Province of the
EASTERN CAPE
EDUCATION

NASIONALE SENIOR SERTIFIKAAT

GRAAD 12

JUNIE 2017

WISKUNDE V2

PUNTE: **150**

TYD: **3 uur**

* J M A T H A 2 *

Hierdie vraestel bestaan uit 14 bladsye, insluitend 1 bladsy inligtingsblad, en 'n SPESIALE ANTWOORDEBOEK.

INSTRUKSIES EN INLIGTING

1. Hierdie vraestel bestaan uit 11 vrae.
2. Antwoord AL die vrae in die SPESIALE ANTWOORDEBOEK voorsien.
3. Toon duidelik ALLE berekeninge, diagramme, grafieke, ensovoorts wat jy gebruik het in die bepaling van jou antwoorde.
4. Antwoorde alleen sal NIE noodwendig volpunte toegeken word NIE.
5. Indien nodig moet jy jou antwoorde tot TWEE desimale plekke afrond, tensy anders vermeld.
6. Diagramme is nie noodwendig volgens skaal geteken nie.
7. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, tensy anders vermeld.
8. 'n Inligtingsblad met formules is aan die einde van die vraestel ingesluit.
9. Skryf netjies en leesbaar.

VRAAG 1

Die persentasies wat deur leerlinge in hulle eerste Wiskunde-toets behaal is, word in die tabel hieronder getoon.

Persentasies	Frekwensie	Kumulatiewe Frekwensie
$30 \leq x < 40$	1	
$40 \leq x < 50$	2	
$50 \leq x < 60$	9	
$60 \leq x < 70$	12	
$70 \leq x < 80$	11	
$80 \leq x < 90$	9	
$90 \leq x < 100$	6	

1.1 Voltooi die kumulatiewe frekwensie kolom in die tabel wat in die ANTWOORDEBOEK gegee is. (3)

1.2 Teken ’n ogief (kumulatiewe frekwensie kurwe), op die rooster wat in die ANTWOORDEBOEK voorsien is, om die data voor te stel. (4)

1.3 Beraam hoeveel leerlinge 75% of minder in die toets behaal het. Toon dit met ’n B op die grafiek aan. (2)
[9]

VRAAG 2

Die water verbruik (in kiloliter) van 15 huisgesinne is soos volg:

12,4	20,0	34,5	40,1	18,9
19,7	34,9	15,1	23,8	23,7
31,1	20,9	19,7	36,5	33,6

2.1 Skryf die vyfgetalopsomming vir die data neer. (4)

2.2 Teken 'n mond-en-snor diagram om die data voor te stel. (3)

2.3 Lewer kommentaar op die skeefheid van die data wat in VRAAG 2.2 voorgestel is. (1)

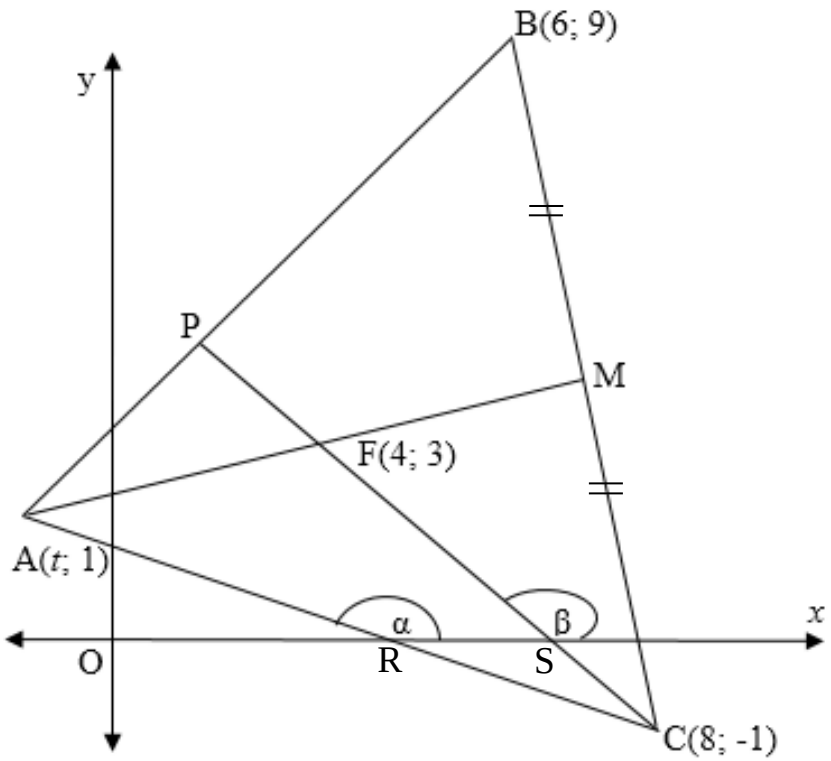
2.4 Bepaal die standaardafwyking van die data. (2)

2.5 Gebruik die standaardafwyking om op die verspreiding van die data kommentaar te lewer. (1)

[11]

VRAAG 3

In die diagram is A(t ; 1), B(6 ; 9) en C(8 ; -1) punte in 'n Cartesiesevlak.
M is die middelpunt van BC. P is 'n punt op AB. CP sny AM by F(4 ; 3). R is die x-afsnit van lyn AC en S is die x-afsnit van lyn PC.



3.1 Bereken die koördinate van M. (2)

3.2 Bepaal die vergelyking van die mediaan AM. (4)

3.3 Bereken die waarde van t. (2)

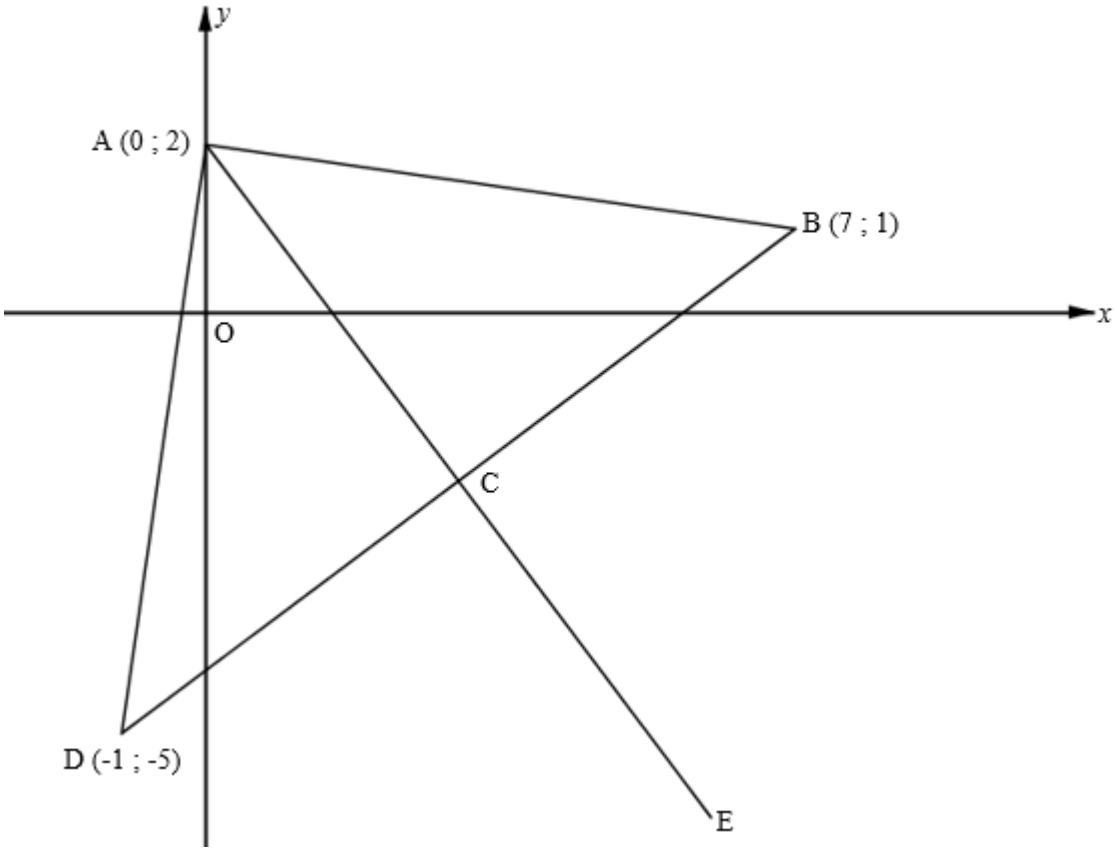
3.4 Bereken die gradiënt van PC. (2)

3.5 Bepaal die grootte van β. (2)

3.6 Bereken die grootte van $A\hat{C}P$. (4)
[16]

VRAAG 4

Vierhoek ABED, met hoekpuntee A (0 ; 2), B (7; 1), D (-1 ; -5) en E, is hieronder geskets. Hoeklyne AE en BD kruis by C.



4.1 Bereken die koördinate van C, die middelpunt van BD. (2)

4.2 Toon dat CA = CB as die koördinate van C (3 ; -2) is. (3)

4.3 Waarom is $D\hat{A}B$ = 90°? (5)

4.4 Gee, vervolgens, die vergelyking van die sirkel met middelpunt C wat deur A, B, E en D gaan. (2)

4.5 Bereken die gradiënt van BC, die radius van die sirkel. (2)

4.6 Bepaal die vergelyking van die raaklyn aan die sirkel by B in die vorm y = … (3)

4.7 Verduidelik waarom ABED 'n reghoek is. (3)

[20]

VRAAG 5

5.1 As sin 58^o = *k*, bepaal, **sonder die gebruik van 'n sakrekenaar:**

5.1.1 sin 238° (2)

5.1.2 cos 58° (2)

5.2 Vereenvoudig, **sonder die gebruik van 'n sakrekenaar**:

$$\frac{\tan 150°.\sin 300°.\sin 10°}{\cos 225°.\sin 135°.\cos 80°}$$ (7)

5.3 Gegee $\cos(\alpha + \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

Gebruik die formule vir $\cos(\alpha + \beta)$ om die formule vir $\sin(\alpha + \beta)$ af te lei. (4)

5.4 Bewys die identiteit: $\frac{\cos 2x + 1}{\sin 2x.\tan x} = \frac{1}{tan^2 x}$ (4)

5.5 5.5.1 Toon aan dat tan *x* = 2sin *x* geskryf kan word as sin *x* = 0 of cos *x* = ½. (3)

5.5.2 Skryf, vervolgens, die algemene oplossing van die vergelyking

$\tan x = 2\sin x$ neer. (4)

[26]

VRAAG 6

Gegee $f(x) = \tan x$ en $g(x) = \sin(x + 45°)$

6.1 Teken die grafieke van *f(x)* en g(*x)* op dieselfde assestelsel vir $x \in [-90°; 180°]$, op die rooster wat in die ANTWOORDEBOEK voorsien is. (6)

6.2 Gebruik jou grafieke om die waarde(s) van *x*, in die interval $x \in [-90°; 90°]$ te bepaal, waarvoor:

6.2.1 $g(x) - f(x) = 1$ (2)

6.2.2 $g(x) \geq f(x)$ (2)

