basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

MATHEMATICS P2

2021

MARKS: 150

TIME: 3 hours

This question paper consists of 14 pages pages, 1 information sheet and an answer book of 24 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. that 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 correct 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

1.1 Sam recorded the amount of data (in MB) that she had used on each of the first 15 days in April. The information is shown in the table below.

26	13	3	18	12	34	24	58	16	10	15	69	20	17	40

1.1.1 Calculate the:

(a) Mean for the data set (2)

(b) Standard deviation for the data set (1)

1.1.2 Determine the number of days on which the amount of data used was greater than one standard deviation above the mean. (2)

1.1.3 Calculate the maximum total amount of data that Sam must use for the remainder of the month if she wishes for the overall mean of April to be 80% of the mean for the first 15 days. (3)

1.2 The wind speed (in km per hour) and temperature (in °C) for a certain town were recorded at 16:00 for a period of 10 days. The information is shown in the table below.

WIND SPEED IN km/h (x)	2	6	15	20	25	17	11	24	13	22
TEMPERATURE IN °C (y)	28	26	22	22	16	20	24	19	26	19

1.2.1 Determine the equation of the least squares regression line for the data. (3)

1.2.2 Predict the temperature at 16:00 if, on a certain day, the wind speed of this town was 9 km per hour. (2)

1.2.3 Interpret the value of b in the context of the data. (1)

[14]

QUESTION 2

The number of days that Grade 8 learners were absent at a certain high school during a year was recorded. This information is represented in the table below.

NUMBER OF DAYS ABSENT	NUMBER OF LEARNERS
$0 \leq x < 5$	34
$5 \leq x < 10$	45
$10 \leq x < 15$	98
$15 \leq x < 20$	43
$20 \leq x < 25$	7
$25 \leq x < 30$	3

2.1 Write down the modal class for the data. (1)

2.2 How many learners were absent from school for less than 15 days? (1)

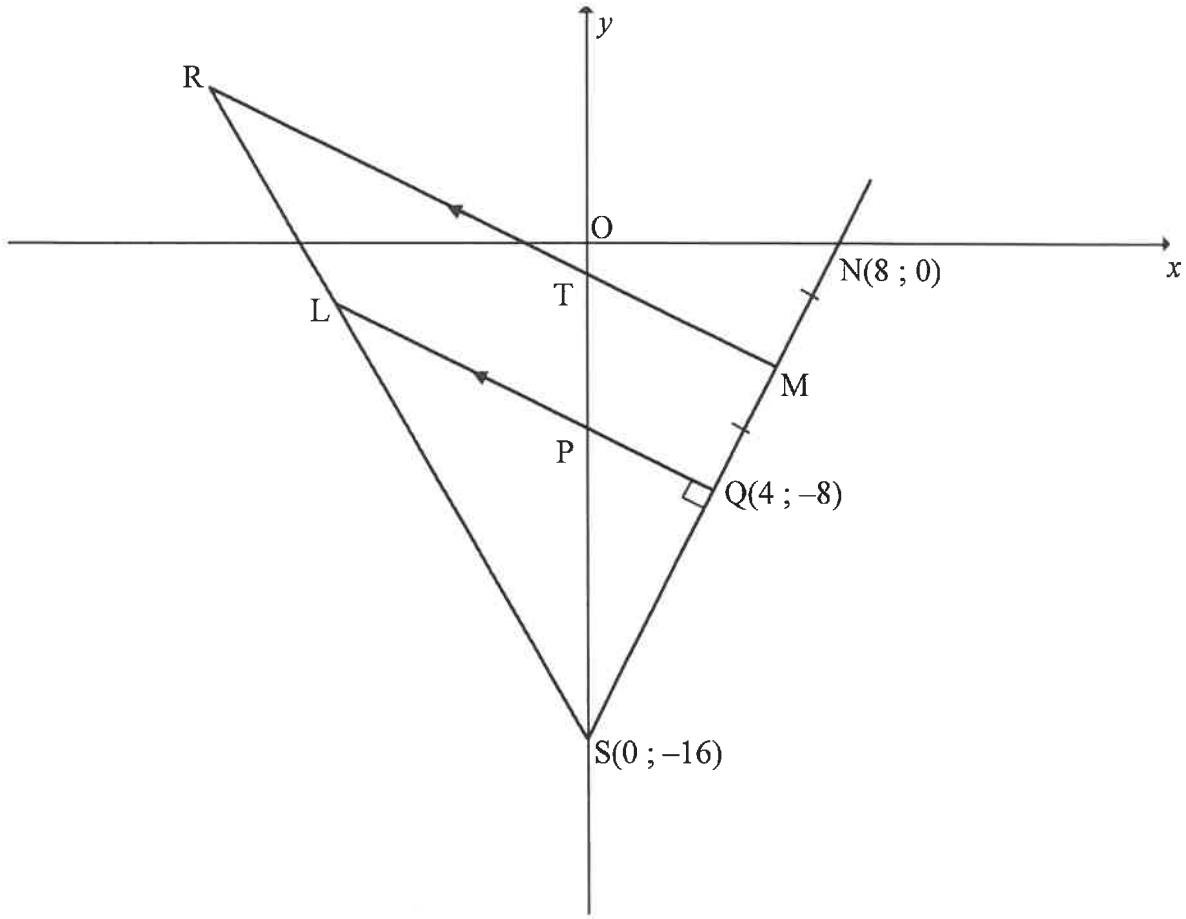
2.3 How many Grade 8 learners are at the school? (1)

2.4 Draw a cumulative frequency graph (ogive) to represent the data above on the grid provided in the ANSWER BOOK. (4)

2.5 Use the cumulative frequency graph to determine the median number of days the Grade 8 learners were absent. (2)
[9]

QUESTION 3

In the diagram, S(0 ; –16), L and Q(4 ; –8) are the vertices of ΔSLQ having LQ perpendicular to SQ. SL and SQ are produced to points R and M respectively such that RM || LQ. SM produced cuts the x-axis at N(8 ; 0). QM = MN. T and P are the y-intercepts of RM and LQ respectively.



3.1 Calculate the coordinates of M. (2)

3.2 Calculate the gradient of NS. (2)

3.3 Show that the equation of line LQ is $y = -\frac{1}{2}x - 6$. (3)

3.4 Determine the equation of a circle having centre at O, the origin, and also passing through S. (2)

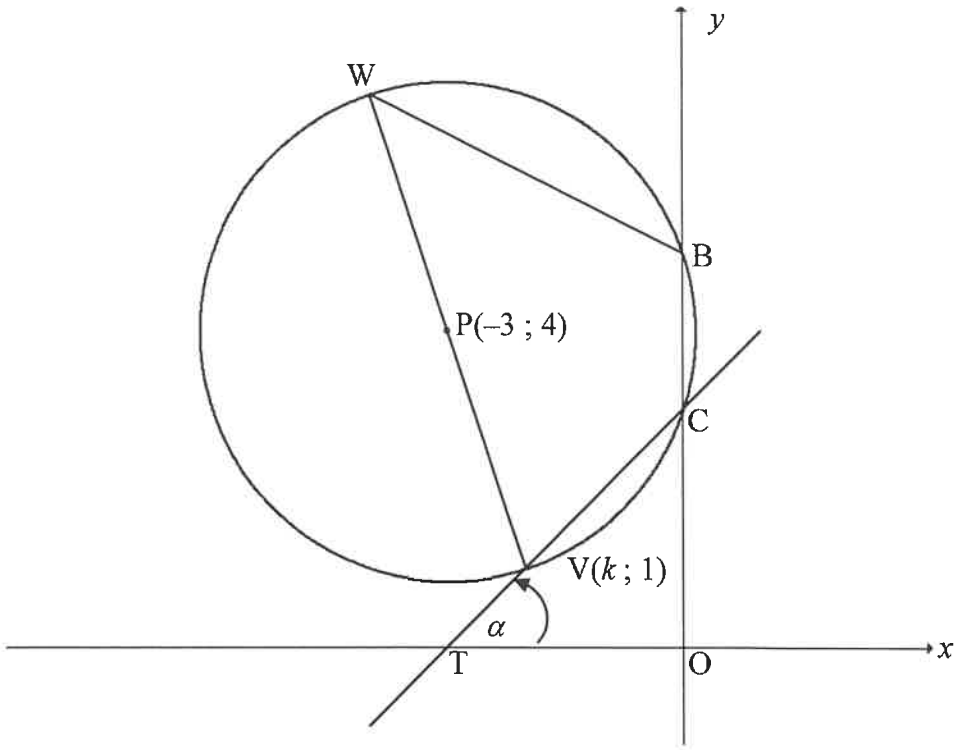
3.5 Calculate the coordinates of T. (3)

3.6 Determine $\frac{LS}{RS}$. (3)

3.7 Calculate the area of PTMQ. (4)
[19]

QUESTION 4

In the diagram, P(–3 ; 4) is the centre of the circle. V(k ; 1) and W are the endpoints of a diameter. The circle intersects the y-axis at B and C. BCVW is a cyclic quadrilateral. CV is produced to intersect the x-axis at T. $\hat{OTC} = \alpha$.



4.1 The radius of the circle is $\sqrt{10}$. Calculate the value of k if point V is to the right of point P. Clearly show ALL calculations. (5)

4.2 The equation of the circle is given as $x^2 + 6x + y^2 - 8y + 15 = 0$. Calculate the length of BC. (4)

4.3 If $k = -2$, calculate the size of:

4.3.1 α (3)

4.3.2 $V\hat{W}B$ (2)

4.4 A new circle is obtained when the given circle is reflected about the line $y = 1$.

Determine the:

4.4.1 Coordinates of Q, the centre of the new circle (2)

4.4.2 Equation of the new circle in the form $(x-a)^2 + (y-b)^2 = r^2$ (2)

4.4.3 Equations of the lines drawn parallel to the y-axis and passing through the points of intersection of the two circles (2)

[20]

QUESTION 5

5.1 Simplify the expression to a **single trigonometric term:**

$$\tan(-x).\cos x.\sin(x-180°)-1$$ (5)

5.2 Given: $\cos 35° = m$

Without using a calculator, determine the value of EACH of the following in terms of m:

5.2.1 $\cos 215°$ (2)

5.2.2 $\sin 20°$ (3)

5.3 Determine the general solution of:

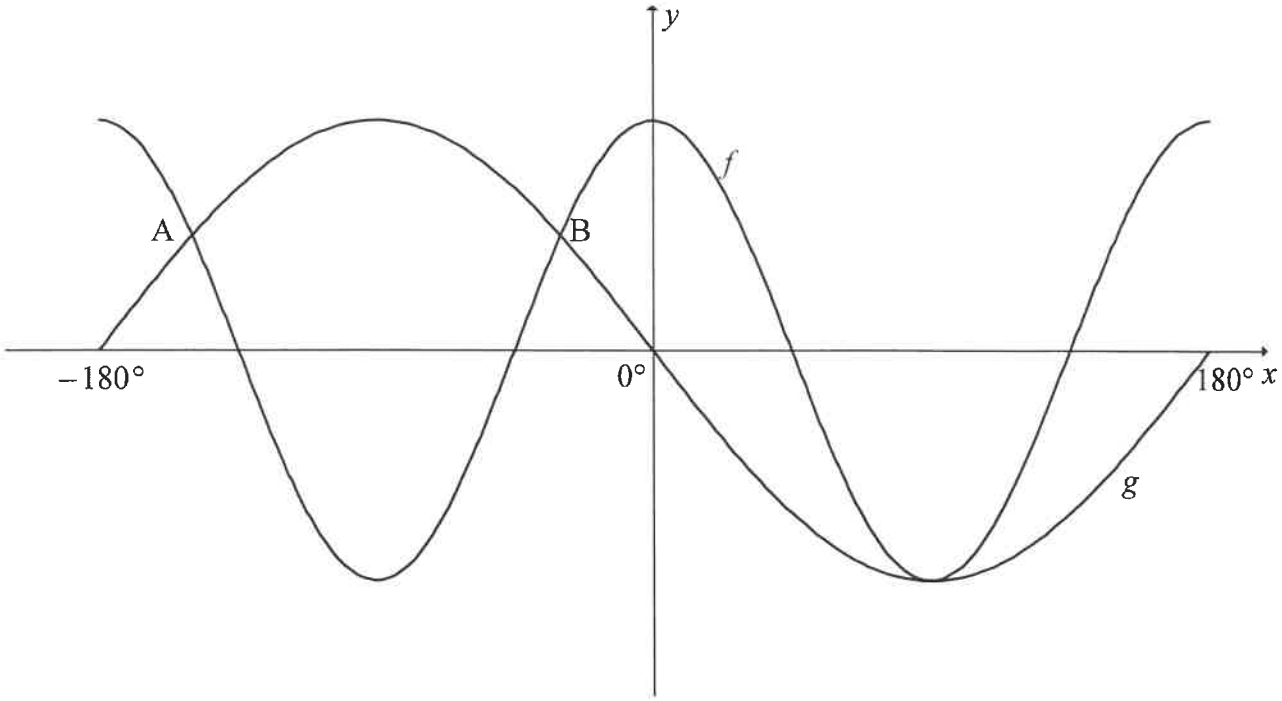
$$\cos 4x.\cos x + \sin x.\sin 4x = -0,7$$ (4)

5.4 Prove the identity: $\dfrac{\sin 4x.\cos 2x - 2\cos 4x.\sin x.\cos x}{\tan 2x} = \cos^2 x - \sin^2 x$ (4)

[18]

QUESTION 6

In the diagram below, the graphs of $f(x) = \cos 2x$ and $g(x) = -\sin x$ are drawn for the interval $x \in [-180° ; 180°]$ A and B are two points of intersection of f and g.



