINATION NUMBER *EKSAMENNOMMER*													
DATE *DATUM*									**BOOK NUMBER** *BOEKNOMMER*		**OF** *VAN*		**BOOKS** *BOEKE*
SUBJECT CODE *VAKKODE*													

MARKER/*NASIENER*					**MODERATOR'S INITIALS IN RELEVANT BLOCK** *MODERATORPARAAF IN BETROKKE BLOKKIE*					
Question *Vraag*	**Marks** *Punte*			**Marker's Code and Initials** *Nasienerkode en -paraaf*	**Marks** *Punte*			**SM**	**DCM**	**CM**	**IM**	**EM**
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RE-MARK/RE-CHECK *HERNASIEN/HERKONTROLEER*			
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TOTAL *TOTAAL*				
HASH TOTAL *KAFTOTAAL*				

CONTROLLED AND CERTIFIED AS CORRECT (SURNAME AND INITIALS OF EA) *GEKONTROLEER EN AS KORREK GESERTIFISEER (VAN EN VOORLETTERS VAN EA)*	

This answer book consists of 27 pages./*Hierdie antwoordeboek bestaan uit 27 bladsye.*

PLEASE FOLLOW THESE INSTRUCTIONS CAREFULLY	VOLG ASSEBLIEF HIERDIE INSTRUKSIES NOUKEURIG
1. Your examination number and centre number must be clearly written in the space provided and attach your examination number sticker in the space provided.	1. Skryf jou eksamennommer en sentrumnommer duidelik in die ruimtes soos verskaf en plak jou eksamennommeretiket in die ruimte soos verskaf.
2. Remember that your own name (or the name of your school) may not appear anywhere on or in this answer book.	2. Onthou dat jou eie naam (of die naam van jou skool) nie op of in hierdie antwoordeboek mag voorkom nie.
3. Answer ALL questions in the spaces provided.	3. Beantwoord ALLE vrae in die ruimtes wat voorsien is.
4. No pages may be torn from this answer book.	4. Geen bladsye mag uit hierdie antwoordeboek geskeur word nie.
5. Read the instructions printed on your timetable carefully as well as any other instructions which may be given in each examination paper.	5. Lees die instruksies wat op jou eksamenrooster gedruk is sorgvuldig deur, asook enige ander instruksies wat in elke eksamenvraestel gegee word.
6. 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.	6. Geen antwoordeboek mag deur die kandidaat behou of uit die eksamenlokaal verwyder word nie. Antwoordeboeke moet aan die Toesighouer terugbesorg word aan die einde van die eksamensessie.
7. Answers must be written in black/blue ink as distinctly as possible. Do not write in the margins.	7. Skryf die antwoorde so duidelik moontlik met swart/blou ink. Moenie in die kantlyn skryf nie.
8. 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.	8. Dui die vrae wat jy beantwoord het aan op die voorblad van die antwoordeboek waar die punte aangebring word, deur 'n kringetjie te trek om die nommers van die vrae wat jy beantwoord het.
9. Rule off through any work/rough work that must not be marked.	9. Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie.
10. In the event that you use the additional space provided: 10.1 Write down the number of the question 10.2 Leave a line and rule off after your answer.	10. In geval jy die addisionele ruimte wat voorsien word, gebruik: 10.1 Skryf die nommer van die vraag neer 10.2 Laat 'n lyn oop en trek 'n lyn na jou antwoord.

QUESTION/*VRAAG* 1

TIME TAKEN (IN HOURS) *TYD GENEEM (IN UUR)*	5	7	5	8	10	13	15	20	18	25	23
COST/*KOSTE* (IN THOUSANDS OF RANDS) (*IN DUISENDE RAND*)	10	10	15	12	20	25	28	32	28	40	30

	Solution/*Oplossing*	**Marks** *Punte*
1.1		(3)
1.2		(2)
1.3		(1)
1.4		(2)
		[8]

QUESTION/*VRAAG* 2

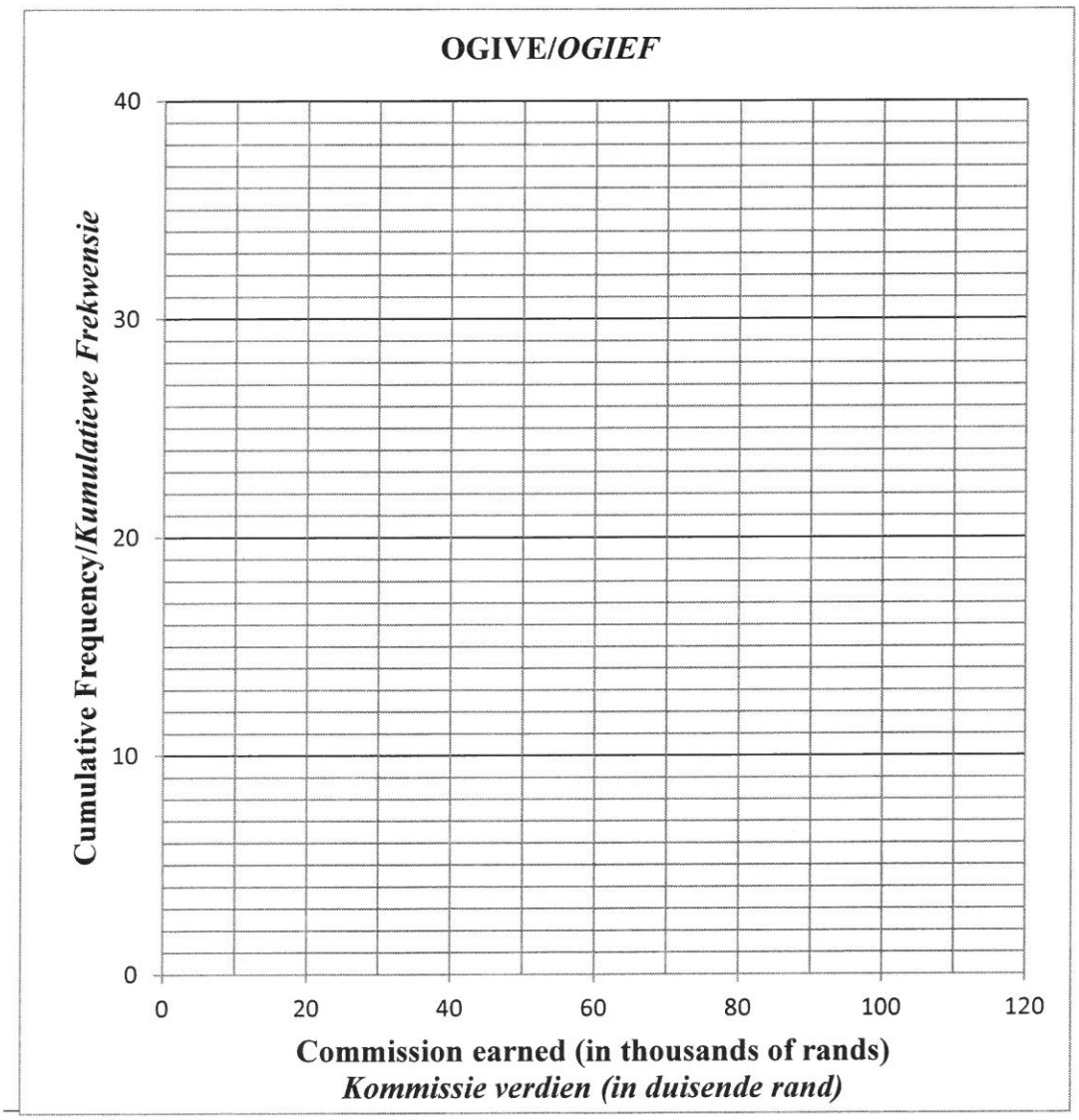
	Solution/*Oplossing*	**Marks/ *Punte***
2.1		(1)

2.2

Commission earned (in thousands of rands) *Kommissie verdien (in duisende rand)*	**Frequency *Frekwensie***	**Cumulative frequency *Kumulatiewe frekwensie***
$20 < x \leq 40$	7	
$40 < x \leq 60$	6	
$60 < x \leq 80$	8	
$80 < x \leq 100$	10	
$100 < x \leq 120$	4	

(2)

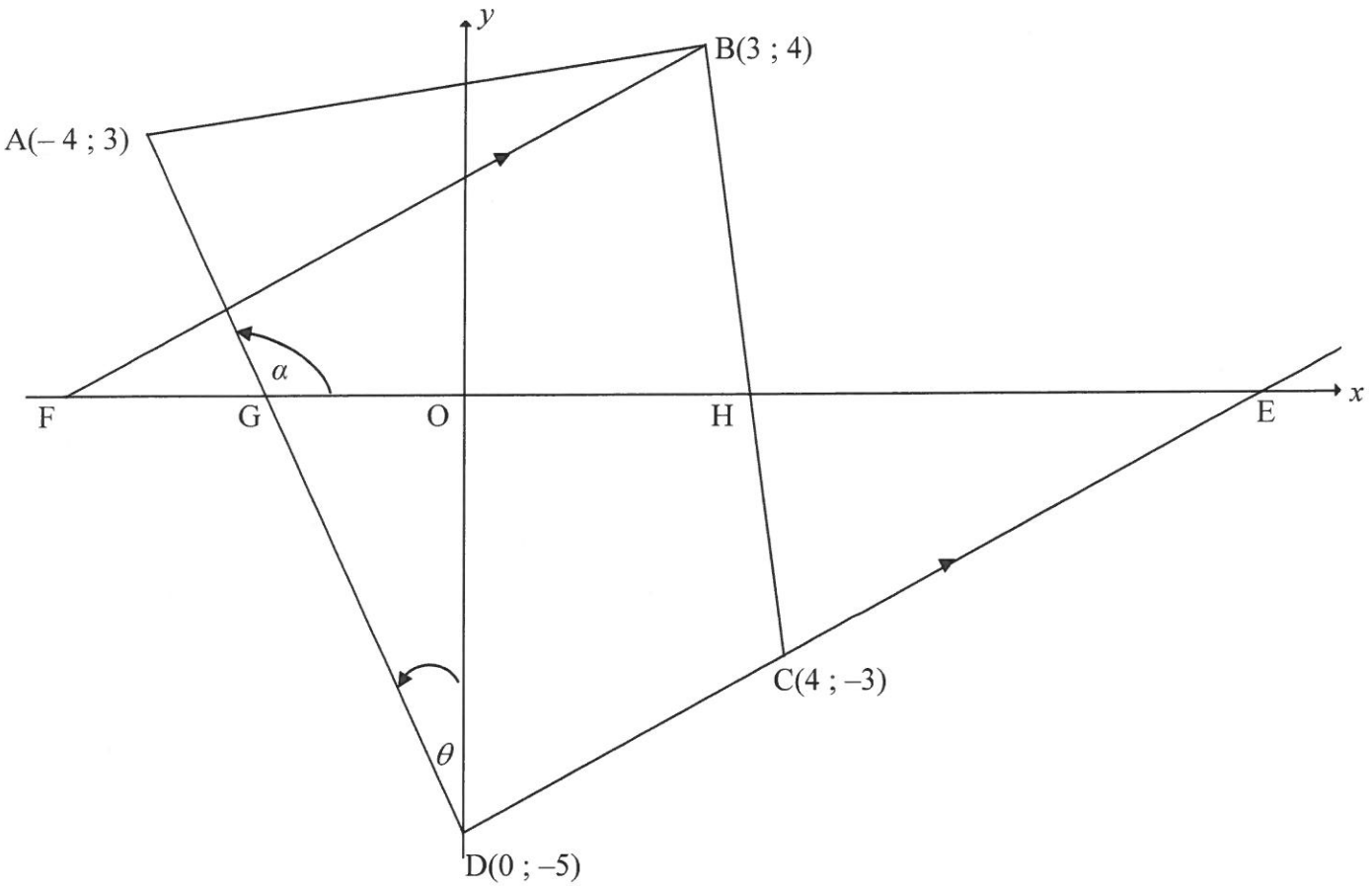
2.3



(4)