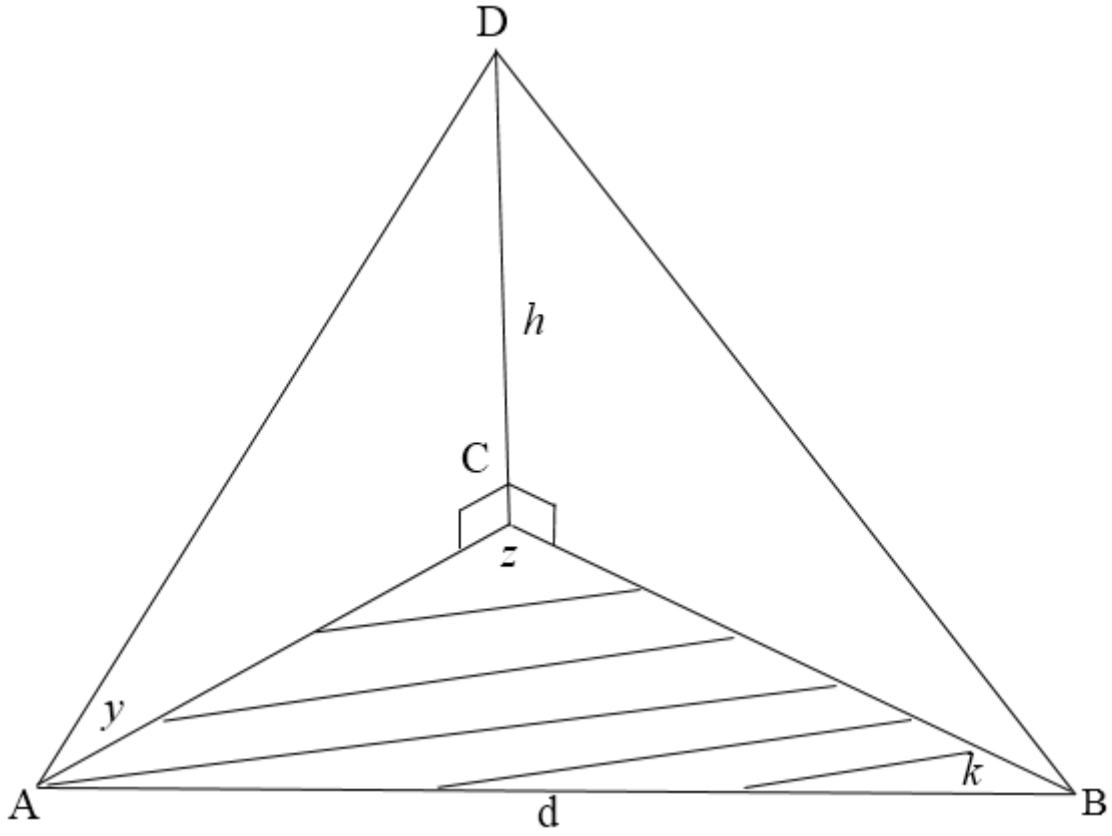
6.3 Meld die periode van $y = f(2x)$. (1)

[11]

VRAAG 7

Om die hoogte *h* van 'n boom CD te bepaal was die einde van die skaduwee op twee verskillende tye van die dag by punte gemerk A en B, in dieselfde horisontalevlak as C, gemeet. Die skaduwee van die boom het *z*° tydens die observasie tye roteer, d.w.s. $A\hat{C}B = z°$.

AB = *d* meter, $A\hat{B}C = k°$ en die hoogtehoek van die son by A was *y*°.



7.1 Bepaal die lengte van AC in terme van *z*, *k* en *d*. (2)

7.2 Bepaal die lengte van AC in terme van *y* en *h*. (2)

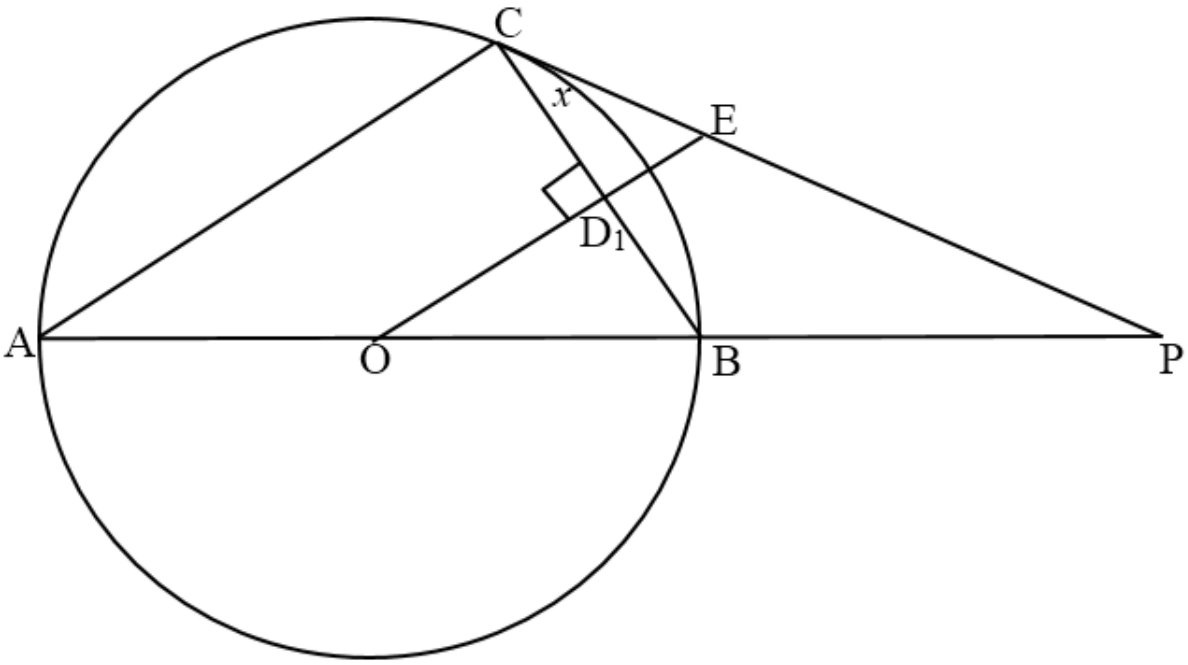
7.3 Toon, vervolgens, dat $h = \frac{d \sin k . \tan y}{\sin z}$. (1)

7.4 Bereken die lengte van *h* as $z = 125°, d = 80m, k = 38°$ en $y = 40°$. (2)
[7]

Gee redes vir ALLE bewerings in VRAAG 8, 9, 10 EN 11.

VRAAG 8

In die figuur is AB die middellyn van die sirkel met middelpunt O. AB is verleng na P. PC is 'n raaklyn aan die sirkel by C en lyn ODE is loodreg op BC en sny BC by D en PC by E.



8.1 Gee 'n rede waarom $CD = DB$ is. (1)

8.2 Toon aan dat AC || OE. (3)

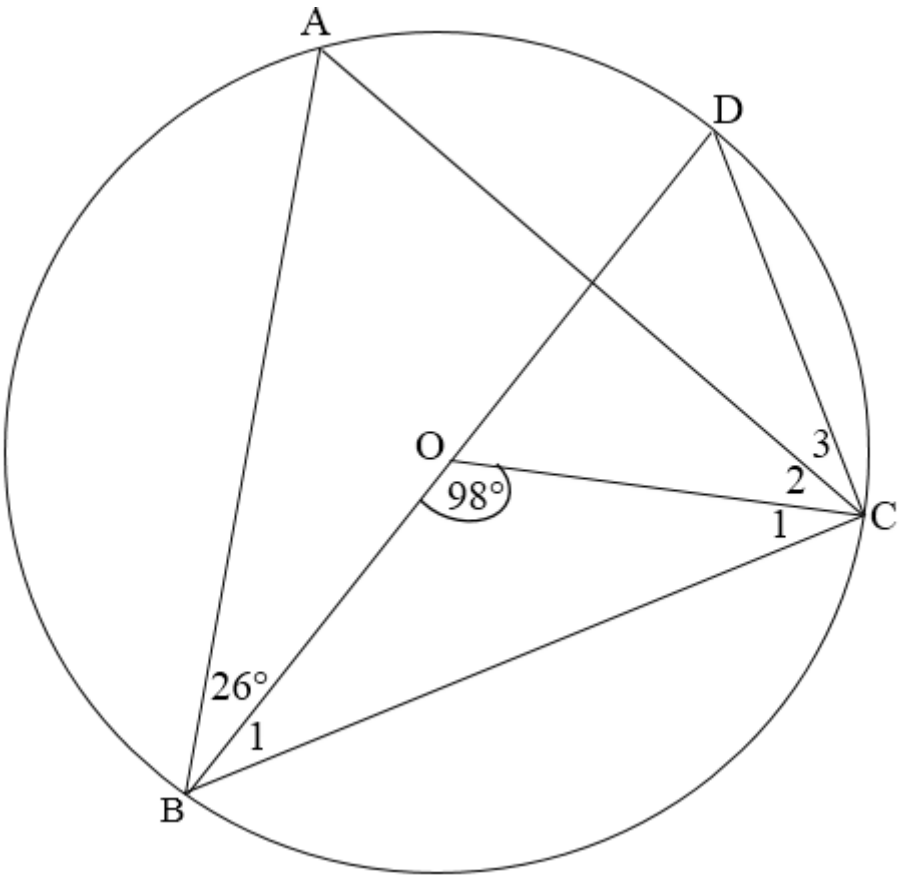
8.3 As $B\hat{C}P = x$, noem twee ander hoeke gelyk aan *x*. (4)

8.4 Bewys dat OBEC 'n koordevierhoek is. (2)

[10]

VRAAG 9

In die diagram is BD die middellyn van die sirkel ABCD met middelpunt O. $A\widehat{B}D = 26°$ en $B\widehat{O}C = 98°$.



Bereken:

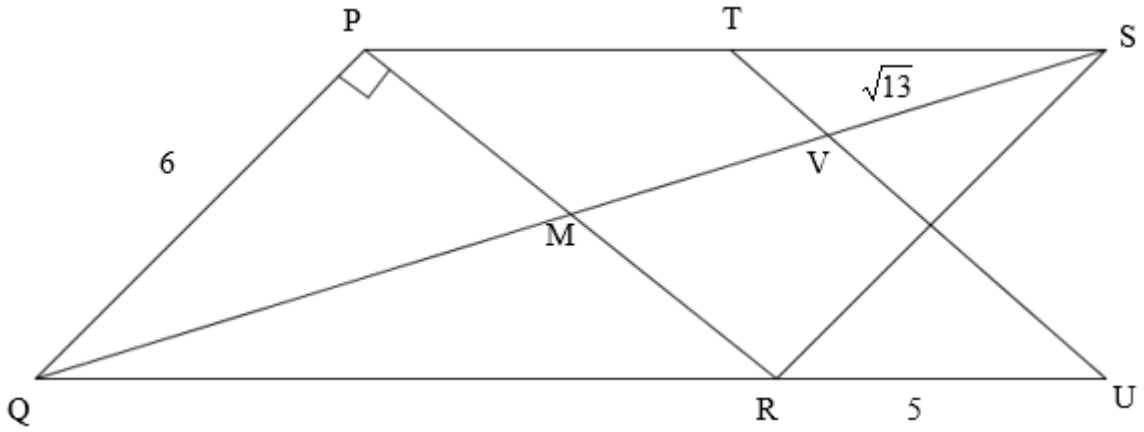
9.1 $\widehat{A}$ (2)

9.2 $\widehat{B}_1$ (3)

9.3 $\widehat{C}_2$ (3)
[8]

VRAAG 10

In die diagram hieronder is PQRS 'n parallelogram, met die hoeklyne wat by M sny.
$Q\hat{P}R = 90^0$. QR is verleng na U. T is 'n punt op PS. TU sny QS by V.
$PQ = 6, \quad PR = 8, \quad RU = 5$ en $VS = \sqrt{13}$



