Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2022

MATHEMATICS P2

MARKS: **150**

TIME: **3 hours**

This question paper consists of 14 pages, including an information sheet and an answer book of 20 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 10 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulae is included at the end of the question paper.
9. Write neatly and legibly.

QUESTION 1

The following table shows a sleeping pattern record, in hours, of ten Grade 11 learners:

Learner	1	2	3	4	5	6	7	8	9	10
Number of hours slept	7	8	8	5	6	3	4	8	7	10

1.1 Calculate the mean number of hours slept by the learners. Give the answer correct to TWO decimal places. (1)

1.2 Write down the five-number summary for this data. (2)

1.3 Draw a box-and-whisker diagram for this data set. (2)

1.4 Refer to your diagram and comment on the skewness of the data, and give a reason for your answer. (2)

1.5 Calculate the standard deviation for this data. Give your answer correct to TWO decimal places. (2)

1.6 A learner is considered to have slept well, if his sleeping time is above one standard deviation from the mean. How many learners slept well? (2)

[11]

QUESTION 2

The different ages of teachers at a certain school in the Eastern Cape are given in the table below.

2.1 Complete the following table in your ANSWER BOOK.

AGE	FREQUENCY	CUMULATIVE FREQUENCY
$25<A\leq30$	2	
$30<A\leq35$	8	
$35<A\leq40$	4	
$40<A\leq45$	5	
$45<A\leq50$	11	
$50<A\leq55$	19	
$55<A\leq60$	20	
$60<A\leq65$	6	

(2)

2.2 Draw an ogive on the set of axes provided in your ANSWER BOOK to represent the data in the table. (4)

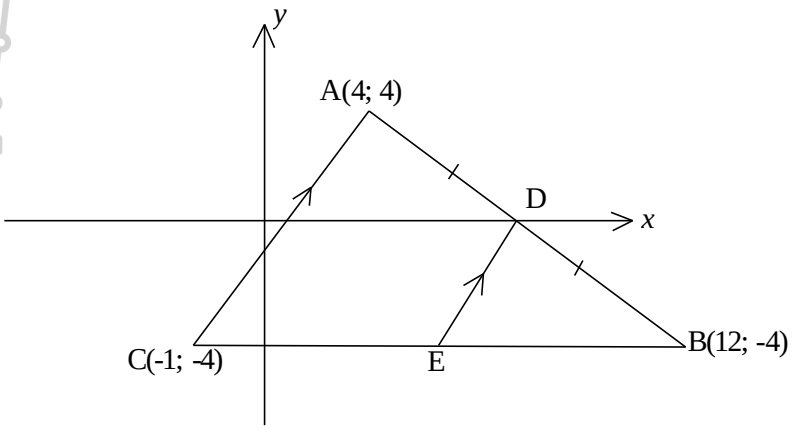
2.3 Use your graph to find an estimate of the median age. (2)

2.4 The school would like to give all teachers older than 57 a special present. Use your graph to find an estimate for the percentage of teachers older than 57 years of age. (2)

[10]

QUESTION 3

In the diagram below, the coordinates of A(4; 4), B(12; -4) and C(-1; -4) are given.
AC ∥ DE and CEB is a straight line. D is the midpoint of AB.



Determine:

3.1 The length of AB. Give your answer correct to TWO decimal places (2)

3.2 The coordinates of D, the midpoint of AB (2)

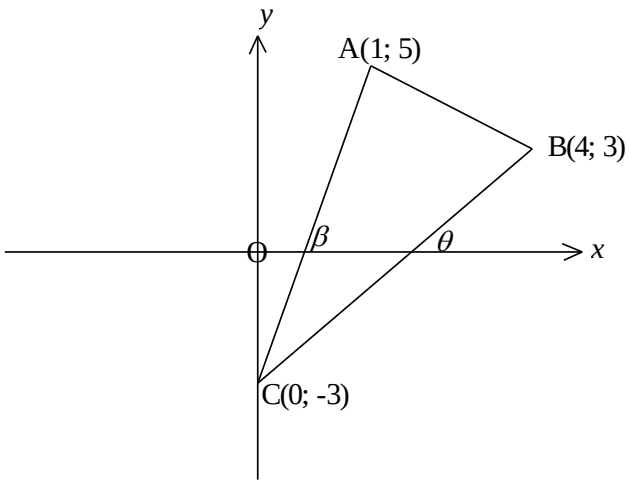
3.3 The equation of line DE (4)

3.4 The coordinates of E (3)

[11]

QUESTION 4

A(1; 5), B(4; 3) and C(0; -3) are vertices of the triangle given below.



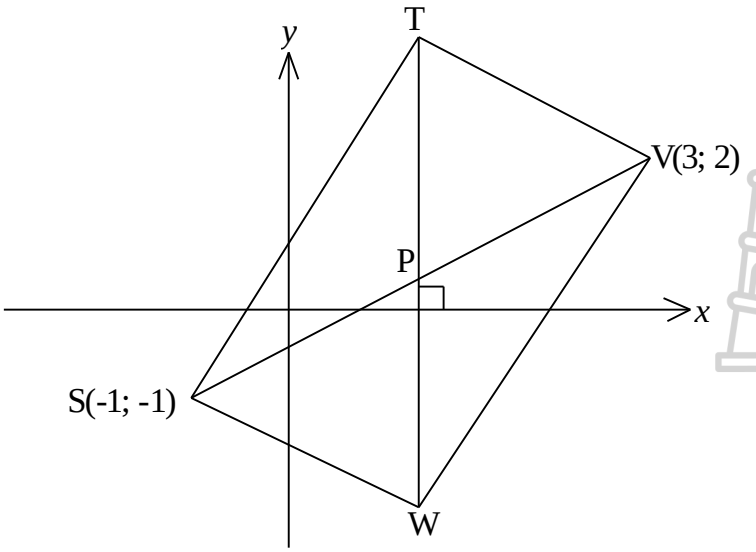
4.1 Determine, using any method, the coordinates of D if ABCD is a parallelogram. (2)

4.2 If the distance between C and F(8; p) is 12 units, determine the value(s) of p (to the nearest integer). (5)

4.3 Determine the size of $A\hat{C}B$. (5)
[12]

QUESTION 5

In the diagram below, the diagonals of STVW are equal in length and bisect each other at P. Calculate the coordinates of T and W.



(6)
[6]

QUESTION 6

6.1 If $-3\sin\beta - 2 = 0$ and $\beta \in [0°;270°]$, use a sketch in the correct quadrant to determine the value of: $1 + \tan^2\beta$ without a calculator. (5)

6.2 If, $\cos 75° = m$ express each of the following in terms of m, showing all your working:

6.2.1 $\cos^2 105°$ (2)

6.2.2 $\sin 15°$ (2)

6.2.3 $\tan 15°$ (2)

6.3 Given the expression:

$$\frac{\cos(180° - k).\sin(k - 90°) - 1}{\tan^2(540° + k).\sin(90° + k).\cos(-k)}$$

6.3.1 Simplify the expression. (7)

6.3.2 Determine the values of $k \in [0°;360°]$ for which the expression is undefined. (6)

6.4 Prove that:

$$\frac{1+\sin\theta}{1-\sin\theta} - \frac{1-\sin\theta}{1+\sin\theta} = \frac{4\tan\theta}{\cos\theta}$$ (5)

6.5 Determine the general solution of:

$6\sin^2\theta + \cos\theta = 4$ (7)

6.6 If $p = \tan A + \sin A$ and $q = \tan A - \sin A$, prove that:

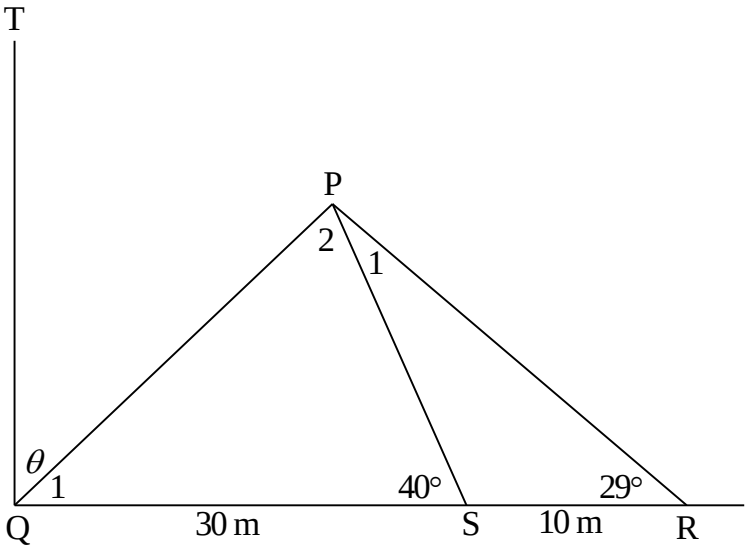
$pq = \tan^2 A \,.\, \sin^2 A$ (5)

[41]

QUESTION 7

Study the diagram below and then answer the questions that follow.

$T\hat{Q}R = 90°$, $Q\hat{S}P = 40°$, $S\hat{R}P = 29°$, QS = 30 m and SR = 10 m.
It is also given that $T\hat{Q}P = \theta$.