	Solution/*Oplossing*	**Marks/ *Punte***
2.4		(2)
2.5		(3)
		[12]

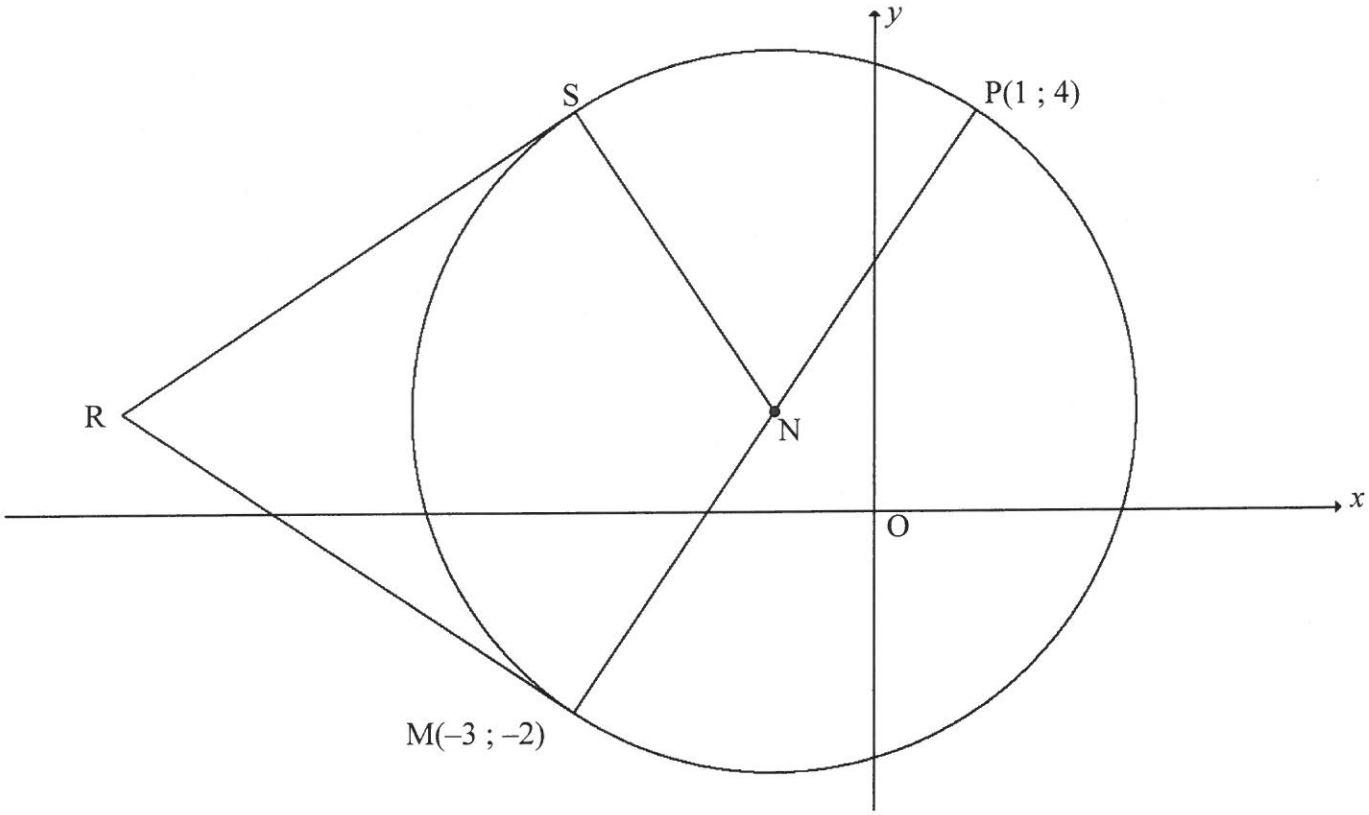
QUESTION/*VRAAG* 3



	Solution/*Oplossing*	**Marks/ *Punte***
3.1		(2)
3.2		(3)

	Solution/*Oplossing*	**Marks/ *Punte***
3.3		(4)
3.4		(3)
3.5		(3)
3.6		(2)
		[17]

QUESTION/*VRAAG* 4



	Solution/*Oplossing*	**Marks/ *Punte***
4.1		(3)
4.2		(4)

	Solution/*Oplossing*	**Marks/ *Punte***
4.3		(5)
4.4		(2)
4.5		(4)
4.6		(4)
		[22]

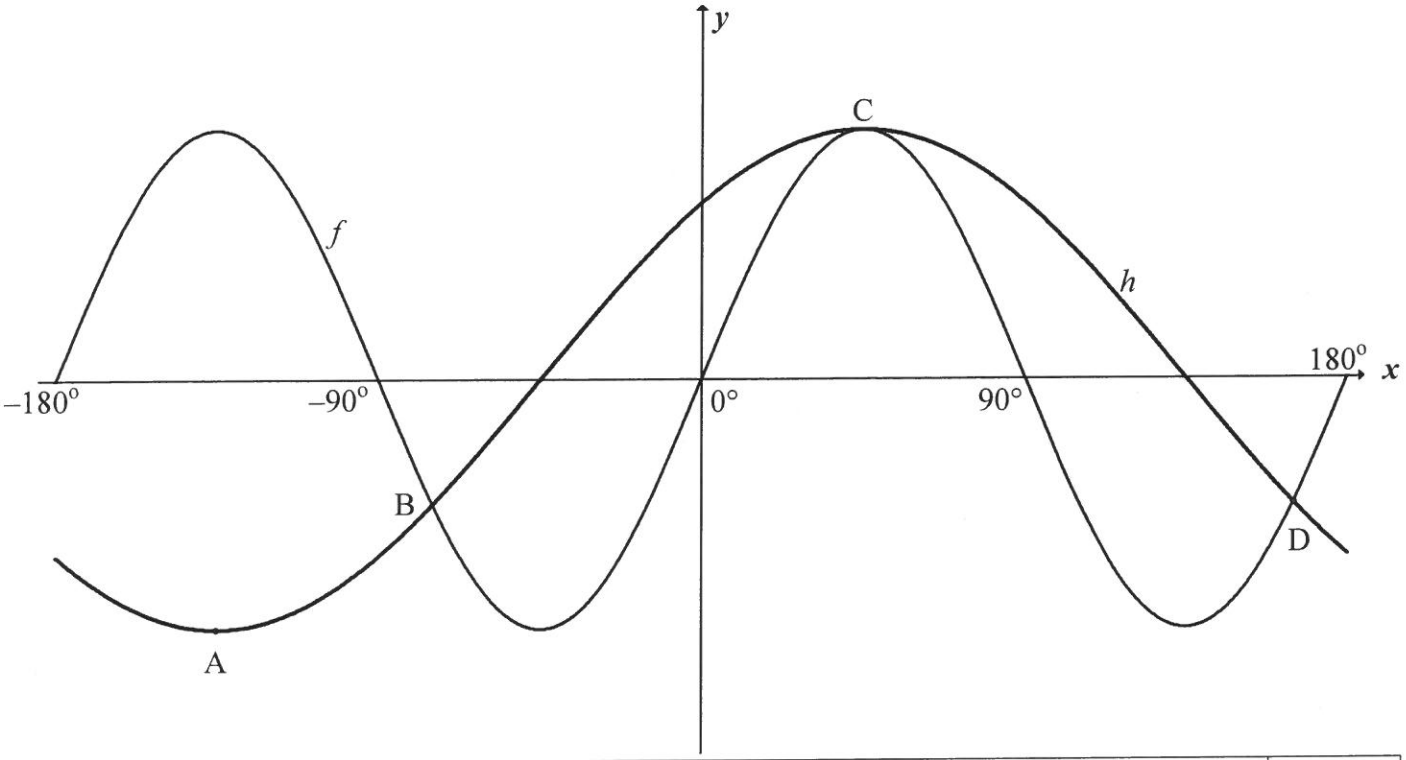
QUESTION/*VRAAG* 5

	Solution/*Oplossing*	**Marks/ *Punte***
5.1.1		(2)
5.1.2		(3)
5.2		(6)

	Solution/*Oplossing*	**Marks/ *Punte***
5.3.1		(1)
5.3.2		(5)
5.4		(5)

	Solution/*Oplossing*	**Marks/ *Punte***
5.5.1		(3)
5.5.2		(2)
		[27]

QUESTION/*VRAAG* 6



	Solution/*Oplossing*	**Marks/ *Punte***
6.1		(1)
6.2		(1)
6.3		(4)
		[6]

QUESTION/*VRAAG* 7

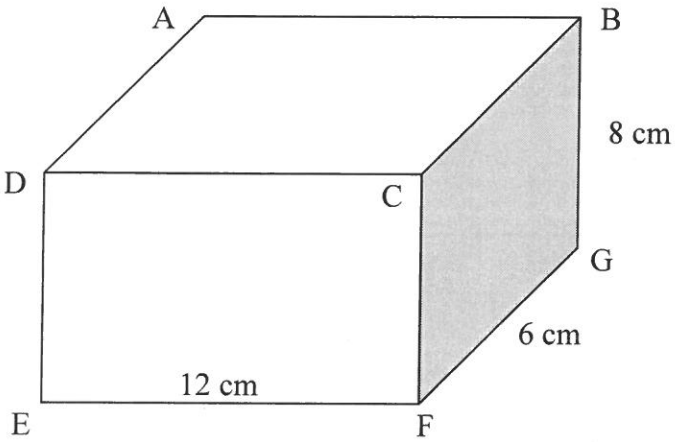


FIGURE (I)/*FIGUUR (I)*

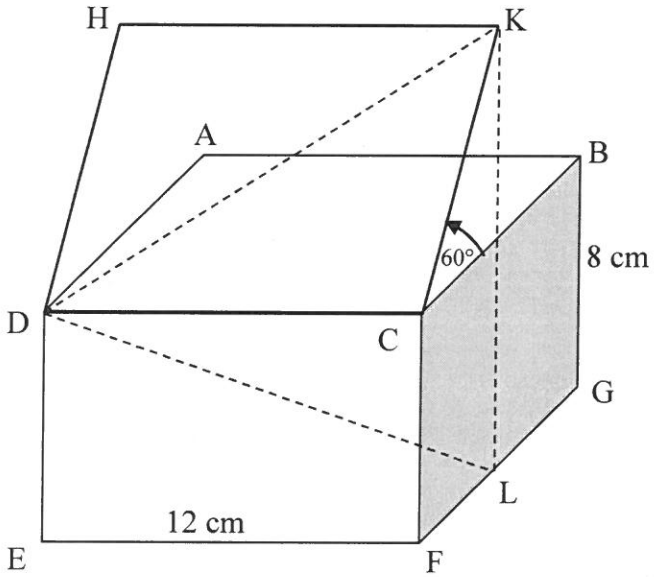
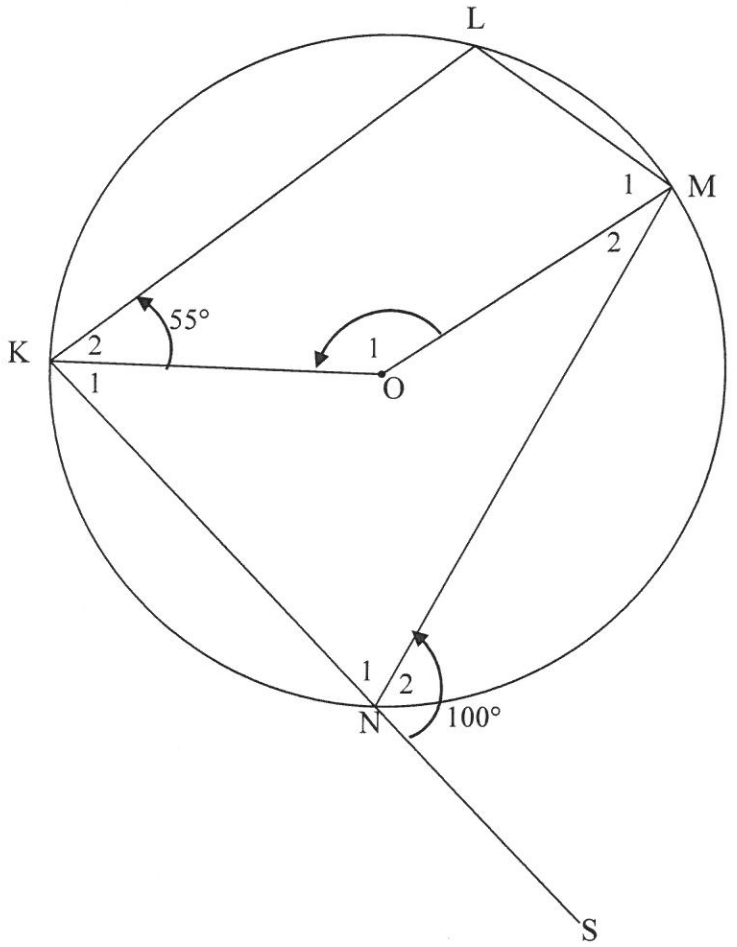