6.1 **Without using a calculator**, determine the values of x for which $\cos 2x = -\sin x$ in the interval $x \in [-180° ; 180°]$. (6)

6.2 Use the graphs above to answer the following questions:

6.2.1 How many degrees apart are points A and B from each other? (2)

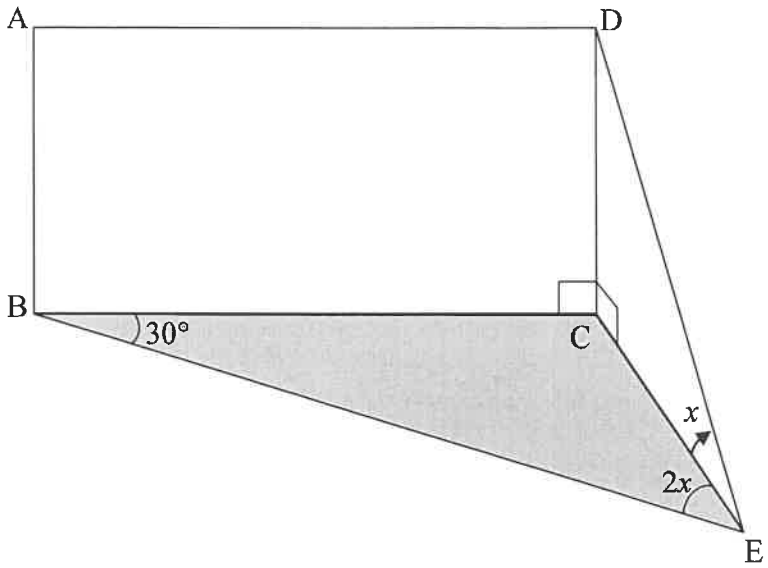
6.2.2 For which values of x in the given interval will $f'(x).g'(x) > 0$? (2)

6.2.3 Determine the values of k for which $\cos 2x + 3 = k$ will have no solution. (3)

[13]

QUESTION 7

Points B, C and E lie in the same horizontal plane. ABCD is a rectangular piece of board. CDE is a triangular piece of board having a right angle at C. Each piece of board is placed perpendicular to the horizontal plane and joined along DC, as shown in the diagram. The angle of elevation from E to D is x. $B\hat{E}C = 2x$ and $E\hat{B}C = 30°$.



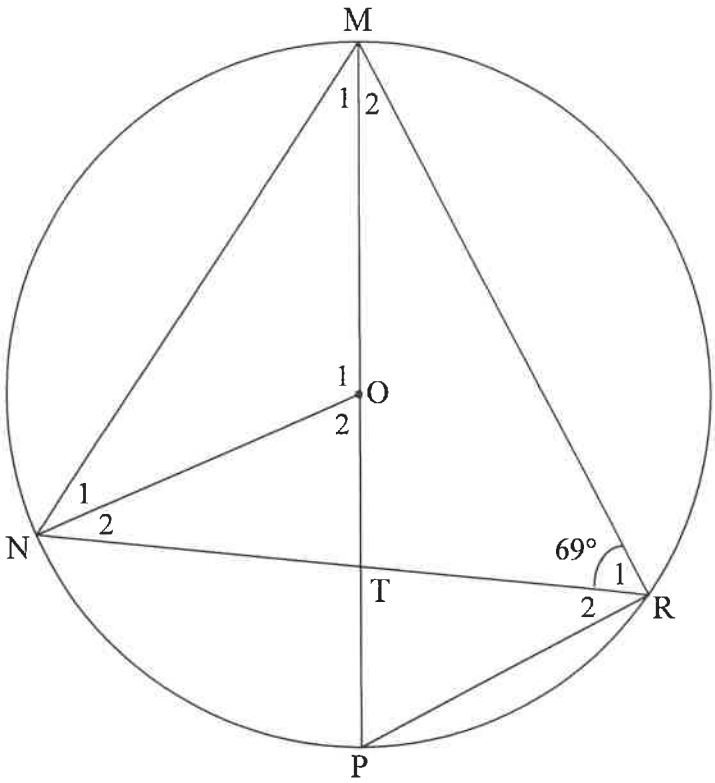
7.1 Show that $DC = \dfrac{BC}{4\cos^2 x}$ (6)

7.2 If $x = 30°$, show that the area of ABCD $= 3AB^2$. (3)

[9]

QUESTION 8

8.1 In the diagram, MP is a diameter of a circle centered at O. MP cuts the chord NR at T. Radius NO and chords PR, MN and MR are drawn. $\hat{R}_1 = 69°$.



Determine, giving reasons, the size of:

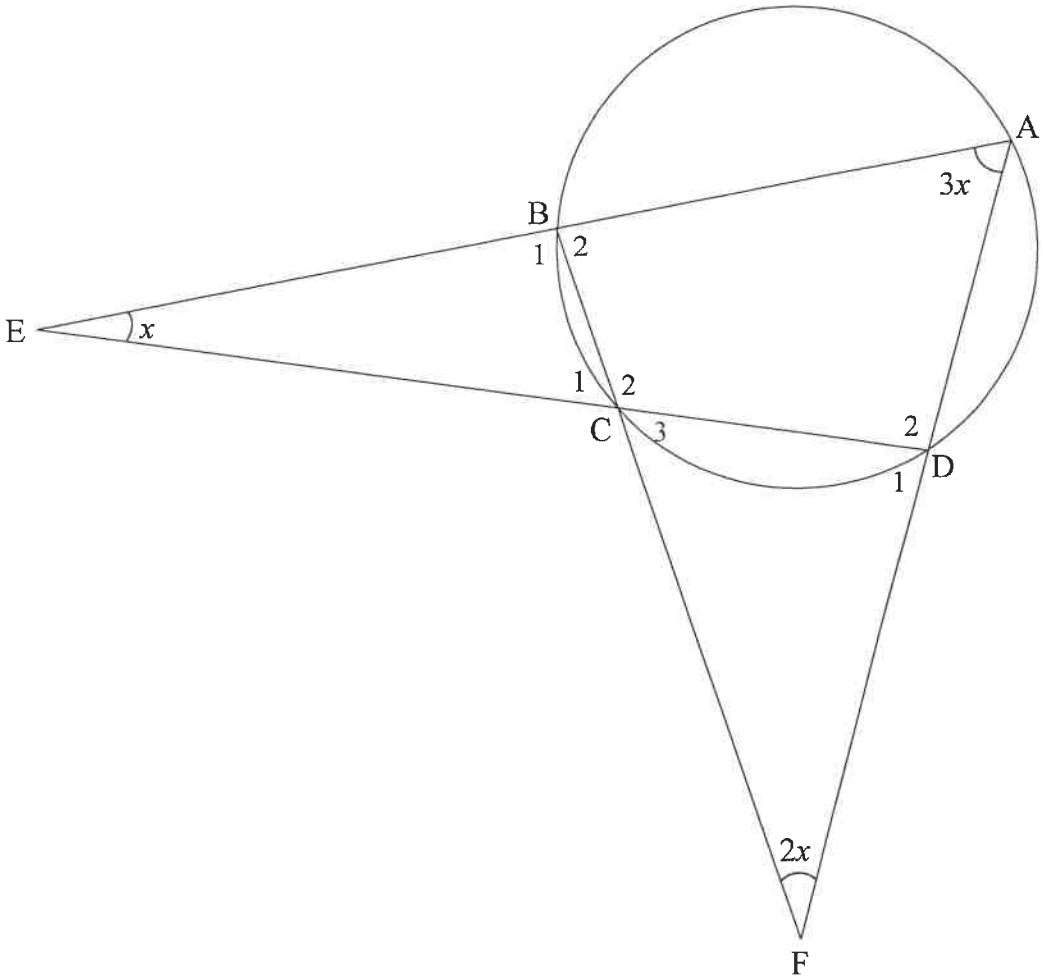
8.1.1 $\hat{R}_2$ (2)

8.1.2 $\hat{O}_1$ (2)

8.1.3 $\hat{M}_1$ (2)

8.1.4 $\hat{M}_2$, if it is further given that NO || PR (4)

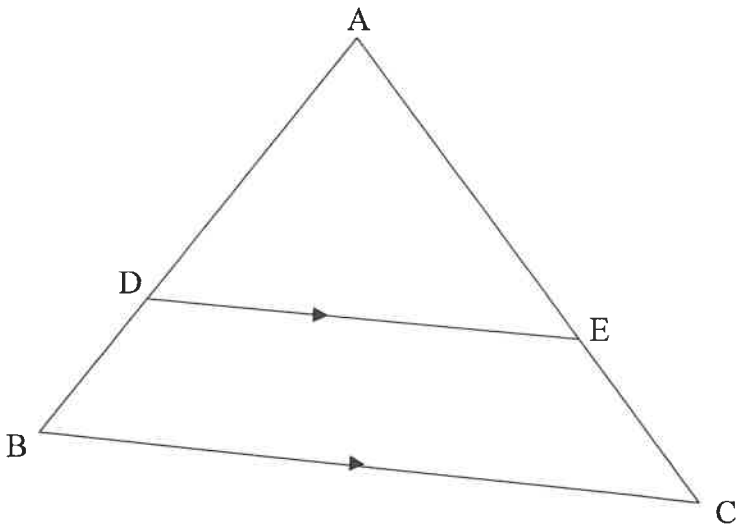
8.2 In the diagram below, ABCD is a cyclic quadrilateral. AB and DC are produced to meet at E. AD and BC are produced to meet at F. $A\hat{F}B = 2x$, $D\hat{A}B = 3x$ and $A\hat{E}D = x$.