10.1 Bepaal, met redes, die volgende verhoudings in eenvoudige vorm:

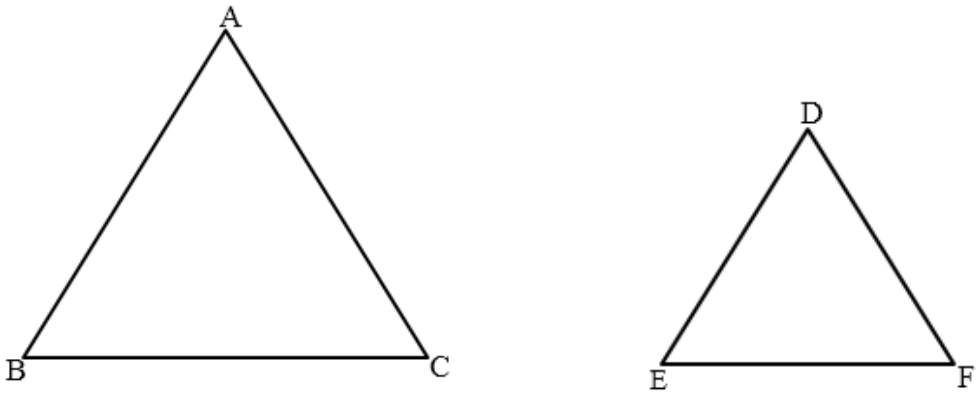
10.1.1 $\frac{UR}{RQ}$ (3)

10.1.2 $\frac{VM}{MQ}$ (4)

10.2 Bewys, vervolgens, dat $MR \parallel VU$. (2)
[9]

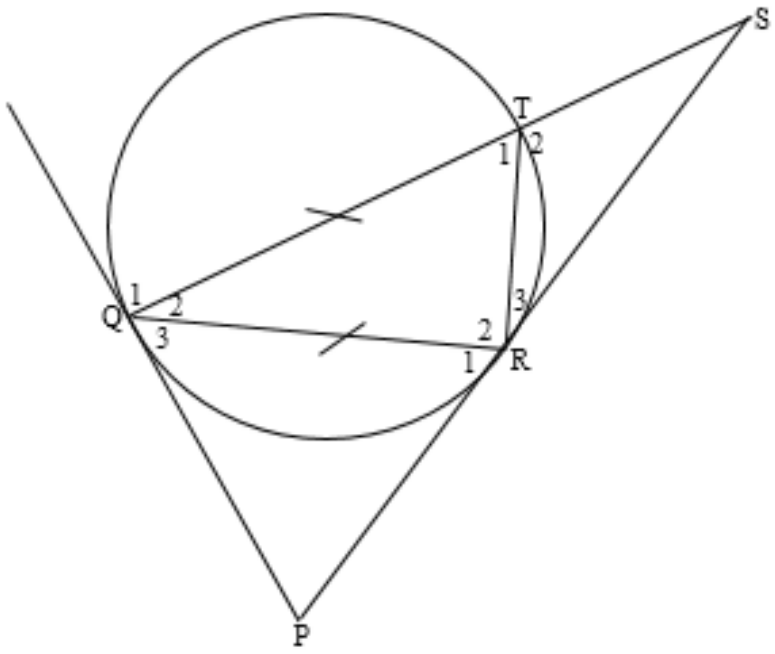
VRAAG 11

11.1 In ΔABC en ΔDEF, is $\hat{A} = \hat{D}$, $\hat{B} = \hat{E}$ en $\hat{C} = \hat{F}$, onderskeidelik. Bewys dat $\frac{AB}{DE} = \frac{AC}{DF}$.



(7)

11.2 Raaklyne PQ en PR raak die sirkel by Q en R onderskeidelik. T is 'n punt op die sirkel sodat QT = QR. QT en PR word verleng en ontmoet PR by S. $\hat{Q}_1 = x$.



11.2.1 Noem DRIE ander hoeke gelyk aan *x*. (3)

11.2.2 Bepaal, in terme van *x*, die grootte van $\hat{Q}_2$. (2)

11.2.3 Toon, vervolgens, aan dat TR || QP. (3)

11.2.4 Bewys dat ΔSTR ||| ΔSRQ. (3)

11.2.5 Toon, vervolgens, aan dat $RS^2 = ST \times SQ$. (2)

11.2.6 Indien dit verder gegee is dat $QT : TS = 3 : 2$, toon dat $\frac{SP}{PQ} = \frac{5}{3}$. (3)

[23]

TOTAAL: 150

INLIGTINGSBLAD : WISKUNDE

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

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

$\sum_{i=1}^{n} 1 = n$ $\quad \sum_{i=1}^{n} i = \frac{n(n+1)}{2}$ $\quad T_n = a + (n-1)d$ $\quad S_n = \frac{n}{2}(2a + (n-1)d)$

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

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

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

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

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

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

In ΔABC: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ $\quad a^2 = b^2 + c^2 - 2bc.\cos A$

$$area\,\Delta ABC = \frac{1}{2}ab.\sin C$$

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

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

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

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

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

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

Province of the
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EDUCATION

LEARNER'S NAME: ***LEERDERNAAM:***	

GRADE 12 ***GRAAD 12***	

NATIONAL/*NASIONALE* SENIOR CERTIFICATE/*SERTIFIKAAT*

GRADE 12/*GRAAD 12*

* J M A T H E 4 *

JUNE/*JUNIE* 2017

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

QUESTION/*VRAAG*	MARK/*PUNT*	INITIAL/*PARAAF*	MOD.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
TOTAL/*TOTAL*			

This SPECIAL ANSWER BOOK consists of 22 pages. /
Hierdie SPESIALE ANTWOORDEBOEK bestaan uit 22 bladsye.

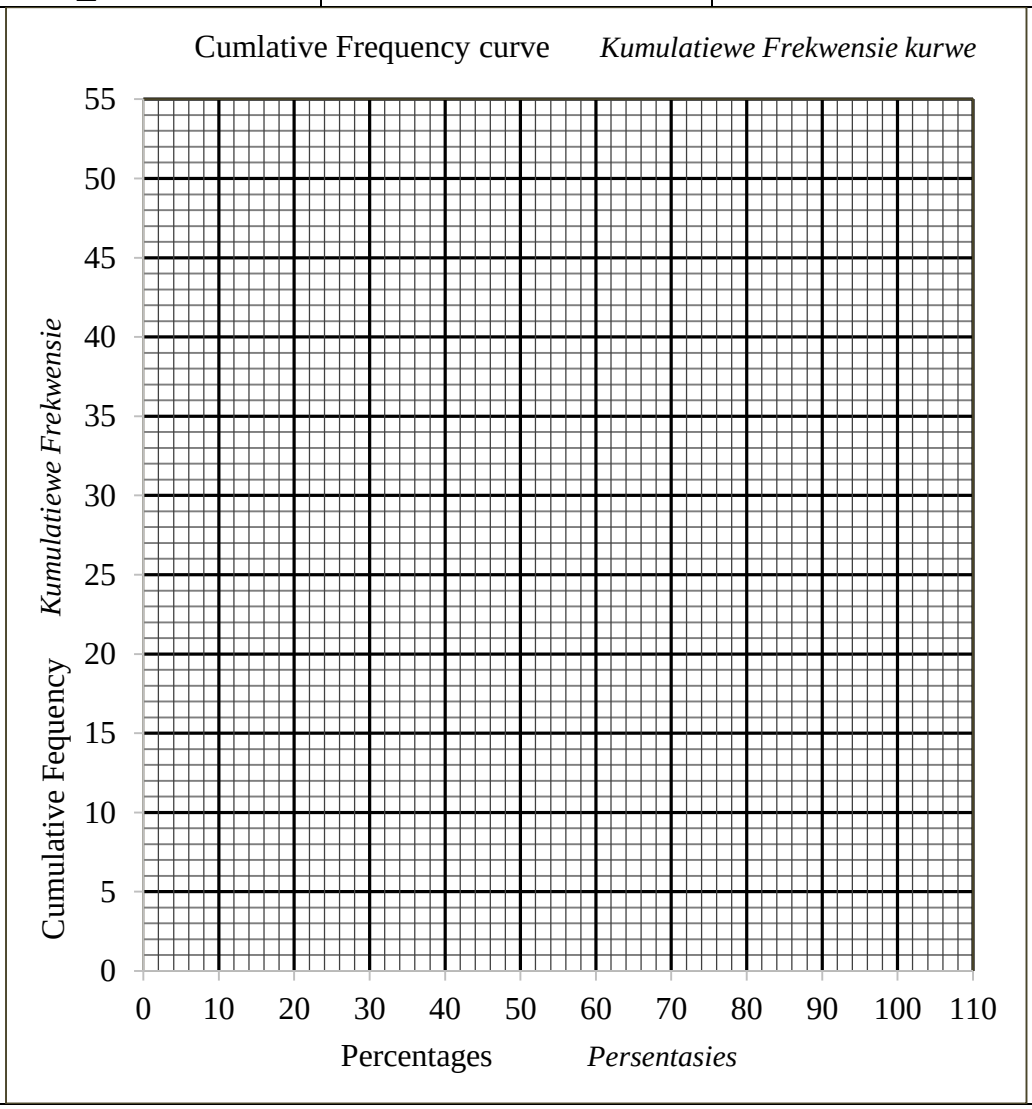
QUESTION/*VRAAG* 1

1.1

Percentages/ *Persentasies*	Frequency/ *Frekwensie*	Cumulative Frequency/ *Kumulatiewe Frekwensie*
$30 \leq x < 40$	1	
$40 \leq x < 50$	2	
$50 \leq x < 60$	9	
$60 \leq x < 70$	12	
$70 \leq x < 80$	11	
$80 \leq x < 90$	9	
$90 \leq x < 100$	6	

(3)

1.2



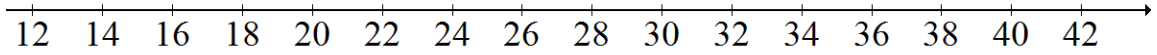
(4)

1.3

(2)

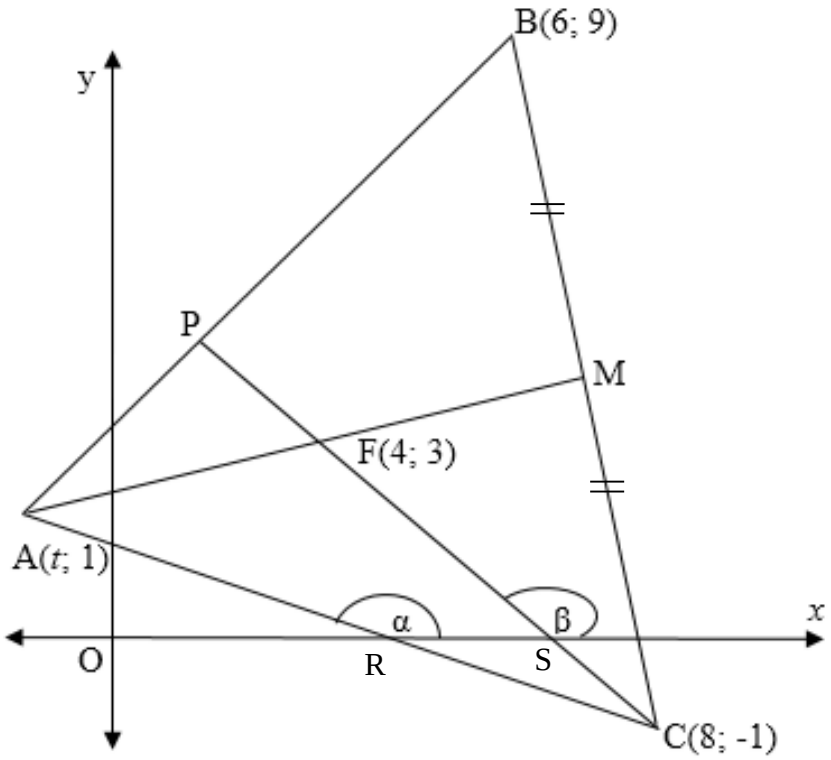
[9]

QUESTION/*VRAAG* 2

2.1		(4)
2.2		(3)
2.3		(1)
2.4		(2)
2.5		(1)