FIGURE (II)/*FIGUUR (II)*

	Solution/*Oplossing*	**Marks/ *Punte***
7.1		(1)

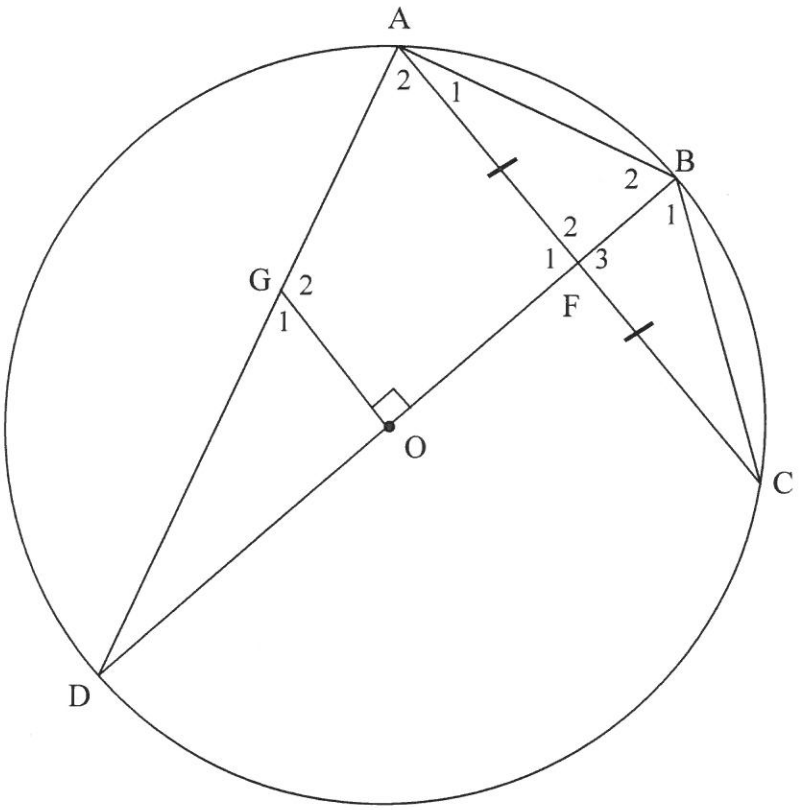
	Solution/*Oplossing*	**Marks/ *Punte***
7.2		(3)
7.3		(4)
		[8]

QUESTION/*VRAAG* 8



	Solution/*Oplossing*	**Marks/ *Punte***
8.1		
		(2)

	Solution/*Oplossing*	**Marks/ *Punte***
8.2		(3)
8.3		(2)
		[7]

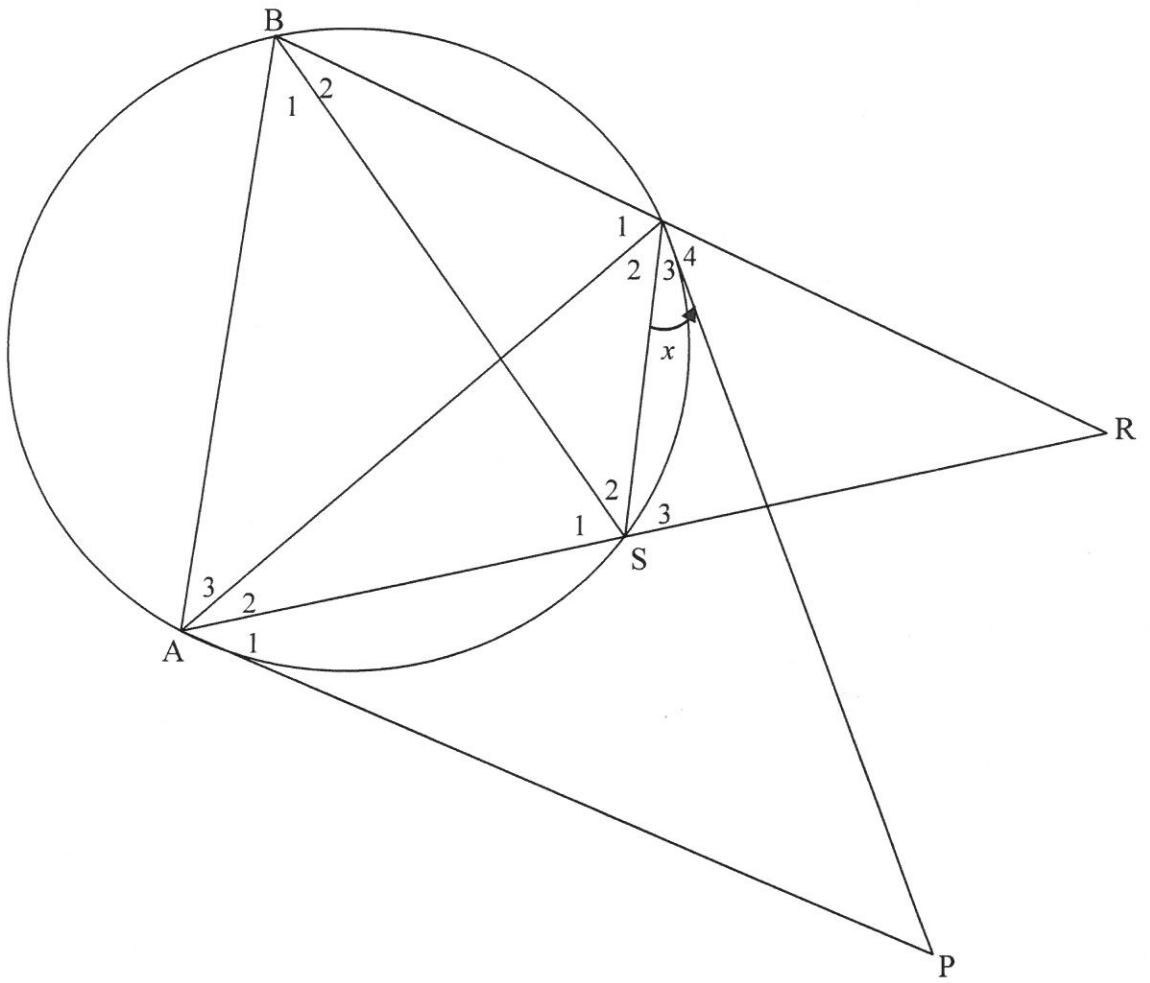


QUESTION/*VRAAG* 9

	Solution/*Oplossing*	**Marks/ *Punte***
9.1.1		(1)
9.1.2		(1)

	Solution/*Oplossing*	**Marks/ *Punte***
9.2.1		(3)
9.2.2		(4)
9.3		(3)
		[12]

QUESTION/*VRAAG* 10

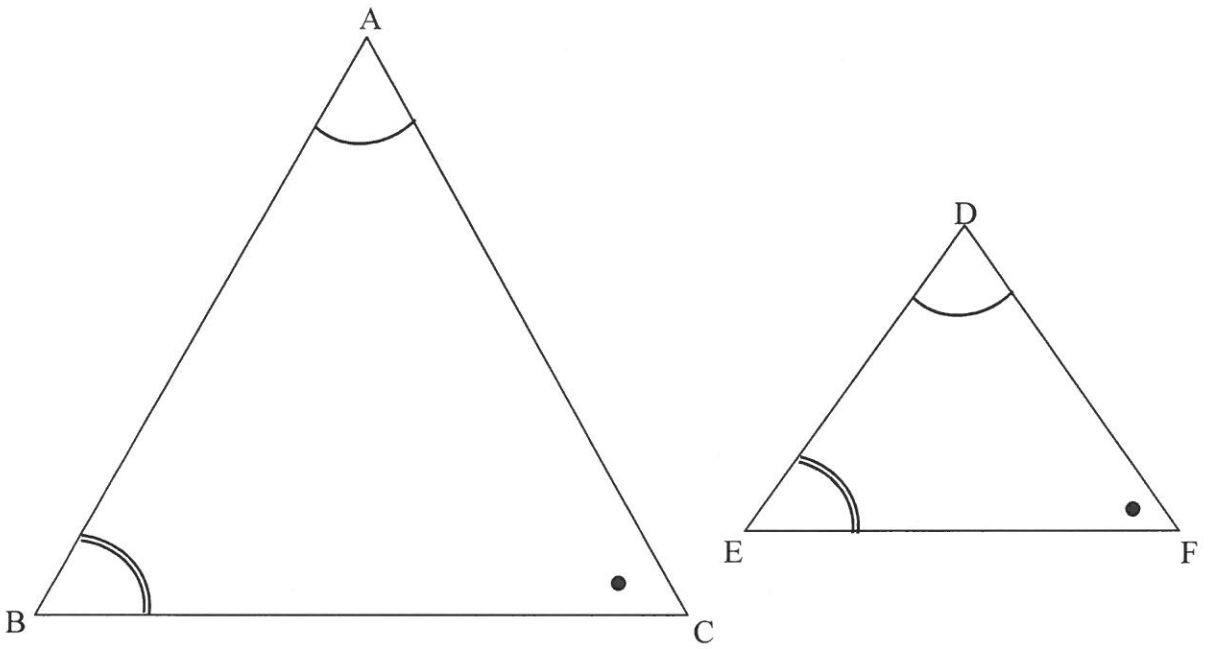


	Solution/*Oplossing*	**Marks/ *Punte***
10.1		(1)

	Solution/*Oplossing*	**Marks/ *Punte***
10.2.1		(5)
10.2.2		(5)
10.2.3		(2)
		[13]

