



Province of the
EASTERN CAPE
EDUCATION



NASIONALE SENIOR SERTIFIKAAT

GRAAD 12

SEPTEMBER 2022

WISKUNDE V2

PUNTE: 150

TYD: 3 uur

Hierdie vraestel bestaan uit 14 bladsye, insluitend 'n 1-bladsy inligtingsblad,
en 'n 18-bladsy antwoordeboek.

INSTRUKSIES EN INLIGTING

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

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, ensovoorts, 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

'n Honderd atlete het aan 'n verspring-kompetisie deelgeneem. Die afstand, in sentimeter, van hulle beste spronge is in die tabel hieronder opgesom.

Afstand van Spronge (in cm)	Aantal atlete
$420 < d \leq 460$	6
$460 < d \leq 500$	14
$500 < d \leq 540$	16
$540 < d \leq 580$	42
$580 < d \leq 620$	14
$620 < d \leq 660$	2
$660 < d \leq 700$	3
$700 < d \leq 740$	2
$740 < d \leq 780$	1

- 1.1 Voltooi die kummulatiewe frekwensiekolom in jou ANTWOORDEBOEK. (2)
- 1.2 Teken 'n ogief (kummulatiewe frekwensiekurve), in jou ANTWOORDEBOEK, om die bostaande inligting voor te stel. (4)
- 1.3 Gebruik jou grafiek om die mediaan sprong van die kompetisie te beraam. (2)
- 1.4 Watter persentasie van die atlete het oor 560 cm gespring? (2)

[10]

VRAAG 2

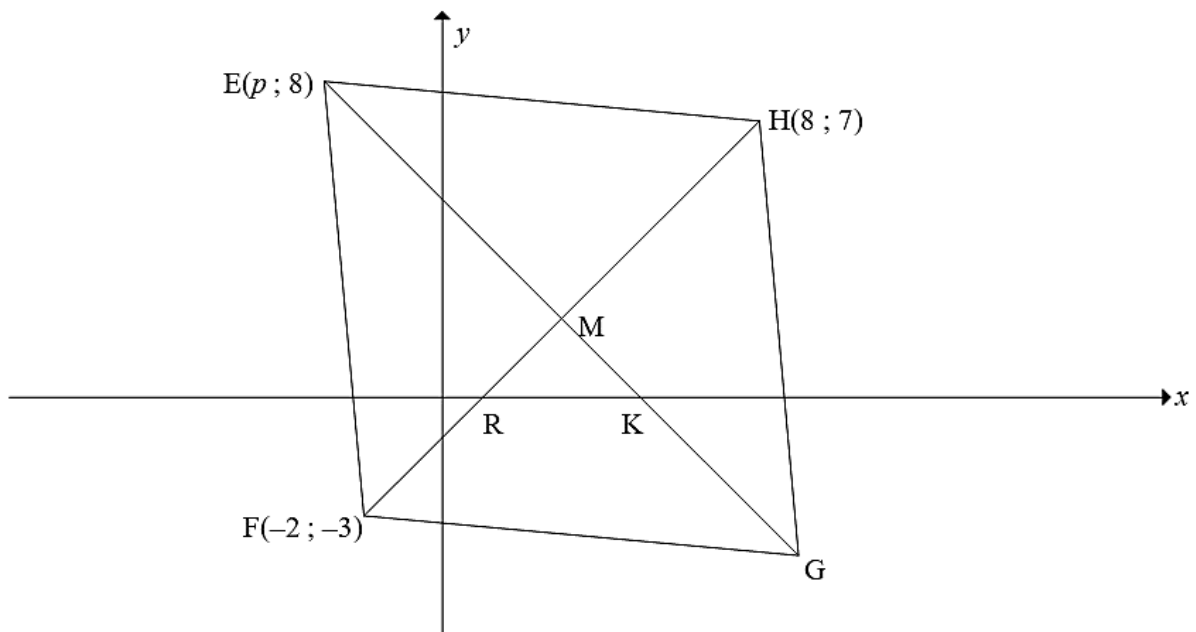
Die volgende tabel toon 'n vergelyking van afstande (sentimeters) wat deur 6 verspringers gespring is en die ure wat hulle per week spandeer om hulle spronge te oefen.

Verspringer	1	2	3	4	5	6
x: Ure geoefen	4,5	2	3,5	4	8	3
y: Afstand gespring (cm)	650	420	580	490	780	525

- 2.1 Bepaal die vergelyking van die kleinste kwadraat-regressielyn vir die data. (3)
- 2.2 Voorspel/Beraam die afstand wat deur 'n verspringer gespring word, wat 5,4 ure oefen het. (2)
- 2.3 Lewer kommentaar oor die geldigheid van jou antwoord in VRAAG 2.2. Motiveer jou antwoord. (2)
- 2.4 Aan die einde van die verspring-item het hulle ontdek dat die maatband wat gebruik was stukkend is, en al die afstande was met 13 cm verminder. Hoe beïnvloed dit die:
- 2.4.1 Gemiddelde sprong van die item? (1)
- 2.4.2 Omvang van die spronge vir hierdie item? (1)
- 2.4.3 Standaardafwyking? (1)
- [10]**

VRAAG 3

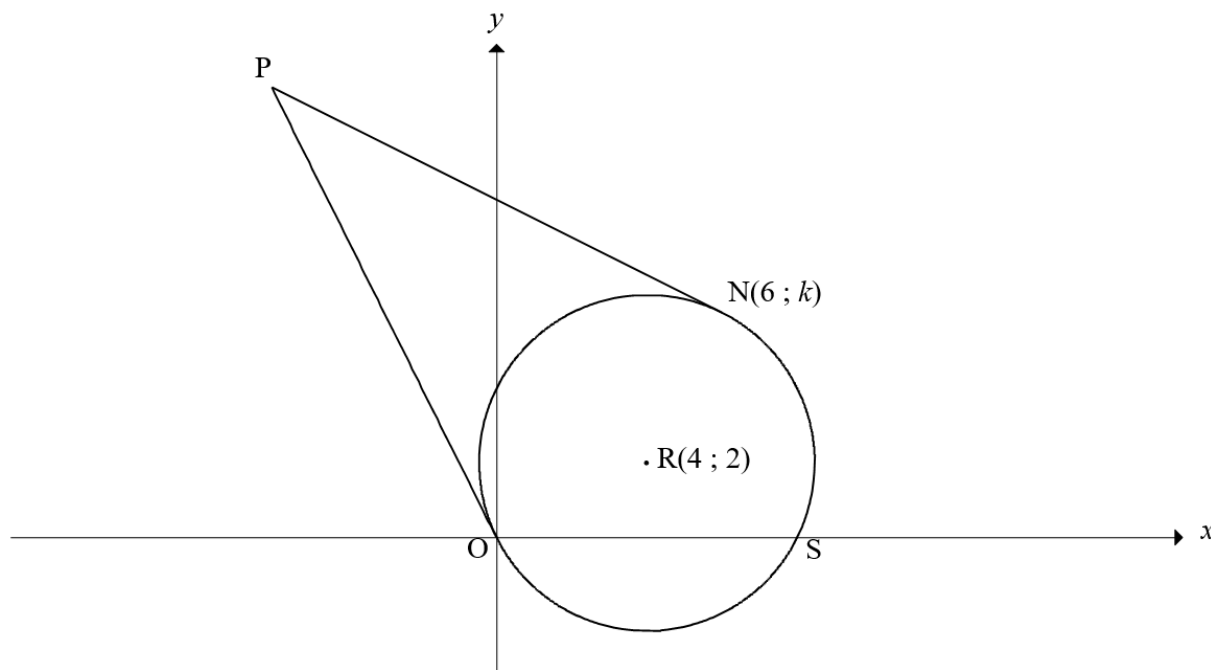
In die diagram hieronder, is $E(p; 8)$, $F(-2; -3)$, G en $H(8; 7)$ die hoekpunte van ruit/rombus EFGH. Die hoeklyne EG en HF sny by M en sny die x -as by K en R onderskeidelik.



- 3.1 Bereken die:
- 3.1.1 Koördinate van M (2)
- 3.1.2 Gradiënt van FH (2)
- 3.1.3 Grootte van $\widehat{MKR}$ (4)
- 3.2 Gebruik die eienskappe van 'n ruit/rombus om die waarde van p te bereken. (4)
- 3.3 Bereken die koördinate van G. (2)
- 3.4 Die ruit/rombus word in die lyn $x = -3$ gereflekteer. N is die beeld van M na die refleksie. Bereken die lengte van MN. (3)
- [17]

VRAAG 4

In die diagram hieronder, gaan 'n sirkel met middelpunt $R(4; 2)$ deur die oorsprong O , S en $N(6; y)$. Raaklyne word vanaf P , 'n punt buite die sirkel, na O en N geteken.



4.1 Bepaal die vergelyking van die sirkel in die vorm $(x-a)^2 + (y-b)^2 = r^2$. (3)

4.2 Bereken die waarde van k . (4)

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

4.4 Dit word verder gegee dat die vergelyking van OP , $y = -2x$ is.

Bereken die:

4.4.1 Koördinate van P (3)

4.4.2 Omtrek van $PNRO$ (4)

4.5 'n Ander sirkel, met T as middelpunt, word geteken en raak die sirkel met middelpunt R uitwendig by S . Die radiusse se lengtes van albei sirkels is gelyk. Bepaal die koördinate van T . (4)

[23]

VRAAG 5

- 5.1 Gegee dat: $\cos 26^\circ = p$
Druk elk van die volgende in terme van p uit, **sonder die gebruik van 'n sakrekenaar**.