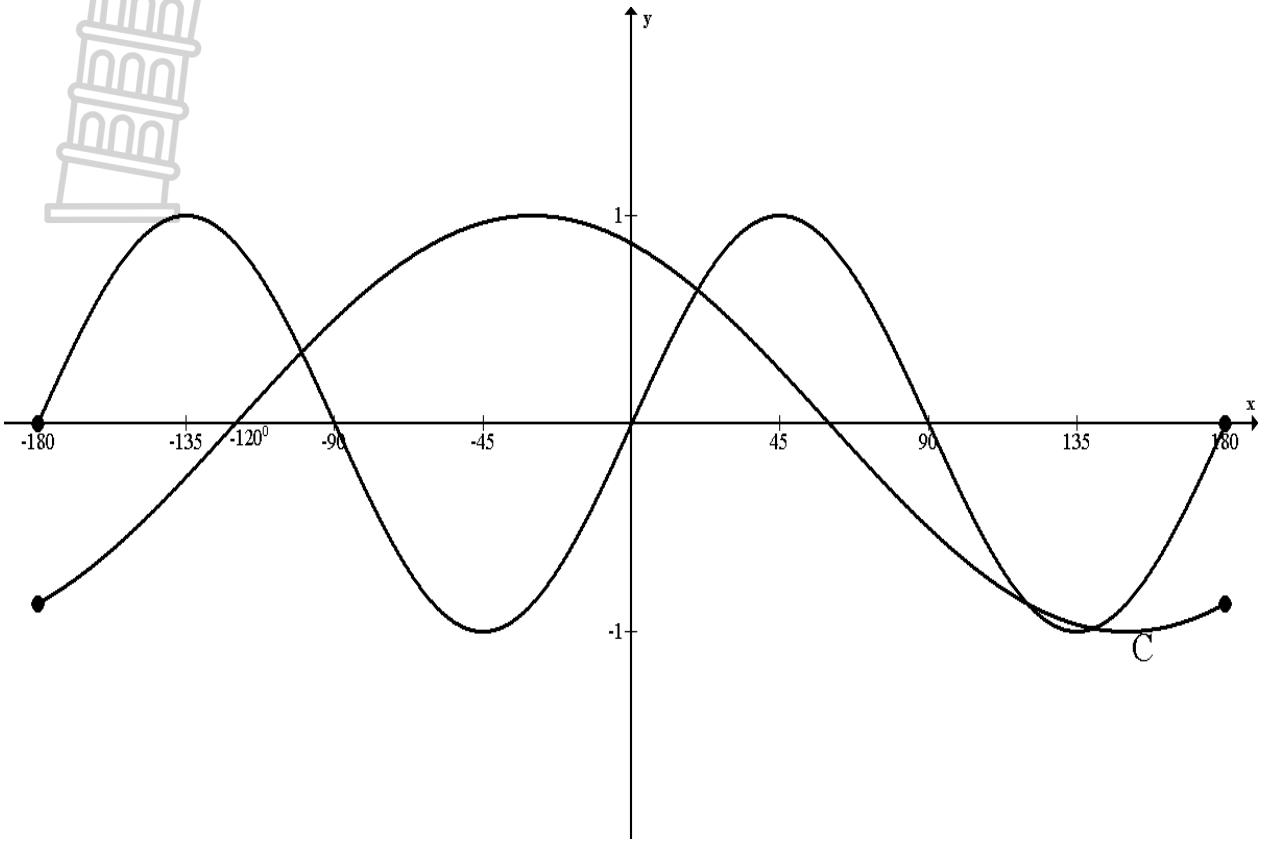
7.1 Give a reason why $\hat{P}_1 = 11°$. (1)

7.2 Calculate the length of PS. (3)

7.3 Determine the value of θ, correct to the nearest degree. (5)
[9]

QUESTION 8

The sketch graphs of $f(x) = \sin ax$ and $g(x) = \cos(x - b)$ is given below.



8.1 Determine the values of a and b. (2)

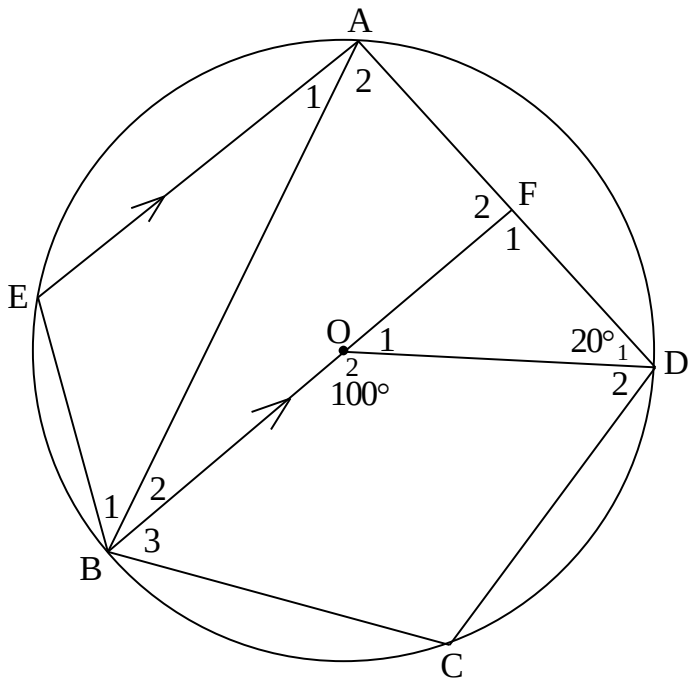
8.2 Determine the coordinates of C, a turning point on $g(x)$. (2)

8.3 For which values of x, where $x < 0$, is $f(x).g(x) \geq 0$? (3)

8.4 Determine the equation of $f(x)$ if the y-axis is moved 30° to the left. (1)
[8]

QUESTION 9

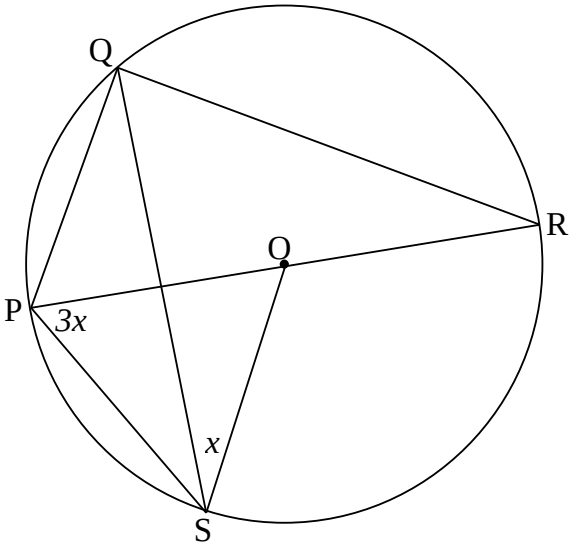
9.1 In the diagram below, O is the centre of circle AEBCD, with line BOF || EA. F lies on AD, $B\widehat{O}D = 100°$ and $\widehat{D}_1 = 20°$. The sizes of some of the angles are given in the table below. In each case, supply a valid reason.



	STATEMENT	REASONS
9.1.1	$\widehat{A}_2 = 50°$	
9.1.2	$\widehat{O}_1 = 80°$	
9.1.3	$\widehat{F}_1 = 80°$	
9.1.4	$\widehat{A}_1 = 30°$	
9.1.5	$\widehat{B}_2 = 30°$	

(5)

9.2 P, Q and R are points on the circumference of the circle with centre O. PR is the diameter of the circle. $Q\hat{S}O = x$ and $O\hat{P}S = 3x$.



Express each of the following in terms of x, giving a reason for your answer:

9.2.1 $S\hat{Q}R$ (2)

9.2.2 $P\hat{Q}S$ (3)

9.2.3 $P\hat{S}Q$ (3)

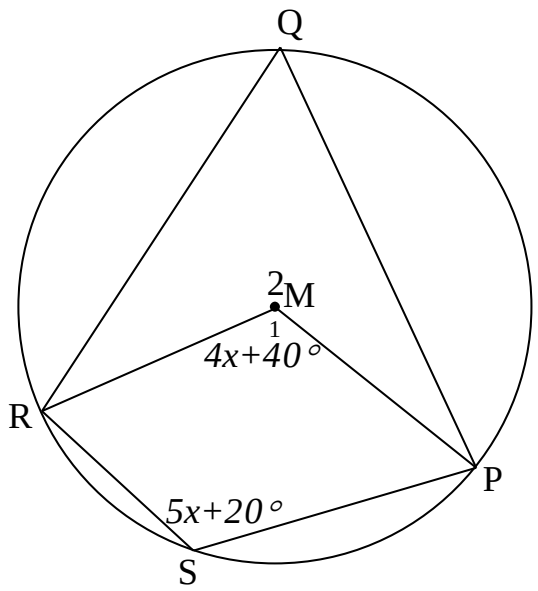
9.2.4 $P\hat{R}Q$ (2)

9.2.5 $Q\hat{P}R$ (2)

[17]

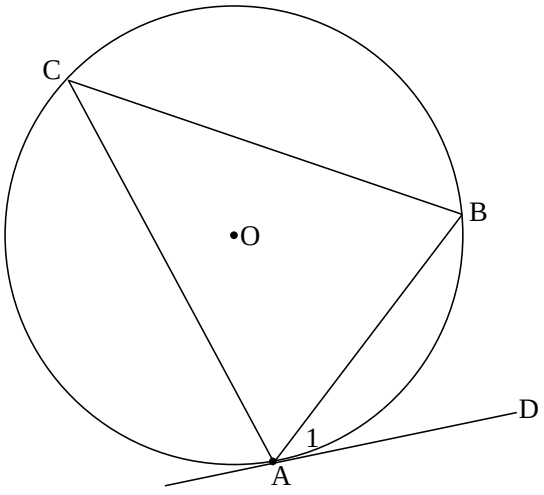
QUESTION 10

10.1 In the figure, P, Q, R and S are points on the circumference of a circle with centre M. It is given that $\hat{M}_1 = 4x + 40°$ and $\hat{S} = 5x + 20°$.