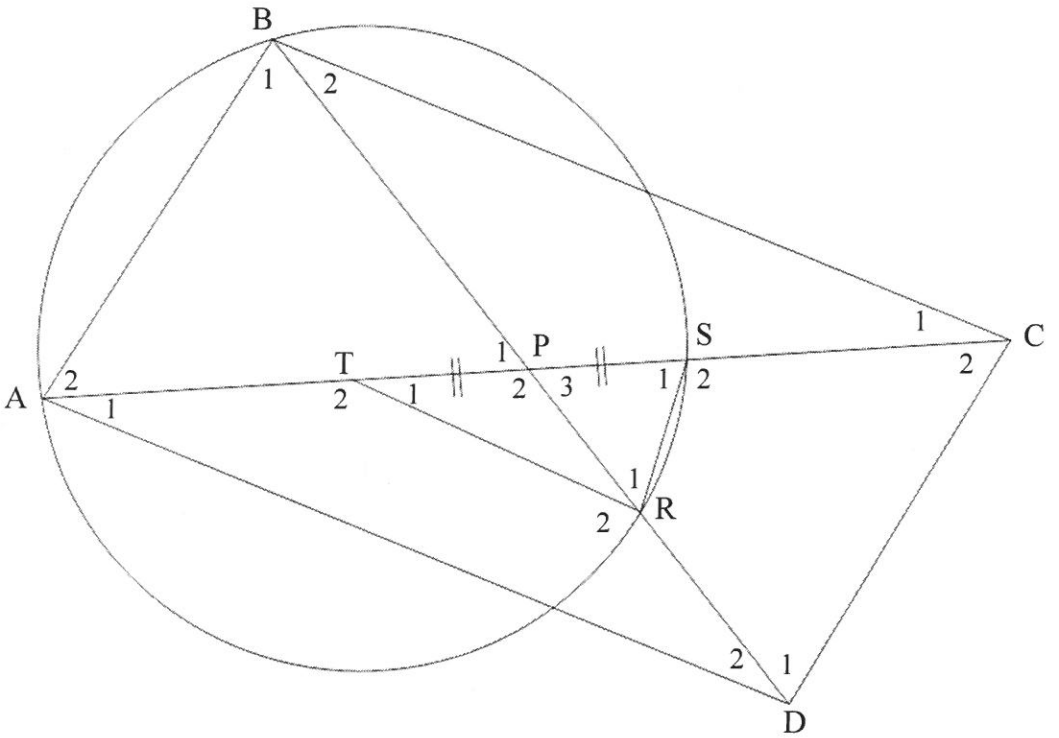
QUESTION/*VRAAG* 11

11.1



	Solution/*Oplossing*	**Marks/ *Punte***
11.1		(6)

11.2



	Solution/*Oplossing*	**Marks/ *Punte***
11.2.1(a)		(2)
11.2.1(b)		(5)

	Solution/*Oplossing*	**Marks/ *Punte***
11.2.2(a)		(3)
11.2.2(b)		(2)
		[18]

	Additional space/*Bykomende ruimte*	**Marks/ *Punte***

	Additional space/*Bykomende ruimte*	**Marks/ *Punte***

	Additional space/*Bykomende ruimte*	**Marks/ *Punte***

TOTAL/*TOTAAL*: 150

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMNATIONS
SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P2/*WISKUNDE V2*

2017

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS: 150
PUNTE: 150

These marking guidelines consist of 22 pages.
Hierdie nasienriglyne bestaan uit 22 bladsye..

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.
- Geometry:
  S = a mark for a correct statement (a statement mark is independent of a reason)
  R = a mark for a correct reason (a reason mark may only be awarded if the statement is correct)
  S/R = award a mark if statement and reason are both correct

NOTA:

- *As 'n kandidaat 'n vraag TWEEKEER beantwoord, merk slegs die EERSTE poging.*
- *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 memorandum toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*
- *Euklidiese Meetkunde:*
  S = 'n punt vir 'n korrekte bewering ('n beweringspunt is onafhanklik van die rede)
  R = 'n punt vir 'n korrekte rede ('n punt kan slegs vir 'n rede toegeken word, indien die bewering korrek is
  S/R = 'n punt word toegeken indien beide die bewering en rede korrek is

QUESTION/VRAAG/VRAAG 1

TIME TAKEN (IN HOURS)	5	7	5	8	10	13	15	20	18	25	23
COST (IN THOUSANDS OF RANDS)	10	10	15	12	20	25	28	32	28	40	30

1.1	$a = 4{,}806... = 4{,}81$ $b = 1{,}323... = 1{,}32$ $y = 4{,}81 + 1{,}32x$	✓ $a = 4{,}81$ ✓ $b = 1{,}32$ ✓ equation (3)
1.2	Cost = 25,974… = 25,97 thousand rand (calculator) = R25 970 **OR/*OF*** $y = 4{,}81 + 1{,}32(16)$ $y = 25{,}93$ Cost = R25 930	✓ 25,97 ✓ answer (in Rands) (2) ✓ substitution ✓ answer (in Rands) (2)
1.3	$r = 0{,}949… = 0{,}95$	✓ answer (1)
1.4	$x = 0$ $y = 4{,}81$ **OR** (4,80647) $\therefore$ R4 810 **OR** R4806,47	✓ $x = 0$ ✓ answer (2) **[8]**

QUESTION/VRAAG 2

2.1 modal class: $80 < x \leq 100$ ✓ correct class (1)

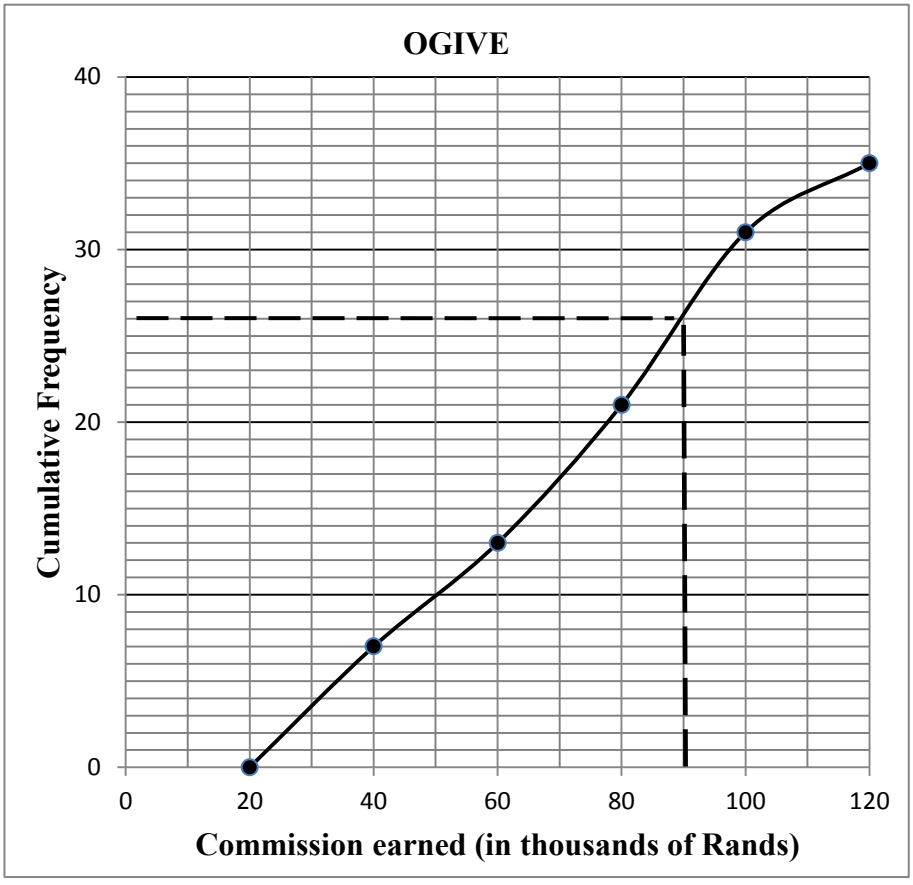
2.2

Commission earned (in thousands of Rands)	Frequency	Cumulative Frequency
$20 < x \leq 40$	7	7
$40 < x \leq 60$	6	13
$60 < x \leq 80$	8	21
$80 < x \leq 100$	10	31
$100 < x \leq 120$	4	35

✓ 13 ; 21

✓ 31 ; 35 (2)

2.3



✓ grounded/*geanker*
✓ upper limits/ *boonste limiet*
✓ cum frequency / Kum frekwensie
✓ shape/*vorm*

(4)

2.4 No. of salesmen awarded bonuses: 35 – 26
= 9 salesmen

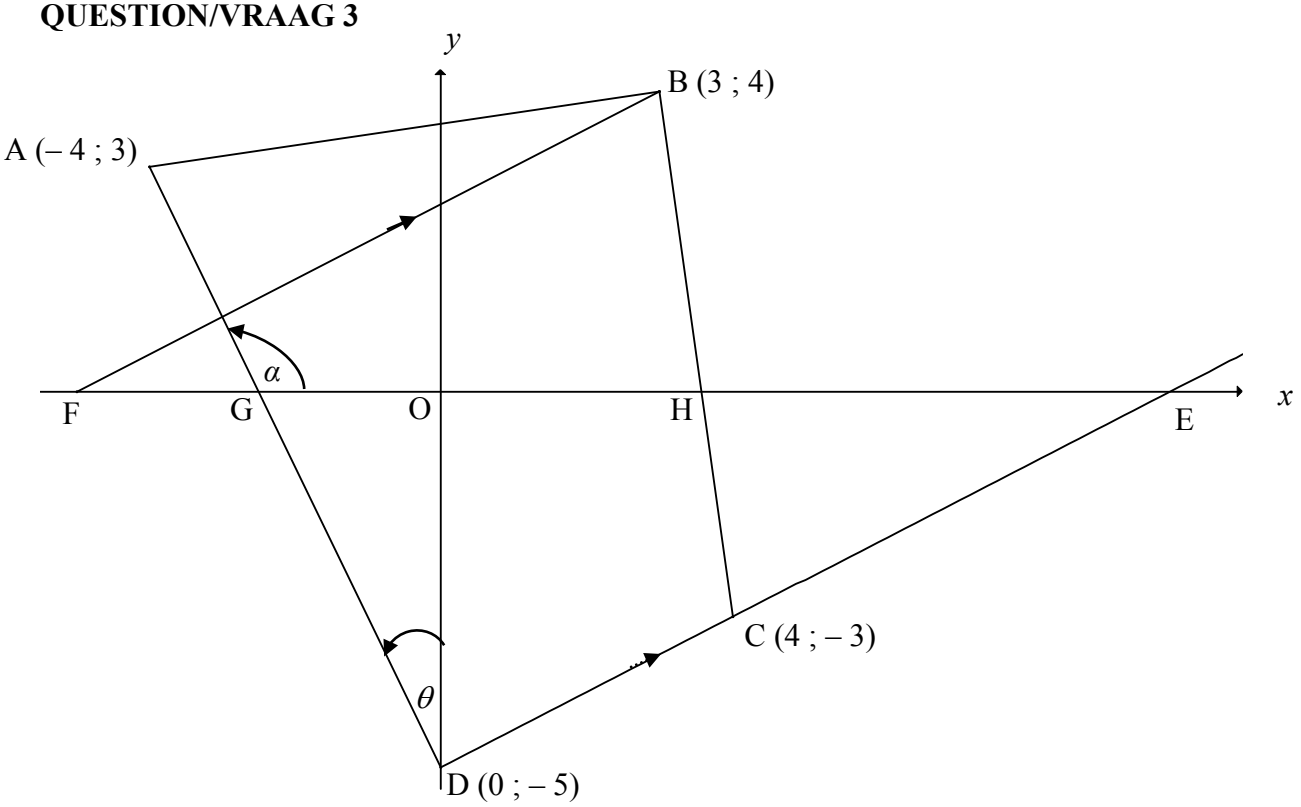
✓ accept (25 – 27)
✓ accept (8 – 10)
(2)

2.5 $$\text{Estimated mean} = \frac{(30\times 7)+(50\times 6)+(70\times 8)+(90\times 10)+(110\times 4)}{35}$$
$$= \frac{2410}{35}$$
= 68,86 thousand rand or R68 857,14
= R69 000 or 69 thousand rand

✓ top line using midpts & freq
✓ 2410

✓ answer (nearest)
(3)
[12]