[11]

QUESTION/*VRAAG* 3

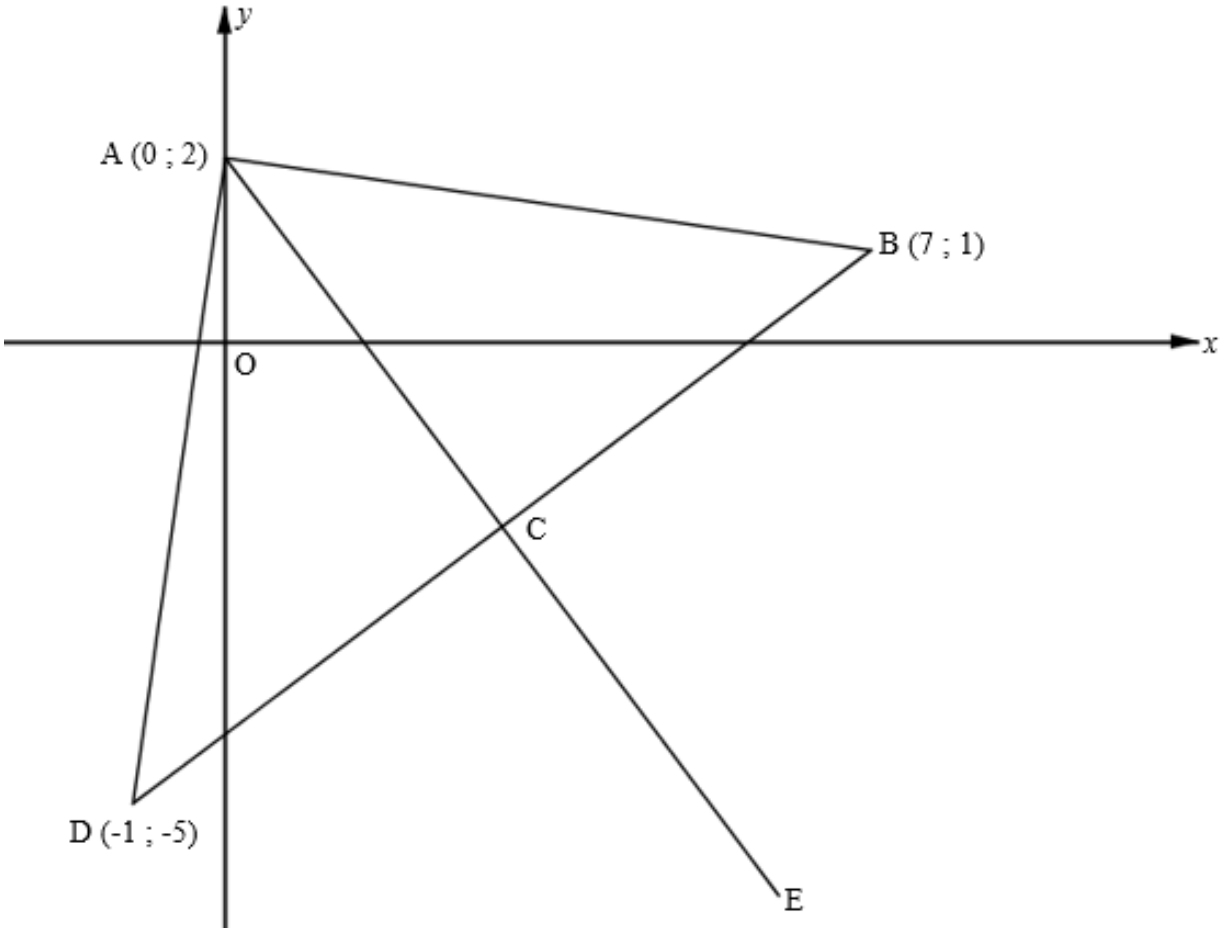


3.1		(2)
3.2		(4)

3.3		(2)
3.4		(2)
3.5		(2)
3.6		(4)

[16]

QUESTION/*VRAAG* 4



4.1		(2)
4.2		(3)

4.3		(5)
4.4		(2)
4.5		(2)
4.6		(3)
4.7		(3)

[20]

QUESTION/*VRAAG* 5

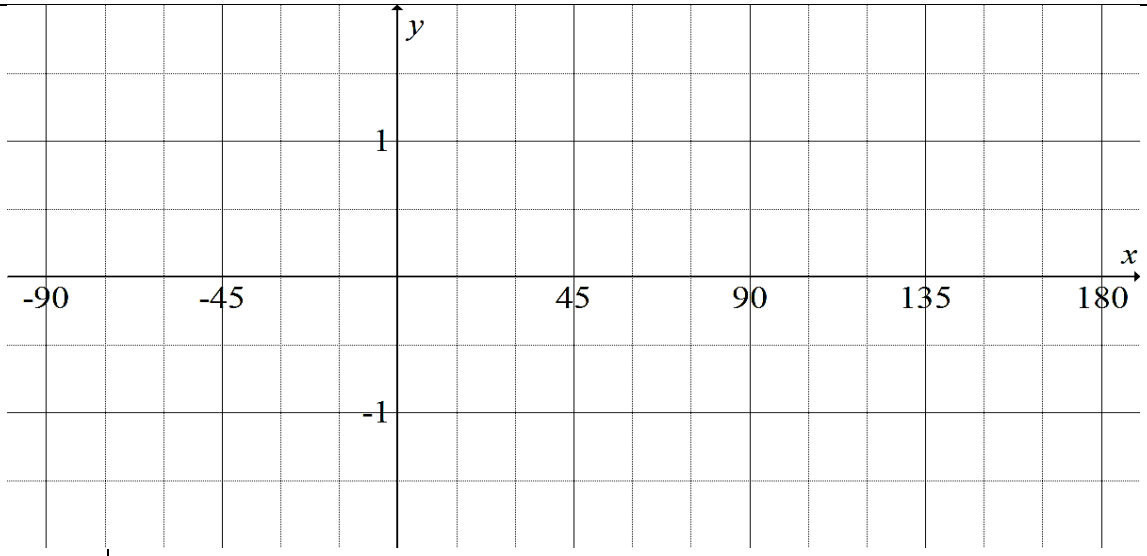
5.1	5.1.1		(2)
	5.1.2		(2)
5.2			(7)
5.3			(4)

5.4			(4)
5.5	5.5.1		(3)
	5.5.2		(4)

[26]

QUESTION/*VRAAG* 6

6.1



(6)

6.2.1

(2)

6.2.2

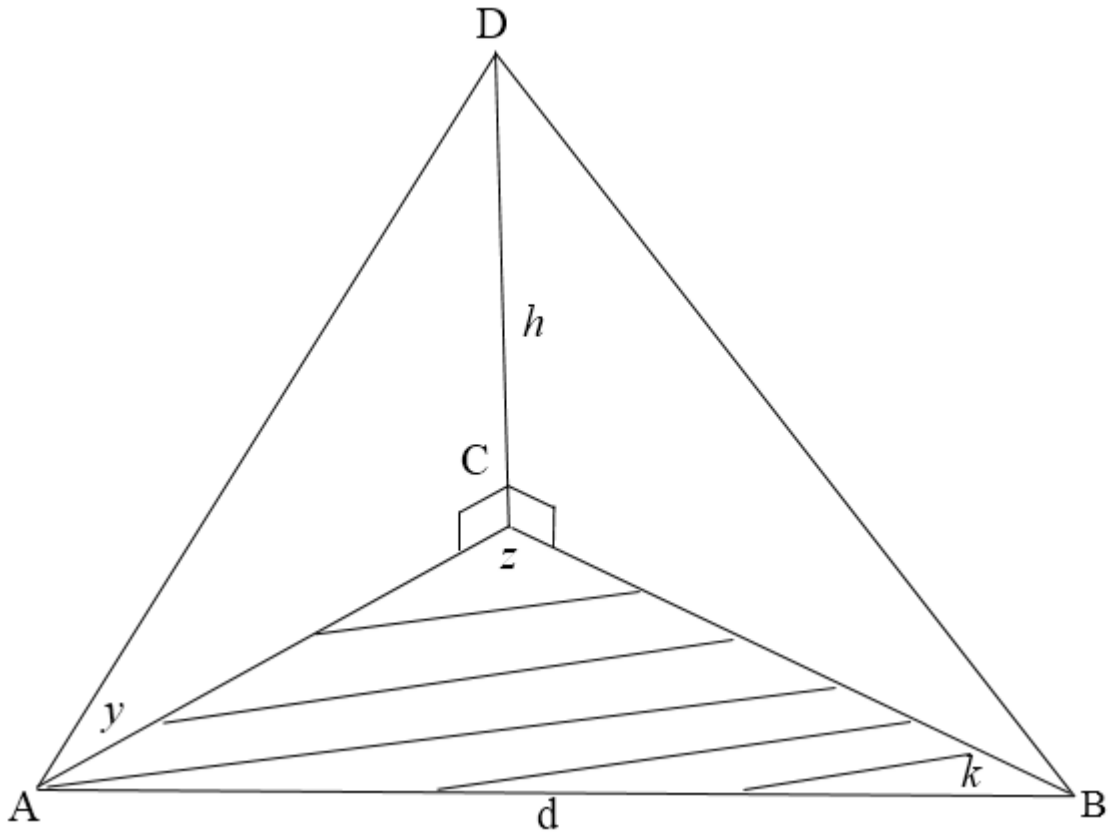
(2)

6.3

(1)

[11]

QUESTION/*VRAAG* 7

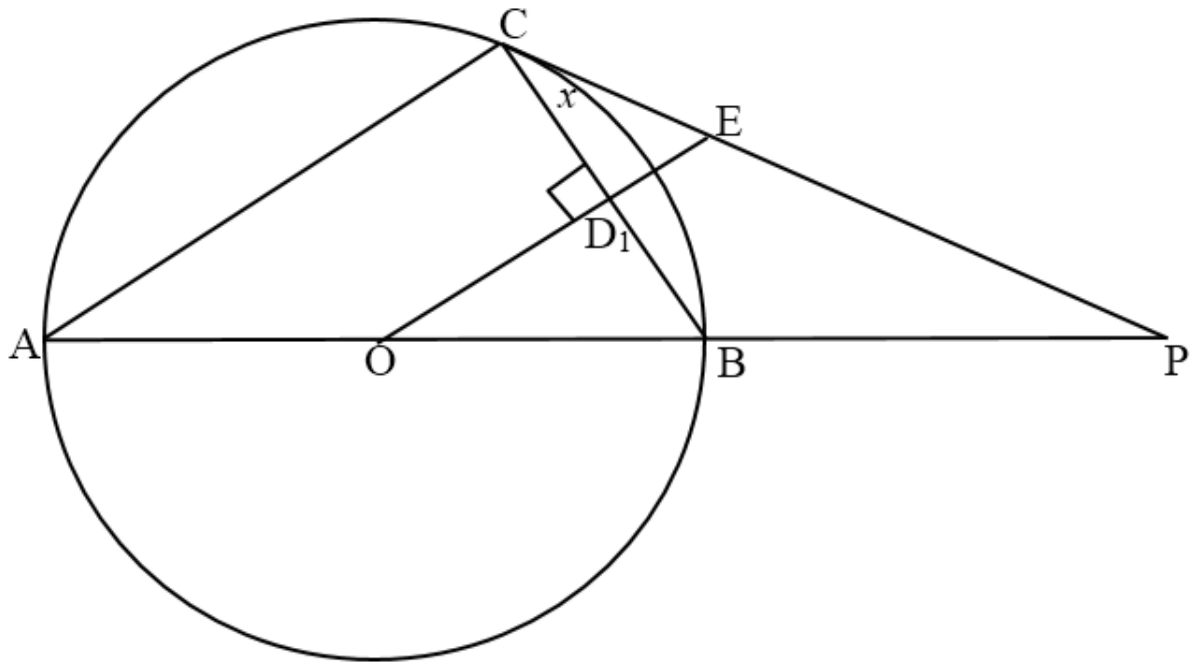


7.1		(2)
7.2		(2)