5.1.1 $\sin 26^\circ$ (2)

5.1.2 $\tan 154^\circ$ (3)

5.1.3 $\sin 13^\circ \cdot \cos 13^\circ$ (2)

- 5.2 Bepaal, **sonder die gebruik van 'n sakrekenaar**, die waarde van die volgende uitdrukkings:

5.2.1 $\frac{\cos(-\theta) \cdot \tan(180^\circ + \theta)}{2 \cos(90^\circ + \theta)}$ (5)

5.2.2 $1 + 2 \cos 105^\circ \cdot \sin 15^\circ$ (4)

- 5.3 Beskou: $\frac{1 - \cos 2x - \sin x}{\sin 2x - \cos x} = \tan x$

5.3.1 Bewys die identiteit. (4)

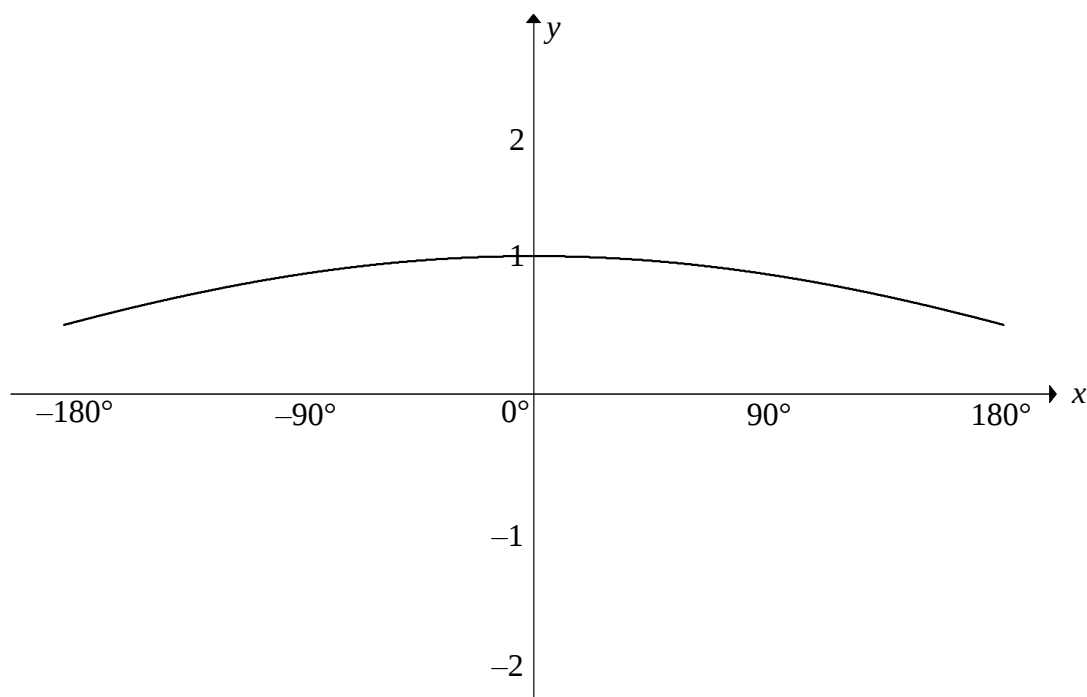
5.3.2 Vir watter waarde(s) van x , in die interval $x \in [-180^\circ; 180^\circ]$, is die identiteit nie geldig nie? (3)

5.4 Bepaal die algemene oplossing van: $\sin^2 x + 2 \sin x \cos x = 3 \cos^2 x$. (7)

[30]

VRAAG 6

Hieronder is die grafiek van $f(x) = \cos\left(\frac{x}{3}\right)$, in die interval $x \in [-180^\circ; 180^\circ]$ geskets.

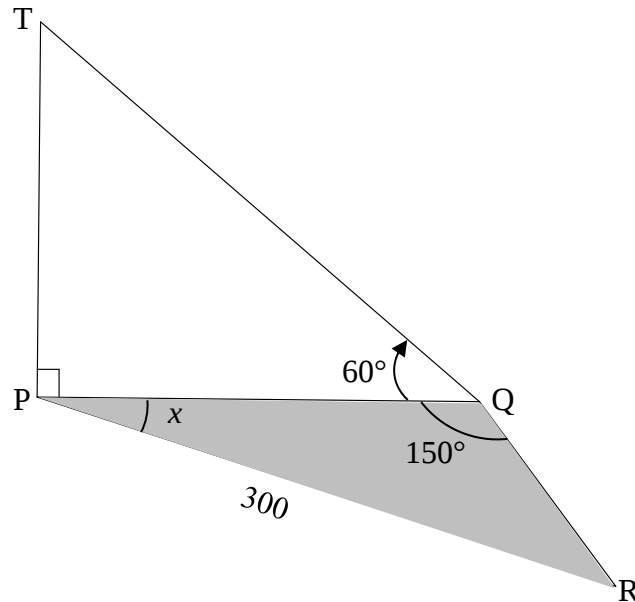


- 6.1 Teken, op die rooster wat in die ANTWOORDEBOEK gegee is, die grafiek van $g(x) = \sin x + 1$, toon duidelik aan ALLE afsnitte met die asse sowel as die koördinate van alle draaipunte. (3)
- 6.2 Skryf neer die:
- 6.2.1 Periode van f (1)
- 6.2.2 Terrein van $g(x) - 3$ (2)
- 6.3 Bepaal die maksimum afstand van $g(x) - h(x)$, waar h 'n refleksie van g in die x -as is, in die interval $x \in [-180^\circ; 180^\circ]$. (2)
- 6.4 Vir watter waardes van x in die interval $x \in [-180^\circ; 180^\circ]$ sal $f(x) \cdot g'(x) > 0$? (2)
- 6.5 Die grafiek van g ondergaan 'n transformasie om 'n nuwe grafiek $k(x) = \sin(x - 15^\circ)$ te vorm. Beskryf, in woorde, die transformasie vanaf g na k . (2)

[12]

VRAAG 7

In die diagram hieronder, stel TP die hoogte van 'n gebou voor. Die voet van die gebou, P en die punte Q en R is in dieselfde horisontale vlak. Die hoogtehoek vanaf Q na die bopunt van die gebou is 60° . $\widehat{PQR} = 150^\circ$, $\widehat{QPR} = x$ en die afstand tussen P en R is 300 meter.



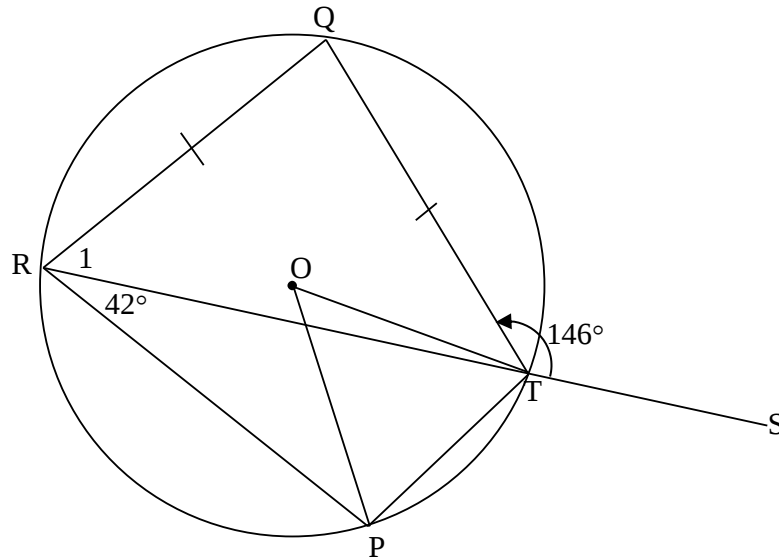
7.1 Skryf $\widehat{R}$ in terme van x neer. (1)

7.2 Bepaal die lengte van PQ in terme van x . (3)

7.3 Toon, vervolgens, aan dat: $TP = 300\sqrt{3}(\cos x - \sqrt{3}\sin x)$ (4)
[8]

VRAAG 8

In die diagram is $PRQT$ 'n koordevierhoek in die sirkel met $QR = QT$. Koord RT is verleng na S en radiusse OP en OT is geteken. $\widehat{PRT} = 42^\circ$ en $\widehat{QTS} = 146^\circ$.



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

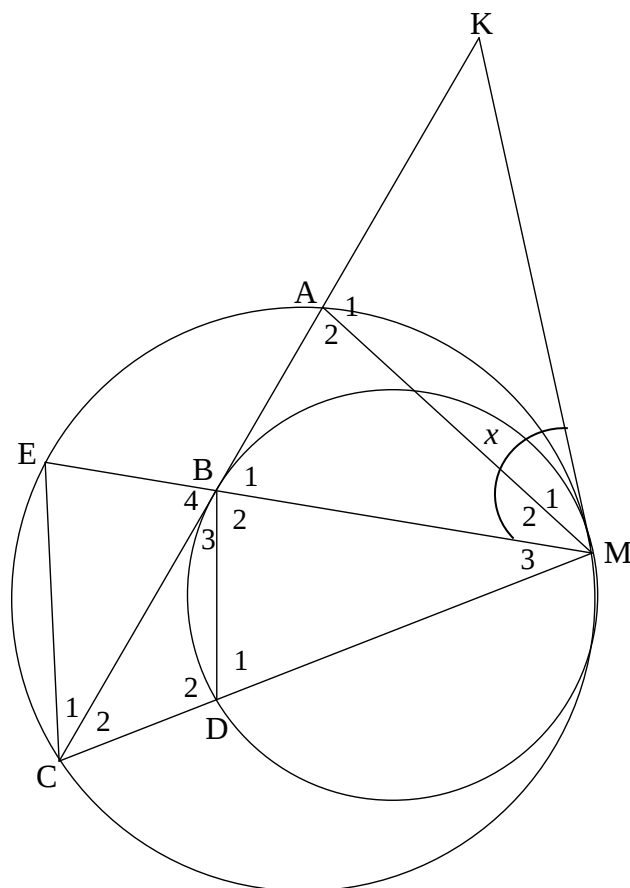
8.1 $\widehat{POT}$ (2)

8.2 $\hat{R}_1$ (2)

8.3 $\widehat{RPT}$ (3)
[7]

VRAAG 9

In die diagram raak die twee sirkels mekaar intern by M. MK is 'n gemene raaklyn aan die sirkels. A, E en C is punte op die groter sirkel en B en D is punte op die kleiner sirkel. Koord CA is verleng om die raaklyn by K te ontmoet. $\triangle MEC$ is geteken. CA en EM ontmoet by B. KB is 'n raaklyn aan die kleiner sirkel by B. D is 'n punt op CM. AM en BD is geteken. Laat $\widehat{KMB} = x$.