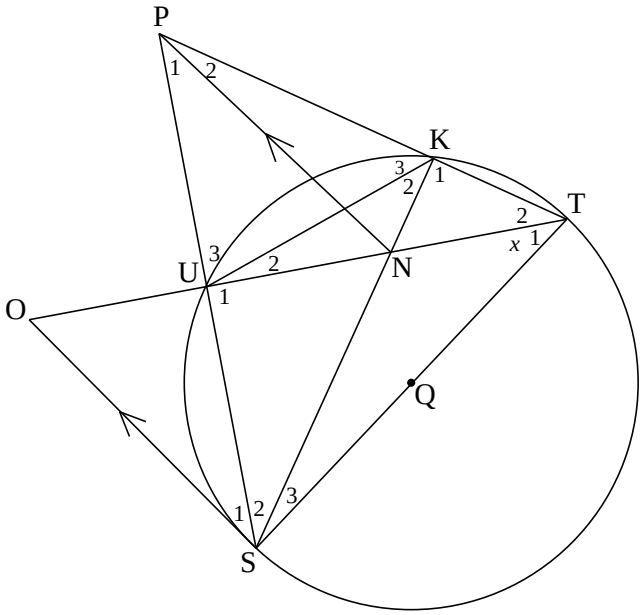
Calculate the size of $\hat{Q}$ with reasons. (5)

10.2 In the diagram below, the circle with centre O passes through the points A, B and C. AD is a tangent to the circle at A.



Use the diagram to prove the theorem that states that $\hat{A}_1 = \hat{C}$. (6)

10.3 Refer to the diagram below. ST is a diameter of the circle. OS || PN, TO bisects $S\widehat{T}P$. Let $\widehat{T}_1 = x$.



10.3.1 Prove that PUNK is a cyclic quadrilateral. (5)

10.3.2 SO is a tangent to circle KUST. (6)

10.3.3 Prove that POST is a cyclic quadrilateral. (3)

[25]

TOTAL: 150

INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

In ΔABC:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad a^2 = b^2 + c^2 - 2bc.\cos A \qquad area\,\Delta ABC = \frac{1}{2}ab.\sin C$$

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

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

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

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

$$P(A) = \frac{n(A)}{n(S)} \qquad P\,(A \text{ or } B) = P\,(A) + P\,(B) - P\,(A \text{ and } B)$$

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

Province of the EASTERN CAPE EDUCATION

LEARNER'S NAME: ***LEERDER SE NAAM:***	

GRADE 11/*GRAAD 11*	

NATIONAL/*NASIONALE* SENIOR CERTIFICATE/*SERTIFIKAAT*

GRADE 11/*GRAAD 11*

NOVEMBER 2022

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

Marker/*Merker*					**Moderator's initials / *Moderator se voorletters***															
Question ***Vraag***	**Mark** ***Punt***			**Initial** **Voorletters**	**Marks** ***Punte***			**S M**	**Marks** ***Punte***			**D M**	**Marks** ***Punte***			**P M**	**Marks** ***Punte***			**N M**
1																				
2																				
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5																				
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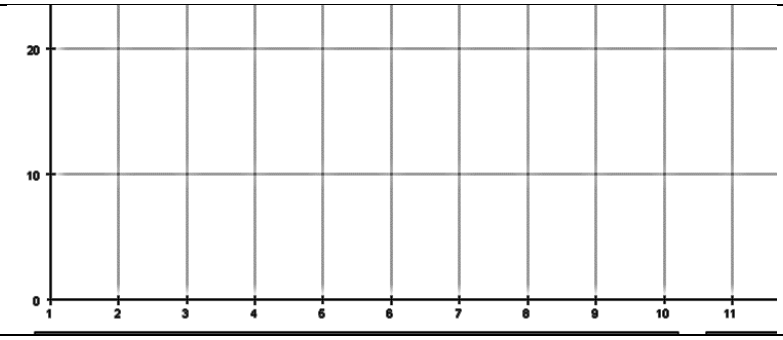
7																				
8																				
9																				
10																				
TOTAL/ ***TOTAAL***																				

This special answer book consists of 20 pages./
Hierdie spesiale antwoordeboek bestaan uit 20 bladsye.

QUESTION 1/*VRAAG 1*

1.1		(1)
1.2		(2)
1.3		(2)
1.4		(2)
1.5		(2)
1.6		(2)
		[11]

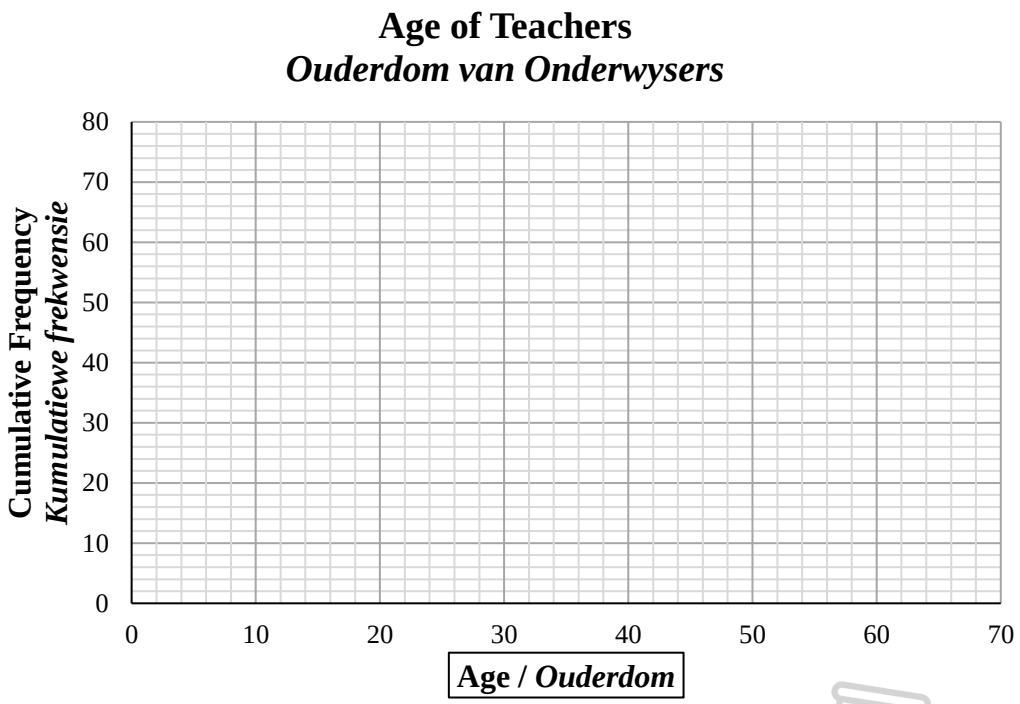
QUESTION 2/*VRAAG 2*

2.1

Age ***Ouderdom***	**Frequency** ***Frekwensie***	**Cumulative Frequency** ***Kumulatiewe Frekwensie***
$25 < A \leq 30$	2	
$30 < A \leq 35$	8	
$35 < A \leq 40$	4	
$40 < A \leq 45$	5	
$45 < A \leq 50$	11	
$50 < A \leq 55$	19	
$55 < A \leq 60$	20	
$60 < A \leq 65$	6	

(2)

2.2



(4)

2.3

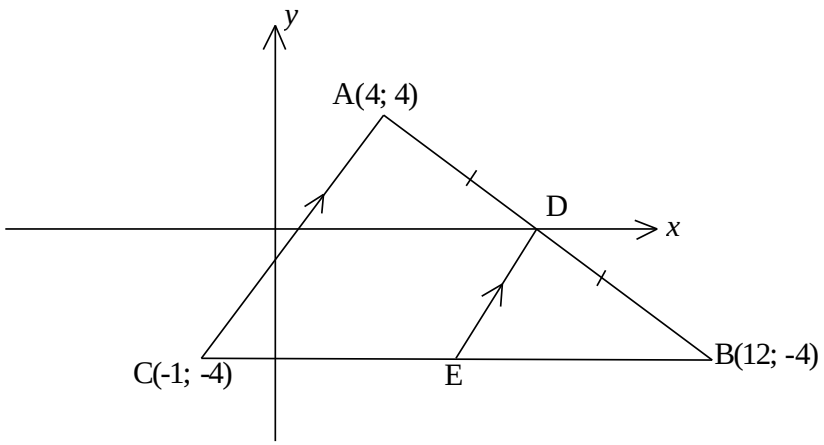
(2)

2.4

(2)

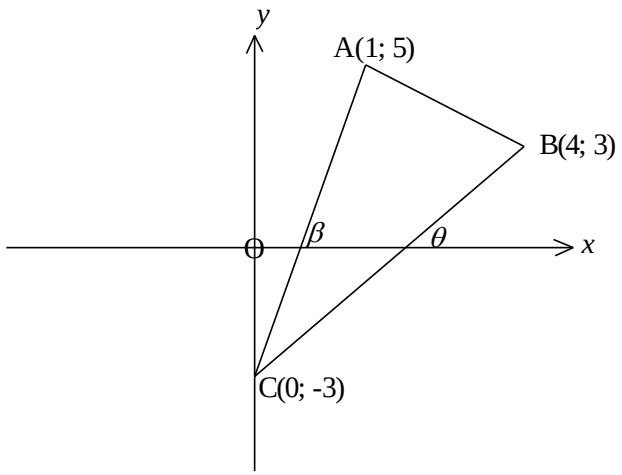
[10]

QUESTION 3/*VRAAG 3*



3.1		(2)
3.2		(2)
3.3		(4)
3.4		(3)
		[11]