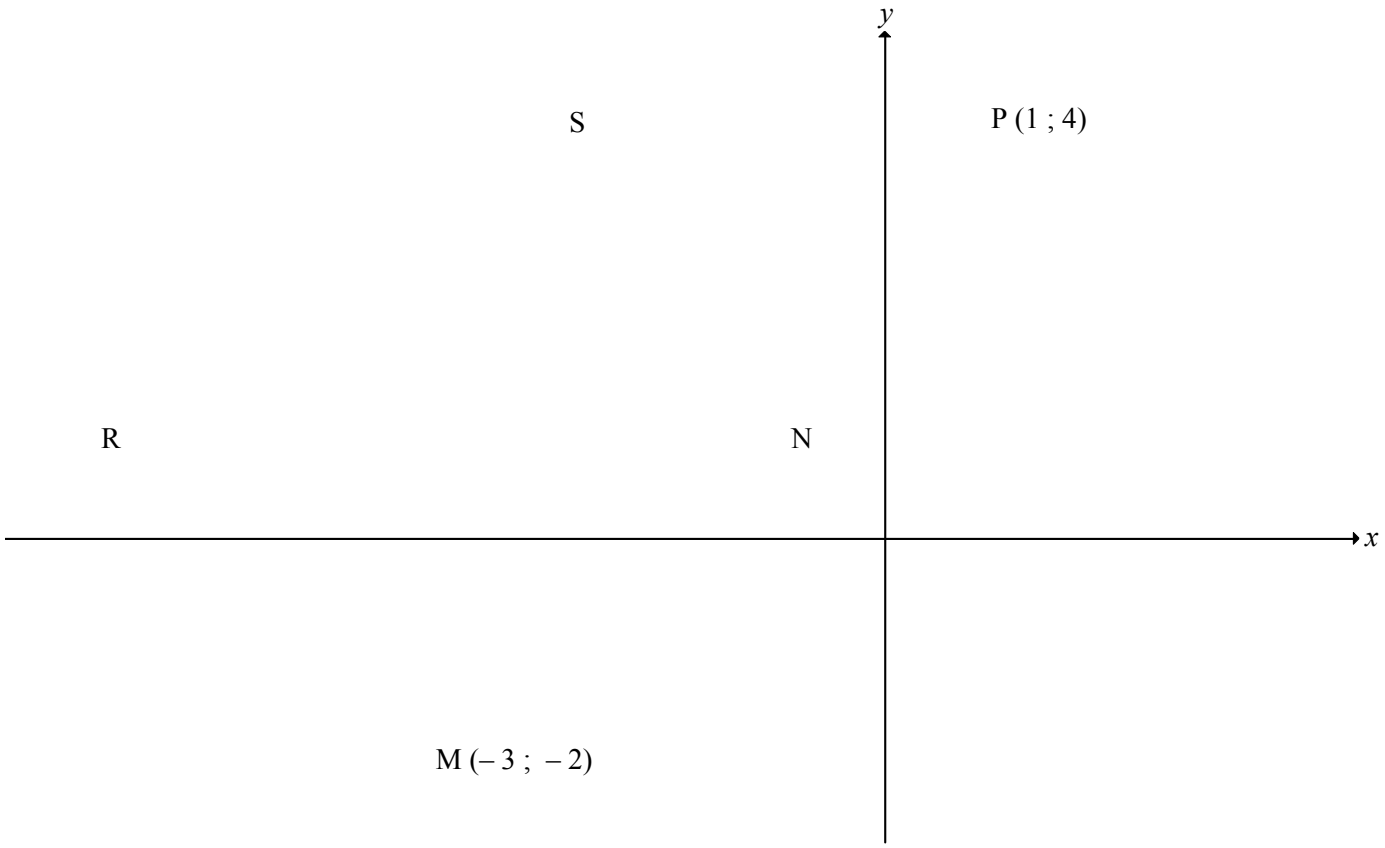
QUESTION/VRAAG 3



3.1	$m_{CD} = \frac{-3-(-5)}{4-0}$ $= \frac{-3+5}{4-0}$ $= \frac{1}{2}$	✓ substitution of C & D ✓answer (2)
3.2	$m_{AD} = \frac{-5-3}{0-(-4)}$ $= -2$ $m_{CD} \times m_{AD} = \frac{1}{2} \times -2$ $= -1$ $\therefore$ AD $\perp$ DC	✓ substitution of A & D ✓ $m_{AD} = -2$ ✓ product = –1 (3)
3.3	$AB = \sqrt{(3+4)^2 + (4-3)^2} = \sqrt{50} = 5\sqrt{2}$ $BC = \sqrt{(4-3)^2 + (-3-4)^2} = 5\sqrt{2}$ AB = BC $\therefore \Delta ABC$ is an iscosceles triangle/*'n gelykbenige driehoek*	✓ correct substitution ✓ length of AB ✓ correct substitution ✓ length of BC (4)

3 .4	$m_{CD} = m_{BF} = \frac{1}{2}$ [BF || DC] $4 = \frac{1}{2}(3) + c$ $c = \frac{5}{2}$ $y = \frac{1}{2}x + \frac{5}{2}$ **OR/*OF*** $y - 4 = \frac{1}{2}(x - 3)$ $y - 4 = \frac{1}{2}x - 1\frac{1}{2}$ $y = \frac{1}{2}x + 2\frac{1}{2}$	✓ $m_{BF} = \frac{1}{2}$ ✓ substitution of B(3 ; 4) ✓equation (3)
3.5	$\tan\alpha = -2$ $\therefore \alpha = 116.57°$ $\alpha = 90° + \theta$ [ext ∠Δ] $\therefore \theta = 26{,}57°$ **OR/*OF*** $\tan\alpha = -2$ OR $m_{AD} = -2$ $\therefore \tan\theta = \frac{1}{2}$ $\therefore \theta = 26{,}57°$ **OR/*OF*** Inclination of DE is β: $\tan\beta = \frac{1}{2}$ $\therefore \beta = 26{,}57°$ $\therefore \hat{ODE} = 63{,}43°$ $\therefore \theta = 90° - 63{,}43°$ $= 26{,}57°$	✓ $\tan\alpha = -2$ ✓ $\alpha = 116.57°$ ✓ $\theta = 26{,}57°$ (3) ✓ $\tan\alpha = -2$ ✓ $\tan\theta = \frac{1}{2}$ ✓ $\theta = 26{,}57°$ (3) ✓ $\beta = 26{,}57°$ ✓ $\hat{ODE} = 63{,}43°$ ✓ $\theta = 26{,}57°$ (3)
3.6	$x^2 + y^2 = r^2$ $(4)^2 + (-3)^2 = 25$ $x^2 + y^2 = 25$	✓ $r^2 = 25$ ✓ equation (2) **[17]**

QUESTION/VRAAG 4



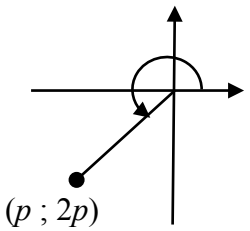
4.1	$N\left(\frac{1+(-3)}{2};\frac{4+(-2)}{2}\right)$ $N(-1\,;\,1)$ is the centre of the circle	✓ substitution M & P ✓ x-value of N ✓ y-value of N (3)
4.2	$r=\sqrt{(1-(-1))^2+(4-1)^2}$ $r=\sqrt{13}$ = radius $(x+1)^2+(y-1)^2=13$ **OR/*OR*** $r=\sqrt{(-3-(-1))^2+(-2-1)^2}$ $r=\sqrt{13}$ = radius $(x+1)^2+(y-1)^2=13$	✓ substitution N & P ✓ $r=\sqrt{13}$ ✓ LHS of eq ✓ RHS of eq (4) ✓ substitution N & M ✓ $r=\sqrt{13}$ ✓ LHS of eq ✓ RHS of eq (4)

4.3	$m_{NM} \times m_{MR} = -1$ [radius $\perp$ tangent/*raakklyn*] $m_{NM} = \frac{1-(-2)}{-1-(-3)}$ *OR* $m_{PM} = \frac{4-(-2)}{1-(-3)}$ $= \frac{3}{2}$ $= \frac{3}{2}$ $m_{MR} = -\frac{2}{3}$ $y - y_1 = -\frac{2}{3}(x - x_1)$ **OR/*OF*** $y = -\frac{2}{3}x + c$ $y + 2 = -\frac{2}{3}(x + 3)$ **OR/*OF*** $-2 = -\frac{2}{3}(-3) + c$ $y = -\frac{2}{3}x - 4$	✓ correct substitution ✓ m_{NM} ✓ m_{MR} ✓substitution of m_{MR} &(–3 ;–2) ✓ equation (5)
4.4	Symmetry of a kite: S(–3 ; 4) **OR/*OF*** $P\hat{S}M = 90°$ [$\angle$ in semi circle] PS $\perp$ SM $\therefore$ S(–3 ; 4) **OR/*OF*** $(NS)^2 = (\text{radius})^2$ $(-3+1)^2 + (y-1)^2 = 13$ $(y-1)^2 = 9$ $y - 1 = \pm 3$ $y = 4$ *OR* $y \neq -2$ $\therefore$ S(–3 ; 4)	✓ x-value of S ✓ y-value of S (2) ✓ x-value of S ✓ y-value of S (2) ✓ x-value of S ✓ y-value of S (2)
4.5	$(SR)^2 = (RM)^2$ ...Tangents from common pt/*rklyne v dies punt* $(x+3)^2 + (y-4)^2 = (x+3)^2 + (y+2)^2$ $y^2 - 8y + 16 = y^2 + 4y + 4$ $-12y = -12$ $y = 1$ $\frac{2}{3}x = -4 - 1$ or $1 = -\frac{2}{3}x - 4$ $x = -\frac{15}{2}$ $x = -7\frac{1}{2}$ $\therefore$ R$\left(-7\frac{1}{2}; 1\right)$ **OR/*OF***	✓ equating lengths ✓ simplification ✓ y-value of R ✓ x-value of R (4)

	R$(x;1)$ [RN is a horizontal line] $\therefore 1=-\frac{2}{3}x-4$ $5=-\frac{2}{3}x$ $x=-\frac{15}{2}$ $\therefore \text{R}\left(-\frac{15}{2};1\right)$	✓ $y_R=1$ ✓ horizontal line OR R lies on $y=1$ ✓ equating ✓ x-value of R ($x<-4,6$) (4)
	OR/*OF* $m_{NS}=\frac{1-4}{-1+3}=-\frac{3}{2}$ $\therefore\ m_{RS}=\frac{2}{3}$ $y-4=\frac{2}{3}(x+3)$ $y=\frac{2}{3}x+6$ $-\frac{2}{3}x-4=\frac{2}{3}x+6$ $x=-7\frac{1}{2}$ $y=\frac{2}{3}(-\frac{15}{2})+6=1$ $\therefore \text{R}\left(-\frac{15}{2};1\right)$	✓ $y=\frac{2}{3}x+6$ ✓ equating ✓ x-value of R ($x<-4,6$) ✓ y-value of R (4)
4.6	$\text{RS}=\sqrt{(-3+7,5)^2+(4-1)^2}$ OR/OF $\text{RM}=\sqrt{(-3+7,5)^2+(-2-1)^2}$ $\text{RS}=\frac{3\sqrt{13}}{2}=5,41$ area of RSNM = 2area of ΔRSN $=2\left(\frac{1}{2}\right)(\sqrt{13})\left(\frac{3\sqrt{13}}{2}\right)$ $=\frac{39}{2}$ **OR/*OF*** 19,5 square units	✓ RS **OR** RM ✓ method ✓ $\sqrt{13}$ and $\left(\frac{3\sqrt{13}}{2}\right)$ ✓ answer (4)
	OR/*OF*	✓ method ✓ MS = 6 ✓ RN = 6,5 ✓ answer

	area RSNM $= \frac{1}{2}$(MS × RN) (area of a kite/*opp v vlieër*) $= \frac{1}{2}(6)(6{,}5)$ $= \frac{39}{2}$ OR 19,5 square units	(4) ✓ RS **OR** RM ✓ $\left(\frac{1}{2}\right)\sqrt{13}\left(\frac{3\sqrt{13}}{2}\right)$
	OR/*OF*	
	RS $= \sqrt{(-3+7{,}5)^2+(4-1)^2}$ OR/OF RM $= \sqrt{(-3+7{,}5)^2+(-2-1)^2}$ RS $= \frac{3\sqrt{13}}{2}$ *or* 5,41	✓ method ✓ answer (4)
	area of ΔRSN $= \left(\frac{1}{2}\right)(\sqrt{13})\left(\frac{3\sqrt{13}}{2}\right)$ $= \frac{39}{4}$ **OR/*OF*** 9,75 square units area of RSNM = 2area of ΔRSN $= \frac{39}{2}$ **OR/*OF*** 19,5 square units	✓ method ✓ MS = 6 ✓ $h = 1$ & $5\frac{1}{2}$
	OR/*OF*	
	SM = 6 area of RSNM = Area of ΔSMN + Area of ΔRSM $= \frac{1}{2}(6)(1) + \frac{1}{2}(6)(5\frac{1}{2})$ $= 3 + 16\frac{1}{2}$ $= 19\frac{1}{2}$	✓ answer (4)
		[22]