9.1 Noem, met redes, VIER ander hoeke, elk gelyk aan x . (5)

9.2 Bewys, met redes, dat:

9.2.1 $BD \parallel EC$ (2)

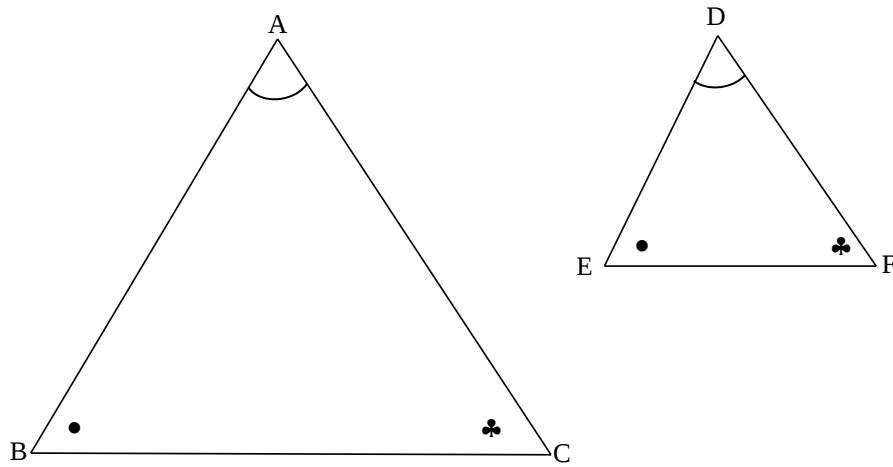
9.2.2 $\widehat{A}_2 = \widehat{B}_2$ (3)

9.2.3 $ME \times MD = MC \times MB$ (2)

[12]

VRAAG 10

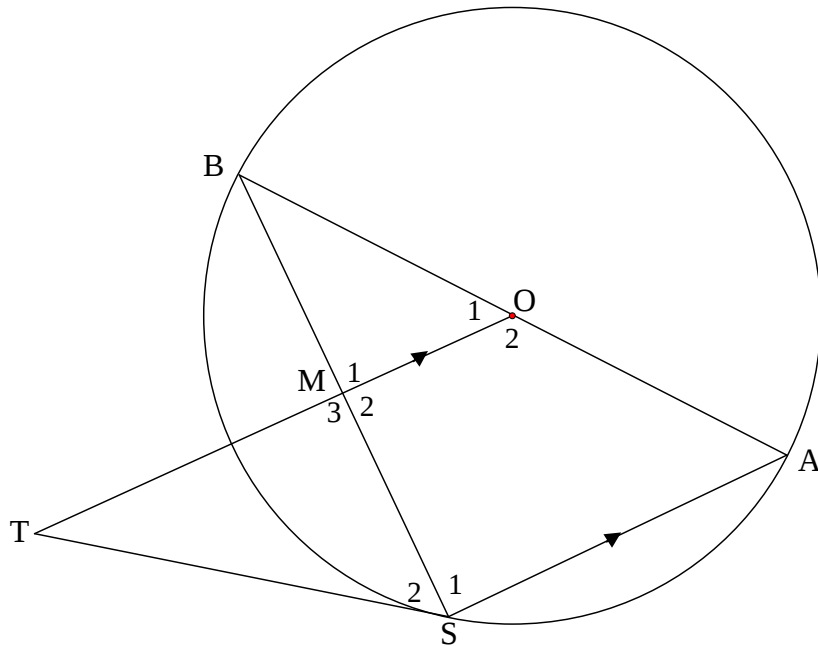
10.1 In die diagram hieronder is $\triangle ABC$ en $\triangle DEF$ gegee sodat $\hat{A} = \hat{D}$, $\hat{B} = \hat{E}$ en $\hat{C} = \hat{F}$.



Bewys die stelling wat meld dat as twee driehoeke gelykhoekig is, dan is hulle sye eweredig, d.w.s. bewys dat: $\frac{DE}{AB} = \frac{DF}{AC}$

(6)

- 10.2 In die diagram is AB 'n middellyn van die sirkel met middelpunt O. $\triangle ABS$ is geteken met S 'n punt op die sirkel. M is 'n punt op BS en OM is verleng na T sodat $AS \parallel OM$. TS is geteken sodat BOST 'n koordevierhoek is.



Bewys, met redes, dat:

- 10.2.1 TS 'n raaklyn aan die sirkel by S is (4)
- 10.2.2 TS die middellyn van die sirkel is wat deur punte T, M en S gaan (5)
- 10.2.3 $\triangle ABS \parallel \triangle STM$ (3)
- 10.2.4 $AS \cdot MT = 2SM^2$ (3)

[21]

TOTAAL: 150

INLICHTINGSBLAD: WISKUNDE

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

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

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

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

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

$$\sum_{i=1}^n 1 = n$$

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad a^2 = b^2 + c^2 - 2bc \cos A \quad \text{area } \triangle ABC = \frac{1}{2} ab \sin C$$

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

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

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

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

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

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

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

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

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

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



LEARNER'S NAME: LEERDER SE NAAM:	
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GRADE 12 GRAAD 12	
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**NATIONAL/NASIONALE
SENIOR
CERTIFICATE/SERTIFIKAAT**

GRADE 12/GRAAD 12

SEPTEMBER 2022

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

Marker/Merker				Moderator's Initials / Moderator se paraaf									
Question Vraag	Mark Punt		Initial Parafeer	Marks Punte	S M	Marks Punte	D M	Marks Punte	P M	Marks Punte	NM		
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
TOTAL TOTAAL													

This special answer book consists of 18 pages./
Hierdie spesiale antwoordeboek bestaan uit 18 bladsye.

QUESTION 1/VRAAG 1

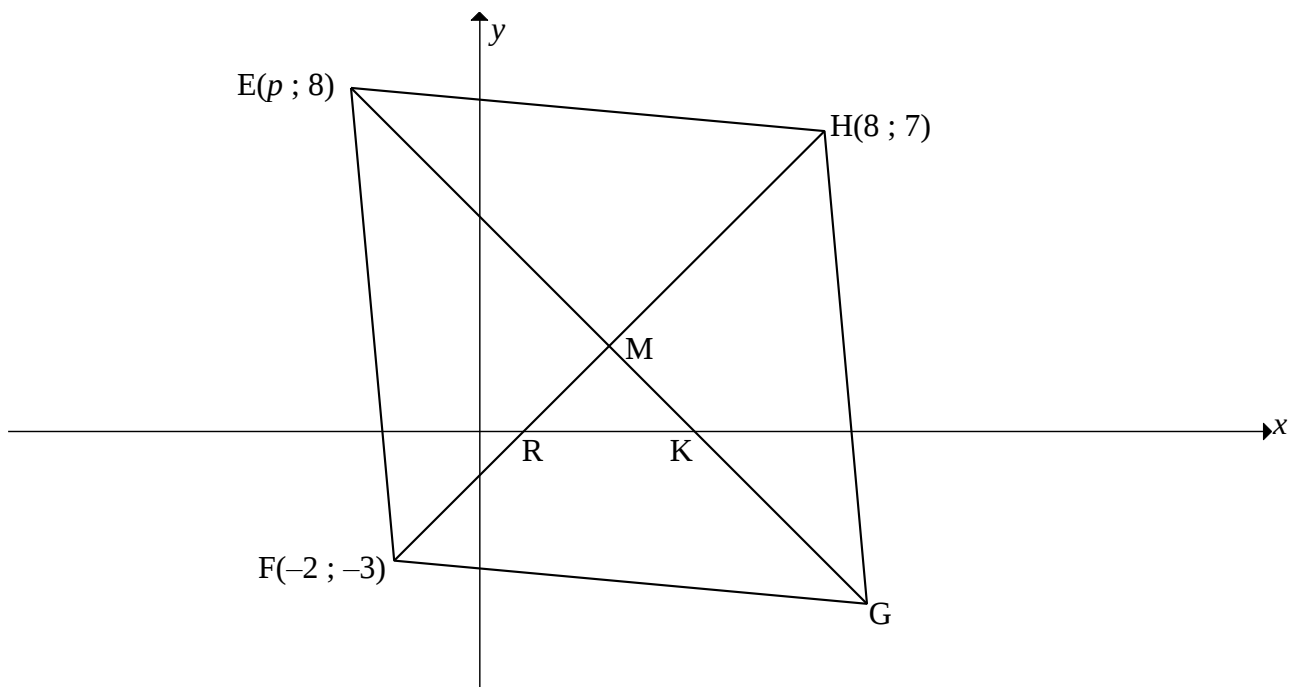
	Solution/Oplissing	Marks/ Punte																														
1.1	<table border="1"> <thead> <tr> <th>Distance of Jumps <i>Afstand van Spronge</i> (in cm)</th><th>Number of athletes <i>Aantal atlete</i></th><th>Cumulative Frequency <i>Kumulatiewe Frekwensie</i></th></tr> </thead> <tbody> <tr><td>$420 < d \leq 460$</td><td>6</td><td></td></tr> <tr><td>$460 < d \leq 500$</td><td>14</td><td></td></tr> <tr><td>$500 < d \leq 540$</td><td>16</td><td></td></tr> <tr><td>$540 < d \leq 580$</td><td>42</td><td></td></tr> <tr><td>$580 < d \leq 620$</td><td>14</td><td></td></tr> <tr><td>$620 < d \leq 660$</td><td>2</td><td></td></tr> <tr><td>$660 < d \leq 700$</td><td>3</td><td></td></tr> <tr><td>$700 < d \leq 740$</td><td>2</td><td></td></tr> <tr><td>$740 < d \leq 780$</td><td>1</td><td></td></tr> </tbody> </table>	Distance of Jumps <i>Afstand van Spronge</i> (in cm)	Number of athletes <i>Aantal atlete</i>	Cumulative Frequency <i>Kumulatiewe Frekwensie</i>	$420 < d \leq 460$	6		$460 < d \leq 500$	14		$500 < d \leq 540$	16		$540 < d \leq 580$	42		$580 < d \leq 620$	14		$620 < d \leq 660$	2		$660 < d \leq 700$	3		$700 < d \leq 740$	2		$740 < d \leq 780$	1		(2)
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1.2	OGIVE/OGIEF	(4)																														
1.3		(2)																														
1.4		(2)																														
		[10]																														