Determine, giving reasons, the value of x. (6)
[16]

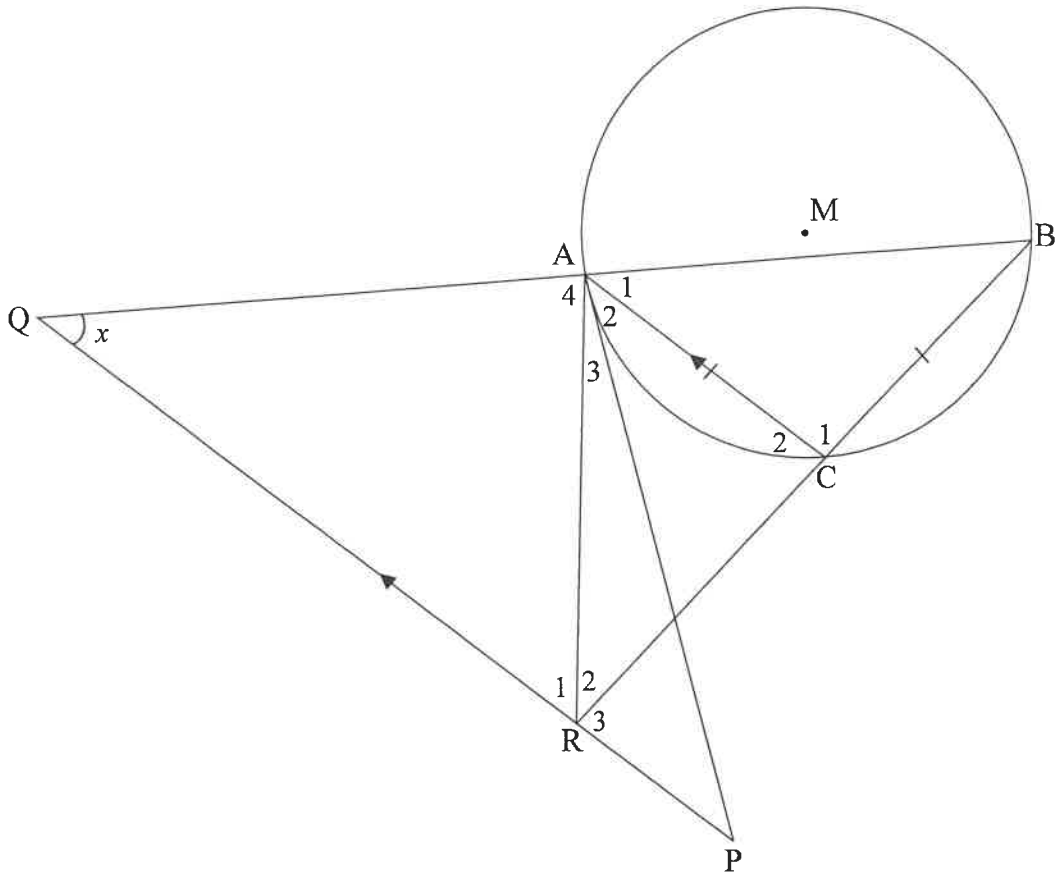
QUESTION 9

9.1 In the diagram, ABC is a triangle. D and E are points on sides AB and AC respectively such that DE || BC .



Use the diagram above to prove the theorem which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally, i.e. prove that $\frac{AD}{DB} = \frac{AE}{EC}$. (6)

9.2 In the diagram, M is the centre of the circle. A, B and C are points on the circle such that AC = BC. PA is a tangent to the circle at A. PQ is drawn parallel to CA to meet BA produced at Q. BC produced meets PQ at R and AR is drawn.
Let $\hat{Q} = x$.



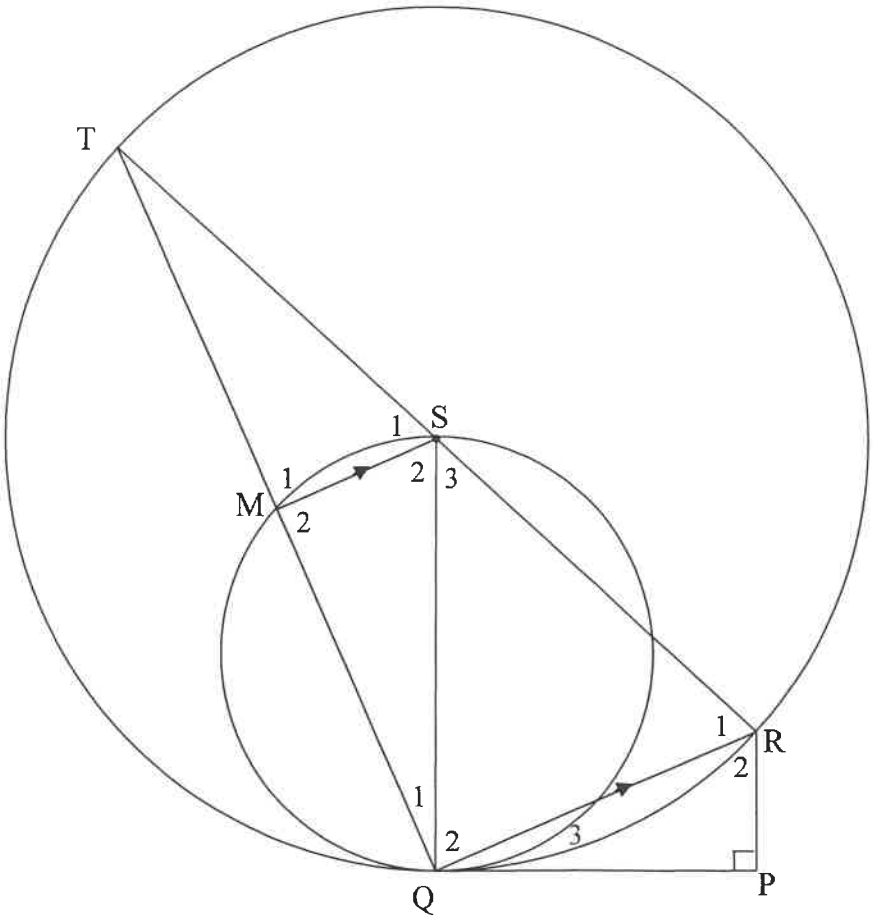
9.2.1 Determine, giving reasons, FOUR other angles EACH equal to x. (6)

9.2.2 Prove that ABPR is a cyclic quadrilateral. (2)

9.2.3 Prove that $\frac{BA}{BQ} = \frac{BC}{QR}$. (3)
[17]

QUESTION 10

In the diagram, TSR is a diameter of the larger circle having centre S. Chord TQ of the larger circle cuts the smaller circle at M. PQ is a common tangent to the two circles at Q. SQ is drawn.
RP ⊥ PQ and MS || QR.



10.1 Prove, giving reasons that:

10.1.1 SQ is the diameter of the smaller circle (3)

10.1.2 $RT = \frac{RQ^2}{RP}$ (6)

10.2 If MS = 14 units and $PQ = \sqrt{640}$ units, calculate, giving reasons, the length of the radius of the larger circle. (6)
[15]

TOTAL: 150

INFORMATION SHEET

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

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

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

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

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

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

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

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

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

In ΔABC:

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

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

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

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

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

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

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

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

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

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NASIONALE SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P2/
WISKUNDE V2

MARKING GUIDELINES/*NASIENRIGLYNE*

2021

MARKS: 150
PUNTE: 150

These marking guidelines consist of 23 pages.
Hierdie nasienriglyne bestaan uit 23 bladsye.

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

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

QUESTION/VRAAG 1

1.1

26	13	3	18	12	34	24	58	16	10	15	69	20	17	40

1.1.1(a)	$\bar{x} = \frac{375}{15}$ $\bar{x} = 25\,\text{MB}$ Answer only: Full marks	✓ 375 ✓ answer (2)
1.1.1(b)	$\sigma = 17{,}65$ MB	✓answer (1)
1.1.2	25 + 17,65 = 42,65 $\therefore$ 2 days	✓ 42,65 ✓ 2 (2)
1.1.3	Overall $\bar{x} = \frac{80}{100} \times 25$ = 20 MB $\frac{375 + x}{30} = 20$ $x = 600 - 375$ $= 225$ maximum total amount of data that Sam must use for the remainder of the month: **225** MB	✓ Overall $\bar{x} = 20$ ✓ $\frac{375 + x}{30} = 20$ ✓ answer (3)

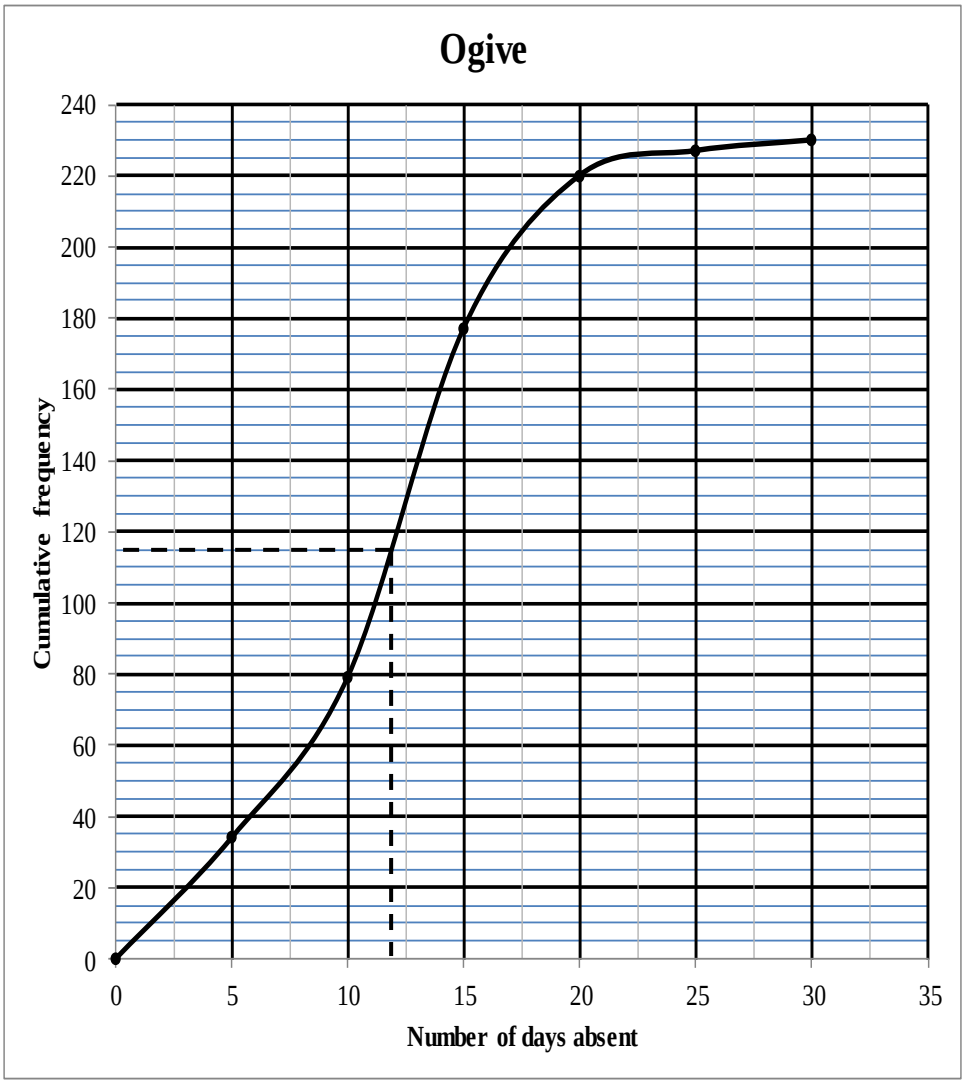
1.2

Wind speed in km/h (x)	2	6	15	20	25	17	11	24	13	22
Temperature in °C (y)	28	26	22	22	16	20	24	19	26	19