QUESTION 4/*VRAAG 4*

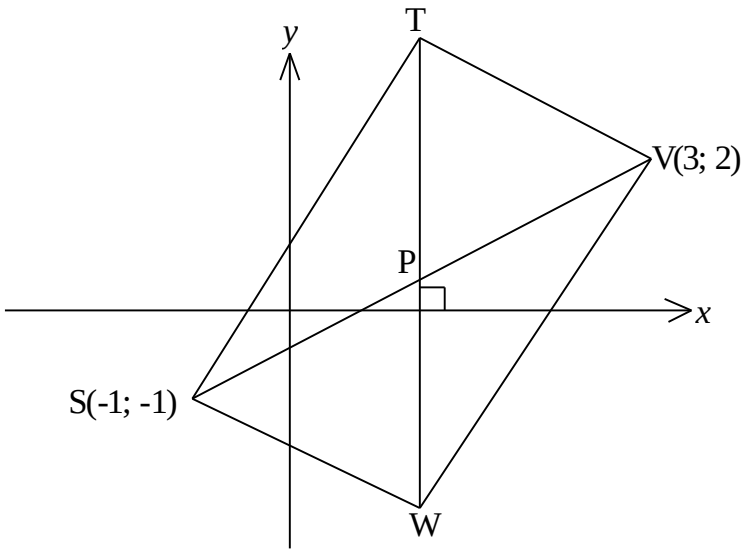


4.1 (2)

4.2 (5)

4.3		(5)
		[12]

QUESTION 5/*VRAAG 5*



		(6)
		[6]

QUESTION 6/*VRAAG 6*

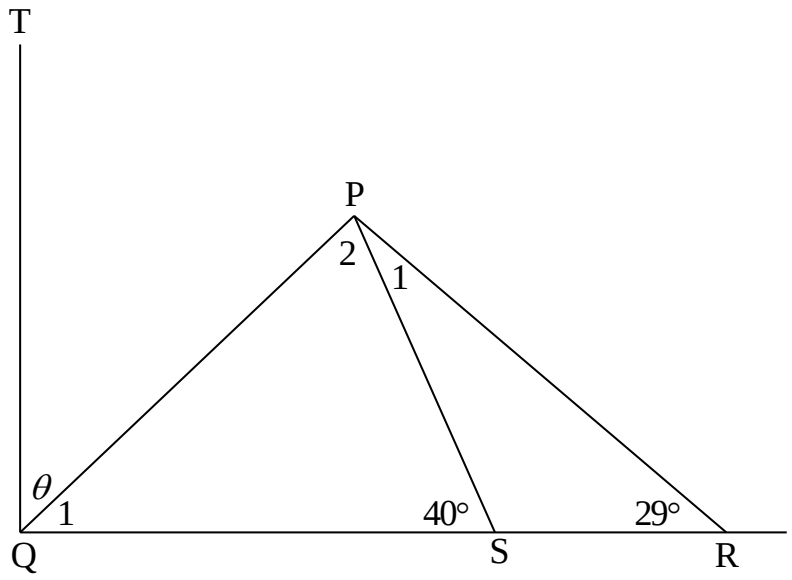
6.1	Draw your sketch here *Teken jou skets hier*	Do your calculations here *Doen jou berekeninge hier*	(5)
6.2.1			(2)
6.2.2			(2)
6.2.3			(2)

6.3.1		(7)
6.3.2		(6)

6.4		(5)
6.5		(7)

6.6		(5)
		[41]

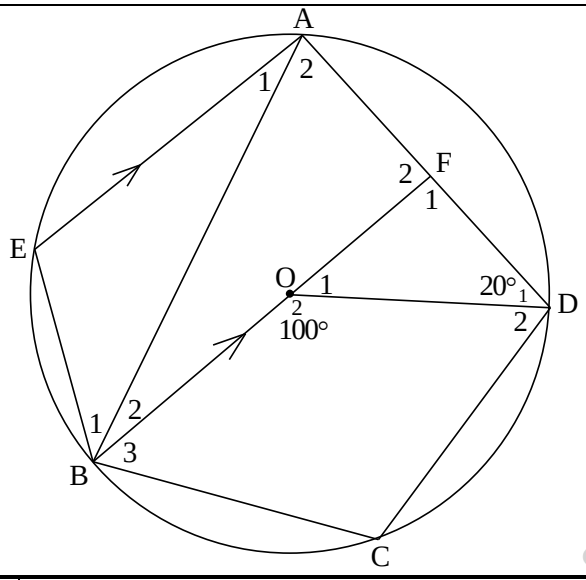
QUESTION 7/*VRAAG 7*

		
7.1		(1)
7.2		(3)
7.3		(5)
		[9]

QUESTION 8/*VRAAG 8*

8.1		(2)
8.2		(2)
8.3		(3)
8.4		(1)
		[8]

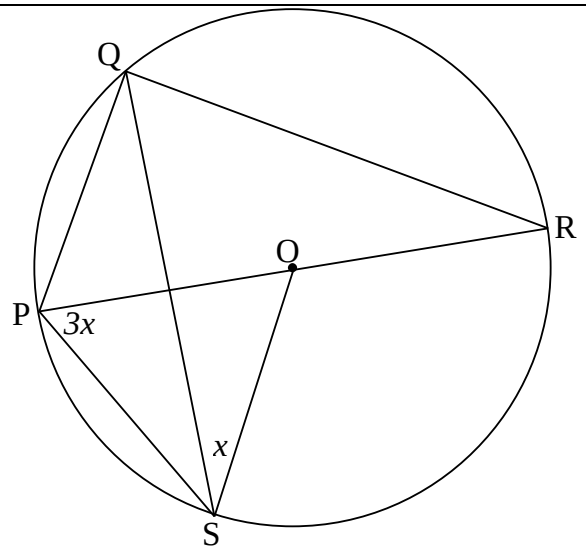
QUESTION 9/*VRAAG 9*



9.1

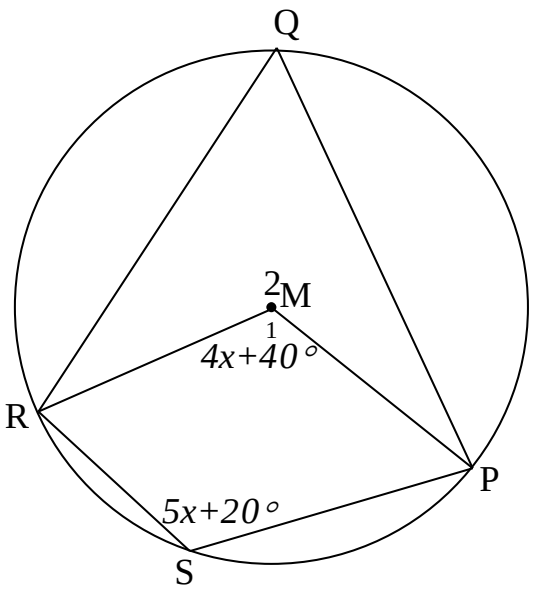
	Statement *Stelling*	Reason/*Rede*
9.1.1	$\hat{A}_2 = 50°$	
9.1.2	$\hat{O}_1 = 80°$	
9.1.3	$\hat{F}_1 = 80°$	
9.1.4	$\hat{A}_1 = 30°$	
9.1.5	$\hat{B}_2 = 30°$	

(5)

		
9.2.1		(2)
9.2.2		(3)
9.2.3		(3)
9.2.4		(2)
9.2.5		(2)
		[17]

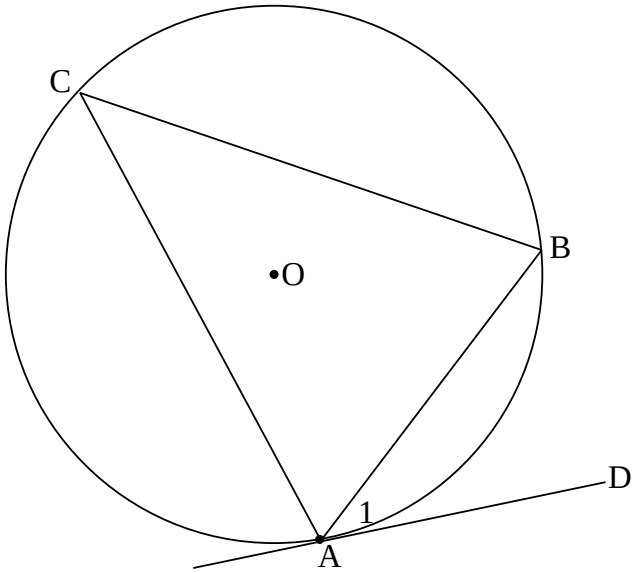
QUESTION 10/*VRAAG 10*

10.1



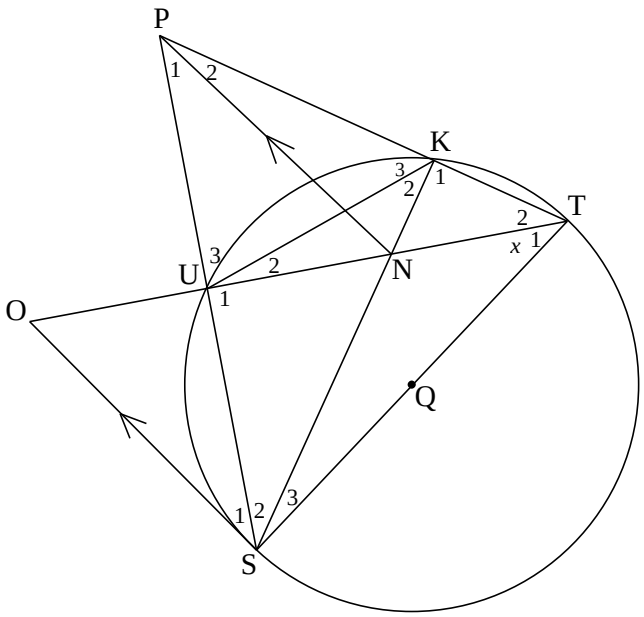
(5)