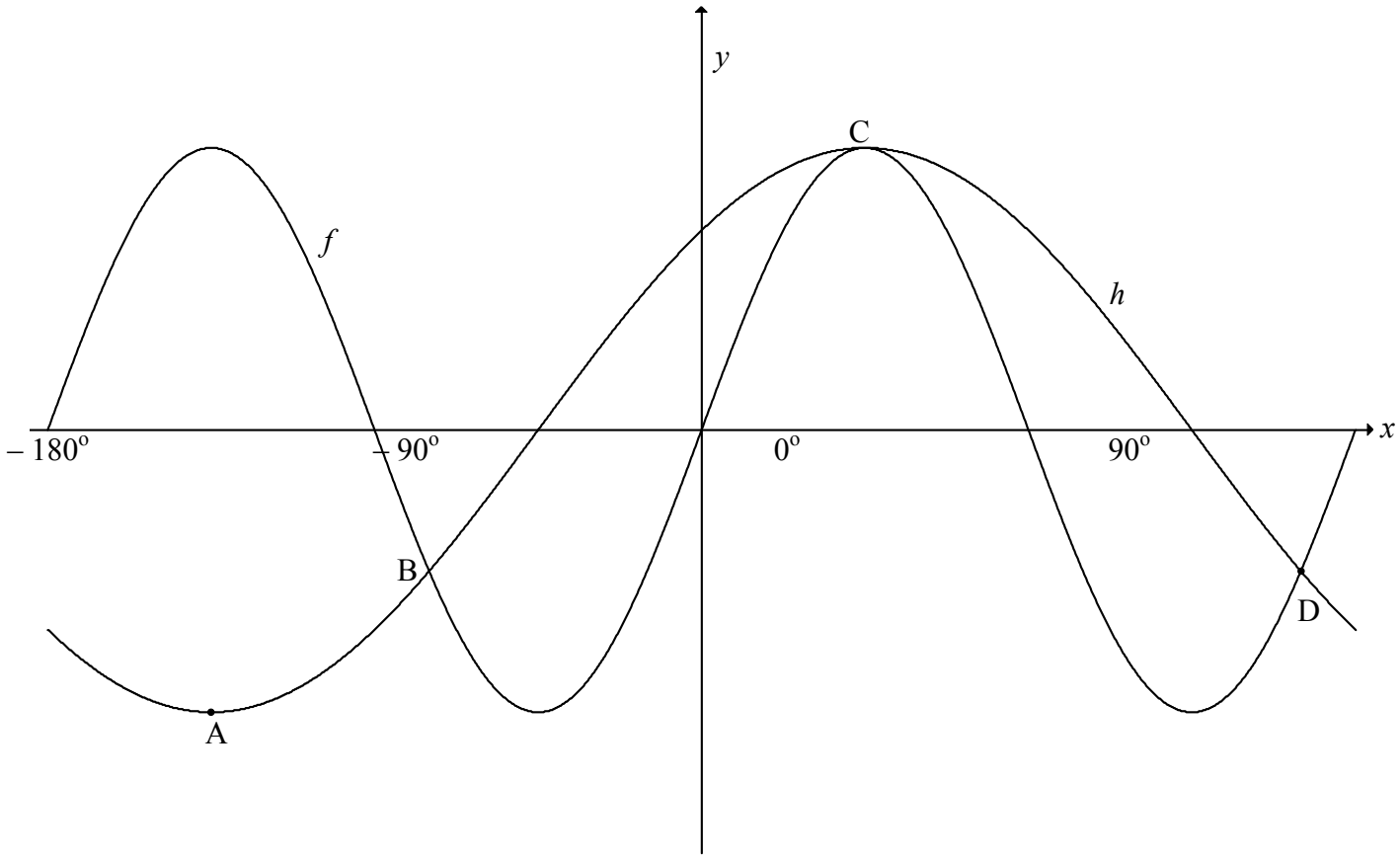
QUESTION/VRAAG 5

5.1.1	$\tan A = \frac{\sin A}{\cos A}$ $= \frac{2p}{p}$ $= 2$ **OR/*OF*** $\tan A = \frac{2p}{p}$ $= 2$  	✓identity ✓value of tan A (2) ✓ $\frac{y}{x}$ ✓value of tan A (2)
5.1.2	$\sin^2 A + \cos^2 A = 1$ $(2p)^2 + p^2 = 1$ $4p^2 + p^2 = 1$ $5p^2 = 1$ $p^2 = \frac{1}{5}$ $\therefore p = -\frac{1}{\sqrt{5}}$	✓ $(2p)^2 + p^2 = 1$ ✓ simplification of LHS ✓answer (3)
5.2	$2\sin^2 x - 5\sin x + 2 = 0$ $(2\sin x - 1)(\sin x - 2) = 0$ $\sin x = \frac{1}{2}$ or $\sin x = 2$(no solution) ref $\angle = 30°$ $\therefore x = 30° + k.360°$ or $x = 150° + k.360°$; $k \in Z$	✓ factors or formula ✓ both equations ✓ no solution/*geen opl* ✓ $30° + k.360°$ ✓ $150° + k.360°$; ✓ $k \in Z$ (6)
5.3.1	$\sin(x + 300°) = \sin x \cos 300° + \cos x \sin 300°$	✓ expansion/*uitbreiding* (1)
5.3.2	$\sin(x + 300°) - \cos(x - 150°)$ $= \sin x \cos 300° + \cos x \sin 300° - (\cos x \cos 150° + \sin x \sin 150°)$ $= \sin x \cos 60° - \cos x \sin 60° - (-\cos x \cos 30° + \sin x \sin 30°)$ $= \sin x \cos 60° - \cos x \sin 60° + \cos x \cos 30° - \sin x \sin 30°$ $= \frac{1}{2}\sin x - \frac{\sqrt{3}}{2}\cos x + \frac{\sqrt{3}}{2}\cos x - \frac{1}{2}\sin x$ $= 0$ **OR/*OF***	✓2nd expansion/ *2de uitbreiding* ✓✓ reduction/*reduksie* ✓ special angle values/ *spesiale hoekwaardes* ✓ answer (5)

	$\sin(x+300°)-\cos(x-150°)$ $=\sin x\cos 300°+\cos x\sin 300°-(\cos x\cos 150°+\sin x\sin 150°)$ $=\sin x\cos 60°-\cos x\sin 60°-(-\cos x\cos 30°+\sin x\sin 30°)$ $=\sin x\cos 60°-\cos x\sin 60°+\cos x\cos 30°-\sin x\sin 30°$ $=\sin x\sin 30°-\cos x\sin 60°+\cos x\sin 60°-\sin x\sin 30°$ $=0$	✓2nd expansion/ *2de uitbreiding* ✓✓ reduction/*reduksie* ✓ co-ratios / *ko-verh* ✓ answer (5)
5.4	Consider: $\dfrac{\tan x+1}{\sin x\tan x+\cos x}=\sin x+\cos x$ $\text{LHS}=\dfrac{\left(\dfrac{\sin x}{\cos x}+1\right)}{\left(\sin x.\dfrac{\sin x}{\cos x}+\cos x\right)}=\dfrac{\left(\dfrac{\sin x+\cos x}{\cos x}\right)}{\left(\dfrac{\sin^2 x+\cos^2 x}{\cos x}\right)}$ $=\dfrac{\dfrac{\sin x+\cos x}{\cos x}}{\dfrac{1}{\cos x}}$ $=\dfrac{\sin x+\cos x}{\cos x}\times\dfrac{\cos x}{1}$ $=\sin x+\cos x$ = RHS **OR/*OF*** $\text{LHS}=\dfrac{\left(\dfrac{\sin x}{\cos x}+1\right)}{\left(\sin x.\dfrac{\sin x}{\cos x}+\cos x\right)}=\dfrac{\left(\dfrac{\sin x}{\cos x}+1\right)}{\left(\dfrac{\sin^2 x+\cos^2 x}{\cos x}\right)}$ $=\dfrac{\left(\dfrac{\sin x}{\cos x}+1\right)}{\dfrac{1}{\cos x}}$ $=\left(\dfrac{\sin x}{\cos x}+1\right)\times\dfrac{\cos x}{1}$ $=\sin x+\cos x$ = RHS	✓ identity of tan x ✓ $\dfrac{\sin x+\cos x}{\cos x}$ ✓ $\dfrac{\sin^2 x+\cos^2 x}{\cos x}$ ✓ $\sin^2 x+\cos^2 x=1$ ✓ simplify (5) ✓ identity of tan x ✓ $\dfrac{\sin^2 x+\cos^2 x}{\cos x}$ ✓ $\sin^2 x+\cos^2 x=1$ ✓ simplify ✓ multiplication (5)
5.5.1	$\left(\sqrt{1+k}\right)^2=(\sin x+\cos x)^2$ $1+k=\sin^2 x+2\sin x\cos x+\cos^2 x$ $1+k=1+\sin 2x$ $k=\sin 2x$	✓ square both sides ✓ $\sin^2 x+\cos^2 x=1$ ✓ $\sin 2x$ (3)

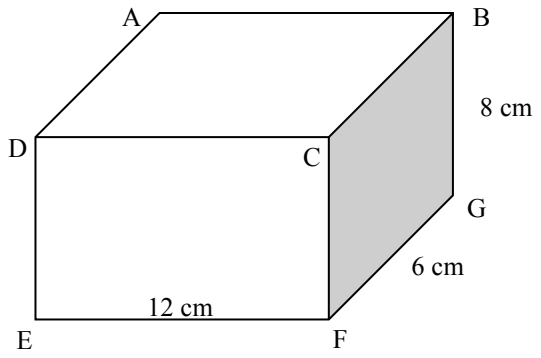
5.5.2	From 5.5.1 $\sin x + \cos x = \sqrt{1+\sin 2x}$ $\therefore \text{max value}: \sin x + \cos x = \sqrt{1+1}$ $= \sqrt{2}$ **OR/*OF*** Maximum value of $1 + \sin 2x = 1 + 1$ $= 2$ $\therefore \text{maximum value of } \sin x + \cos x = \sqrt{2}$ **OR/*OF*** $(\sin x + \cos x)^2 = \sin^2 x + 2\sin x \cos x + \cos^2 x$ $= 1 + \sin 2x$ $\therefore \text{max value} (\sin x + \cos x)^2 = 1 + 1 = 2$ $\therefore \text{max value} \sin x + \cos x = \sqrt{2}$	✓ max of $\sin 2x = 1$ ✓ answer (2) ✓ max of $\sin 2x = 1$ ✓ answer (2) ✓ max of $\sin 2x = 1$ ✓ answer (2)
		[27]