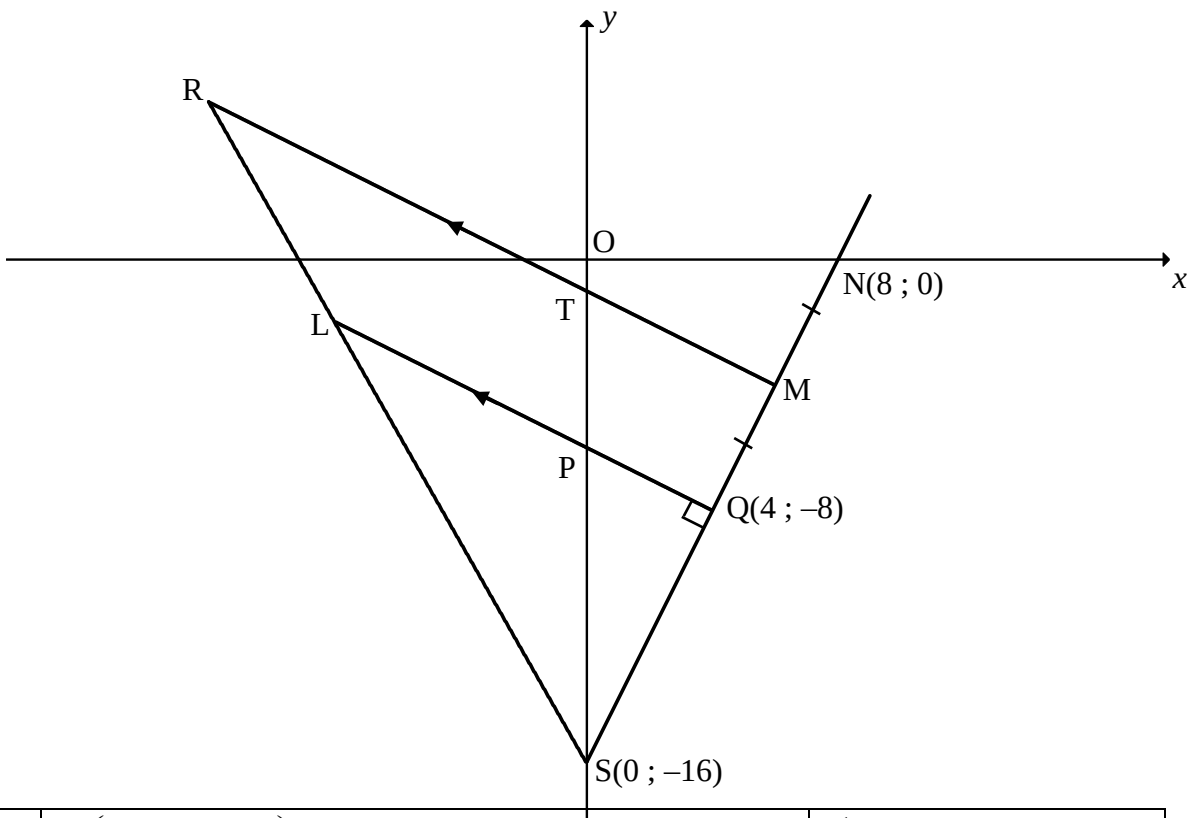
1.2.1	$a = 29{,}35$ $b = -0{,}46$ $\hat{y} = 29{,}35 - 0{,}46x$	✓ a ✓ b ✓ equation (3)
1.2.2	y = 25,20 °C (calculator) OR $\hat{y} = 29{,}35 - 0{,}46(9)$ y = 25,21 °C	✓✓ answer (2) ✓ substitution ✓ answer (2)
1.2.3	$b < 0$, indicating that as the wind speed increases the temperature decreases.	✓ interpretation (1)
		[14]

QUESTION/VRAAG 2

Number of days absent	Number of learners	Cumulative frequency
$0 \leq x < 5$	34	34
$5 \leq x < 10$	45	79
$10 \leq x < 15$	98	177
$15 \leq x < 20$	43	220
$20 \leq x < 25$	7	227
$25 \leq x < 30$	3	230

2.1	Modal class: $10 \leq x < 15$	✓ answer (1)
2.2	177 learners	✓ answer (1)
2.3	230 learners	✓ answer (1)
2.4		✓ grounding at (0; 0) ✓ shape ✓ upper limits ✓ All other points correct (4)
2.5	The median is at position 115. □value of median is 12 days (accept 11 – 14) Answer only: Full marks	✓ reading off at 115 ✓ answer (2)
		[9]

QUESTION/VRAAG 3

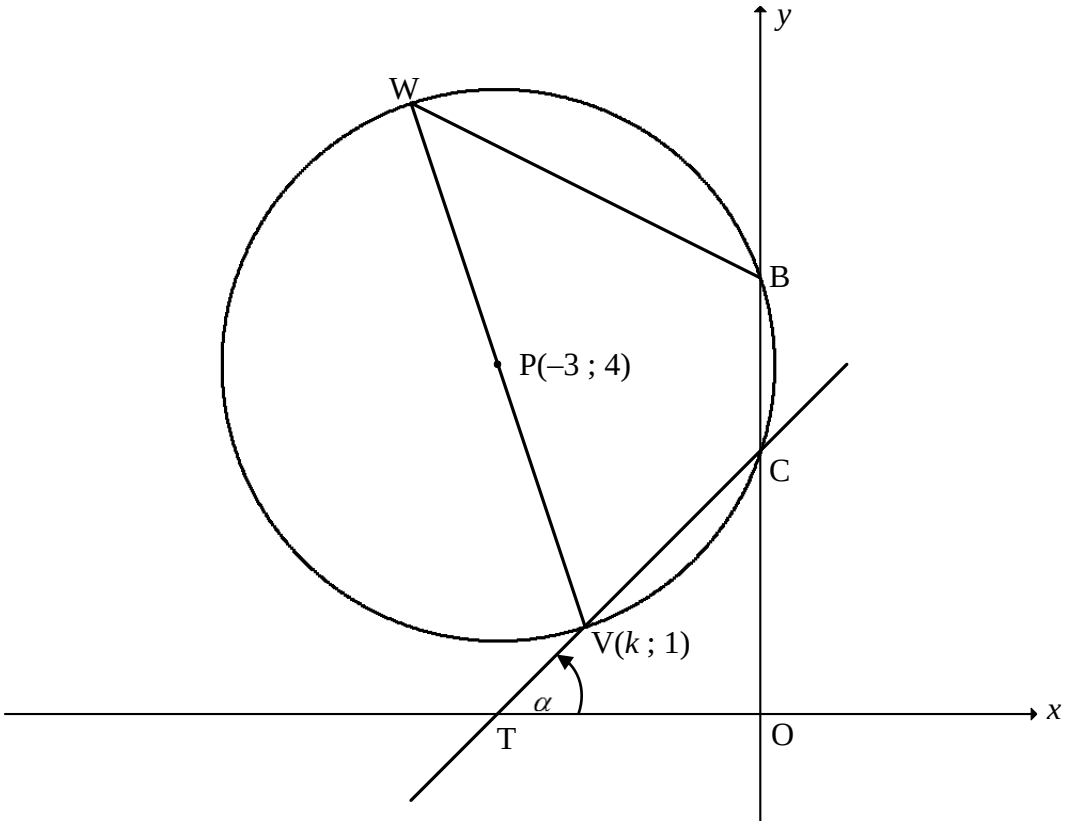


3.1	$M\left(\frac{4+8}{2};\frac{-8+0}{2}\right)$ $M(6;-4)$	✓ x_M ✓ y_M (2)
3.2	$m_{NS}=\frac{0-(-16)}{8-0}$ or $m_{NQ}=\frac{0-(-8)}{8-4}$ or $m_{QS}=\frac{-8-(-16)}{4-0}$ $=2$	✓ subst N and Q or N and Q or Q and S into gradient formula ✓ answer (2)
3.3	$m_{LQ}\times 2=-1$ [LQ ⊥ NS] $\therefore m_{LQ}=-\frac{1}{2}$ $-8=-\frac{1}{2}(4)+c$ **OR** $y+8=-\frac{1}{2}(x-4)$ $c=-6$ $y+8=-\frac{1}{2}x+2$ $\therefore y=-\frac{1}{2}x-6$	✓ m_{LQ} ✓ substitution of Q ✓ calculation of c or simplification (3)
3.4	OS is the radius of circle passing through S $(x-0)^2+(y-0)^2=(16)^2$ $x^2+y^2=256$ Answer only: Full marks	✓ identifying radius = 16 ✓ Equation of circle (2)

3.5	$m_{RM} = m_{LQ} = -\frac{1}{2}$ [RM ‖ LQ] $-4 = -\frac{1}{2}(6) + c$ **OR** $y + 4 = -\frac{1}{2}(x - 6)$ $c = -1$ $y + 4 = -\frac{1}{2}x + 3$ $\therefore y = -\frac{1}{2}x - 1$ T(0;–1)	✓ m_{RM} ✓ substitution of M(6;–4) ✓ coordinates of T (3)
3.6	T(0;–1), P(0;–6) and S(0;–16) ∴ PS = 10 units and TS = 15 units $\frac{LS}{RS} = \frac{PS}{TS} = \frac{2}{3}$ [prop theorem; RM ‖ LP] **OR** [line ‖ one side of Δ/*lyn* ‖ *een sy v Δ*] Answer only: Full marks **OR** M(6 ; –4), Q(4 ; –8) and S(0 ; –16) MS = $\sqrt{180} = 6\sqrt{5}$ and QS = $\sqrt{80} = 4\sqrt{5}$ $\frac{LS}{RS} = \frac{QS}{MS} = \frac{2}{3}$ [prop theorem; RM ‖ LQ] **OR** [line ‖ one side of Δ/*lyn* ‖ *een sy v Δ*] Answer only: Full marks	✓ PS = 10 units ✓ TS = 15 units ✓ answer (3) ✓ MS = $6\sqrt{5}$ units ✓ QS = $4\sqrt{5}$ units ✓ answer (3)
3.7	area of PTMQ = area of ΔTSM – area of ΔPSQ $= \frac{1}{2}.ST.\perp h_M - \frac{1}{2}.PS.\perp h_Q$ $= \frac{1}{2}(15)(6) - \frac{1}{2}(10)(4)$ = 45 – 20 = 25 square units **OR** TM = $\sqrt{45} = 3\sqrt{5} = 6{,}71$ MQ = $\sqrt{20} = 2\sqrt{5} = 4{,}47$ PQ = $\sqrt{20} = 2\sqrt{5} = 4{,}47$ area of trapezium PTMQ = $\frac{1}{2}\left(3\sqrt{5} + 2\sqrt{5}\right)\left(2\sqrt{5}\right)$ $= \frac{1}{2}\left(5\sqrt{5}\right)\left(2\sqrt{5}\right)$ = 25 square units	✓ area of ΔTSM – area of ΔPSQ ✓ area ΔTSM = 45 ✓ area ΔPSQ = 20 ✓ answer (4) ✓ TM = $3\sqrt{5}$ MQ = $2\sqrt{5}$ PQ = $2\sqrt{5}$ ✓ area of trapezium = $\frac{1}{2}$ (sum of ‖sides)(height) ✓ substitute into formula ✓ answer (4)

	OR $MQ = \sqrt{20} = 2\sqrt{5}$ $PQ = \sqrt{20} = 2\sqrt{5}$ $TP = 5$ area of $PTMQ$ = area of ΔMTP + area of ΔPQM $\text{area of PTMQ} = \frac{1}{2}TP \times \perp h_M + \frac{1}{2}MQ \times PQ$ area of $PTMQ = \frac{1}{2}(5) \times 6 + \frac{1}{2}\left(2\sqrt{5}\right)\left(2\sqrt{5}\right)$ area of $PTMQ = 10 + 15 = 25$	✓ area of ΔMTP + area of ΔPQM ✓ area ΔMTP = 10 ✓ area ΔPQM = 15 ✓ answer (4)
		[19]

QUESTION 4



4.1	$PV = r = \sqrt{10}$ $PV = \sqrt{(k-(-3))^2+(1-4)^2} = \sqrt{10}$ $(PV)^2 = (k-(-3))^2+(1-4)^2 = 10$ $k^2+6k+9+9=10$ **OR** $(k+3)^2+9=10$ $k^2+6k+8=0$ $(k+3)^2=1$ $(k+4)(k+2)=0$ $k+3=1$ or $k+3=-1$ $k=-4$ or $k=-2$ $\therefore k=-2$	✓ $PV = r = \sqrt{10}$ ✓ substitution into distance formula ✓ standard form ✓ factors ✓ answer (5)
4.2	$x^2+6x+y^2-8y+15=0$ y-intercepts: $(0)^2+6(0)+y^2-8y+15=0$ $(y-3)(y-5)=0$ $y_C=3$ or $y_B=5$ $\therefore BC = 2$ units	✓ $x = 0$ ✓ factors ✓ both values ✓ answer (4)