10.2



(6)

10.3



10.3.1 (5)

10.3.2 (6)

10.3.3		(3)
		[25]
	TOTAL/*TOTAAL*:	**150**

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	Additional Space/*Addisionele ruimte*	

Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

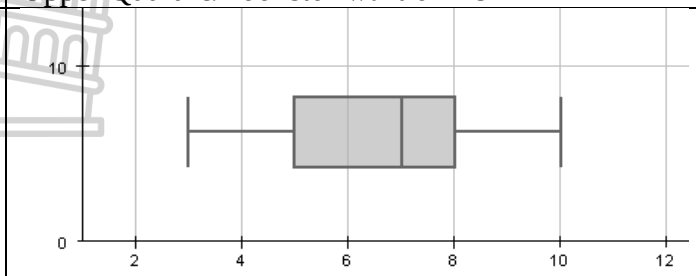
NOVEMBER 2022

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

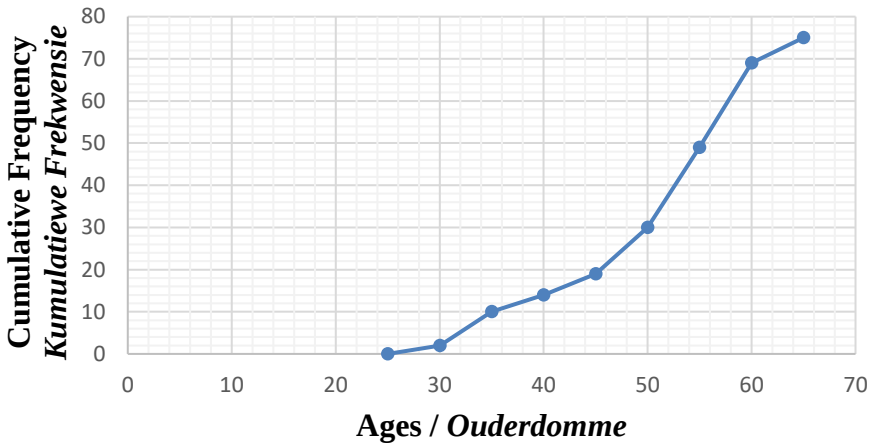
MARKS/*PUNTE*: 150

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

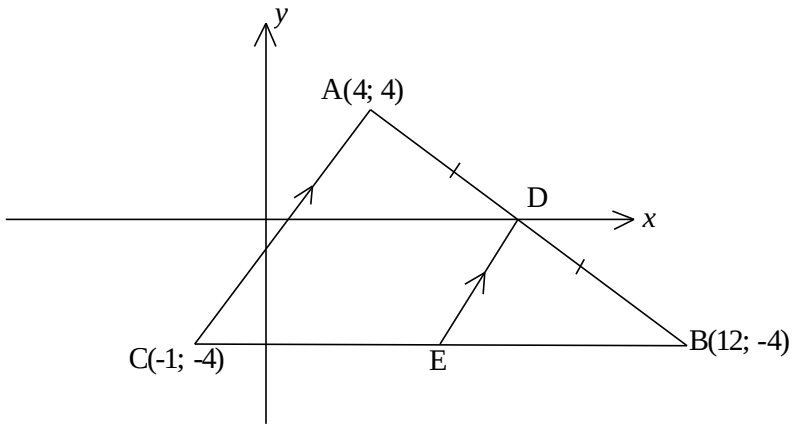
QUESTION 1/*VRAAG 1*

1.1	$\bar{x} = 6,4$	✓ answer / *antwoord*	(1)
1.2	Min/*Min* = 3; Max./*Maks.* = 10; Lower Quartile/*Onderste kwartiel* = 5; Median/*Mediaan* = 7; Upper Quartile/*Boonste kwartiel* = 8	✓ for both min. and max. *vir beide min. en maks.* ✓ for the rest / *vir die res*	(2)
1.3		✓ for the box / *vir die mond* ✓ whiskers / *snorre*	(2)
1.4	Skewed to the left, mean is smaller than the median **OR** longer rectangle on the left. *Skeef na links, Gemiddelde is kleiner as mediaan **OF** langer reghoek op linkerkant.*	✓ answer / *antwoord* ✓ reason / *rede*	(2)
1.5	Standard deviation/*Standaardafwyking* = 2, 01	✓✓ answer / *antwoord*	(2)
1.6	Slept well, if bigger than 8,61. / *Het goed geslaap, indien groter as 8,61.* Answer 1 learner./ *Antwoord 1 leerder*	✓ 8,61 ✓ answer / *antwoord*	(2)
			[11]

QUESTION 2/*VRAAG 2*

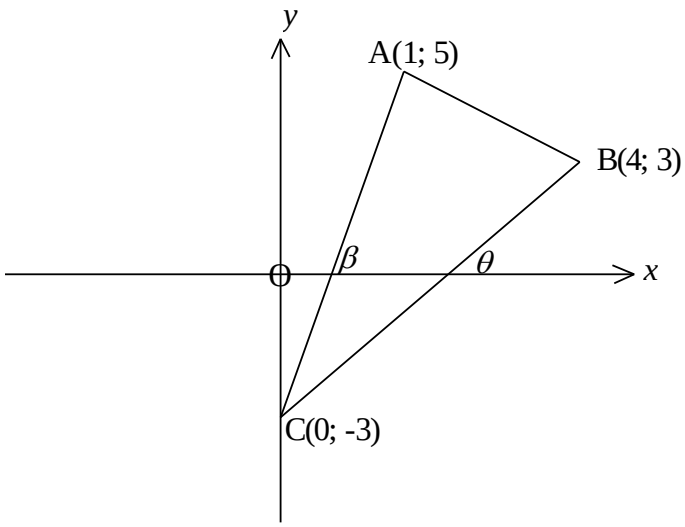
2.1	**Age** ***Ouderdom***	**Frequency** ***Frekwensie***	**Cumulative Frequency** ***Kumulatiewe Frekwensie***	✓ for first 4 *vir eerste 4* ✓ last 4 *laaste 4*	(2)
	$25 < A \leq 30$	2	2		
	$30 < A \leq 35$	8	10		
	$35 < A \leq 40$	4	14		
	$40 < A \leq 45$	5	19		
	$45 < A \leq 50$	11	30		
	$50 < A \leq 55$	19	49		
	$55 < A \leq 60$	20	69		
	$60 < A \leq 65$	6	75		
2.2	**Ages of Teachers** ***Ouderdomme van Onderwysers***  **Cumulative Frequency** ***Kumulatiewe Frekwensie*** 0 10 20 30 40 50 60 70 80 0 10 20 30 40 50 60 70 **Ages / *Ouderdomme***			✓ start point *beginpunt* ✓ end point *eindpunt* ✓✓ shape *vorm*	(4)
2.3	Median / *Mediaan* = 52 (Accept/*Aanvaar* 51 – 53)			✓✓ answer / *antwoord*	(2)
2.4	Percentage / *Persentasie* = $\frac{75-57}{75} = \frac{18}{75} = 24\%$			✓ calculation / *berekening* ✓ answer / *antwoord*	(2)
					[10]

QUESTION 3/*VRAAG 3*



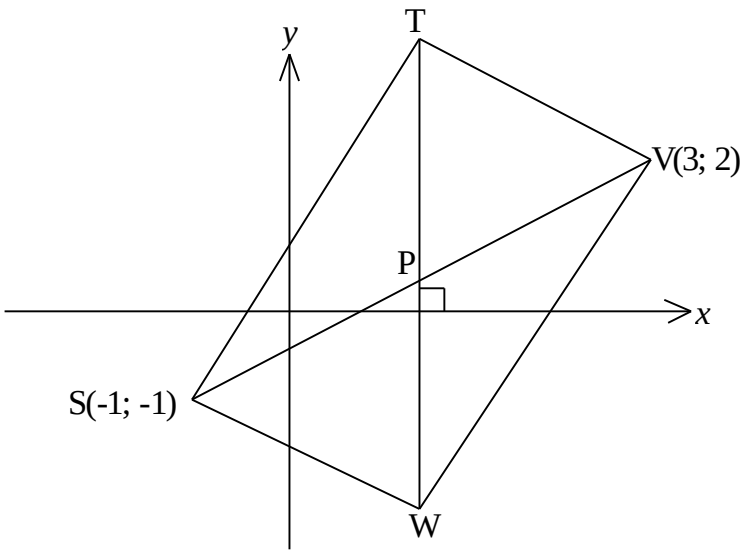
3.1	$AB = \sqrt{(12 - 4)^2 + (-4 - 4)^2}$ AB = 11,31 units / *eenhede*		✓ substitution / *vervanging* ✓ answer / *antwoord*	(2)
3.2	$D\left(\frac{4+12}{2}; \frac{4-4}{2}\right)$ = D(8; 0)		✓ substitution / *vervanging* ✓ answer / *antwoord*	(2)
3.3	$m = \frac{4-(-4)}{4-(-1)} = \frac{8}{5}$ $y = mx + c$ $0 = \frac{8}{5} \times 8 + c$ $c = -\frac{64}{5}$ $\therefore y = \frac{8}{5}x - \frac{64}{5}$	$m = \frac{4-(-4)}{4-(-1)} = \frac{8}{5}$ $y - y_1 = m(x - x_1)$ $y - 0 = \frac{8}{5}(x - 8)$ $y = \frac{8}{5}x - \frac{64}{5}$	✓ gradient / *gradiënt* ✓substitution / *vervanging* ✓ y-intercept / *y-afsnit* ✓ answer / *antwoord*	(4)
3.4	$y = \frac{8}{5}x - \frac{64}{5}$ $-4 = \frac{8}{5}x - \frac{64}{5}$ $\therefore x = \frac{11}{5}$ $E\left(\frac{11}{2}; -4\right)$ **OR / *OF*** $E\left(\frac{11}{2}; -4\right)$ (Midpoint Theorem) / (*Middelpunt-Stelling*)		✓substitution -4 *vervanging -4* ✓ value of *x* *waarde van x* ✓coordinates of E *koördinate van* E **OR / *OF*** ✓ *x* – value / *waarde* ✓ *y* – value / *waarde* ✓ reason / *rede*	(3)
				[11]