QUESTION/VRAAG 6



6.1	Period = 180°	✓ answer (1)
6.2	$-75°$	✓ answer (1)
6.3	$\sin 2x \le \frac{1}{\sqrt{2}}\cos x + \frac{1}{\sqrt{2}}\sin x$ $\sin 2x \le \cos 45°.\cos x + \sin 45°.\sin x$ $\sin 2x \le \cos(x - 45°)$ $x \in [-75° \ ; 165°]$	✓ $\cos 45°.\cos x + \sin 45°.\sin x$ ✓ $\cos(x - 45°)$ ✓ ✓ answer (4)
		[6]

QUESTION/VRAAG 7



Figure/*Figuur* (i)

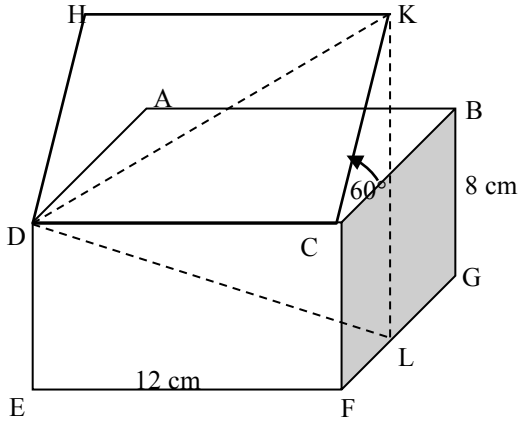
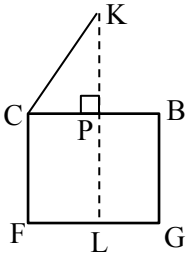
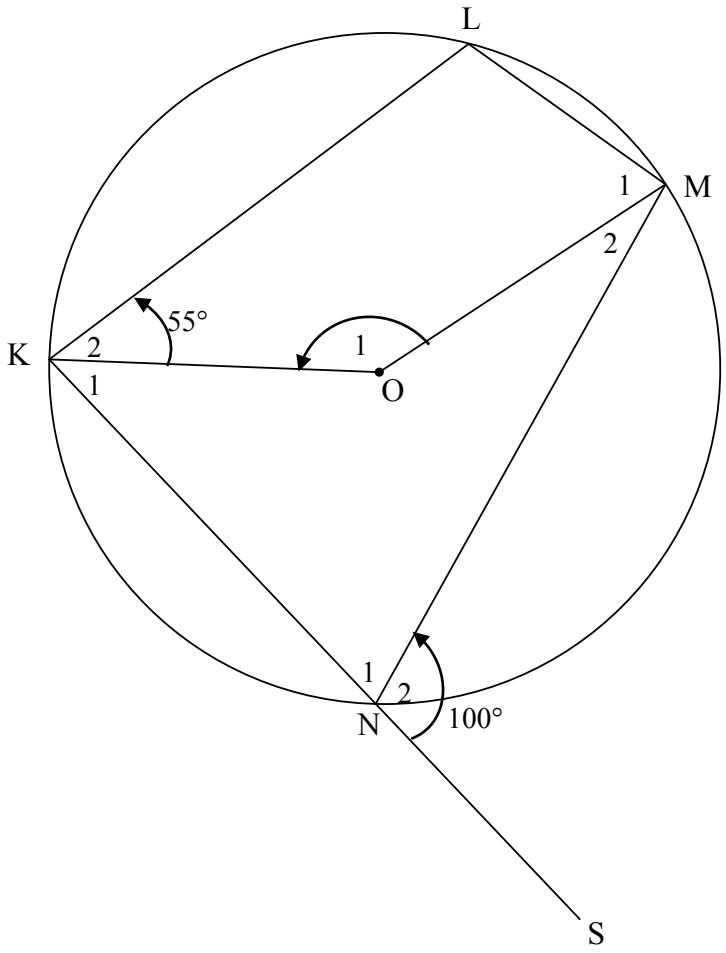


Figure / *Figuur* (ii)

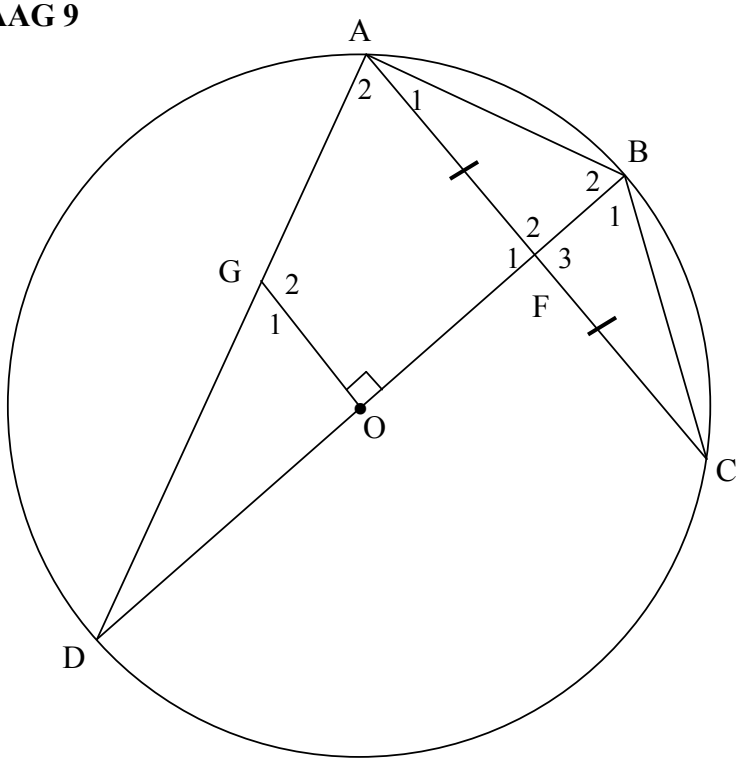
7.1	$KC = 6\text{ cm}$	✓ answer (1)
7.2	Let P be the point of intersection of KL and CB $\frac{KP}{KC} = \sin 60°$ $KP = 6\sin 60°$ $KP = 3\sqrt{3}$ or 5,20 $\therefore KL = 8 + 3\sqrt{3}$ or 13,20 cm 	✓ trig ratio ✓ length of KP ✓ answer (3)
7.3	$DK^2 = 6^2 + 12^2$ $DK = \sqrt{180}$ or $6\sqrt{5}$ or 13,42 cm $\frac{\sin K\hat{D}L}{KL} = \frac{\sin D\hat{L}K}{DK}$ $\frac{\sin K\hat{D}L}{\sin D\hat{L}K} = \frac{KL}{DK}$ $= \frac{8+3\sqrt{3}}{6\sqrt{5}}$ or $\frac{13,20}{13,42}$ or 0,98	✓ $DK = 6\sqrt{5}$ ✓ use of sine rule ✓ $\frac{\sin K\hat{D}L}{\sin D\hat{L}K} = \frac{KL}{DK}$ ✓ answer (4) **[8]**

QUESTION/VRAAG 8



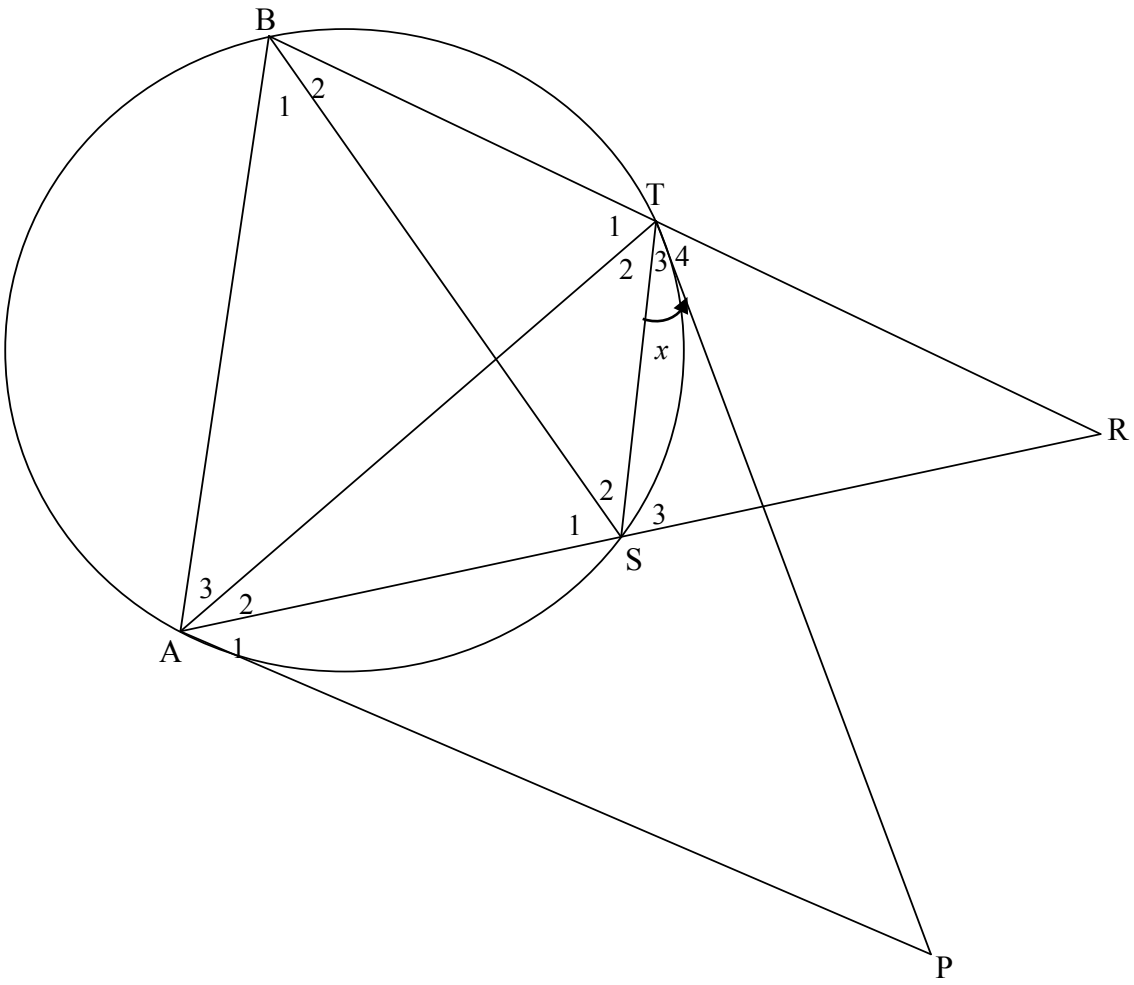
8.1	$\hat{L} = 100°$ [ext ∠ cyclic quad = int opp ∠ / *buite ∠ kdvh = tos ∠*] **OR/*OF*** $\hat{N}_1 = 80°$ [∠s on straight line] $\hat{L} = 100°$ [opp ∠s of cyclic quad]	✓S ✓R (2) ✓S ✓R (2)
8.2	$\hat{N}_1 = 80°$ [∠s on straight line/∠e *op reguitlyn*] $\therefore \hat{O}_1 = 160°$ [∠ at centre = 2 × ∠ at circumference/midpts ∠ = 2 omtreks ∠] **OR/*OF*** reflex $K\hat{O}M = 200°$ [∠ at centre=2 × ∠ at circumference/*midpts∠ = 2×omtreks∠*] $\therefore \hat{O}_1 = 160°$ [∠s around a pt/ ∠e om 'n pt]	✓S ✓S ✓R (3) ✓S ✓R ✓S (3)
8.3	$\hat{M}_1 = 360° - (100° + 55° + 160°)$ [sum ∠*s o*f quad/*som ∠e v vierhoek*] $\therefore \hat{M}_1 = 45°$	✓S ✓S (2) **[7]**