4.3.1	$m_{TC} = \frac{3-1}{0-(-2)}$ $= 1$ $\tan\alpha = 1$ $\therefore \alpha = 45°$ **OR** $y = mx + 3$ $1 = m(-2) + 3$ $m_{TC} = 1$ $\tan\alpha = 1$ $\therefore \alpha = 45°$	✓ substitution into gradient formula ✓ $\tan\alpha = 1$ ✓ answer (3) ✓ substitution into equation of a line ✓ $\tan\alpha = 1$ ✓ answer (3)
4.3.2	$B\hat{C}V = 135°$ [ext ∠ of Δ/*buite* ∠ v Δ] $\therefore V\hat{W}B = 45°$ [opp ∠s of cyclic quad/*teenoorst.* ∠*e v kvh*] Answer only: Full marks **OR** $T\hat{C}O = 45°$ [∠s of Δ/∠*e v* Δ] $\therefore V\hat{W}B = 45°$ [ext ∠s of cyclic quad/*buite* ∠ *v kvh*] Answer only: Full marks	✓ $B\hat{C}V = 135°$ ✓ answer (2) ✓ $T\hat{C}O = 45°$ ✓ answer (2)
4.4.1	$Q(-3;-2)$	✓ x_Q ✓ y_Q (2)
4.4.2	$(x+3)^2 + (y+2)^2 = 10$	✓ LHS ✓ RHS (2)
4.4.3	$x = -2$ or $x = -4$	✓ $x = -2$ ✓ $x = -4$ (2)
		[20]

QUESTION/VRAAG 5

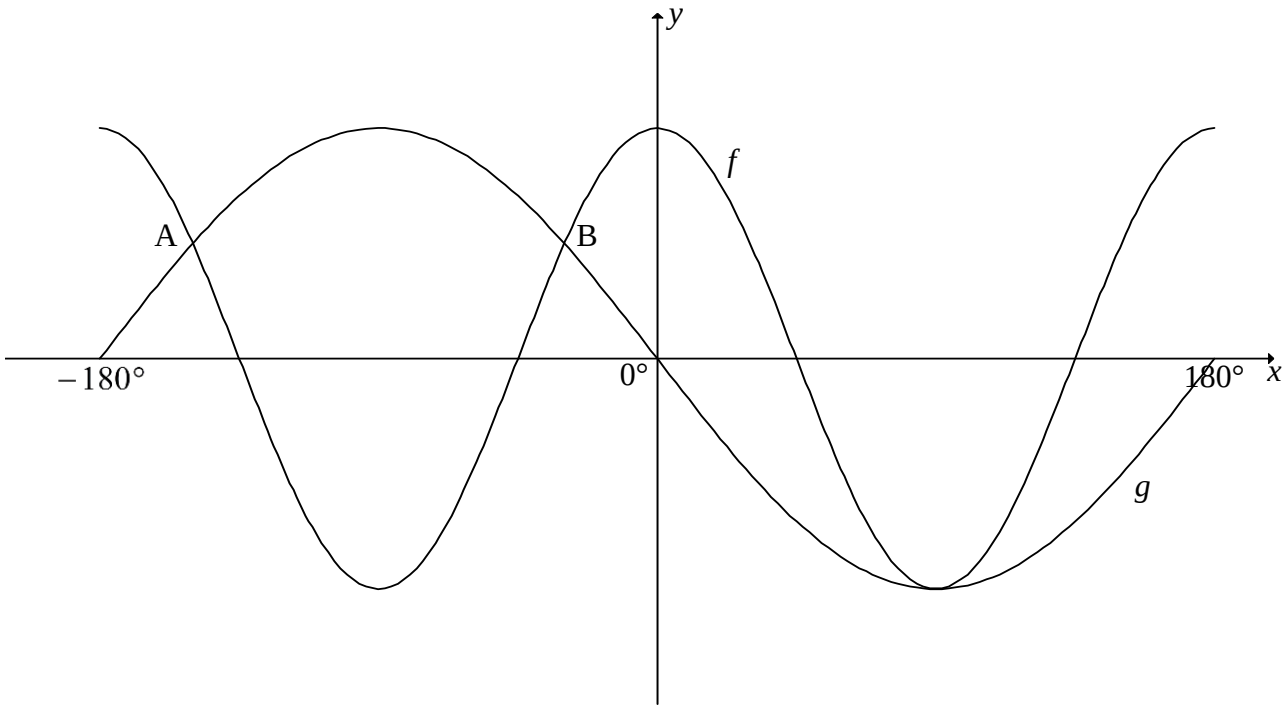
5.1	$\tan(-x).\cos x.\sin(x-180°)-1$ $=-\tan x.\cos x.\sin(-(180°-x))-1$ $=\frac{-\sin x}{\cos x}.\cos x.(-\sin x)-1$ $=\sin^2 x-1$ $=-\cos^2 x$	✓ $-\tan x$ ✓ $-\sin x$ ✓ $\frac{-\sin x}{\cos x}$ ✓ $\sin^2 x-1$ ✓ answer (5)
5.2.1	$\cos 215°$ $=-\cos 35°$ $=-m$	✓ reduction ✓ answer (2)
5.2.2	$\sin 20°$ $=\cos 70°$ $=\cos 2(35°)$ $=2\cos^2 35°-1$ $=2m^2-1$ OR $=\sin(55°-35°)$ $=\sin 55°\cos 35°-\cos 55°\sin 35°$ $=m.m-\sqrt{1-m^2}.\sqrt{1-m^2}$ $=m^2-(1-m^2)$ $=2m^2-1$	✓ co-function ✓ double angle expansion ✓ answer in terms of m (3) ✓ compound angle expansion ✓ $\cos 55°=\sqrt{1-m^2}$ or $\sin 35°=\sqrt{1-m^2}$ ✓ answer in terms of m (3)
5.3	$\cos 4x.\cos x+\sin 4x.\sin x=-0,7$ $\cos(4x-x)=-0,7$ ref $\angle = 45,57\ldots°$ $3x=180°-45,57...°+k.360°$ or $3x=180°+45,57...°+k.360°$ $3x=134,43°+k.360°$ or $3x=225,57°+k.360°$ $x=44,81°+k.120°;\ k\in Z$ $x=75,19°+k.120°;\ k\in Z$	✓ compound angle ✓ $3x$ = 134,43° or 225,57° ✓ x = 44,81° or 75,19° ✓ $+k.120°;\ k\in Z$ (4)

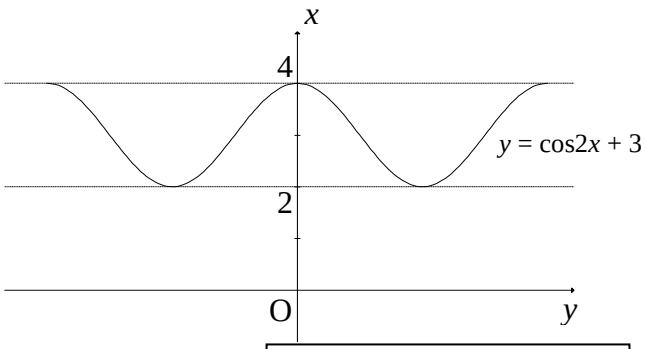
5.4	$\text{RHS} = \cos^2 x - \sin^2 x$ $\text{LHS} = \dfrac{\sin 4x.\cos 2x - 2\cos 4x.\sin x.\cos x}{\tan 2x}$ $= \dfrac{\sin 4x.\cos 2x - \cos 4x.\sin 2x}{\dfrac{\sin 2x}{\cos 2x}}$ $= \sin(4x-2x)\left(\dfrac{\cos 2x}{\sin 2x}\right)$ $= \cos 2x$ $= \cos^2 x - \sin^2 x$ LHS = RHS	✓ $\sin 2x$ ✓ $\dfrac{\sin 2x}{\cos 2x}$ ✓ $\sin(4x-2x)$ ✓ $\cos 2x$ (4)
		[18]

QUESTION/VRAAG 6

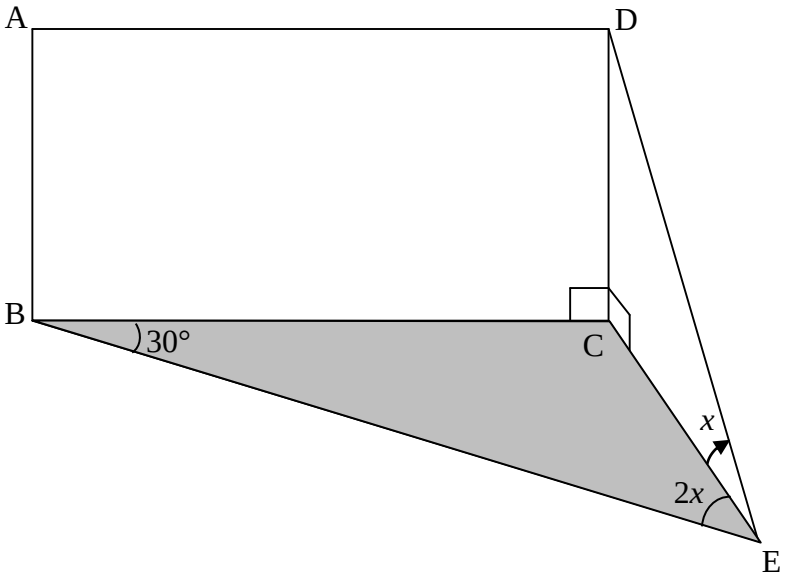
6.1	$1-2\sin^2 x=-\sin x$ $2\sin^2 x-\sin x-1=0$ $(2\sin x+1)(\sin x-1)=0$ $\sin x=-\frac{1}{2}$ or $\sin x=1$ ref $\angle = 30°$ ref $\angle = 90°$ $x=210°+k.360°$ $x=90°+k.360°$ or $x=330°+k.360°$ $x=-150°$ or $x=-30°$ or $x=90°$ **OR** $\cos 2x=-\sin x$ $\cos 2x=-\cos(90°-x)$ $2x=180°-(90°-x)+k.360°$ or $2x=180°+(90°-x)+k.360°$ $2x=90°+x+k.360°$ or $2x=270°-x+k.360°$ $x=90°+k.360°$ $x=90°+k.120°$ $x=-150°$ or $x=-30°$ or $x=90°$ **OR** $\cos 2x=-\sin x$ $\cos 2x=\cos(90°+x)$ $2x=90°+x+k.360°$ or $2x=360°-(90°+x)+k.360°$ $x=90°+k.360°$ or $3x=270°+k.360°$ $x=90°+k.120°$ $x=-150°$ or $x=-30°$ or $x=90°$ **OR** $\cos 2x=-\sin x$ $\sin(90°-2x)=-\sin x$ $90°-2x=180+x+k.360°$ or $90°-2x=360°-x+k.360°$ $x=-30°+k.120°$ $x=-270°+k.360°$ $x=-150°$ or $x=-30°$ or $x=90°$	✓ identity ✓ factors ✓ $\sin x=-\frac{1}{2}$ ✓ $\sin x=1$ ✓ –150° and –30° ✓ 90° (A) (6) ✓ co-functions ✓ $2x$ in quadrant 2 ✓ $2x$ in quadrant 3 ✓ both general solutions ✓ –150° and –30° ✓ 90° (A) (6) ✓ co-functions ✓ $2x$ in quadrant 1 ✓ $2x$ in quadrant 4 ✓ both general solutions ✓ –150° and –30° ✓ 90° (A) (6) ✓ co-functions ✓ $90°-2x$ in quadrant 3 ✓ $90°-2x$ in quadrant 4 ✓ both general solutions ✓ –150° and –30° ✓ 90° (A) (6)