QUESTION 2/VRAAG 2

Long jumper / Verspringer	1	2	3	4	5	6
x: Hours practised / Ure geoefen	4,5	2	3,5	4	8	3
y: Distance jumped / Afstand gespring (cm)	650	420	580	490	780	525

	Solution/Oplissing	Marks/ Punte
2.1		(3)
2.2		(2)
2.3		(2)
2.4.1		(1)
2.4.2		(1)
2.4.3		(1)
		[10]

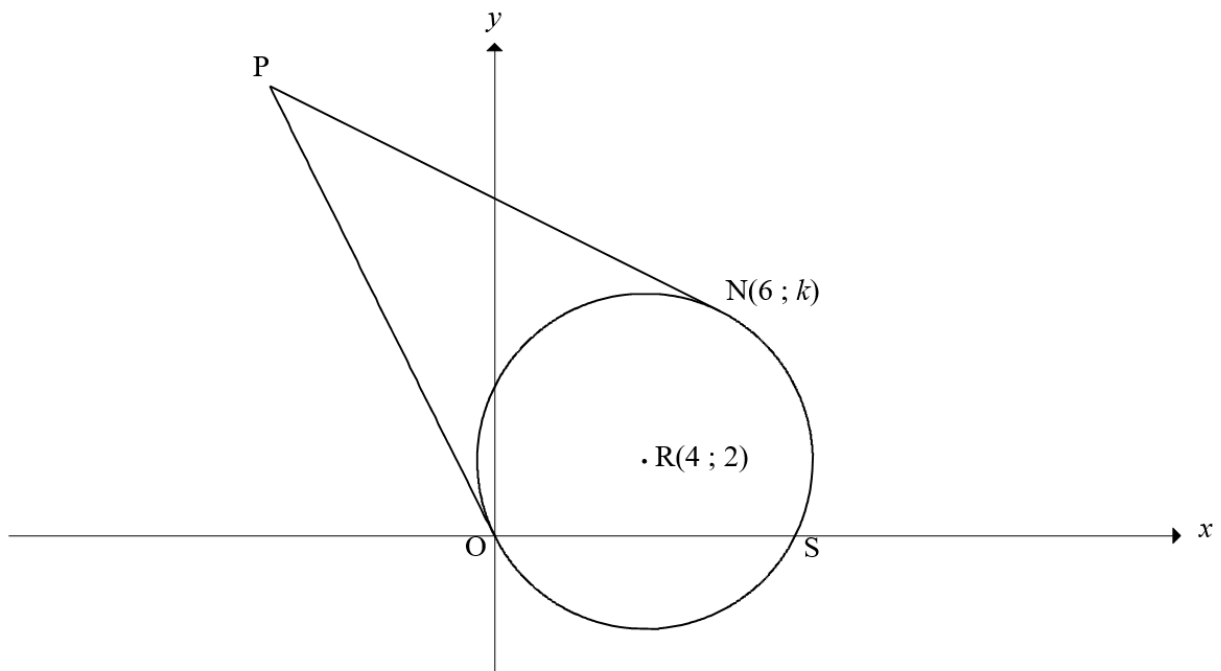
QUESTION 3/VRAAG 3



	Solution/Oplossing	Marks/ Punte
3.1.1		(2)
3.1.2		(2)
3.1.3		(4)

	Solution/Oplissing	Marks/ Punte
3.2		(4)
3.3		(2)
3.4		(3)
		[17]

QUESTION 4/VRAAG 4



	Solution/Oplissing	Marks/ Punte
4.1		(3)
4.2		(4)
4.3		(5)

	Solution/Oplissing	Marks/ Punte
4.4.1		(3)
4.4.2		(4)
4.5		(4)
		[23]

QUESTION 5/VRAAG 5

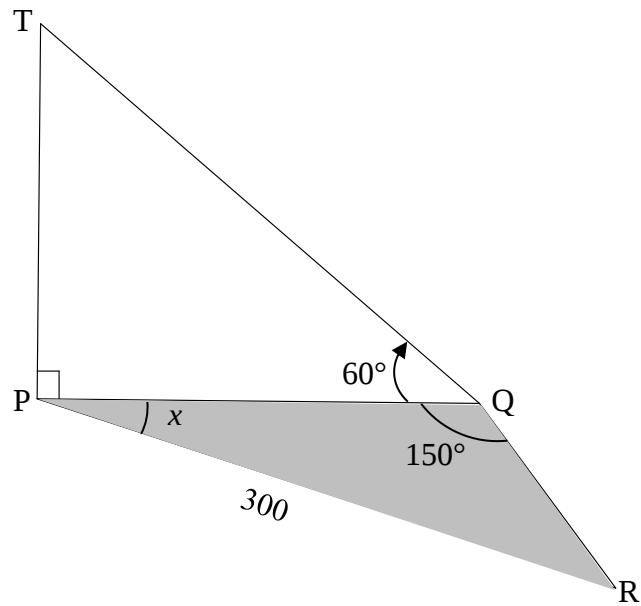
	Solution/Oplossing	Marks/ Punte
5.1.1		(2)
5.1.2		(3)
5.1.3		(2)
5.2.1		(5)
5.2.2		(4)

	Solution/Oplissing	Marks/ Punte
5.3.1		(4)
5.3.2		(3)
5.4		(7)
		[30]

QUESTION 6/VRAAG 6

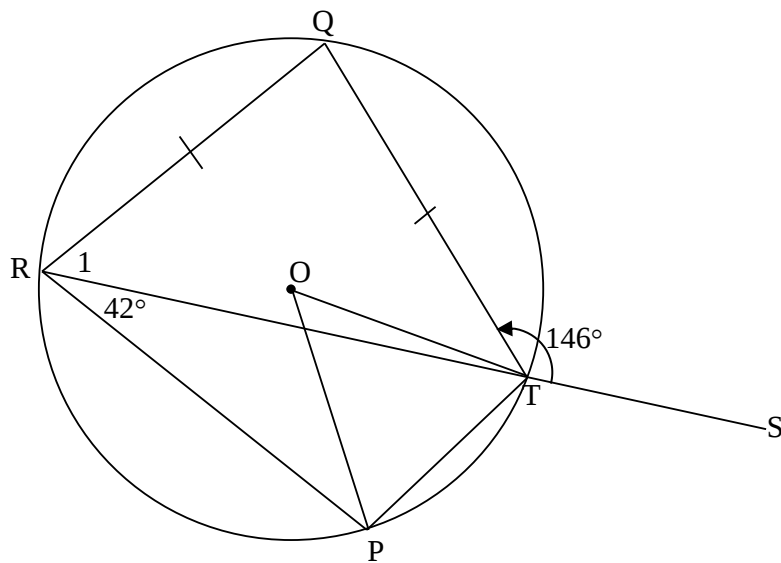
	Solution/Oplissing	Marks/ Punte
6.1		
		(3)
6.2.1		
		(1)
6.2.2		
		(2)
6.3		
		(2)
6.4		
		(2)
6.5		
		(2)
		[12]

QUESTION 7/VRAAG 7



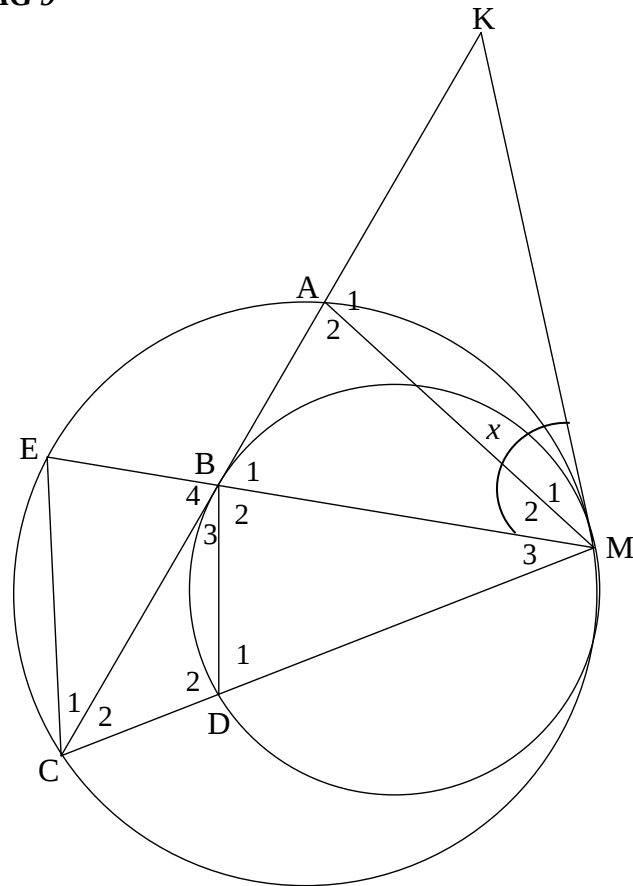
	Solution/Oplossing	Marks/ Punte
7.1		(1)
7.2		(3)
7.3		(4)
		[8]

QUESTION 8/VRAAG 8



	Solution/Oplissing	Marks/ Punte
8.1		(2)
8.2		(2)
8.3		(3)
		[7]