7.3		(1)
7.4		(2)

[7]

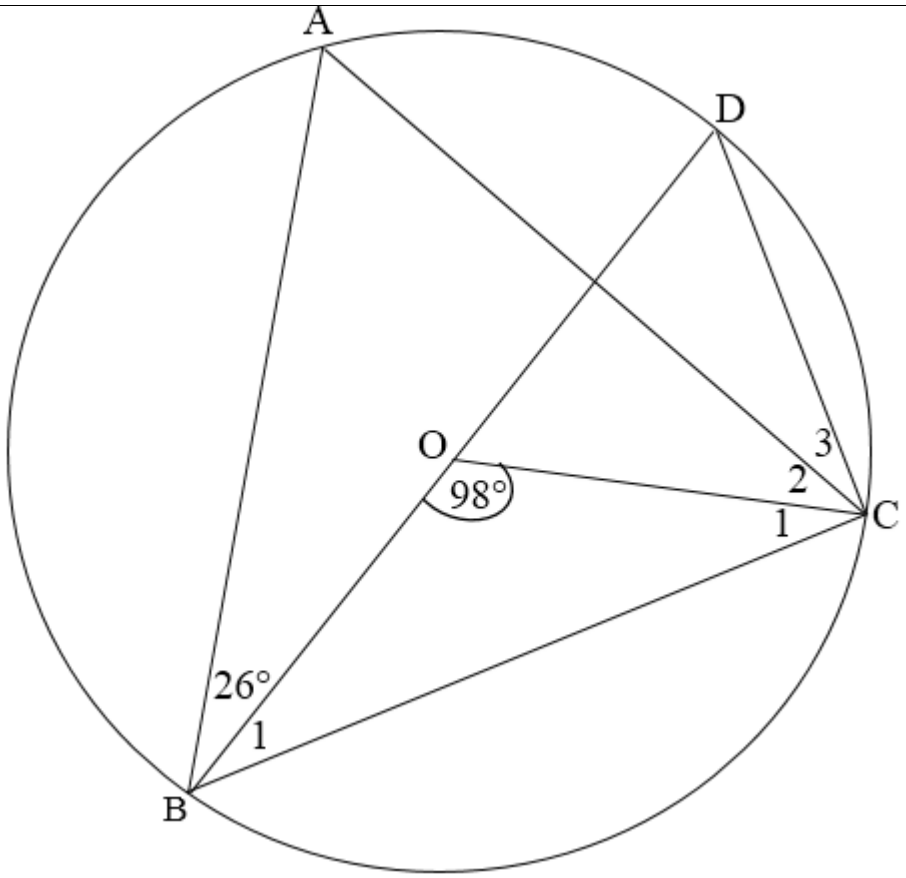
QUESTION/*VRAAG* 8



8.1		(1)
8.2		(3)
8.3		(4)
8.4		(2)

[10]

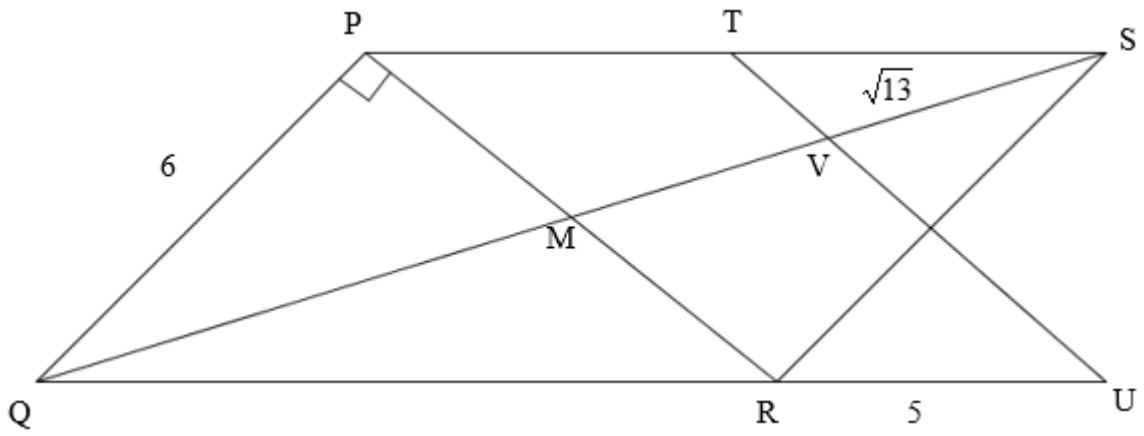
QUESTION/*VRAAG* 9



9.1		(2)
9.2		(3)
9.3		(3)

[8]

QUESTION/*VRAAG* 10

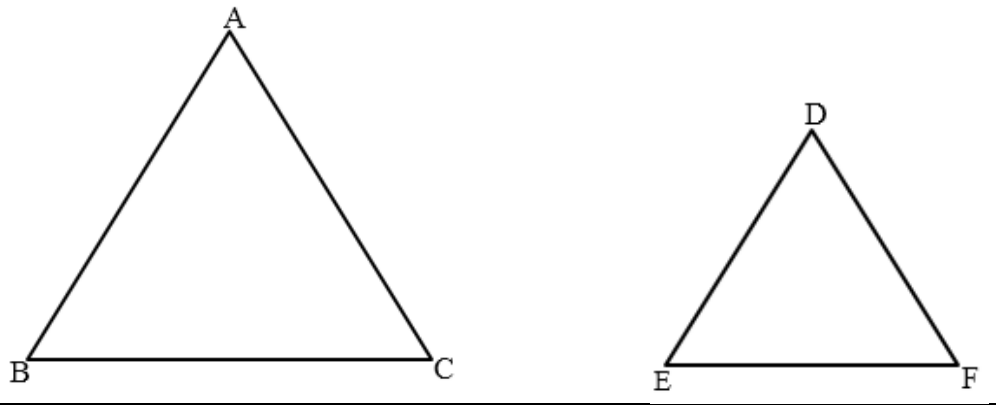


10.1	10.1.1		(3)
	10.1.2		(4)
10.2			(2)

[9]

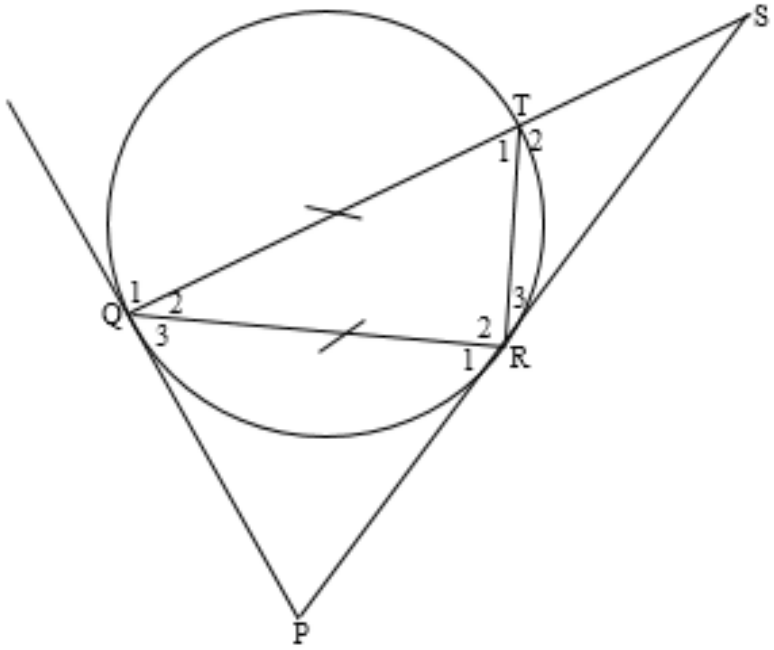
QUESTION/*VRAAG* 11

11.1



(7)

11.2



11.2.1 (3)

11.2.2 (2)

11.2.3 (3)

11.2.4 (3)

	11.2.5		(2)
	11.2.6		(3)

[23]

TOTAL/*TOTAAL*: 150

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CERTIFICATE/*SERTIFIKAAT*

GRADE/*GRAAD* 12

JUNE/*JUNIE* 2017

MATHEMATICS P2/*WISKUNDE V2*
MEMORANDUM

MARKS/*PUNTE*: 150

This memorandum consists of 12 pages.
Hierdie memorandum bestaan uit 12 bladsye.

QUESTION 1 / *VRAAG 1*

1.1

Percentages / *Persentasies*	Frequency / *Frekwensie*	Cumulative Frequency / *Kumulatiewe Frekwensie*
$30 \leq x < 40$	1	1
$40 \leq x < 50$	2	3
$50 \leq x < 60$	9	12
$60 \leq x < 70$	12	24
$70 \leq x < 80$	11	35
$80 \leq x < 90$	9	44
$90 \leq x < 100$	6	50

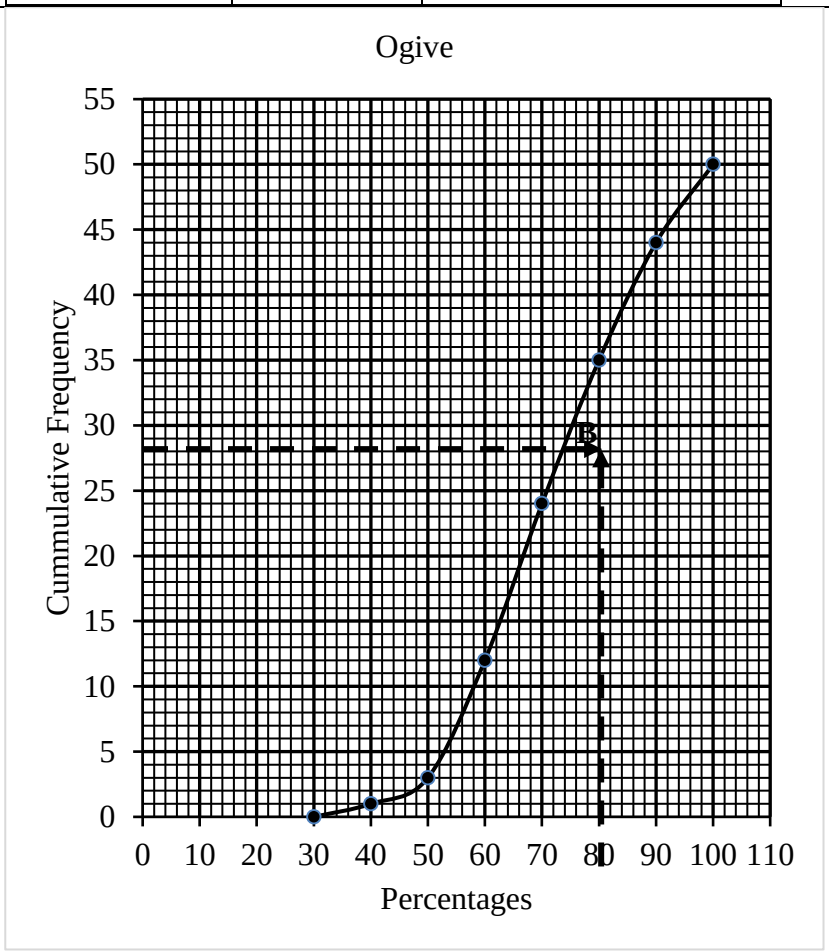
✓ 3, 12

✓ 24, 35, 44

✓ 50

(3)