6.2



6.2.1	A(–150°; 0,5) B(–30°; 0,5) AB = –30° – (–150°) AB = 120° Answer only: Full marks	✓ AB = –30° – (–150°) ✓ answer (2)
6.2.2	$x \in (0°; 90°)$ or $x \in (90°; 180°)$ **OR** $0° < x < 90°$ or $90° < x < 180°$	✓ $x \in (0°; 90°)$ ✓ $x \in (90°; 180°)$ (2) ✓ $0° < x < 90°$ ✓ $90° < x < 180°$ (2)
6.2.3	$\cos 2x = k - 3$ $k - 3 < -1$ or $k - 3 > 1$ $k < 2$ or $k > 4$ Answer only: Full marks **OR**  $k < 2$ or $k > 4$ Answer only: Full marks	✓ $k - 3 < -1$ or $k - 3 > 1$ ✓ $k < 2$ ✓ $k > 4$ (3) ✓ graph of $y = \cos 2x + 3$ ✓ $k < 2$ ✓ $k > 4$ (3)
		[13]

QUESTION/VRAAG 7

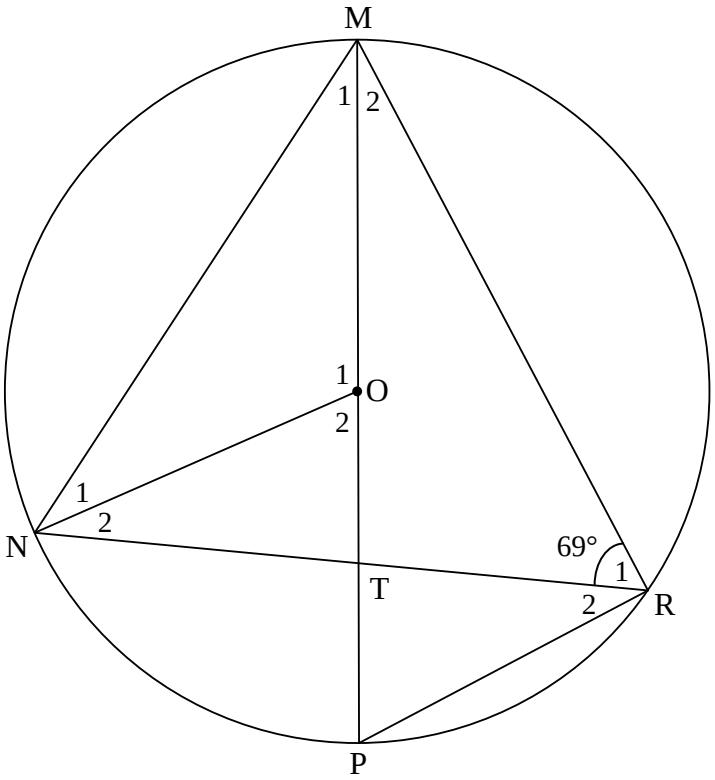


7.1	In ΔBCE: $\frac{CE}{\sin\hat{B}} = \frac{BC}{\sin B\hat{E}C}$ $\frac{CE}{\sin 30°} = \frac{BC}{\sin 2x}$ $CE = \frac{BC\sin 30°}{\sin 2x}$ In ΔCDE: $\frac{DC}{CE} = \tan D\hat{E}C$ $DC = \frac{BC.\sin 30°}{\sin 2x}(\tan x)$ $DC = \frac{BC}{4\sin x\cos x}\left(\frac{\sin x}{\cos x}\right)$ $DC = \frac{BC}{4\cos^2 x}$	✓ correct use of sine rule ✓ $CE = \frac{BC\sin 30°}{\sin 2x}$ ✓ correct trig ratio ✓ Subst CE ✓ $2\sin x\cos x$ ✓ $\frac{\sin x}{\cos x}$ (6)

7.2	$DC = \frac{BC}{4\cos^2 30°}$ $= \frac{BC}{4\left(\frac{\sqrt{3}}{2}\right)^2}$ $= \frac{BC}{3}$ $\therefore BC = 3DC$ But AB = DC [opp sides of rectangle/*teenoorst. sye v reghoek*] $\therefore BC = 3AB$ Area of rectangle = (AB)(BC) = (AB)(3AB) $=3AB^2$	✓ $DC == \frac{BC}{3}$ ✓ $BC = 3AB$ ✓ substitution into area formula (3)
		[9]

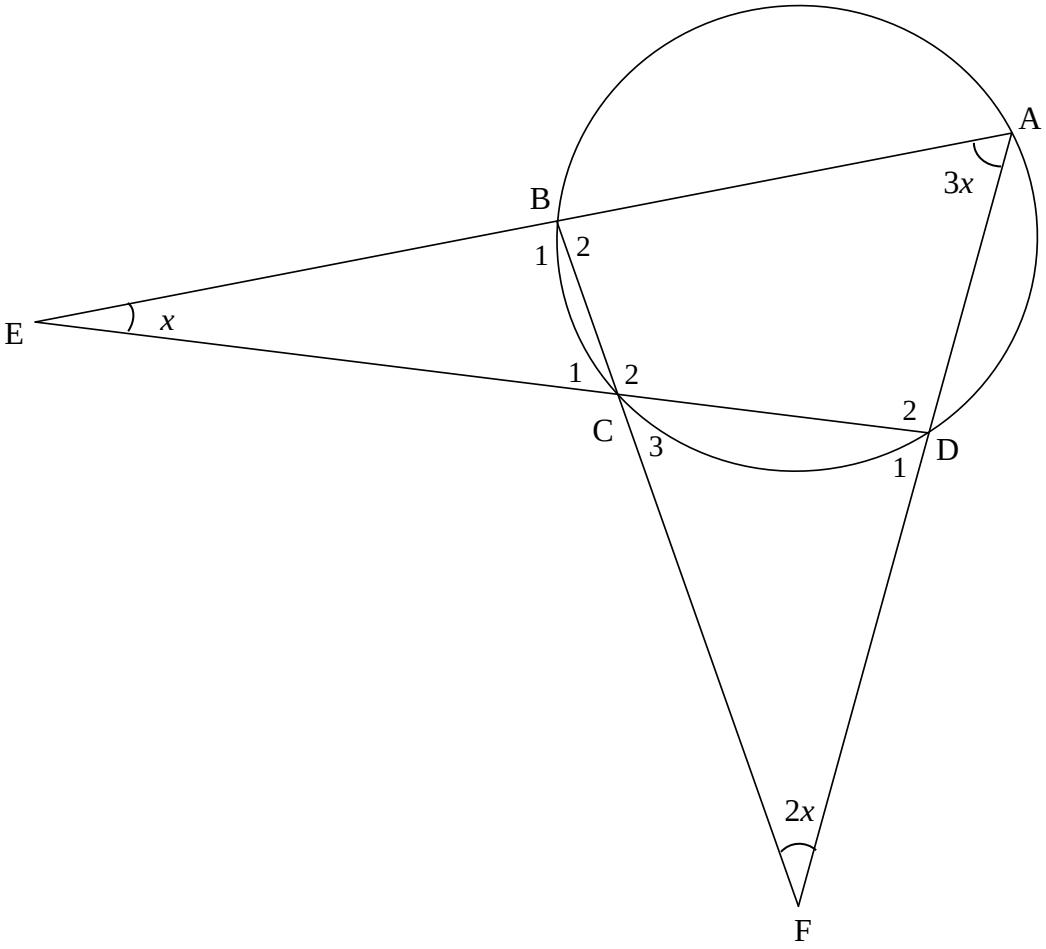
QUESTION/VRAAG 8

8.1



8.1.1	$M\hat{R}P = 90°$ $\hat{R}_2 = 21°$	[∠ in semi circle/∠ *in halwe sirkel*]	✓ R ✓ S (2)
8.1.2	$\hat{O}_1 = 138°$	[∠ at centre = 2 ×∠ at circumference/ *midpts.* ∠ = 2× *omtreks* ∠]	✓ S ✓R (2)
8.1.3	$\hat{M}_1 = 21°$ **OR** $\hat{M}_1 + N_1 = 180° - 138°$ $\therefore \hat{M}_1 = 21°$	[∠s in the same segment/∠*e in dieselfde sirkel segment*] [sum of ∠s in Δ/∠*e v* Δ] [∠s opp equal sides/∠*e teenoor gelyke sye*]	✓ S ✓R (2) ✓ S ✓R (2)
8.1.4	$\hat{O}_2 = 42°$ $\hat{P} = 42°$ $\hat{M}_2 = 48°$ **OR** $\hat{N}_2 = \hat{R}_2 = 21°$ $\hat{N}_1 = \hat{M}_1 = 21°$ $\hat{M}_2 = 48°$	[∠s on a str line/∠*e op 'n reguitlyn*] [alt ∠s; NO || PR/*Verw.* ∠*e*, NO || PR] [sum of ∠s in Δ/∠*e v* Δ] [alt ∠s; NO || PR/*Verw.* ∠*e*, NO || PR] [∠s opposite equal sides/∠*e teenoor gelyke sye*] [sum of ∠s of Δ NMR//∠*e v* ΔNMR]	✓ S ✓ S ✓R ✓ S (4) ✓ S ✓R ✓ S ✓ S (4)

8.2

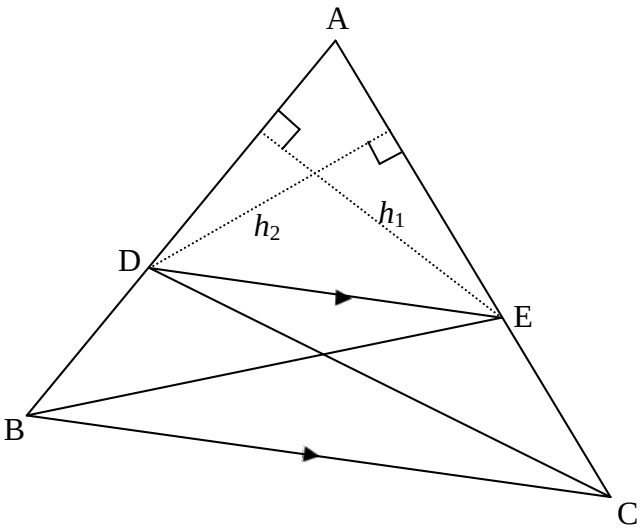


8.2	$\hat{D}_1 = 4x$	[ext ∠ of Δ/*buite ∠ v* Δ]	✓ S/R
	$\hat{D}_2 = 180° - 4x$	[∠s on a str line/*∠e op ´n reguitlyn*]	✓ S
	$\hat{B}_1 = 5x$	[ext ∠ of Δ/*buite ∠ v* Δ]	✓ S
	$\hat{B}_1 = \hat{D}_2$	[ext ∠ of cyclic quad/*buite ∠ v kvh*]	✓S ✓R
	$180° - 4x = 5x$		
	$9x = 180°$		
	$x = 20°$		✓ answer (6)
	OR		
	$\hat{C}_1 = 3x$	[ext ∠ of cyclic quad/*buite ∠ v kvh*]	✓ S ✓ R
	$\hat{B}_2 = 4x$	[ext ∠ of Δ/*buite ∠ v* Δ]	✓ S
	$\hat{C}_1 = \hat{C}_3 = 3x$	[vert opp ∠s]	✓ S
	$\hat{D}_2 = 5x$	[ext ∠ of Δ/*buite ∠ v* Δ]	
	$4x + 5x = 180°$	[opp ∠ of cyclic quad/*teenoorst. ∠e v kvh*]	✓S/R
	$x = 20°$		✓ answer (6)

	OR $\hat{C}_3 = 3x$ [ext ∠ of cyclic quad/*buite ∠ v kvh*] $\hat{D}_1 = 4x$ [ext ∠ of Δ/*buite ∠ v* Δ] $2x + 3x + 4x = 180°$ [sum of ∠s in Δ/*∠e v* Δ] $9x = 180°$ $x = 20°$	✓ S ✓R ✓ S ✓ S ✓R ✓ answer (6)
		[16]