QUESTION 4/*VRAAG 4*



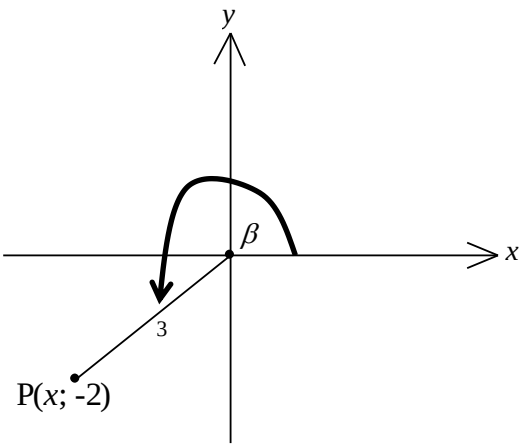
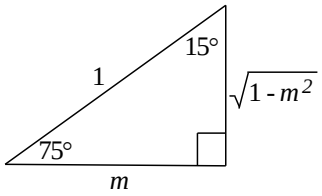
4.1	D(-3; -1)		✓ *x*-coordinate / *koördinaat* ✓ *y*-coordinate / *koördinaat*	(2)
4.2	$FC = \sqrt{(8-0)^2+(p+3)^2} = 12$ $64 + p^2 + 6p + 9 = 144$ $p^2 + 6p - 71 = 0$ Using the quadratic formula: $p = 5,94$ or $p = -11,94$ $p = 6$ or $p = -12$		✓ substitution into the formula and equating to 12 *vervanging in die formule en stel gelyk aan 12* ✓ squaring both sides *kwadreer albei kante* ✓ standard form/*standaardvorm* ✓ $p = 6$ ✓ $p = -12$	(5)
4.3	$m_{BC} = \frac{3-(-3)}{4-0} = \frac{3}{2}$ $\therefore \tan\theta = \frac{3}{2}$ $\therefore \theta = 56,31°$	$\tan\beta = 8$ $\therefore \beta = 82,87°$ $\therefore A\hat{C}B = 82,87° - 56,3°$ $\therefore A\hat{C}B = 26,56°$	✓ gradient of BC ✓ $\tan\theta = \frac{3}{2}$ ✓ for θ ✓ for β ✓ for $A\hat{C}B$	(5)
				[12]

QUESTION 5/*VRAAG 5*



	$P\left(\frac{-1+3}{2};\frac{-1+2}{2}\right)$ $= P\left(1;\frac{1}{2}\right)$ $SV = \sqrt{(3+1)^2+(2+1)^2}$ SV = 5 units / eenhede TW = 5 units / eenhede (diagonals of a rectangle) (hoeklyne van 'n reghoek) T(1; 3) W(1; -2)	✓ coordinates of P *koördinate van P* ✓ substitution / *vervanging* ✓ for/*vir* SV ✓ for/*vir* TW ✓ coordinates of T *koördinate van* T ✓ coordinates of W *koördinate van* W	(6)
			[6]

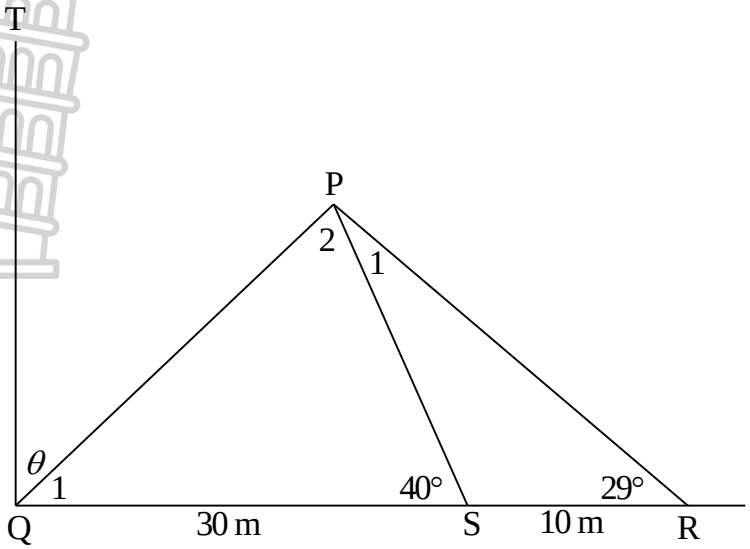
QUESTION 6/*VRAAG 6*

6.1	$\sin\beta = -\frac{2}{3}$  $x^2 = (3)^2 - (-2)^2$ $x = -\sqrt{5}$ $\therefore 1 + \tan^2\beta$ $= 1 + \left(\frac{-2}{-\sqrt{5}}\right)^2$ $= \frac{9}{5}$	✓ for solving for sin *oplos vir* sin ✓ sketch in the correct quad *skets in die korrekte kwadrant* ✓ value of *x*/ *waarde van x* ✓ substitution / *vervanging* ✓ answer / *antwoord*	(5)
6.2	 		
6.2.1	$\cos^2 105°$ $= \left[\cos(180° - 75)\right]^2$ $= (-\cos 75°)^2$ $= m^2$	✓ for/vir - cos 75° ✓ for/vir m^2	(2)
6.2.2	$\sin 15°$ $= \cos 75°$ $= m$	✓ for/vir cos 75° ✓ for/vir *m*	(2)
6.2.3	$\tan 15° = \frac{m}{\sqrt{1-m^2}}$ **OR / *OF*** $\tan 15° = \frac{\sin 15°}{\cos 15°} = \frac{\cos 75°}{\sin 75°} = \frac{m}{\sqrt{1-m^2}}$	✓✓ for correct answer only *vir korrekte antwoord* (accuracy / *akkuraatheid*)	(2)

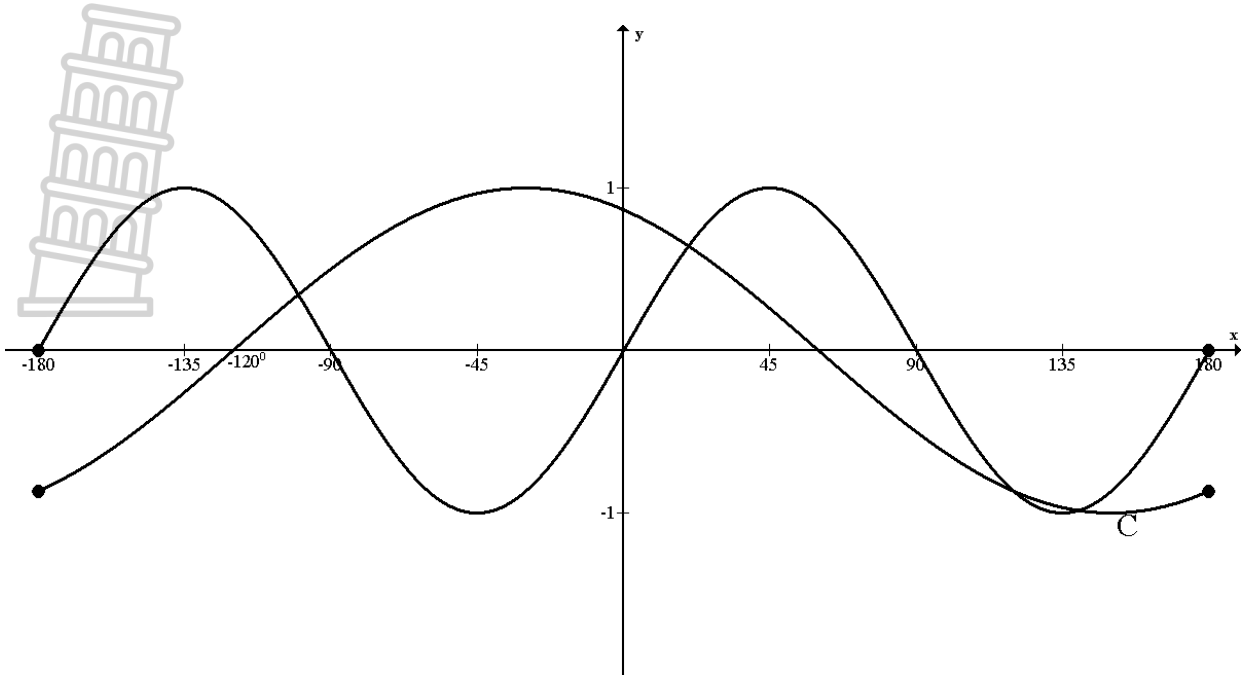
6.3.1	$\dfrac{\cos(180°-k).\sin(k-90°)-1}{\tan^2(540°+k).\sin(90°+k).\cos(-k)}$ $=\dfrac{-\cos k.-\cos k-1}{\tan^2 k.\cos k.\cos k}$ $=\dfrac{\cos^2 k-1}{\dfrac{\sin^2 k}{\cos^2 k}.\cos^2 k}$ $=\dfrac{-\sin^2 k}{\sin^2 k}$ $=-1$	✓ for/*vir* $-\cos k$ ✓ for/*vir* $-\cos k$ ✓ for/*vir* $\tan^2 k$ ✓ for/*vir* $\cos k$ ✓ for/*vir* $\cos k$ ✓ for changing $\tan^2 k$ *vir verandering van* $\tan^2 k$ ✓ for answer / *vir antwoord*	(7)
6.3.2	$\tan^2 k.\cos^2 k=0$ $\tan^2 k=0$ or/*of* $\cos^2 k=0$ $\tan k=0$ or/*of* $\cos k=0$ $\therefore k=0°$ or/*of* $k=90°$ or/*of* $k=180°$ or/*of* $k=270$ or/*of* $k=360°$	✓ $\tan^2 k.\cos^2 k=0$ $\tan^2 k=0$ or/*of* $\cos^2 k=0$ ✓✓ $\tan k=0$ or/*of* $\cos k=0$ ✓ $k=0°$; $k=90°$ ✓ $k=180°$; $k=270°$ ✓ $k=360°$	(6)
6.4	$\dfrac{1+\sin\theta}{1-\sin\theta}-\dfrac{1-\sin\theta}{1+\sin\theta}=\dfrac{4\tan\theta}{\cos\theta}$ LHS/*LK* $=\dfrac{1+\sin\theta}{1-\sin\theta}-\dfrac{1-\sin\theta}{1+\sin\theta}$ $=\dfrac{1+2\sin\theta+\sin^2\theta-1+2\sin\theta-\sin^2\theta}{(1-\sin\theta)(1+\sin\theta)}$ $=\dfrac{4\sin\theta}{1-\sin^2\theta}$ $=\dfrac{4\sin\theta}{\cos^2\theta}$ $=\dfrac{4\tan\theta}{\cos\theta}=$ RHS/*RK*	✓ for/*vir* LCD/*KGD* ✓ for/*vir* $1+2\sin\theta+\sin^2\theta$ ✓ for/*vir* $-1+2\sin\theta-\sin^2\theta$ ✓ for/*vir* $\dfrac{4\sin\theta}{1-\sin^2\theta}$ ✓ for/*vir* $\cos^2\theta$	(5)