1.2



✓ upper limits / *bo-limiete*

✓cum *f* / *kum. f*

✓shape / *vorm*

✓grounded / *ge-anker*

(4)

1.3 Approx. 30 [accept between 28 – 32]
Ongeveer 30 [aanvaar tussen 28 – 32]

✓✓ answer/ indicated on graph.
antwoord / op grafiek aangedui (2)

[9]

QUESTION 2 / *VRAAG 2*

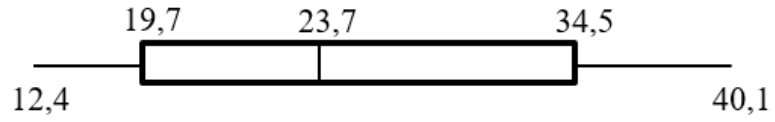
	12,4	15,1	18,9	19,7	19,7	20,0
	20,9	23,7	23,8	31,1	33,6	34,5
	34,9	36,5	40,1			

2.1

Minimum / *Minimum* = 12.4
Lower quartile / *Onderste kwartiel* (Q_1) = 19.7
Median / *Mediaan* (Q_2) = 23.7
Upper quartile / *Boonste kwartiel* (Q_3) = 34.5
Maximum / *Maksimum* = 40.1

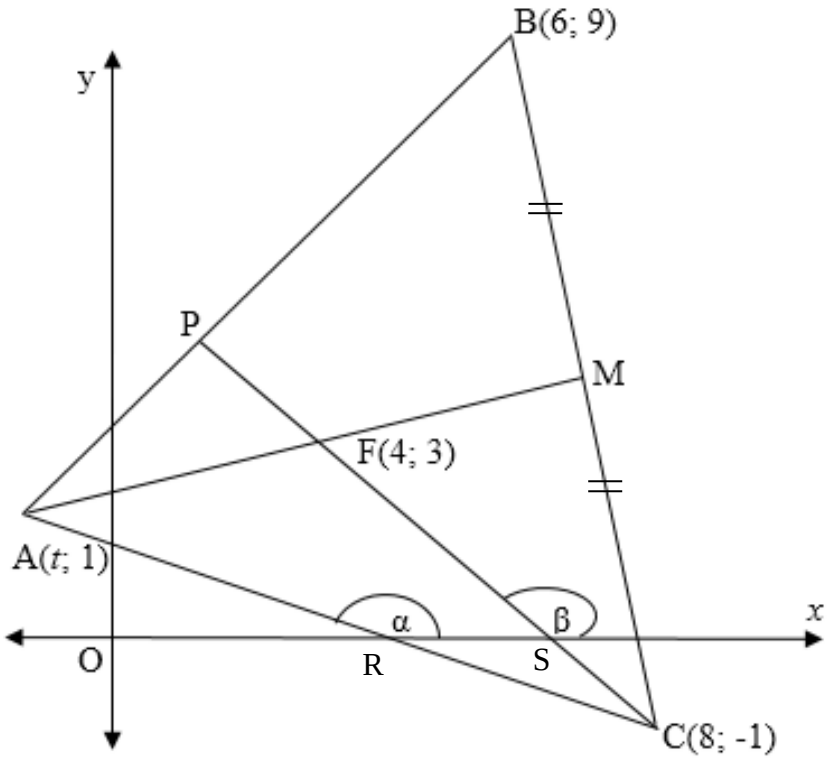
✓ min & max
✓ Q_1
✓ Q_2
✓ Q_3

(4)

2.2		✓ min / max ✓ Q_1 / Q_3 ✓ Q_2 (3)
2.3	Skewed positively to the right. Skeef positief na regs	✓positively skewed / *positief skeef* (1)
2.4	SD/SA = 8,36	✓✓ answer / *antwoord* (2)
2.5	A small standard deviation indicates that the data is clustered around the mean. **OR/OF** A large standard deviation indicates that the data is more spread out. *'n Klein standaardafwyking dui aan dat die data rondom die gemiddelde gegroepeer is. 'n Groot standaardafwyking dui aan dat die data meer versprei is.*	✓ answer / *antwoord* (1)

[11]

QUESTION 3 / *VRAAG 3*

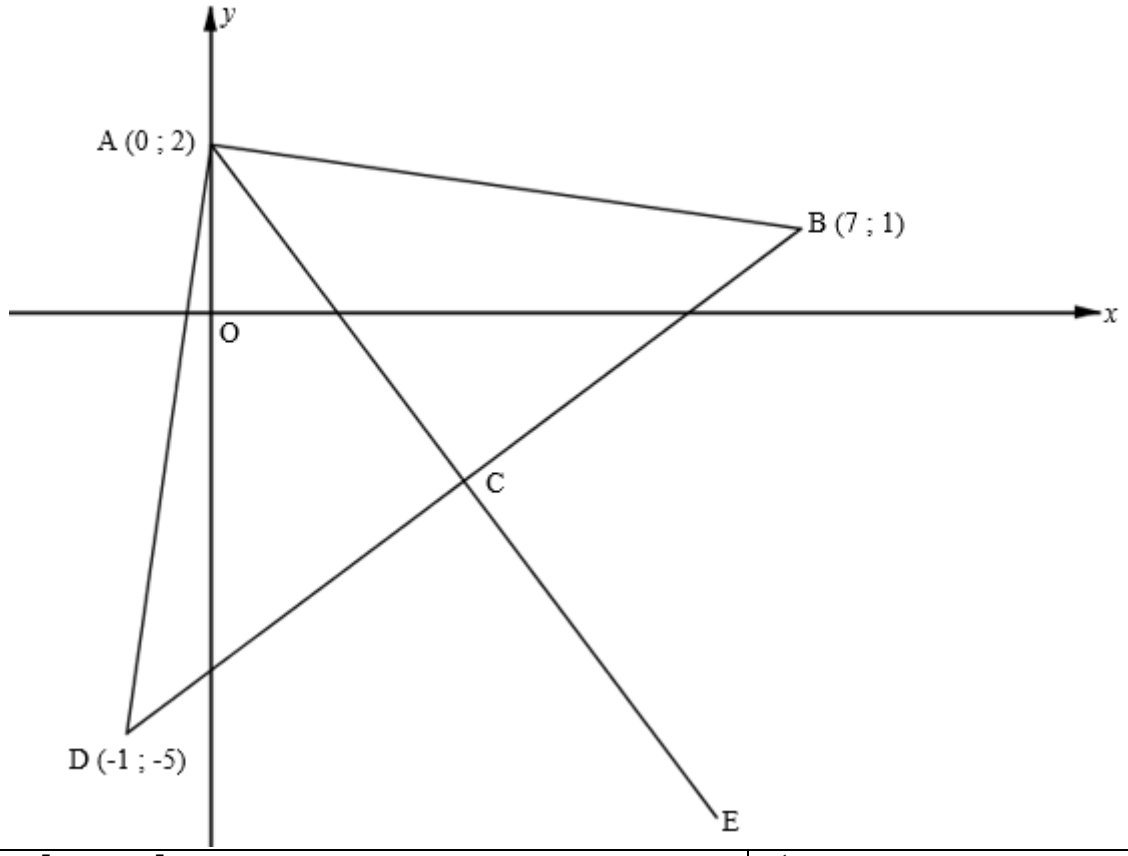


3.1	M = $\left[\frac{6+8}{2} ; \frac{9-1}{2}\right]$ M = (7 ; 4)	✓*x*- value of M / *x-waarde van M* ✓*y*- value of M / *y-waarde van M* (2)
3.2	$m_{FM} = \frac{4-3}{7-4} = \frac{1}{3}$ $y - y_1 = \frac{1}{3}(x - x_1)$ m = $\frac{1}{3}$ $y - 4 = \frac{1}{3}(x - 7)$ M = (7; 4) $\therefore y = \frac{1}{3}x + \frac{5}{3}$	✓substituting / *vervanging* ✓ value of m_{FM} / *waarde van* m_{FM} ✓ substituting M(7; 4) / *vervanging* M(7; 4) ✓ answer / *antwoord* (4)

3.3	$1 = \frac{1}{3}t + \frac{5}{3}$ $t = -2$ **OR / OF** $m_{AF} = m_{FM}$ $\frac{3-1}{4-t} = \frac{1}{3}$ $4 - t = 6$ $t = -2$	✓ substitution into line equation / *vervanging in lyn vergelyking* ✓ answer (as negative) / *antwoord (as negatief)* **OR / OF** ✓ substitution into grad eqn / *vervanging in gradiënt vergelyking* ✓answer as negative / *antwoord as negatief* (2)
3.4	$m_{PC} = \frac{3-(-1)}{4-8} = -1$ ANSWER ONLY FULL MARKS/ *SLEGS ANTWOORD*	✓ substitution / *vervanging* ✓ answer / *antwoord* (2)
3.5	$\tan\beta = -1$ $\beta = 135°$	✓ $\tan\beta = -1$ ✓ $\beta = 135°$ (2)
3.6	$\tan\alpha = \frac{-2}{10} = -\frac{1}{5}$ $\therefore \alpha = 180° - 11.31^0$ $= 168.69°$ $A\hat{C}P = \alpha - \beta$ $= 33.69°$	✓ $\tan\alpha = -\frac{1}{5}$ ✓ $\alpha = 168.69°$ ✓$A\hat{C}P = \alpha - \beta$ ✓ answer / *antwoord* (4)

[16]

QUESTION 4 / *VRAAG 4*

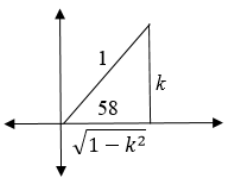


4.1	$C = \left[\frac{7-1}{2}; \frac{1-5}{2}\right]$ $= [3; -2]$	ANSWER ONLY / *SLEGS ANTWOORD*	✓*x*-value /*waarde* ✓ *y*-value /*waarde* (2)

4.2	$CA^2 = (3-0)^2 + (2+2)^2$ $CA^2 = 25$ $CA = 5$ $CB^2 = (7-3)^2 + (1+2)^2$ $CB^2 = 25$ $CB = 5$ $\therefore CA = CB$	✓ substitution / *substitusie* ✓ answer for CA *antwoord vir* CA ✓ answer for CB *antwoord vir* CB (3)
4.3	$m_{AD} = \frac{2+5}{0+1}$ $= 7$ $m_{AB} = \frac{2-1}{0-7}$ $= -\frac{1}{7}$ $m_{AD} \times m_{AB} = 7 \times \left(-\frac{1}{7}\right) = -1$ $\therefore AD \perp AB \quad [m_{AD} \times m_{AB} = -1]$ $\therefore D\hat{A}B = 90^0$	✓ substitution ✓ $m_{AD} = 7$ ✓ substitution ✓ m_{AB} ✓ $m_{AD} \times m_{AB} = -1$ (5)
4.4	$(x-3)^2 + (y+2)^2 = 25$	✓correct centre / *korrek middelpunt* ✓ correct / *korrekte* r^2 (2)
4.5	$m_{BC} = \frac{1-(-2)}{7-3}$ $= \frac{3}{4}$	✓ substitution ✓ m_{BC} (2)
4.6	$m_{tan} = -\frac{4}{3}$ $y - 1 = -\frac{4}{3}(x-7)$ $y = -\frac{4}{3}x + \frac{31}{3}$	✓ m_{tan} ✓ subst $m=-\frac{4}{3}$ and B(7;1) verv. $m=-\frac{4}{3}$ en B(7;1) ✓ answer / *antwoord* (3)
4.7	AE = DB [diametersof same circle] $\therefore$ ABED is a rectangle [diagonals =]	✓ AE = DB ✓ reason ✓ reason (3)

[20]

QUESTION 5 / *VRAAG 5*

5.1.1	$\sin 238° = -\sin 58°$ $= -k$	✓reduction / *reduksie* ✓ answer / *antwoord* (2)
5.1.2	$\cos 58° = \sin 32°$ $= \sqrt{1-k^2}$  	✓ sin 32° ✓ answer / *antwoord* (2)