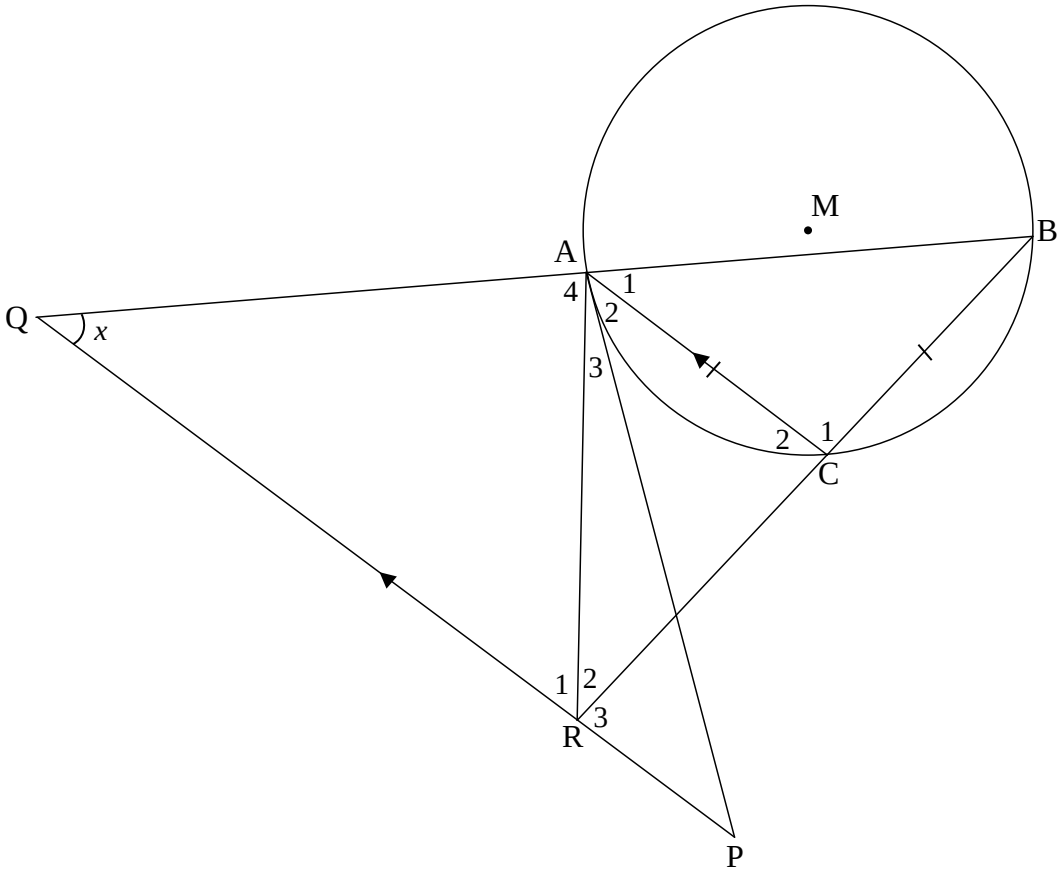
QUESTION/VRAAG 9

9.1



9.1	Constr: Join BE and CD and draw h_1 from E $\perp$ AD and h_2 from D $\perp$ AE *Konstr: Verbind BE en CD en trek h_1 vanaf* E $\perp$ AD *en h_2 vanaf* D $\perp$ AE Proof/*Bewys*: $\frac{\text{area } \Delta ADE}{\text{area } \Delta BDE} = \frac{\frac{1}{2}AD \times h_1}{\frac{1}{2}BD \times h_1} = \frac{AD}{BD}$ $\frac{\text{area } \Delta ADE}{\text{area } \Delta DEC} = \frac{\frac{1}{2}AE \times h_2}{\frac{1}{2}EC \times h_2} = \frac{AE}{EC}$ area ΔADE = area ΔADE [common/*gemeenskaplik*] But area ΔBDE = area ΔDEC [same base & height ; DE || BC/ *dies basis & hoogte ;* DE || BC] $\therefore \frac{\text{area } \Delta ADE}{\text{area } \Delta BDE} = \frac{\text{area } \Delta ADE}{\text{area } \Delta DEC}$ $\therefore \frac{AD}{BD} = \frac{AE}{EC}$	✓ constr/*konstr* ✓ $\frac{\text{area } \Delta ADE}{\text{area } \Delta BDE}$ ✓ $\frac{\frac{1}{2}AD \times h_1}{\frac{1}{2}BD \times h_1}$ **or R** ✓ $\frac{\text{area } \Delta ADE}{\text{area } \Delta DEC} = \frac{AE}{EC}$ ✓ S ✓R (6)

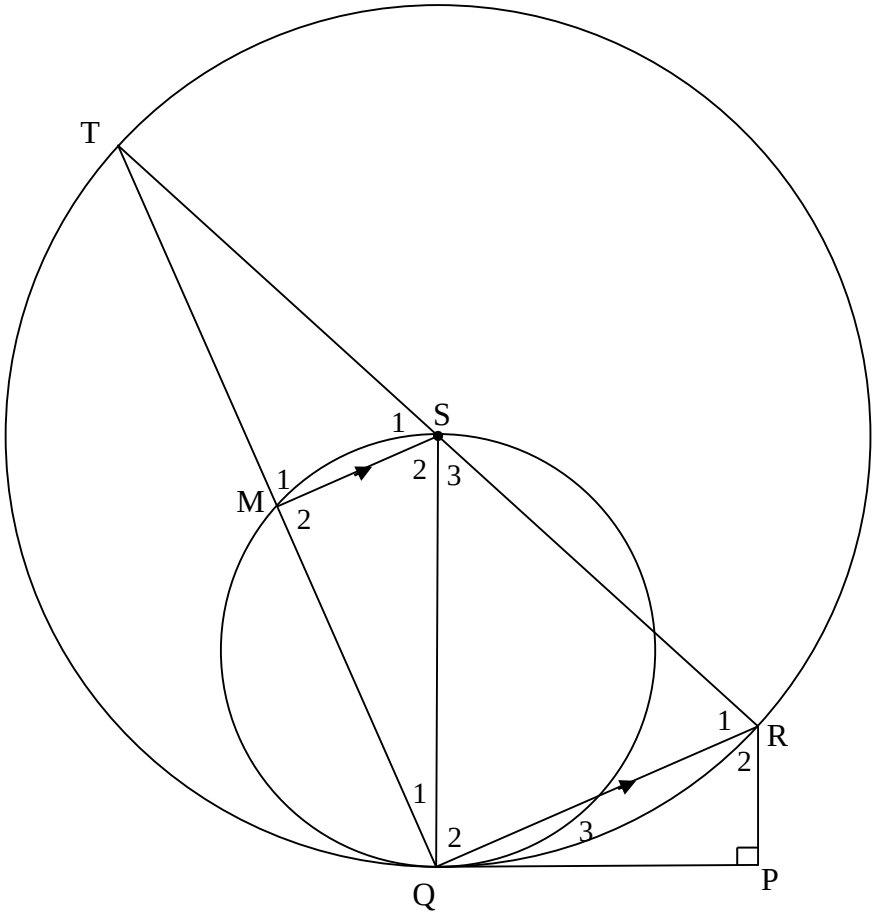
9.2



9.2.1	$\hat{A}_1 = x$ [corresp ∠s; PQ ‖ CA/*ooreenkomstige ∠e*, PQ ‖ CA] $\hat{B} = x$ [∠s opp equal sides/*∠e teenoor gelyke sye*] $\hat{A}_2 = x$ [tan-chord theorem/*∠ tussen raaklyn en koord*] $\hat{P} = x$ [alt ∠s; PQ ‖ CA/*verw. ∠e*, PQ ‖ CA]	✓ S ✓ R ✓ S/R ✓ S ✓ R ✓ S/R (6)
9.2.2	$\hat{B} = \hat{P}$ [proved in 9.2.1/*bewys in 9.2.1*] ∴ A, B, P and R are concyclic ∴ ABPR is a cyclic quadrilateral [conv ∠s in the same segment/ *koord onderspan gelyke omtreks ∠e*]	✓ S ✓ R (2)
9.2.3	$\frac{BA}{BQ} = \frac{BC}{BR}$ [prop th; AC ‖ QP] **OR** [line ‖ one side Δ/*lyn ‖ een syn v Δ*] But QR = BR [sides opp = ∠s/*sye teenoor = ∠e*] $\therefore \frac{BA}{BQ} = \frac{BC}{QR}$	✓ S ✓ R ✓ S (3)

	OR In Δ ABC and Δ BQR: $\hat{A}_1 = \hat{B} = x$ [proved in 9.2.1] $\hat{B} = \hat{Q} = x$ [proved in 9.2.1] $\hat{C}_1 = B\hat{R}Q = 180° - 2x$ [sum of $\angle$s of Δ] $\therefore \Delta ABC \,|||\, \Delta BQR$ $\therefore \frac{BA}{BQ} = \frac{BC}{QR}$	✓ S ✓ S ✓ S (3)
	OR In Δ ABC and Δ BQR: $\hat{A}_1 = \hat{B} = x$ [proved in 9.2.1] $\hat{B} = \hat{Q} = x$ [proved in 9.2.1] $\hat{C}_1 = B\hat{R}Q = 180° - 2x$ [sum of $\angle$s of Δ] $\therefore \Delta ABC \,|||\, \Delta BQR$ [$\angle\angle\angle$] $\therefore \frac{BA}{BQ} = \frac{BC}{QR}$	✓ S ✓ S ✓ R (3)
	OR In Δ ABC and Δ QBR: $\hat{B}$ is common $\hat{A}_1 = \hat{Q} = x$ [corres $\angle$s; PQ || CA] $\hat{C}_1 = B\hat{R}Q = 180° - 2x$ [sum of $\angle$s of Δ] $\therefore \Delta ABC \,|||\, \Delta QBR$ [$\angle\angle\angle$] But QR = BR [sides opp = $\angle$s/*sye teenoor* = $\angle$*e*] $\therefore \frac{BA}{BQ} = \frac{BC}{QR}$	✓ S ✓ S ✓ S (3)
		[17]

QUESTION/VRAAG 10



10.1.1	$\hat{Q}_1 + \hat{Q}_2 = 90°$	[∠ in semi circle/∠ *in halwe sirkel*]	✓ S/R
	$\therefore \hat{M}_2 = 90°$	[co-interior ∠, MS || QR/*ko-binne ∠e*, MS || QR]	✓ S/R
	∴ SQ is a diameter	[converse: ∠ in semi circle/ *Omgekeerde: ∠ in halwe sirkel*]	✓ R (3)
	OR		
	MS || QR		
	$\frac{TS}{SR} = \frac{TM}{MQ} = \frac{1}{1}$	[prop theorem; SM || QR] **OR** [line || one side of Δ]/*lyn || een sy v*Δ	✓ S/R
	$\therefore TM = MQ$		
	$\therefore \hat{M}_2 = 90°$	[Line from centre bisects chord/*midpt. sirkel; midpt koord*]	✓ S/R
	∴ SQ is a diameter	[converse: ∠ in semi circle/ *Omgekeerde: ∠ in halwe sirkel*]	✓ R (3)
	OR		
	SQ ⊥ QP	[tan ⊥ rad/*raaklyn ⊥ radius*]	✓ S ✓ R
	∴ SQ is a diameter	[converse: tan ⊥ rad/*Omgekeerde: raaklyn ⊥ radius*]	✓ R (3)