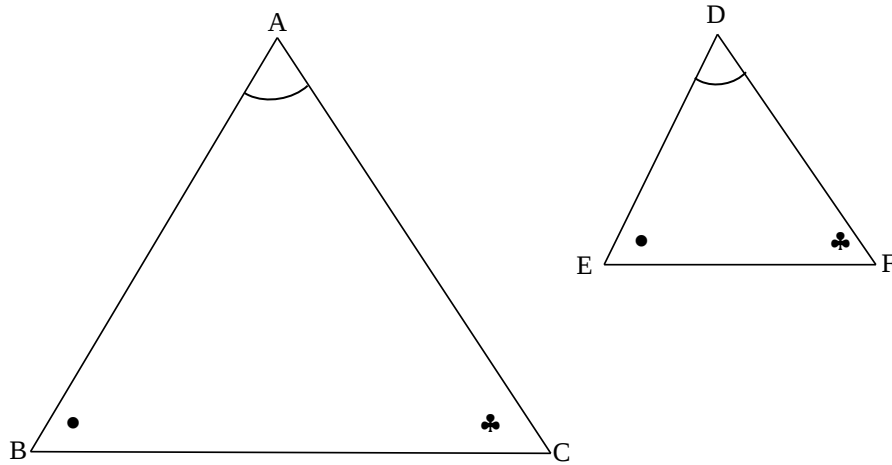
QUESTION 9/VRAAG 9



	Solution/Oplossing	Marks/ Punte
9.1		(5)
9.2.1		(2)
9.2.2		(3)
9.2.3		(2)
		[12]

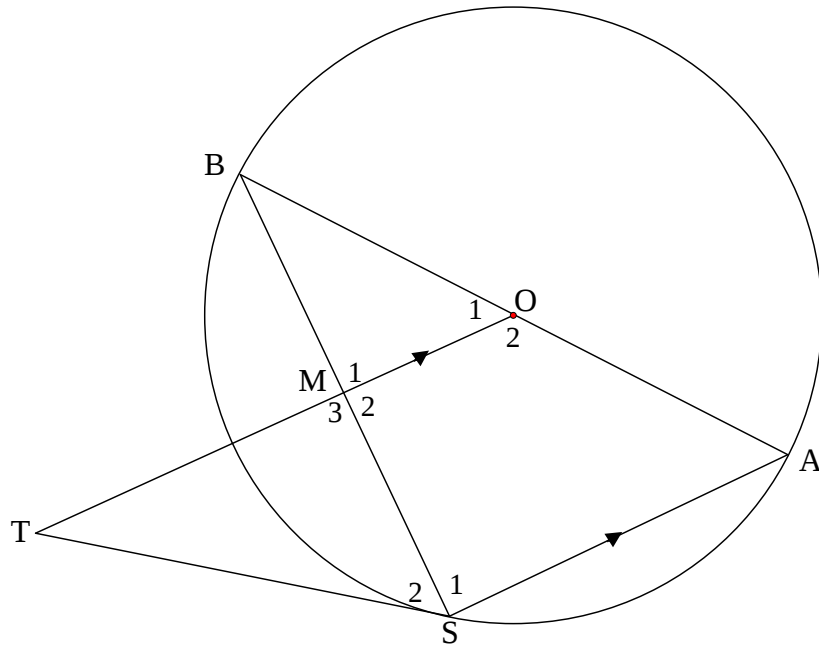
QUESTION 10/VRAAG 10

10.1



	Solution/Oplossing	Marks/ Punte
10.1		
		(6)

10.2



	Solution/Oplossing	Marks/ Punte
10.2.1		(4)
10.2.2		(5)
10.2.3		(3)
10.2.4		(3)
		[21]

[illegible]

[illegible]

TOTAL/TOTAAL: 150



CHIEF DIRECTORATE: EXAMINATIONS AND ASSESSMENT

Steve Vukile Tshwete Complex, Zone 6 Zwelitsha, 5608, Private Bag X0032, Bhisho, 5605 REPUBLIC OF SOUTH AFRICA:

Enquiries: Mrs F. Ntsangani Tel: 040 602 7099 . Fax : 040 602 7295. E-mail: fezeka.ntsangani@ecdoe.gov.za

Website: www.ecdoe.gov.za

Ref. no.	13/P	Tel.:	(040) 602 7099/082 888 5419
Enquire:	Mrs F. Ntsangani	Fax:	040 602 7295

**TO: DISTRICTS HEADS OF EXAMINATIONS
PRINCIPALS OF SCHOOLS IN THE FET BAND**

**FROM: (A) CES: ASSESSMENT INSTRUMENT DEVELOPMENT AND ITEM
BANK MANAGEMENT
MRS F. NTSANGANI**

**SUBJECT: ERRATA – MATHEMATICS P2
GRADE 12 PREPARATORY EXAMS**

DATE: 15 SEPTEMBER 2022

Mathematics P2 was written on Monday, 12 September 2022. We were made aware of certain errors, amendments and omissions that were discovered during the marking process.

In order to address this and to ensure that the learners are not disadvantaged, the following standardised approach to marking must be adopted across the Province. The following guidelines with regard to marking was prepared in conjunction with the examiner and moderator.

ERRATA: MATHEMATICS P2 (MARKING GUIDELINE)

1.2	Anchor point must be (420 ; 0) Upper Limit – 780 Last point has y – coordinate of 100	
1.3	Mark according to learner's Ogive.	
1.4	Please accept between 42% - 44%. Marking must be according to the learner's response on their drawing of the Ogive.	
2.1	No penalty for rounding.	
2.2	No penalty for rounding.	
2.3	Accept if learner states that 5,4 is within the domain of the data set. Or if learner mentions that it is valid as the correlation coefficient is 0,92.	
2.4.1	Accept if learner merely states that the mean will change.	

3.1.3	Alternative Solution: $\tan \widehat{MRK} = 1$ $\therefore \widehat{MRK} = 45^\circ$ $\widehat{RMK} = 90^\circ$ $\therefore \widehat{MKR} = 45^\circ$	
5.2.2	Correction on Marking Guideline $1 + 2 \cos 105^\circ \cdot \sin 15^\circ$ $= 1 - 2 \cos 75^\circ \cdot \sin 15^\circ$ $= 1 - 2 \sin 15^\circ \cdot \sin 15^\circ$ $= 1 - 2 \sin^2 15^\circ$ $= \cos 2(15^\circ)$ $= \cos 30^\circ$ $= \frac{\sqrt{3}}{2}$ ✓ for reduction of $\cos 105^\circ$ ✓ for reduction of $\cos 75^\circ$ ✓ for $\cos 30^\circ$ ✓ for the answer	
5.4	2 marks for values of $\tan x$. / One tick missing on marking guideline.	
6.2.1	Period/ Periode = 1080°	
6.3	Maximum distance = 4 units	
7.3	Final line: $TP = \sqrt{3} \cdot 300(\cos x - \sqrt{3} \sin x)$	
8.3	$\widehat{RQT} = 112^\circ$ (sum of angles of a triangles)	
10.1	Mark allocation to be done as follows: ✓ for construction. ✓ for proving triangles congruent ✓ for deduction that $\widehat{APQ} = \widehat{E}$ ✓ for $PQ \parallel BC$ ✓ for corresponding angles equal. ✓ for the deduction of the ratios.	
10.2.3	In $\triangle ABS$ and $\triangle STM$ (1) $\widehat{A} = \widehat{S}_2$ (2) $\widehat{B} = \widehat{STM}$ (angles in same segment) (3) $\widehat{S}_1 = \widehat{M}_3$ (proven) $\triangle ABS \parallel \triangle STM$ (A,A,A)	

We request that this must be brought to the attention of all educators marking this paper and sincerely apologise for the inconvenience.

Yours in quality education.



Mrs F. Ntsangani

15 SEPTEMBER 2022

DATE



**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

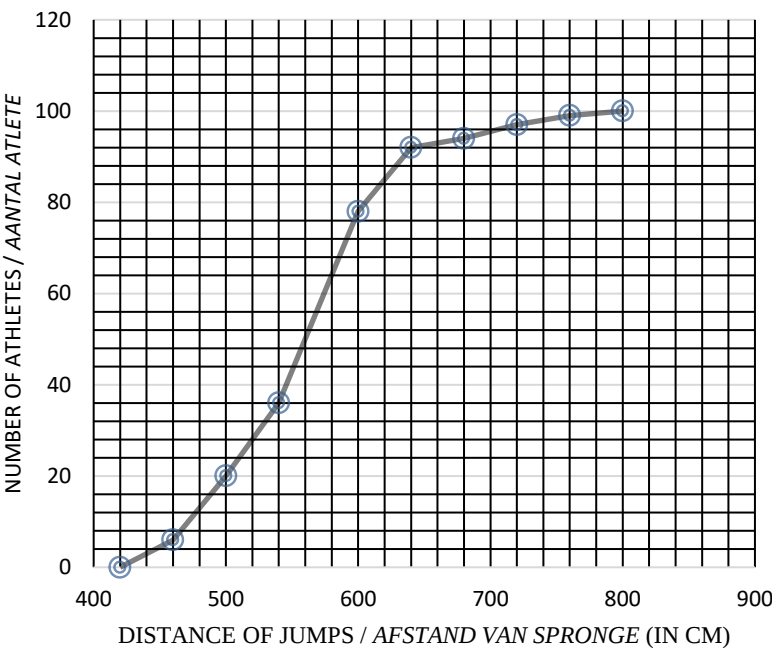
SEPTEMBER 2022

**MATHEMATICS P2/WISKUNDE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150

This marking guideline consists of 16 pages./
Hierdie nasienriglyn bestaan uit 16 bladsye.