5.2	$= \frac{\tan(180°-30°).\sin(360°-60°).\sin 10°}{\cos(180°+45°).\sin(180°-45°).\cos(90°-10°)}$ $= \frac{(-\tan 30°)(-\sin 60°)\sin 10°}{(-\cos 45°)(\sin 45°)\sin 10°}$ $= \frac{\frac{1}{\sqrt{3}}.\frac{\sqrt{3}}{2}}{-\frac{1}{\sqrt{2}}.\frac{1}{\sqrt{2}}}$ $= -1$	✓ - tan 30° ✓ - sin 60° ✓ - cos 45° ✓ sin 45° ✓ sin 10° ✓ simplification / *vereenvoudiging* ✓ answer / *antwoord* (7)
5.3	$\sin(\alpha+\beta) = \cos[90° - (\alpha+\beta)]$ $= \cos[(90 - \alpha) - \beta]$ $= \cos(90° - \alpha)\cos\beta - \sin(90° - \alpha)\cos\beta$ $= \sin\alpha\cos\beta - \cos\alpha\sin\beta$	✓ $\cos[90° - (\alpha+\beta)]$ ✓ $\cos[(90 - \alpha) - \beta]$ ✓ $\cos(90° - \alpha)\cos\beta - \sin(90° - \alpha)\cos\beta$ ✓ $\sin\alpha\cos\beta - \cos\alpha\sin\beta$ (4)
5.4	$\frac{\cos 2x + 1}{\sin 2x.\tan x} = \frac{2\cos^2 x - 1 + 1}{2\sin x\cos x.\frac{\sin x}{\cos x}}$ $= \frac{2\cos^2 x}{2\sin^2 x}$ $= \frac{1}{\tan^2 x}$	✓ identity numerator *identiteit teller* ✓ identity denominator *identiteit noemer* ✓ $\frac{\sin x}{\cos x}$ ✓ $\frac{\cos^2 x}{\sin^2 x}$ simplification / *vereenvoudiging* (4)
5.5.1	$\frac{\sin x}{\cos x} = 2\sin x$ $\sin x = 2\sin x\cos x$ $\sin x - 2\sin x\cos x = 0$ $\sin x(1 - 2\cos x) = 0$ $\sin x = 0$ or/*of* $\cos x = \frac{1}{2}$	✓ identity / *identiteit* ($\frac{\sin x}{\cos x}$) ✓ simplification / *vereenvoudiging* ✓ factors / *faktore* (3)
5.5.2	$\sin x = 0$ or $\cos x = \frac{1}{2}$ $x = 0° + 360°k, k \in Z$ OR $x = \pm 60° + 360°k$ $x = 180° + 360°k$ $k \in Z$	✓ $x = 0°$ ✓ $x = 180°$ ✓ $x = \pm 60°$ ✓ $360°k, k \in Z$ (4)

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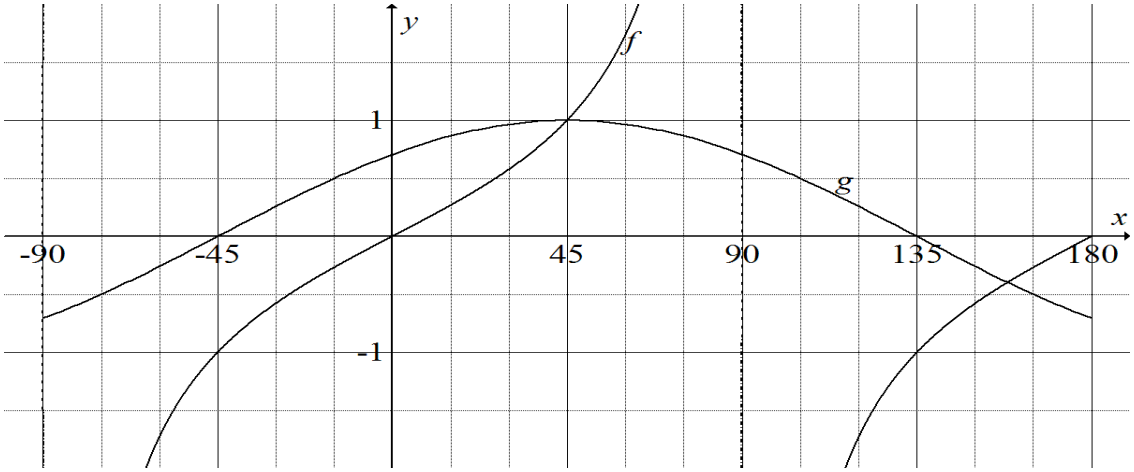
QUESTION 6 / *VRAAG 6*

6.1

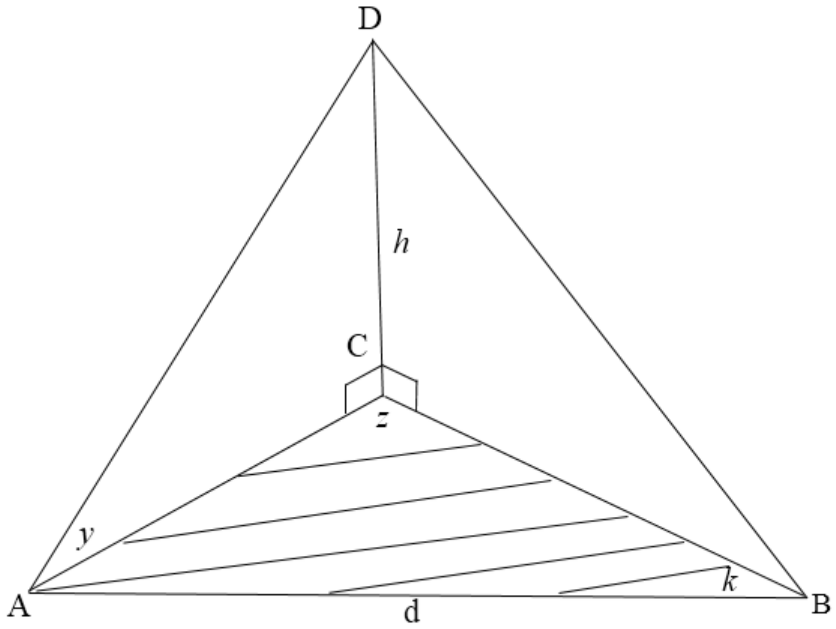


✓ Asymptotes / Asimptote (*f*)
✓ Shape / *Vorm* (*g*)
✓ (45° ; 1) (*f*)
✓ (-45° ; 0) / (135° ; 0) / *x*-intercepts (*g*)
✓ Endpoints / Eindpunte (*f*)
✓ Endpoints / *Eindpunte* (*g*)
(6)

6.2.1	$x = -45°$	✓✓ -45° (2)
6.2.2	(-90°;45°] **OR/OF** $-90^0 < x \leq 45^0$	✓ -90^0 and 45^0 ✓correct inequalities (2)
6.3	90°	✓ answer / *antwoord* (1)

[11]

QUESTION 7 / *VRAAG 7*



7.1 In ΔABC

$$\frac{AC}{\sin k} = \frac{d}{\sin z}$$

$$\therefore AC = \frac{d.\sin k}{sinz}$$

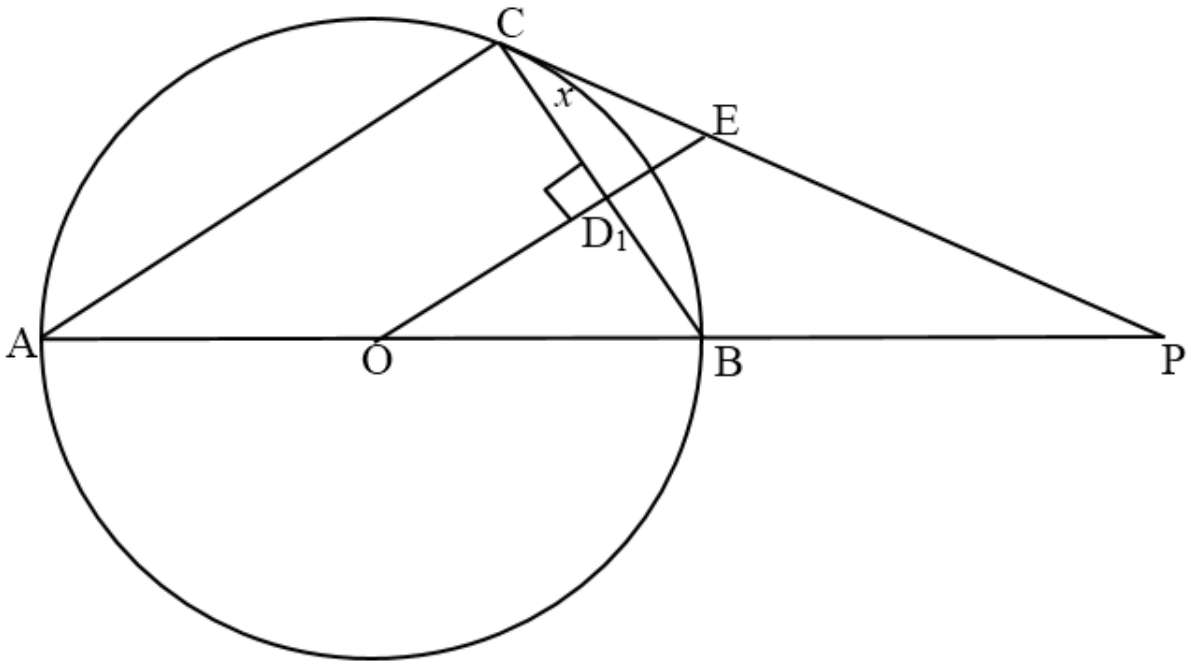
ANSWER ONLY/ *SLEGS ANTWOORD*

✓ proportion / *verhouding*
✓ answer / *antwoord*
(2)

7.2	In ΔADC $\frac{\text{AC}}{\sin(90°-y)} = \frac{h}{\sin y}$ $\text{AC} = \frac{h.\cos y}{\sin y}$ $\text{AC} = \frac{h}{tany}$ **OR/OF** $\frac{AC}{h} = \frac{1}{\tan y}$ $AC = \frac{h}{\tan y}$	✓ proportion / *verhouding* ✓ answer / *antwoord* ✓ $\frac{AC}{h} = \frac{1}{\tan y}$ ✓ $AC = \frac{h}{\tan y}$ (2)
7.3	$h = \frac{\text{AC}.\sin y}{\cos y}$ $h = \frac{d\sin k.\sin y}{\cos y.\sin z}$ $h = \frac{\text{d}.\tan y.\sin k}{\sin z}$ **OR/OF** $AC = \frac{h}{\tan y}$ $AC = \frac{d.\sin k}{\sin z}$ $\therefore \frac{h}{\tan y} = \frac{d.\sin k}{\sin z}$ $\therefore h = \frac{d\sin k\,.tany}{sinz}$	✓ subst/*verv*. $\text{AC} = \frac{d.\sin k}{sinz}$ **OR/OF** ✓ equating AC / *gelykstel aan* AC (1)
7.4	$\therefore h = \frac{d\sin k\,.tany}{sinz}$ $h = \frac{80\,.\sin 38°.\tan 40°}{\sin 125}$ =50,45m	✓ substitution / *vervanging* ✓ answer / *antwoord* (2)

[7]