6.5	$6\sin^2\theta+\cos\theta=4$ $6(1-\cos^2\theta)+\cos\theta=4$ $6-6\cos^2\theta+\cos\theta-4=0$ $-6\cos^2\theta+\cos\theta+2=0$ $6\cos^2\theta-\cos\theta-2=0$ $(3\cos\theta-2)(2\cos\theta+1)=0$ $\cos\theta=\frac{2}{3}$ or/*of* $\cos\theta=-\frac{1}{2}$ $\theta=48{,}19°+360°.k$ or/*of* $\theta=311{,}81°+360°.k$ OR/*OF* $\theta=120°+360°.k$ or/*of* $\theta=240°+360°.k$ where/*waar* $k\in Z$	✓ for/*vir* $1-\cos^2\theta$ ✓ for the two general solutions/ *vir die twee algemene oplossings* ✓ for standard form/ *vir standaardvorm* ✓ for factors / *vir faktore* ✓ for the other two general solutions/ *vir die ander twee algemene oplossings* ✓ for answers of $\cos\theta=\frac{2}{3}$ *vir antwoorde van* $\cos\theta=\frac{2}{3}$ ✓ for answers of $\cos\theta=-\frac{1}{2}$ *vir antwoorde van* $\cos\theta=-\frac{1}{2}$	(7)
6.6	$p=\tan A+\sin A$ and/*en* $q=\tan A-\sin A$ $pq=(\tan A+\sin A)(\tan A-\sin A)$ $pq=\tan^2 A-\sin^2 A$ $pq=\frac{\sin^2 A}{\cos^2 A}-\sin^2 A$ $pq=\frac{\sin^2 A-\sin^2 A.\cos^2 A}{\cos^2 A}$ $pq=\frac{\sin^2 A(1-\cos^2 A)}{\cos^2 A}$ $pq=\tan^2 A.\sin^2 A$	✓ for substitution *vir vervanging* ✓ for multiplication *vir vermenigvuldiging* ✓ for changing $\tan^2 A$ *vir verandering van* $\tan^2 A$ ✓ for the numerator *vir die teller* ✓ for the common factor *vir die gemene faktor*	(5)
			[41]

QUESTION 7/*VRAAG 7*

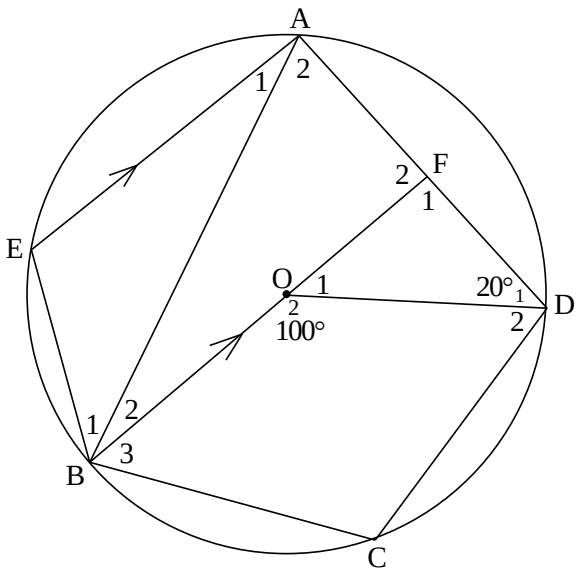
			
7.1	Exterior angle of a triangle / *Buitehoek van 'n driehoek*	✓ answer / *antwoord*	(1)
7.2	$\frac{PS}{\sin 29°} = \frac{10}{\sin 11°}$ $PS = \frac{10.\sin 29°}{\sin 11°}$ PS = 25,41 m	✓ for sub. in sine rule *vir verv. in sinus-reël* ✓✓ for the answer *vir die antwoord*	(3)
7.3	$PQ^2 = (30)^2 + (25,41)^2 - 2\times 30\times 25,41\times \cos 40°$ PQ = 19,44 m $\frac{\sin Q_1}{25,41} = \frac{\sin 40°}{19,44}$ $\sin Q_1 = \frac{25,41\times \sin 40°}{19,44}$ $\therefore \hat{Q}_1 = 57,16°$ $\therefore \theta = 32,84°$	✓ for sub. in the cosine rule *verv. in die cosinus-reël* ✓ for the answer PQ *vir die antwoord* PQ ✓ for using the sine rule *vir gebruik van die sinus-reël* ✓ for/*vir* $\hat{Q}_1$ ✓ for/*vir* θ	(5)
			[9]

QUESTION 8 / *VRAAG 8*

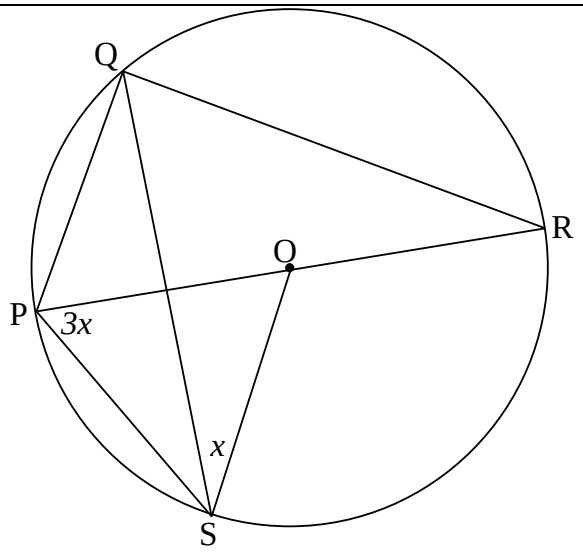


8.1	$a = 2 \qquad b = -30°$	✓ for/*vir* a ✓ for/*vir* b	(2)
8.2	C(150°; -1)	✓ for/*vir* 150° ✓ for/*vir* -1	(2)
8.3	$-120° \leq x \leq -90°$	✓ for/*vir* $-120°$ ✓ for/*vir* $-90°$ ✓ for correct notation *vir korrekte notasie*	(3)
8.4	$f(x) = \sin 2\,(x - 30°)$	✓ for correct answer *vir korrekte antwoord*	(1)
			[8]

QUESTION 9/*VRAAG 9*

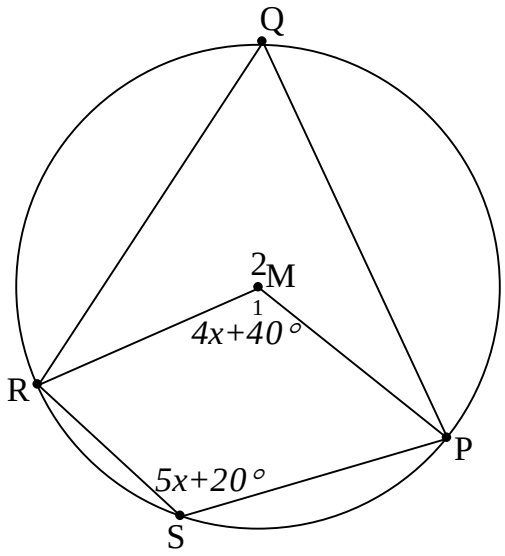


9.1.1	< at centre = 2 x angle at the circumference *Middelpunts ∠ = 2 × Omtreks ∠*	✓ for the answer *vir die antwoord*	(1)
9.1.2	<'s on a straight line *∠'e op 'n reguitlyn*	✓ for the answer *vir die antwoord*	(1)
9.1.3	Exterior angle of a triangle / <'s of a triangle *Buitehoek van 'n driehoek / ∠e van 'n driehoek*	✓ for the answer *vir die antwoord*	(1)
9.1.4	$\widehat{A} = \widehat{F}_1$; corresponding angles = ; EA∥BOF *ooreenkomstige ∠e = ; EA || BOF*	✓ for the answer *vir die antwoord*	(1)
9.1.5	alternate angles = ; EA∥BOF *verwisselende hoeke = ; EA || BOF*	✓ for the answer *vir die antwoord*	(1)