QUESTION 1/VRAAG 1

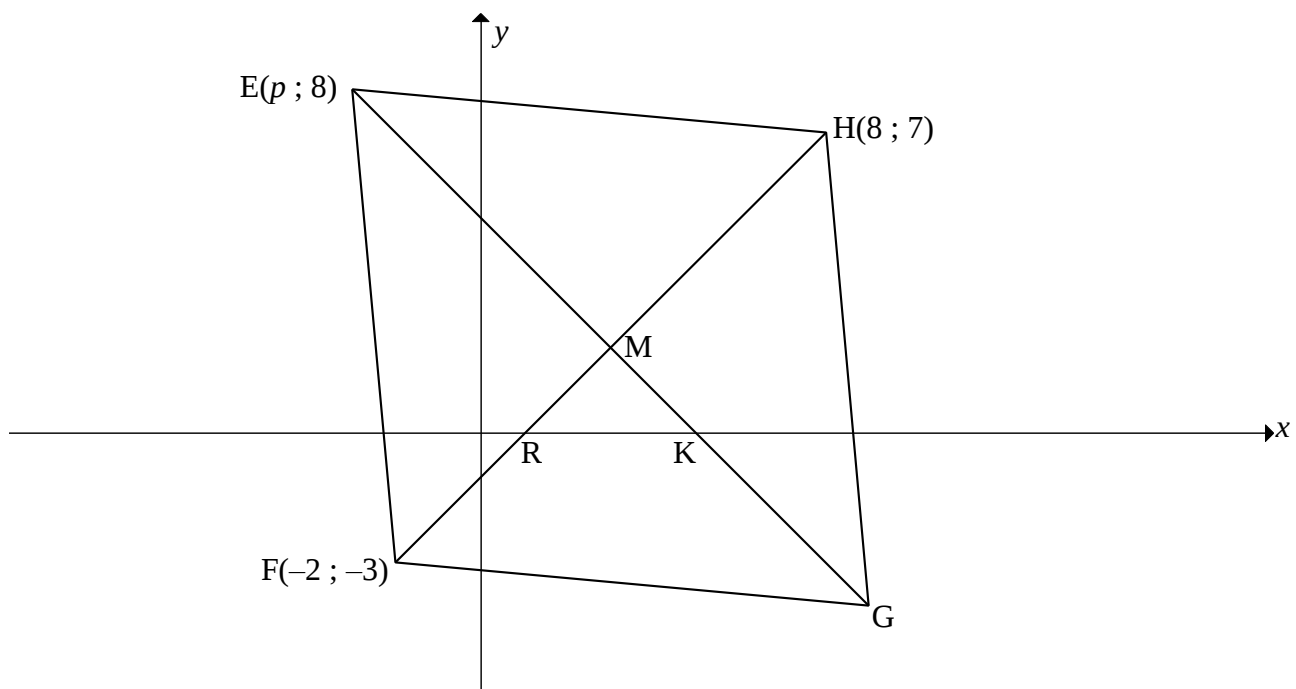
1.1	<table><thead><tr><th>Distance of Jumps <i>Afstand van Spronge</i> (in cm)</th><th>Number of athletes <i>Aantal atlete</i></th><th>CF <i>KF</i></th></tr></thead><tbody><tr><td>$420 < d \leq 460$</td><td>6</td><td>6</td></tr><tr><td>$460 < d \leq 500$</td><td>14</td><td>20</td></tr><tr><td>$500 < d \leq 540$</td><td>16</td><td>36</td></tr><tr><td>$540 < d \leq 580$</td><td>42</td><td>78</td></tr><tr><td>$580 < d \leq 620$</td><td>14</td><td>92</td></tr><tr><td>$620 < d \leq 660$</td><td>2</td><td>94</td></tr><tr><td>$660 < d \leq 700$</td><td>3</td><td>97</td></tr><tr><td>$700 < d \leq 740$</td><td>2</td><td>99</td></tr><tr><td>$740 < d \leq 780$</td><td>1</td><td>100</td></tr></tbody></table>	Distance of Jumps <i>Afstand van Spronge</i> (in cm)	Number of athletes <i>Aantal atlete</i>	CF <i>KF</i>	$420 < d \leq 460$	6	6	$460 < d \leq 500$	14	20	$500 < d \leq 540$	16	36	$540 < d \leq 580$	42	78	$580 < d \leq 620$	14	92	$620 < d \leq 660$	2	94	$660 < d \leq 700$	3	97	$700 < d \leq 740$	2	99	$740 < d \leq 780$	1	100	✓ for cf [6 to 92] <i>vir kf [6 tot 92]</i> ✓ for cf [94 to 100] <i>vir kf [94 tot 100]</i>	(2)
Distance of Jumps <i>Afstand van Spronge</i> (in cm)	Number of athletes <i>Aantal atlete</i>	CF <i>KF</i>																															
$420 < d \leq 460$	6	6																															
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$660 < d \leq 700$	3	97																															
$700 < d \leq 740$	2	99																															
$740 < d \leq 780$	1	100																															
1.2	LONG JUMPERS' BEST JUMPS <i>VERSPRINGERS SE BESTE SPRONGE</i> 	✓ anchor point <i>ankerpunt</i> ✓ upper limits <i>boonste limiete</i> ✓ sf / ✓ smooth shape <i>egalige vorm</i>	(4)																														
1.3	The median jump is 553. Accept between (551 – 555) <i>Die mediaan sprong is 553. Aanvaar tussen (551 – 555)</i>	✓✓ for answer <i>vir antwoord</i>	(2)																														
1.4	Number jumped over 560 cm = $100 - 57 = 43$ athletes Therefore, it is 43% of the athletes. <i>Aantal wat oor 560 cm gespring het = $100 - 57 = 43$ atlete</i> <i>Dit is daarom 43% van die atlete.</i>	✓ for subtraction <i>vir aftrekking</i> ✓ for the answer <i>vir die antwoord</i>	(2)																														
[10]																																	

QUESTION 2/VRAAG 2

Long jumper / Verspringer	1	2	3	4	5	6
x: Hours practised / Ure geoefen	4,5	2	3,5	4	8	3
y: Distance jumped / Afstand gespring (cm)	650	420	580	490	780	525

2.1	$a = 336,699$ $b = 56,992$ $\hat{y} = 336,699 + 56,992x$	✓ for/vir a ✓ for/vir b ✓ for/vir $a + bx$	(3)
2.2	$\hat{y} = 336,699 + 56,992(5.4) = 644,46$ cm	✓ for substitution vir vervanging ✓ for the answer vir die antwoord	(2)
2.3	The more they practiced, the further they jumped. Strong positive correlation. <i>Hoe meer hulle geoefen het, hoe verder het hulle gespring. Sterk positiewe korrelasie.</i>	✓✓ for the answer vir die antwoord	(2)
2.4.1	The mean will decrease by 13 cm. <i>Die gemiddelde sal met 13 cm verminder.</i>	✓ for the answer vir die antwoord	(1)
2.4.2	The range will remain the same / No influence on range. <i>Die omvang sal dieselfde bly / Geen invloed op die omvang.</i>	✓ for the answer vir die antwoord	(1)
2.4.3	The standard deviation remains the same. <i>Die standaardafwyking bly dieselfde.</i>	✓ for the answer vir die antwoord	(1)
			[10]

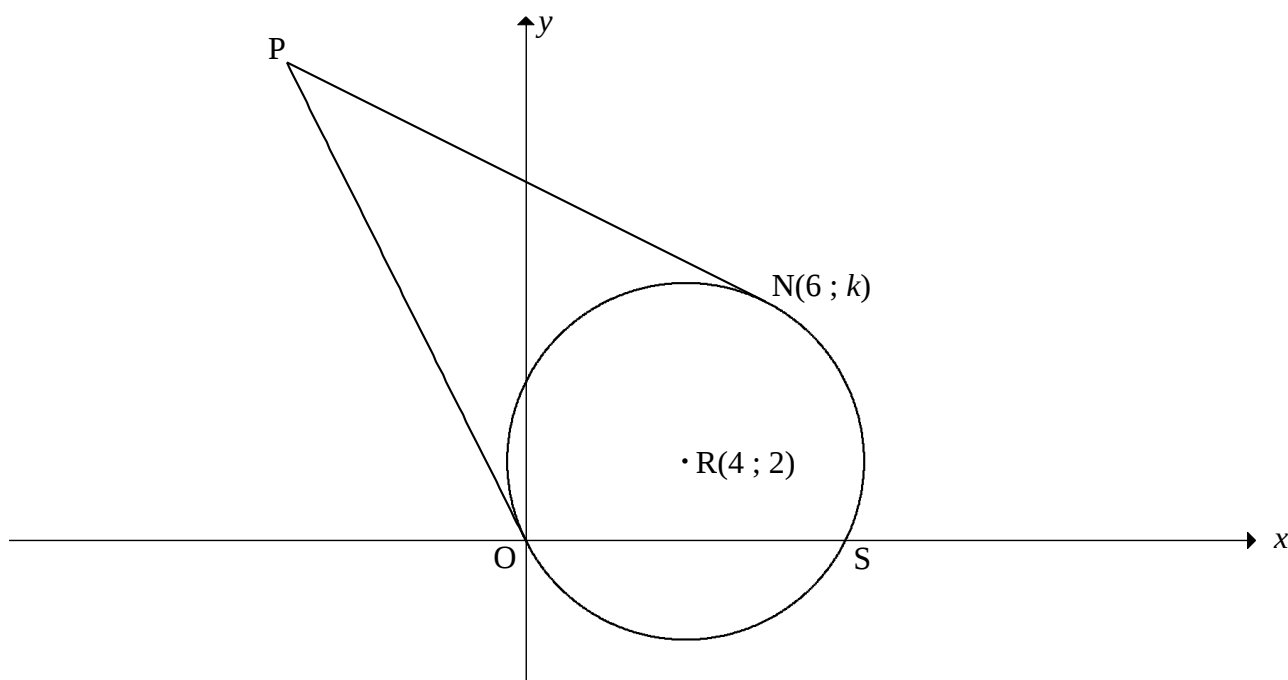
QUESTION 3/VRAAG 3



3.1.1	M (3; 2)	✓ for/vir x ✓ for/vir y	(2)
3.1.2	$m_{FH} = \frac{7 - (-3)}{8 - (-2)} = 1$	✓ for subst. / vir vervanging ✓ for answer / vir antwoord	(2)
3.1.3	$m_{EG} = -1$ (diagonals bisect at 90°) (hoeklyne halveer loodreg/by 90°) $\tan \widehat{MKX} = -1$ $\widehat{MKX} = 135^\circ$ $\therefore \widehat{MKR} = 45^\circ$	✓ S ✓ S ✓ $\widehat{MKX} = 135^\circ$ ✓ for answer / vir antwoord	(4)