QUESTION/VRAAG 9



9.1.1	∠ in semi-circle/∠ *in halfsirkel*	✓answer (1)
9.1.2	**Opp ∠s** of quad = **180°**/*Teenoorst ∠e v vierhoek=180°*	✓answer (1)
9.2.1	OF ⊥ AC [line from centre bisects chord/*lyn v midpt halv kd*] ∴ AC ‖ GO [co-interior/*ko-binne* ∠s = 180° **OR/*OF*** corresp/*ooreenkomstige* ∠s =]	✓ S ✓ R ✓ R (3)
9.2.2	$\hat{G}_1 = \hat{A}_2$ [corresp/*ooreenk* ∠s; AC ‖ GO] $\hat{A}_2 = \hat{B}_1$ [∠s in same segment/∠e *in dies segment*] $\therefore \hat{G}_1 = \hat{B}_1$ **OR/*OF*** $\hat{G}_1 = \hat{B}_2$ [ext ∠ cyclic quad/*buite ∠ koordevh*] but ΔABF ≡ ΔCBF [s, ∠, s] $\therefore \hat{B}_2 = \hat{B}_1$ $\therefore \hat{G}_1 = \hat{B}_1$	✓ S ✓ R ✓ S ✓ R (4) ✓ S ✓ R ✓ R ✓ S (4)
9.3	OF : FB = 3 : 2 ∴ DO = 5*k* and DF = 8*k* ∴ $\frac{DG}{DA} = \frac{DO}{DF} = \frac{r}{\frac{8}{5}r}$ ∴ $\frac{DG}{DA} = \frac{5}{8}$	DB = 2*r* **OR/*OF*** DF = $2r - \frac{2}{5}r = \frac{8}{5}r$ [line ‖ side of Δ/*lyn ‖ sy v* Δ] ✓ S ✓ R ✓ S (3)
		[12]

QUESTION/VRAAG 10

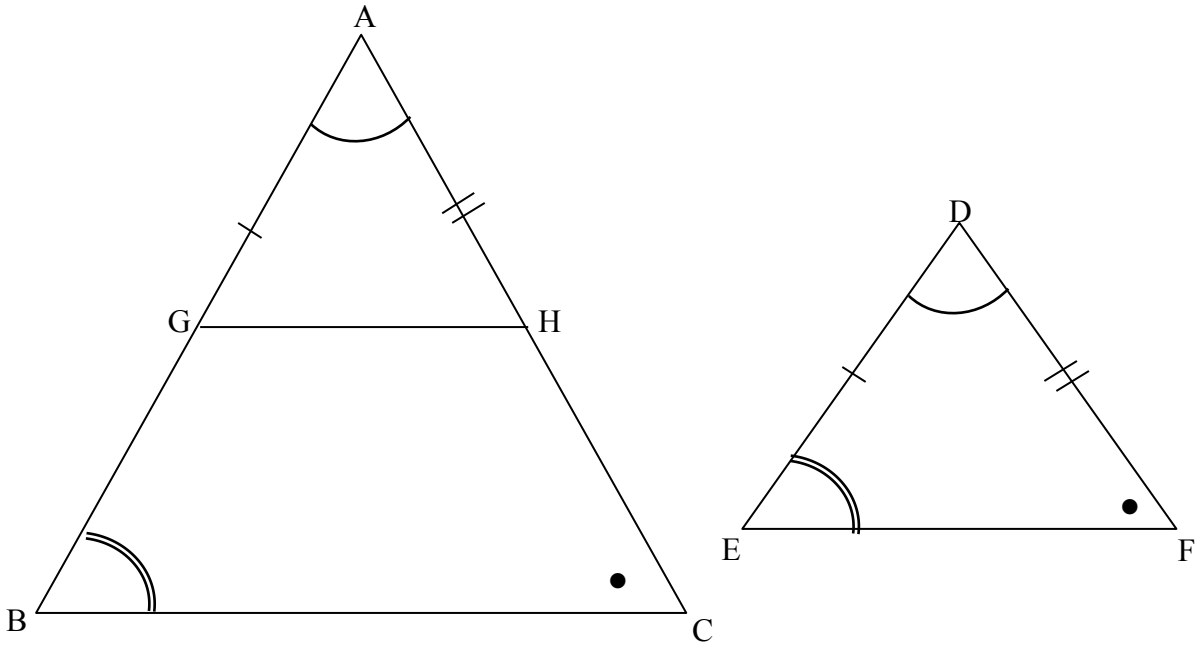


10.1	Tangent-chord theorem		✓ R (1)
10.2.1	$\hat{A}_2 + \hat{A}_3 = \hat{B}_1 + \hat{B}_2$	[$\angle^s$ opp = sides/$\angle e$ *teenoor* = *sye*]	✓ S ✓ R
	$\hat{S}_3 = \hat{B}_1 + \hat{B}_2$	[ext $\angle$ cyclic quad/*buite* $\angle$ *koordevh*]	✓ S ✓ R
	$\therefore \hat{S}_3 = \hat{A}_2 + \hat{A}_3$		
	$\therefore AB \parallel ST$	[corresp/*ooreenk* $\angle^s$ =]	✓ R (5)
	OR/*OF*		
	$R\hat{T}S = B\hat{A}S$	[ext $\angle$ cyclic quad/*buite* $\angle$ *koordevh*]	✓ S ✓ R
	$B\hat{A}S = A\hat{B}T$	[$\angle^s$ opp = sides/$\angle e$ *teenoor* = *sye*]	✓ S ✓ R
	$\therefore R\hat{T}S = A\hat{B}T$		
	$\therefore AB \parallel ST$	[corresp/*ooreenk* $\angle^s$ =]	✓ R (5)

10.2.2	$\hat{B}_2 = x$ [tan chord theorem/*raakl – koordst*] $x + \hat{T}_4 = \hat{B}_1 + \hat{B}_2$ [corresp/*ooreenk* $\angle^s$; AB // ST] $\therefore \hat{T}_4 = \hat{B}_1$ $\hat{B}_1 = \hat{A}_1$ [tan chord theorem/*raakl – koordst*] $\therefore \hat{T}_4 = \hat{A}_1$	✓ S ✓ R ✓ S ✓ R ✓ R (5)
10.2.3	$\hat{T}_4 = \hat{A}_1$ [proven/*bewys in* 10.2.2] $\therefore$ RTAP is a cyclic quadrilateral [line subtends = $\angle^s$] *Is 'n koordevierhoek* [*lyn onderspan* = $\angle e$]	✓ S ✓ R (2)
		[13]

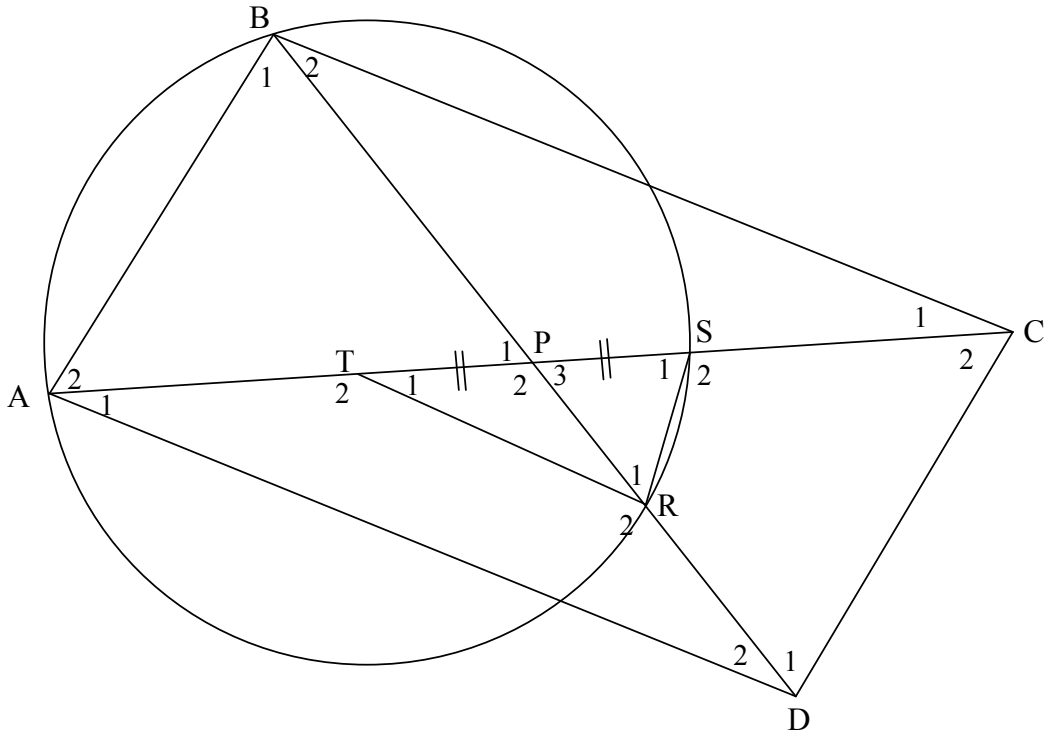
QUESTION/VRAAG 11

11.1



11.1	Constr: On sides AB and AC of ΔABC, mark points G and H respectively such that AG = DE and AH = DF. Draw GH/*Merk punt G en H op sy AB en AC van ΔABC onderskeidelik af sodanig dat AG = DE en AH = DF. Trek GH.* Proof/*Bewys*: $\Delta AGH \equiv \Delta DEF$ [s, ∠, s] $\therefore A\hat{G}H = \hat{E}$ $= \hat{B}$ [$\hat{B} = \hat{E}$, given/*gegee*] $\therefore GH \parallel BC$ [corresp/*ooreenk* $\angle^s$ =] $\therefore \frac{AG}{AB} = \frac{AH}{AC}$ [line ∥ side of Δ / *lyn* ∥ *sye v* Δ] $\therefore \frac{DE}{AB} = \frac{DF}{AC}$ [constr/*konstruksie*]	✓ construction/ *konstruksie* ✓ S/R ✓ S ✓ S /R ✓ S ✓ R (6)

11.2



11.2.1(a)	AP = PC [diag $\|\|^m$ bisect each other/*hoekl* $\|\|^m$ *halveer mekaar*] But TP = PS [given/*gegee*] AP – TP = PC – PS ∴ AT = SC	✓S ✓S OR S 2)
11.2.1(b)	In ΔPSR and ΔPBA : $\hat{P}_1 = \hat{P}_3$ [vertically opp $\angle^s$ / *regoorst* $\angle e$] $\hat{B}_1 = \hat{S}_1$ [$\angle^s$ in same segment/$\angle e$ *in dies segment*] ∴ ΔPSR ||| ΔPBA [∠, ∠, ∠] **OR/*OF*** In ΔPSR and ΔPBA : $\hat{P}_1 = \hat{P}_3$ [vertically opp $\angle^s$ / *regoorst* $\angle e$] $\hat{B}_1 = \hat{S}_1$ [$\angle^s$ in same segment/$\angle e$ *in dies segment*] $\hat{A}_2 = \hat{R}_1$ [sum $\angle^s$ Δ / *som* $\angle e$ Δ] ∴ ΔPSR ||| ΔPBA [∠, ∠, ∠]	✓S ✓R ✓S ✓R ✓R (5) ✓S ✓R ✓S ✓R ✓S (5)

11.2.2(a)	$\frac{PR}{PA}=\frac{PS}{PB}$ [|||Δs] $\therefore \frac{PR}{PA}=\frac{TR}{AD}=\frac{PS}{PB}$ [given $\frac{PR}{PA}=\frac{TR}{AD}$] $\therefore \frac{PR}{PA}=\frac{TR}{AD}=\frac{TP}{PD}$ [PS = TP; PB = PD] $\therefore \Delta RPT \text{ ||| } \Delta APD$ [sides of Δ in prop/*sye v Δ in dies verhouding*]	✓ S (all 3 ratios) ✓ S ✓ R (3)
11.2.2(b)	$\hat{T}_1 = \hat{D}_2$ [||| Δs] ∴ ATRD is a cyclic quad [converse: ext ∠ of cyclic quad/ *Omgekeerde buite ∠ v* koordevh]	✓ S ✓ R (2)
		[18]

TOTAL/*TOTAAL*: 150