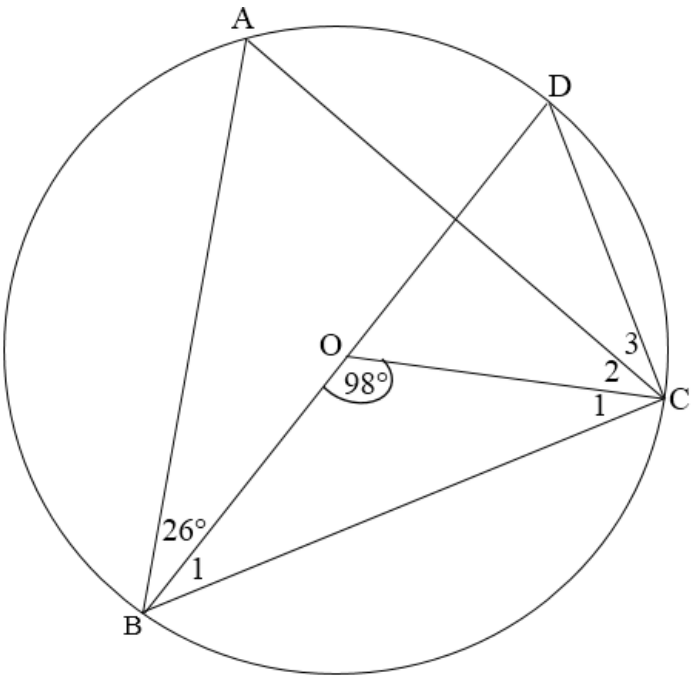
QUESTION 8 / *VRAAG 8*



8.1	Line from centre perpendicular to chord, bisects the chord. / *Lyn vanaf die middelpunt loodreg op die koord, halveer die koord.*	✓ answer / *antwoord* (1)
8.2.	$A\hat{C}B = 90°$ [angle in semi-circle] / [*hoek in semi-sirkel*] $A\hat{C}B = \hat{D}_1$ [both = 90º] / [*beide* = 90º] $\therefore$ OE ‖ AC [corresp $\angle$'*s* equal] / [*ooreenkomstige* $\angle^e$ *is gelyk*]	✓ S ✓R ✓ R (3)
8.3	$\hat{A} = x$ [tan chord] / [*raaklyn koord*] $E\hat{O}B = x$ [corresp $\angle$'*s* ; AC ‖ OE] / [*ooreenkomstige* $\angle^e$; AC ‖ OE]	✓S ✓R ✓S ✓R (4)
8.4	$E\hat{O}B = E\hat{C}B$ [both = *x*] / [*beide* = *x*] ∴ OBEC is cyclic quad [converse angles in same segment] *OBEC is 'n koordevierhoek [hoeke in dieselfde segment]*	✓ S ✓R (2)

[10]

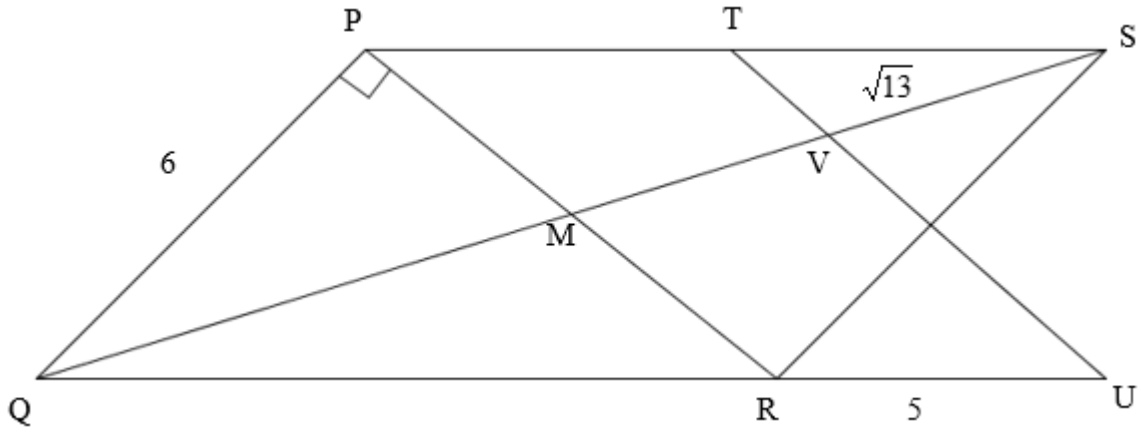
QUESTION 9 / *VRAAG 9*



9.1	$\hat{A} = 49°$ [∠at centre=2∠at circumf.] / [*Middelpunts* ∠]	✓S ✓R	(2)
9.2	$\hat{C}_1 = \hat{B}_1$ [angles opp equal sides] / [*hoeke teenoor gelyke sye*] $\hat{B}_1 = \frac{180°-98°}{2}$ [angles of Δ] / [*hoeke van* Δ] $\hat{B}_1 = 41°$	✓R ✓R ✓ S	(3)
9.3	$B\hat{C}D = 90°$ [∠'s in semi-circle] / [$\angle^e$ *in 'n semi-sirkel*] $\hat{B}_2 = \hat{C}_3 = 26°$ [∠'s in same segment] / [$\angle^e$ *in dieselfde segment*] $\hat{C}_2 = 23°$	✓ S/R ✓ S/R ✓ S	(3)

[8]

QUESTION 10 / *VRAAG 10*

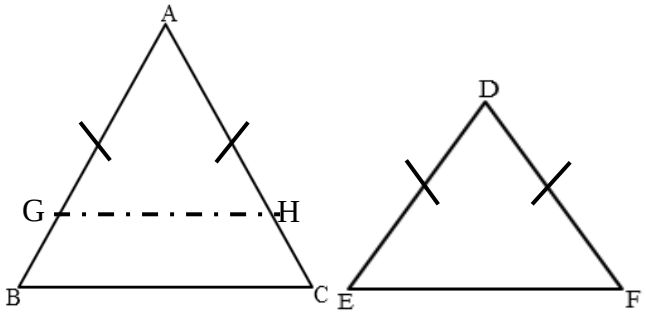


10.1.1	$QR^2 = PQ^2 + PR^2$ Pyth.Theo $= 6^2 + 8^2$ $\therefore QR = 10$ $\therefore \frac{UR}{RQ} = \frac{5}{10}$ $= \frac{1}{2}$	✓ subst. in Pyth ✓ QR = 10 ✓ $\frac{UR}{RQ} = \frac{1}{2}$	(3)

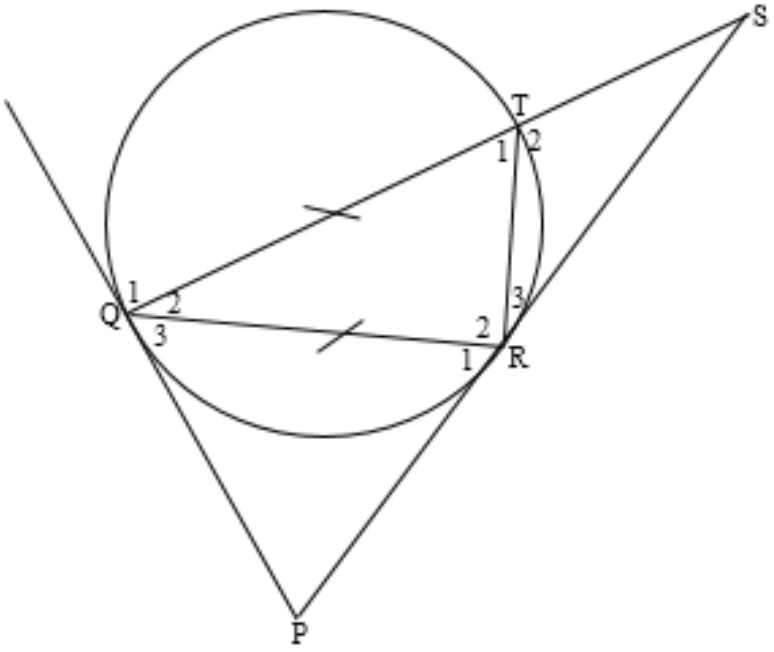
10.1.2	$PM = 4$ [diagonals bisect each other] $QM^2 = 6^2 + 4^2$ [Pyth. Theo] $QM = 2\sqrt{13}$ $MS = QM = 2\sqrt{13}$ [Diagonals bisect each other] $\therefore MV = \sqrt{13}$ $\therefore \frac{VM}{MQ} = \frac{\sqrt{13}}{2\sqrt{13}}$ $= \frac{1}{2}$	✓ R ✓ $QM = 2\sqrt{13}$ ✓ $MV = \sqrt{13}$ ✓ $\frac{VM}{MQ} = \frac{1}{2}$ (4)
10.2	$\frac{UR}{RQ} = \frac{VM}{MQ}$ $\left[\text{both} = \frac{1}{2}\right]$ $\therefore MR \parallel VU$ [line divides two sides of Δ in prop]	✓ **S** ✓ R (2)

[9]

QUESTION 11 / *VRAAG 11*



11.1	Constr/*Konstr*: On AB mark off AG = DE / *Merk* AG = DE *af op* AB On AC mark off AH = DF / *Merk* AH = DF *af op* AC Join GH. / *Verbind* GH Proof / *Bewys*: In ΔAGH & ΔDEF: i) AG = DE (constr) / (*konstr.*) ii) $\hat{A} = \hat{D}$ (given) / (*gegee*) iii) AH = DF (constr) / (*konstr.*) $\therefore$ $\Delta AGH \,|||\, \Delta DEF$ (SAS) / (*SHS*) $\therefore$ $\hat{G}_1 = \hat{E}$ But / *Maar* $\hat{B} = \hat{E}$ given/gegee $\therefore$ $\hat{G}_1 = \hat{B}$ $\therefore$ GH || BC (corresp angles equal) / (*ooreenk. hoeke gelyk*) $\therefore \frac{AB}{AG} = \frac{AC}{AH}$ $\therefore \frac{AB}{DE} = \frac{AC}{DF}$ (AG= DE, AH = DF) $\therefore \frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$	✓ constr / *konstr.* ✓S ✓ S/R ✓S ✓R ✓S ✓R (7)

11.2		
11.2.1	$R_2 = x$ [tan chord] : [*raaklyn koord*] $T_1 = x$ [∠'s opp equal sides] : [∠'e *teenoor gelyke sye*] $Q_3 = x$ [tan chord] : [*raaklyn koord*] $R_1 = x$ [tan from same point] : [*raaklyne vanaf dieselfde punt*]	✓ S/R ✓ S/R ✓ S/R ✓ S/R (any three) / (*enige drie*) (3)
11.2.2	$Q_2 = 180° - 2x$ [angles of Δ] : [*hoeke van* Δ]	✓S ✓R (2)
11.2.3	$\hat{P} = 180° - 2x$ [sum of angles of Δ PQR] $R_3 = Q_2 = 180° - 2x$ [tan chord] : [*raaklyn koord*] ∴ TR || QP [corresp ∠'s =] : [*ooreenkomstige* ∠'e =]	✓ S ✓ S/R ✓ R (3)
11.2.4	In Δ STR & Δ SRQ $\hat{S} = \hat{S}$ common / *gemeen* $\hat{R}_3 = \hat{Q}_2$ tan chord / *raaklyn koord* ∴ ΔSTR |||ΔSRQ [AAA] / [*HHH*]	✓ S ✓ S ✓ R (3)
11.2.5	$\frac{ST}{SR} = \frac{SR}{SQ}$ ΔSTR |||ΔSRQ $RS^2 = ST.SQ$	✓ S ✓R (2)
11.2.6	$\frac{SP}{PR} = \frac{SQ}{TQ}$ [line ∥ to one side of a Δ] $= \frac{5}{3}$ $PQ = PR$ [tan from same point] $\frac{SP}{PQ} = \frac{5}{3}$	✓ S/R ✓ R ✓ *value of* $\frac{SP}{PQ} = \frac{5}{3}$ (3)

[23]

TOTAL/*TOTAAL*: 150