3.2	FE = EH (sides of a rhombus =) (sye van 'n rombus =) $FE^2 = EH^2$ $(p+2)^2 + (8+3)^2 = (p-8)^2 + (8-7)^2$ $p^2 + 4p + 4 + 121 = p^2 - 16p + 64 + 1$ $20p = -120$ $p = -3$ OR/OF E(p; 8) and Midpoint of HF / en Middelpunt van HF = (3; 2) $m_{FH} = 1$ gradient from E to midpoint of FH / gradiënt vanaf E na middelpunt van FH $= \frac{8-2}{p-3} = \frac{6}{p-3}$ FH is perpendicular to EG / FH is loodreg op EG $\therefore \frac{6}{p-3} \times 1 = -1$ $\therefore p = -3$	✓ for equating / gelykstel $FE^2 = EH^2$ ✓ for squaring / kwadrering ✓ for simplification vir vereenvoudiging ✓ for the answer vir die antwoord OR/OF ✓ for gradient of E to FH vir gradiënt van E na FH ✓ statement / stelling ✓ for the product vir die produk ✓ for the answer vir die antwoord	(4)
3.3	G(9; - 4)	✓ for/vir x ✓ for/vir y	(2)
3.4	M(3 ;2) N(-9 ;2) MN = 12 units/eenhede	✓ for coordinates of N vir die koördinate van N ✓✓ for answer / vir antwoord	(3)
			[17]

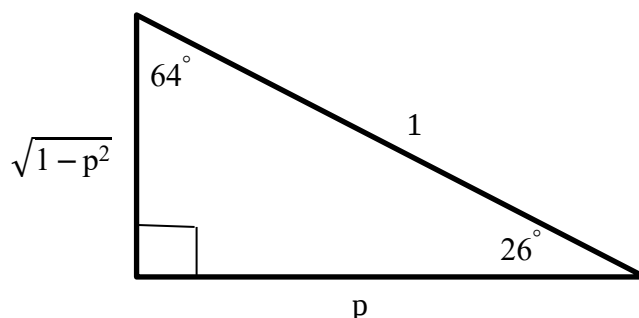
QUESTION/VRAAG 4



4.1	$r^2 = (4-0)^2 + (2-0)^2$ $r^2 = 20$ $\therefore (x-4)^2 + (y-2)^2 = 20$	✓ substitution / <i>vervang</i> ✓ for/vir r^2 ✓ for the equation/vir <i>die vergelyking</i>	(3)
4.2	$(6-4)^2 + (k-2)^2 = 20$ $(k-2)^2 = 16$ $k-2 = \pm 4$ $k = 6$ or/of $k = -2$ $k = 6$ OR/OF Sub: $N(6; y)$ into the equation of the circle. Verv. $N(6; y)$ in <i>die vergelyking van die sirkel</i> . $(6-4)^2 + (y-2)^2 = 20$ $4 + y^2 - 4y + 4 - 20 = 0$ $y^2 - 4y - 12 = 0$ $(y-6)(y+2) = 0$ $y = 6$ or/of $y = -2$ $\therefore y = 6$	✓ substitution of / <i>vervang</i> van N ✓ simplification / <i>vereenvoudig</i> ✓ both answers for k / <i>beide antwoorde vir k</i> ✓ selection of $k = 6$ <i>keuse van $k = 6$</i> OR/OF ✓ for substitution / <i>vir vervang</i> ✓ for standard form / <i>vir standaardvorm</i> ✓ for the factors / <i>vir die faktore</i> ✓ for the answer / <i>vir die antwoord</i>	(4)

4.3	$m_{RN} = \frac{6-2}{6-4} = 2$ $m_{NP} = -\frac{1}{2}$ Equation of NP / <i>Vergelyking van NP</i>: $y - 6 = -\frac{1}{2}(x - 6)$ $y = -\frac{1}{2}x + 9$	✓ for gradient of RN <i>vir gradiënt van RN</i> ✓ for gradient of NP <i>vir gradiënt van NP</i> ✓ for substitution of N <i>vir vervanging van N</i> ✓ for/vir $c = 9$ ✓ for answer / <i>vir antwoord</i>	(5)
4.4.1	$-2x = -\frac{1}{2}x + 9$ $-\frac{3}{2}x = 9$ $-3x = 18$ $\therefore x = -6 \text{ and/en } y = 12$ $\therefore P(-6; 12)$	✓ for equating / <i>vir gelykstelling</i> ✓ for the simplification <i>vir die vereenvoudiging</i> ✓ for the answer / <i>vir die antwoord</i>	(3)
4.4.2	$RO = RN = \sqrt{4^2 + 2^2} = 2\sqrt{5} \text{ (radii/radiusse)}$ $PO = PN = \sqrt{(-6)^2 + 12^2} = 6\sqrt{5} \text{ (tangents from same pt)}$ <i>(raaklyne vanaf dieselfde punt)</i> $\therefore \text{Perimeter of / Omtrek van PNRO} = 2(2\sqrt{5}) + 2(6\sqrt{5})$ $= 16\sqrt{5} \text{ or/of } 35,78 \text{ units/eenhede}$	✓ use of distance formula <i>gebruik van afstand formule</i> ✓ for RO / RN answer <i>vir RO / RN antwoord</i> ✓ for PO / PN answer <i>vir PO / PN antwoord</i> ✓ for final answer <i>vir finale antwoord</i>	(4)
4.5	$S(8 ; 0)$ $T(12 ; -2)$	✓✓ coordinates of S <i>koördinate van S</i> ✓✓ coordinates of T <i>koördinate van T</i>	(4)
			[23]

QUESTION 5/VRAAG 5



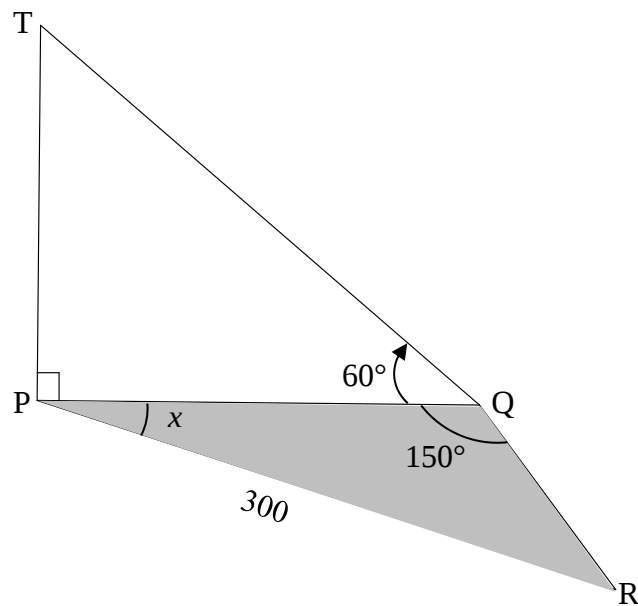
5.1.1	$\sin 26^\circ = \frac{\sqrt{1-p^2}}{1}$	✓✓ for the answer vir die antwoord	(2)
5.1.2	$\tan 154^\circ$ $= -\tan 26^\circ$ $= -\frac{\sqrt{1-p^2}}{p}$	✓✓ for the reduction vir die reduksie ✓ for the answer vir die antwoord	(3)
5.1.3	$\sin 13^\circ \cdot \cos 13^\circ$ $\sin 26^\circ = 2 \sin 13^\circ \cdot \cos 13^\circ$ $\sin 13^\circ \cdot \cos 13^\circ = \frac{\sin 26^\circ}{2}$ $\sin 13^\circ \cdot \cos 13^\circ = \frac{\sqrt{1-p^2}}{2}$	✓ for the reduction vir die reduksie ✓ for the answer vir die antwoord	(2)
5.2.1	$\frac{\cos(-\theta) \cdot \tan(180^\circ + \theta)}{2 \cos(90^\circ + \theta)}$ $= \frac{\cos \theta \cdot \tan \theta}{-2 \sin \theta}$ $= \frac{\cos \theta \cdot \frac{\sin \theta}{\cos \theta}}{-2 \sin \theta}$ $= -\frac{1}{2}$	✓ $\cos \theta$ ✓ $\tan \theta$ ✓ $-2 \sin \theta$ ✓ $\frac{\sin \theta}{\cos \theta}$ ✓ for the answer vir die antwoord	(5)
5.2.2	$1 + 2 \cos 105^\circ \sin 15^\circ$ $= 1 + 2 \cos 75^\circ \sin 15^\circ$ $= 1 + 2 \sin 15^\circ \sin 15^\circ$ $= 1 - \sin 30^\circ$ $= 1 - \frac{1}{2}$ $= \frac{1}{2}$	✓ for reduction of $\cos 105^\circ$ vir reduksie van $\cos 105^\circ$ ✓ for reduction of $\cos 75^\circ$ vir reduksie van $\cos 75^\circ$ ✓ for $\sin 30^\circ$ vir $\sin 30^\circ$ ✓ for the answer vir die antwoord	(4)