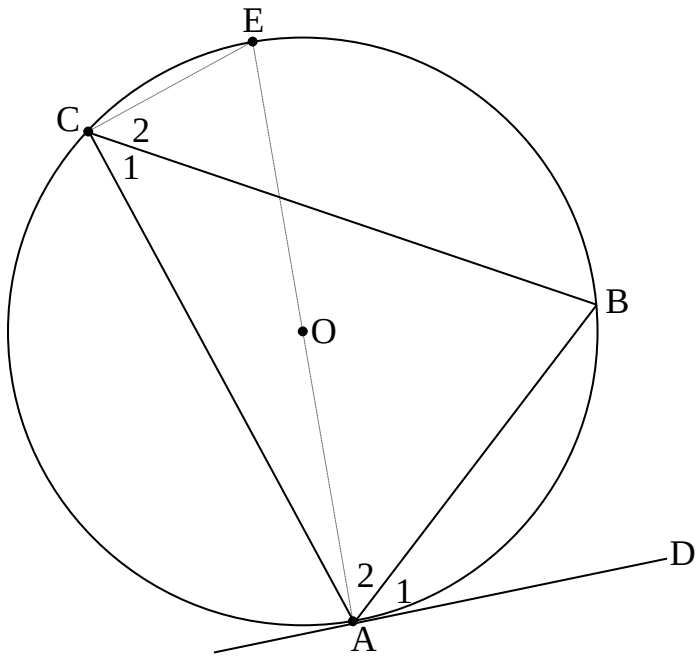


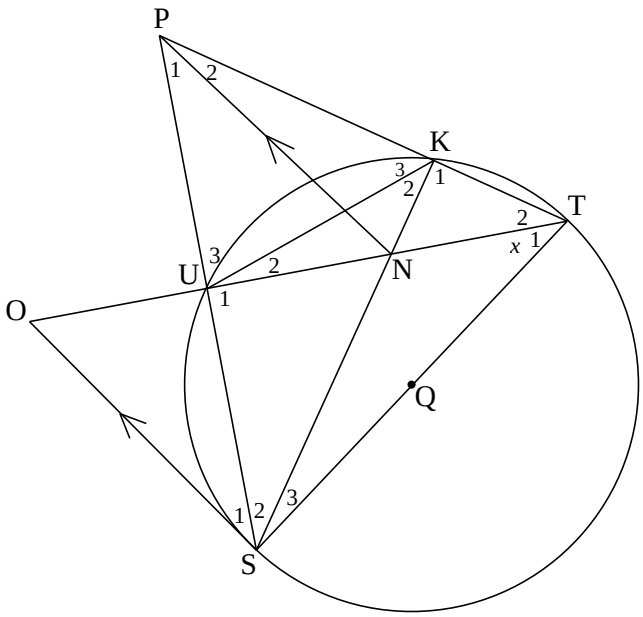
9.2.1	$S\hat{Q}R = 3x$ (<s in the same segment) (∠*e in dieselfde segment*)	✓ S ✓ R	(2)
9.2.2	$\hat{Q} = 90°$ (<s in a semi-circle) (∠*e in 'n halwe-sirkel*) $\therefore P\hat{Q}S = 90° - 3x$	✓ S ✓ R ✓ answer / *antwoord*	(3)
9.2.3	$P\hat{S}O = 3x$ (<s opposite equal sides) (∠e *teenoor gelyke sye*) $\therefore P\hat{S}Q = 2x$ ($Q\hat{S}O = x$)	✓ S ✓ R ✓ answer / *antwoord*	(3)
9.2.4	$P\hat{R}Q = 2x$ (<s in the same segment) (∠e *in dieselfde segment*)	✓ S ✓ R	(2)
9.2.5	$Q\hat{P}R = 180° - (2x + 90°)$ (<s of a triangle) (∠*e van 'n driehoek*) $= 90° - 2x$	✓ S and/*en* R ✓ answer / *antwoord*	(2)
			[17]

QUESTION 10/*VRAAG 10*



10.1	$\hat{Q} = 2x + 20°$ (< at the centre = 2 × angle at the circumf.) (*Middelpunts*$\angle$ = 2 × *Omtrekshoek*) $\therefore 2x + 20° + 5x + 20° = 180°$ (opp. <s of a c.q.) (*teenoorst.* $\angle$*e van 'n k.v*) $7x + 40° = 180°$ $7x = 140°$ $\therefore x = 20°$ $\therefore \hat{Q} = 60°$ **OR / *OF*** $\hat{M}_2 = 360° - (4x + 40°)$ (<s around a point) (*$\angle$e rondom 'n punt*) $= 320° - 4x$ $320° - 4x = 2(5x + 20°)$ (< at the centre) / (*Middelpunts* $\angle$) $320° - 4x = 10x + 40°$ $14x = -280°$ $\therefore x = 20°$ $\therefore \hat{Q} = 60°$	✓ for/*vir* S ✓ for/*vir* R ✓ for S and R *vir* S *en* R ✓ for simplifying *vereenvoudiging* ✓ the answer *die antwoord* ✓ for S and R *vir* S *en* R ✓ for the answer *vir die antwoord* ✓ for S and R *vir* S *en* R ✓ for simplifying *vereenvoudiging* ✓ for the answer *vir die antwoord*	(5)

10.2			
	Construct diameter AE and join C to E. Label $\hat{C}_1$, $\hat{C}_2$ and $\hat{A}_2$ $\hat{C}_1 + \hat{C}_2 = 90°$ (< in a semi - circle) $\hat{A}_1 + \hat{A}_2 = 90°$ (tan $\perp$ rad) But $\hat{C}_2 = \hat{A}_2$ (<s in the same segment) $\therefore \hat{A}_1 = \hat{C}_1$	✓ for construction ✓ for S ✓ for R ✓ for S ✓ for R ✓ for S and R	
	Teken Middellyn AE *en verbind* C *aan* E. *Merk* $\hat{C}_1$, $\hat{C}_2$ *en* $\hat{A}_2$ $\hat{C}_1 + \hat{C}_2 = 90°$ ($\angle$ *in 'n halwe - sirkel*) $\hat{A}_1 + \hat{A}_2 = 90°$ (*raaklyn* $\perp$ *radius*) *Maar* $\hat{C}_2 = \hat{A}_2$ ($\angle$*e in dieselfde segment*) $\therefore \hat{A}_1 = \hat{C}_1$	✓ *vir konstruksie* ✓ *vir* S ✓ *vir* R ✓ *vir* S ✓ *vir* R ✓ *vir* S *en* R	(6)



10.3.1	$\hat{U}_1 = 90°$ (<s in a semi - circle) (*∠e in 'n halwe - sirkel*) $\hat{K}_1 = 90°$ (<s in a semi - circle) (*∠e in 'n halwe - sirkel*) $\hat{K}_3 + \hat{K}_2 = 90°$ (<s on a straight line) (*∠e op 'n reguitlyn*) $\therefore \hat{U}_1 = \hat{K}_2 + \hat{K}_3 = 90°$ $\therefore$ PUNK is a c.q. (conv. exterior < of a c.q) PUNK *is 'n k.v* (*omgekeerde Buite∠ van k.v*)	✓ for/*vir* S and/*en* R ✓ for/*vir* S and/*en* R ✓ for/*vir* S and/*en* R ✓ for/*vir* S ✓ for/*vir* R	(5)
10.3.2	$\hat{T}_2 = x$ (TO bisects S$\hat{T}$P) / (TO halveer S$\hat{T}$P) $\hat{T}_1 = \hat{K}_2 = x$ (<s in the same segment) *(∠e in dieselfde segment)* $\hat{K}_2 = \hat{P}_1 = x$ (<s in the same segment) (*∠e in dieselfde segment*) $\hat{P}_1 = \hat{S}_1 = x$ (alt. <s; PN ∥ OS) */ (Verw. ∠e ; PN* ∥ OS) $\therefore \hat{S}_1 = \hat{T}_1 = x$ $\therefore$ SO is a tangent (conv. tan-chord theorem) *SO is 'n raaklyn (omgekeerde raaklyn-koord stelling)*	✓ for S /*vir* S/✓ and/*en* R ✓ for S /*vir* S /and/*en* R ✓ S and/*en* R ✓ for conclusion *vir gevolgtrekking* ✓ for R /*vir* R	(6)
10.3.3	$\hat{T}_1 = \hat{T}_2 = x$ (proven/*bewys*) $\hat{S}_1 = \hat{T}_2 = x$ (proven/*bewys*) $\therefore$ POST is a c.q. (conv. <s in the same segment) POST *is 'n k.v.* (*omgekeerde ∠e in dieselfde segment*)	✓ for/*vir* S and/*en* R ✓ for S /*vir* S and/*en* R ✓ for R/*vir* R	(3)
			[25]

TOTAL/*TOTAAL*: 150