5.3.1	$\frac{1 - \cos 2x - \sin x}{\sin 2x - \cos x} = \tan x$ LHS: $\frac{1 - (1 - 2\sin^2 x) - \sin x}{2\sin x \cos x - \cos x}$ $= \frac{2\sin^2 x - \sin x}{2\sin x \cos x - \cos x}$ $= \frac{\sin x(2\sin x - 1)}{\cos x(2\sin x - 1)}$ $= \tan x = \text{RHS}$	✓ expansion of $\cos 2x$ <i>uitbreiding van $\cos 2x$</i> ✓ expansion of $\sin 2x$ <i>uitbreiding van $\sin 2x$</i> ✓ for the simplification <i>vir die vereenvoudiging</i> ✓ taking out HCF <i>uithaal van GGD</i>	(4)
5.3.2	$\sin 2x = \cos x$ $x = -90^\circ ; 30^\circ ; 90^\circ \text{ and/en } 150^\circ$	✓ for/vir $\sin 2x = \cos x$ ✓ for any 2 answers <i>vir enige 2 antwoorde</i> ✓ for any other 2 answers <i>vir enige 2 antwoorde</i>	(3)
5.4	$\sin^2 x + 2\sin x \cos x = 3\cos^2 x$ $\sin^2 x + 2\sin x \cos x - 3\cos^2 x = 0$ Divide every term by/ <i>Deel elke term deur</i> $\cos^2 x$ $\tan^2 x + 2\tan x - 3 = 0$ $(\tan + 3)(\tan - 1) = 0$ $\tan x = -3 \text{ or/of } \tan x = 1$ $x = 108,43^\circ + 180^\circ.k \text{ or/of } x = 45^\circ + 180^\circ.k$ where/ <i>waar</i> $k \in \mathbb{Z}$ OR/OF $\sin^2 x + 2\sin x \cos x = 3\cos^2 x$ $\sin^2 x + 2\sin x \cos x - 3\cos^2 x = 0$ $(\sin x + 3\cos x)(\sin x - \cos x) = 0$ $\sin x = -3\cos x \text{ or/of } \sin x = \cos x$ $\tan x = -3 \text{ or/of } \tan x = 1$ $x = 108,43^\circ + 180^\circ.k$ or/ <i>of</i> $x = 45^\circ + 180^\circ.k$ where/ <i>waar</i> , $k \in \mathbb{Z}$	✓ for standard form <i>vir standaardvorm</i> ✓ for dividing by $\cos^2 x$ <i>vir deling deur $\cos^2 x$</i> ✓ for the factors <i>vir die faktore</i> ✓ for values of $\tan x$ <i>vir waardes van $\tan x$</i> ✓✓ for the answers <i>vir die antwoorde</i> ✓ for standard form <i>vir standaardvorm</i> ✓ for the factors <i>vir die faktore</i> ✓ for isolating $\sin x$ <i>vir isolering van $\sin x$</i> ✓ for values of $\tan x$ <i>vir waardes van $\tan x$</i> ✓✓ for the answers <i>vir die antwoorde</i>	(7)
			[30]

QUESTION 6/VRAAG 6

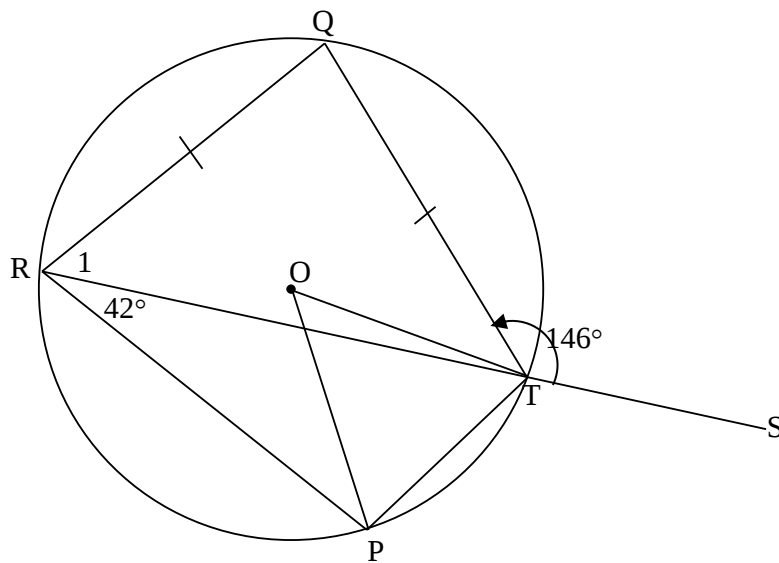
6.1			✓ shape vorm ✓ start / end points begin / eind punte ✓ TP at / DP by 90°	(3)
6.2.1	Period / Periode = 180°		✓ answer	(1)
6.2.2	$-3 \leq y \leq -1$ OR/OF $y \in [-3 ; -1]$	✓ for/vir -3 and/en -1 ✓ for the answer in correct notation vir die antwoord in korrekte notasie		(2)
6.3	$h(x) = -\sin x - 1$ Maximum distance/Maksimum afstand = 2 units/eenhede	✓ for/vir $h(x)$ ✓ answer / antwoord		(2)
6.4	$f(x) \cdot g'(x) > 0$ $-90^\circ < x < 90^\circ$	✓✓ answer / antwoord		(2)
6.5	Graph shifted 1 unit down and 15° to the right. Grafiek het 1 eenheid af en 15° na regs geskuif.	✓ for 1 unit down / vir 1 eenheid af ✓ for 15° to the right / vir 15° na regs		(2)
				[12]

QUESTION 7/VRAAG 7



7.1	$\hat{R}(30^\circ - x)$	✓ for answer / vir antwoord	(1)
7.2	$\frac{PQ}{\sin(30^\circ - x)} = \frac{300}{\sin 150^\circ}$ $\frac{PQ}{\sin(30^\circ - x)} = 600$ $PQ = 600 \sin(30^\circ - x)$	✓ for sine-rule vir sinusreël ✓ for/vir 600 ✓ for the answer vir die antwoord	(3)
7.3	$\tan 60^\circ = \frac{TP}{PQ}$ $TP = PQ \tan 60^\circ$ $TP = \sqrt{3} \cdot 600 \sin(30^\circ - x)$ $TP = \sqrt{3} \cdot 600 \cdot (\sin 30^\circ \cos x - \cos 30^\circ \sin x)$ $TP = \sqrt{3} \cdot 600 \left(\frac{1}{2} \cos x - \frac{\sqrt{3}}{2} \sin x \right)$ $TP = \sqrt{3} \cdot 300 (\cos x - \sin x)$	✓ for/vir $\tan 60^\circ$ ✓ for/vir $\sqrt{3} \cdot 600 \sin(30^\circ - x)$ ✓ for expansion vir uitbreiding ✓ for taking out common factor / vir uithaal van gemene faktor	(4)
			[8]

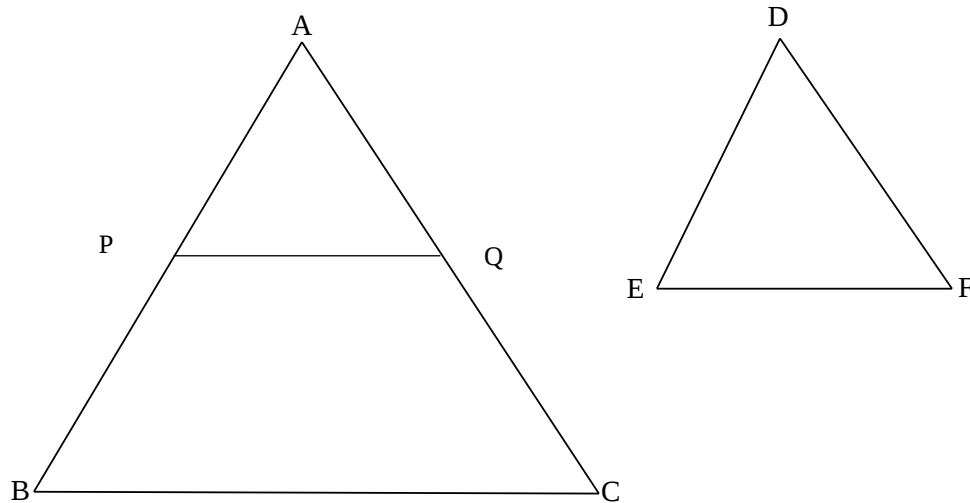
QUESTION 8/VRAAG 8



8.1	$\hat{POT} = 84^\circ$ ($\angle$ at centre) / (<i>Middelpunts $\angle$</i>)	✓ S ✓ R	(2)
8.2	$\hat{QTR} = 34^\circ$ ($\angle$ s on a straight line) (<i>$\angle$ e op 'n reguitlyn</i>)	✓ S and/en R	
	$\hat{R}_1 = 34^\circ$ ($\angle$ s opp. = sides) / (<i>$\angle$ e teenoor = sye</i>)	✓ S and/en R	(2)
8.3	$\hat{RQT} = 112^\circ$ $\hat{RPT} = 68^\circ$ (opp. $\angle$ s of cq) / (<i>teenoorst. $\angle$ e van kv</i>)	✓ S and/en R ✓ S ✓ R	(3)
			[7]

9.2.3	In $\triangle MEC$: $CE \parallel DB$ (proven / bewys) $\frac{ME}{MB} = \frac{MC}{MD}$ (prop. int. Thm, $CE \parallel DB$) (eweredigheid st, $CE \parallel DB$) $\therefore \frac{ME}{MC} = \frac{MB}{MD}$ $\therefore ME \times MD = MC \times MB$	✓ S and/en R ✓ S	(2)
			[12]

QUESTION 10/VRAAG 10



10.1	Construction: Mark off, on AB and AC, P and Q respectively such that $AP = DE$ and $AQ = DF$. <i>Konstruksie: Merk P en Q onderskeidelik op AB en AC af sodat $AP = DE$ en $AQ = DF$.</i> In $\triangle PAQ$ and/en $\triangle EDF$: (1) $PA = ED$ (construction / <i>konstruksie</i>) (2) $\hat{A} = \hat{D}$ (given / <i>gegee</i>) (3) $QA = FD$ (construction / <i>konstruksie</i>) $\therefore \triangle PAQ \equiv \triangle EDF$ (SAS) $\therefore \hat{APQ} = \hat{E}$ (congruency / <i>kongruensie</i>) But/Maar $\hat{B} = \hat{E}$ (given/<i>gegee</i>) $\therefore \hat{APQ} = \hat{E}$ $\therefore PQ \parallel BC$ (corresponding $\angle$s = / <i>ooreenkomstige. $\angle$e =</i>) $\therefore \frac{AP}{AB} = \frac{AQ}{AC}$ (prop. int. thm / <i>eweredigheid stelling</i>) But/Maar : $AP = DE$ and/en $AQ = DF$ (construction/<i>konstruksie</i>) $\therefore \frac{DE}{AB} = \frac{DF}{AC}$	✓ construction <i>konstruksie</i> ✓ S and/en R ✓ S ✓ S ✓ R ✓ S	(6)
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