10.1.2	In ΔRTQ and ΔRQP		
	$\hat{T} = \hat{Q}_3$	[tan-chord theorem/*∠ tussen raaklyn en koord*]	✓ S ✓ R
	$\hat{Q}_1 + \hat{Q}_2 = 90°$	[co-interior ∠s, MS || QR/*ko-binne ∠e*, MS || QR] **or** [∠ in semi circle/*∠ in halwe sirkel*]	✓ S
	$\therefore \hat{Q}_1 + \hat{Q}_2 = \hat{P} = 90°$		✓ S
	$\hat{R}_1 = \hat{R}_2$	[∠s of Δ/*∠e van Δ*]	✓ S
	$\Delta RTQ \text{ ||| } \Delta RQP$		
	$\frac{RT}{RQ} = \frac{RQ}{RP}$		✓ ratio
	$RT = \frac{RQ^2}{RP}$		(6)
	OR		
	In ΔRTQ and ΔRQP		
	$\hat{T} = \hat{Q}_3$	[tan-chord theorem *∠ tussen raaklyn en koord*]	✓ S ✓ R
	$\hat{Q}_1 + \hat{Q}_2 = 90°$	[co-interior ∠s, MS || QR/*ko-binne ∠e*, MS || QR] **or** [∠ in semi circle/*∠ in halwe sirkel*]	✓ S
	$\therefore \hat{Q}_1 + \hat{Q}_2 = \hat{P} = 90°$		✓ S
	$\Delta RTQ \text{ ||| } \Delta RQP$	[∠,∠,∠]	✓ R
	$\frac{RT}{RQ} = \frac{RQ}{RP}$		✓ ratio
	$RT = \frac{RQ^2}{RP}$		(6)
10.2	QR = 28 units	[midpoint theorem/*midpt. stelling*]	✓ S ✓ R
	$RP^2 = 28^2 - \left(\sqrt{640}\right)^2$	[Pythagoras/*Pythagoras*]	✓ S
	RP = 12 units		✓ RP = 12
	$RT = \frac{RQ^2}{RP}$		
	$RT = \frac{28^2}{12}$		
	$RT = \frac{196}{3}$		✓ RT
	Radius = $\frac{98}{3}$ units		✓ answer (6)
			[15]

TOTAL/TOTAAL: 150

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SC/NSC Answer Book
SS/NSS Antwoordeboek

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CENTRE NUMBER *SENTRUMNOMMER*	
EXAMINATION NUMBER *EKSAMENNOMMER*	
DATE *DATUM*	
BOOK NUMBER *BOEKNOMMER*	OF *VAN* BOOKS *BOEKE*
SUBJECT CODE *VAKKODE*	
PAPER NUMBER *VRAESTELNOMMER*	2
SUBJECT NAME *VAKNAAM*	**MATHEMATICS/WISKUNDE**

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Question *Vraag*	Marks *Punte*	Marker's Code & Initials *Nasiener se kode & Voorletters*	Marks *Punte*	SM	Marks *Punte*	DCM *AHN*	Marks *Punte*	CM *HN*	Marks *Punte*	IM	Marks *Punte*	EM
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CONTROLLED AND CERTIFIED CORRECT (SURNAME AND INITIALS OF EA)
GEKONTROLEER EN AS KORREK GESERTIFISEER (VAN EN VOORLETTERS VAN EA)

READ INSTRUCTIONS ON THE NEXT PAGE.
LEES INSTRUKSIES OP VOLGENDE BLADSY.

This answer book consists of 24 pages./*Hierdie antwoordeboek bestaan uit 24 bladsye.*

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

QUESTION/*VRAAG* 1

1.1

26	13	3	18	12	34	24	58	16	10	15	69	20	17	40

	Solution/*Oplossing*	**Marks/ *Punte***
1.1.1(a)		(2)
1.1.1(b)		(1)
1.1.2		(2)
1.1.3		(3)

1.2

WIND SPEED/*WINDSPOED* IN km/h (x)	2	6	15	20	25	17	11	24	13	22
TEMPERATURE/*TEMPERATUUR* IN °C (y)	28	26	22	22	16	20	24	19	26	19

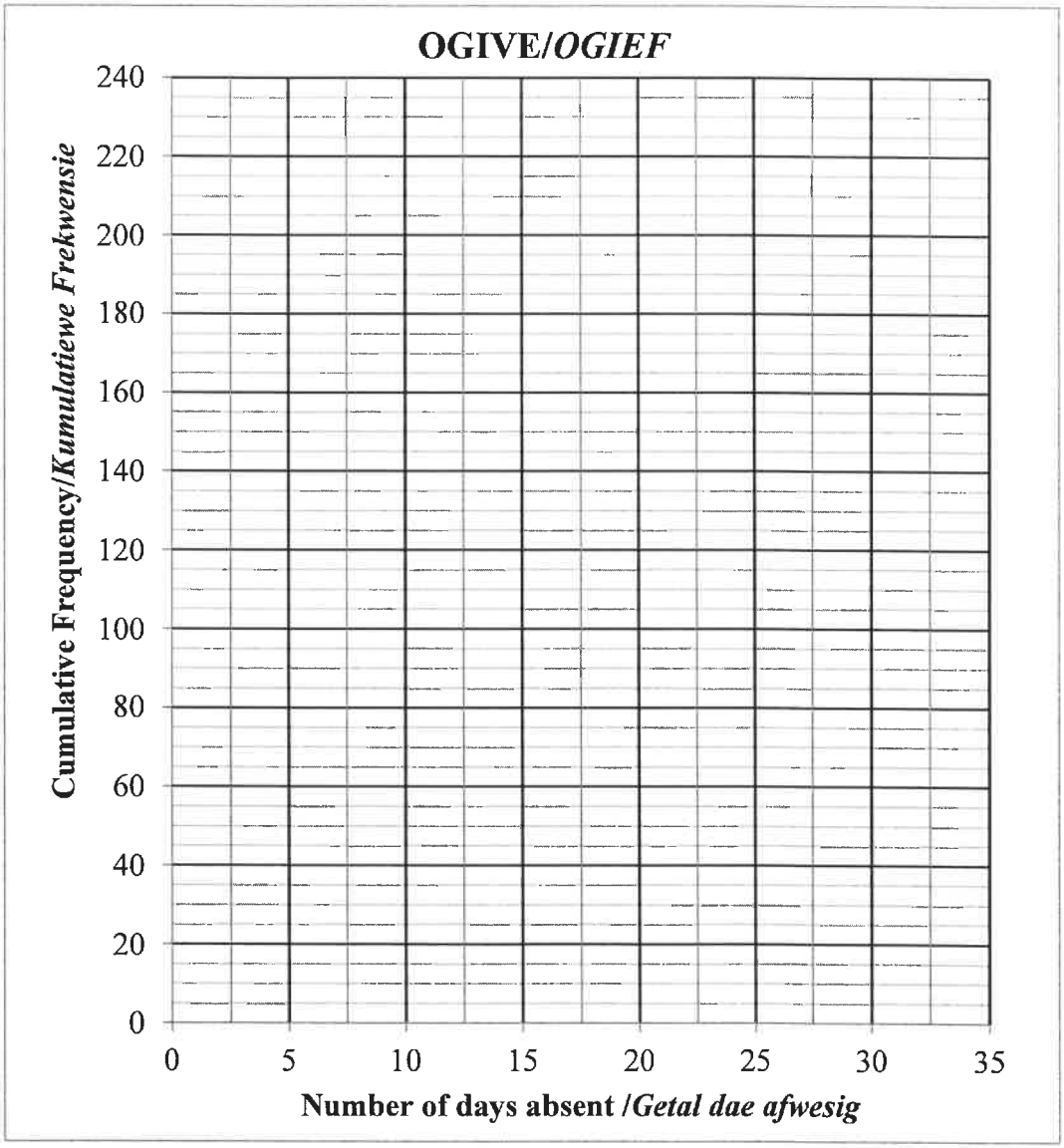
	Solution/*Oplossing*	**Marks/ *Punte***
1.2.1		(3)

	Solution/*Oplossing*	Marks/ *Punte*
1.2.2		(2)
1.2.3		(1)
		[14]

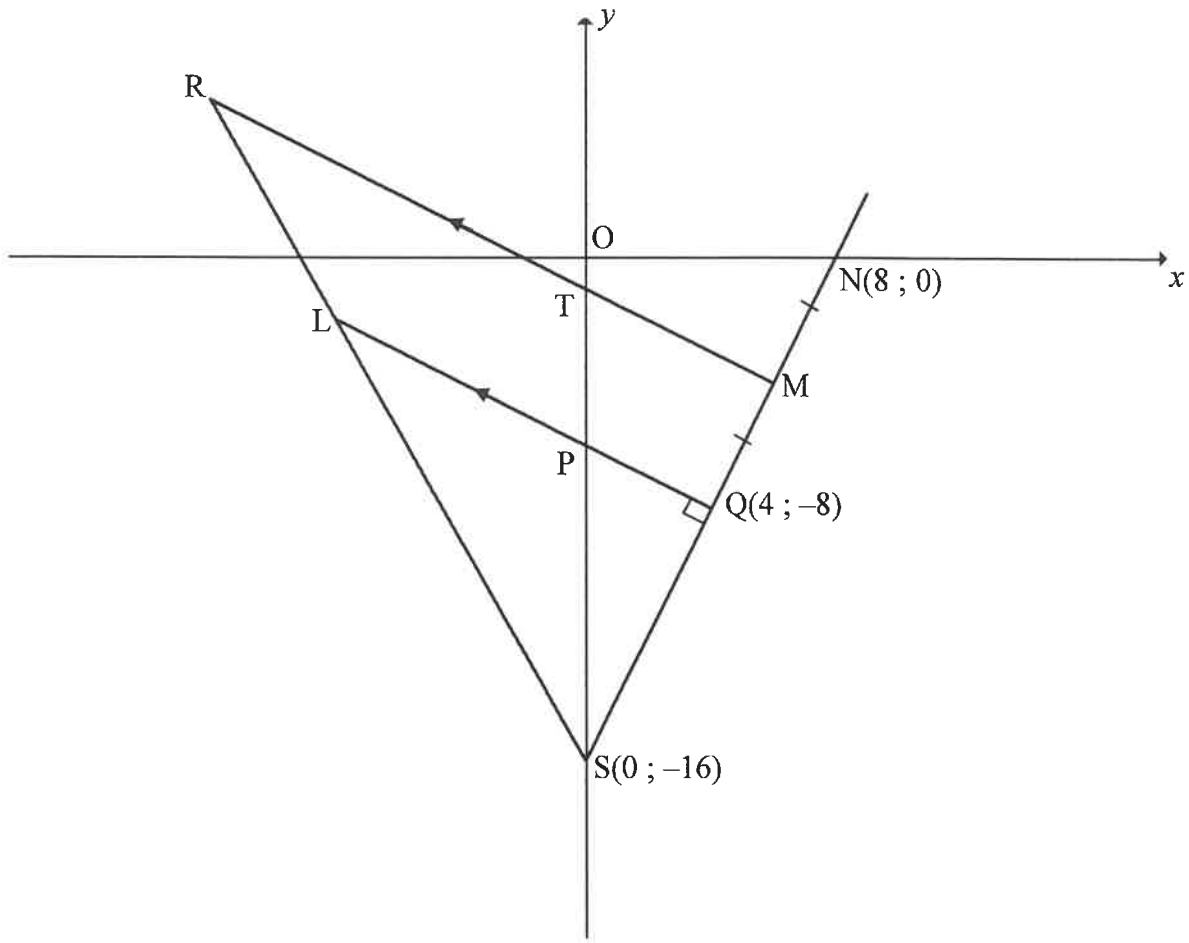
QUESTION/*VRAAG* 2

NUMBER OF DAYS ABSENT *GETAL DAE AFWESIG*	NUMBER OF LEARNERS *GETAL LEERDERS*
$0 \leq x < 5$	34
$5 \leq x < 10$	45
$10 \leq x < 15$	98
$15 \leq x < 20$	43
$20 \leq x < 25$	7
$25 \leq x < 30$	3

	Solution/*Oplossing*	Marks/ *Punte*
2.1		(1)
2.2		(1)

	Solution/*Oplossing*	Marks/ *Punte*
2.3		(1)
2.4		(4)
2.5		(2)
		[9]

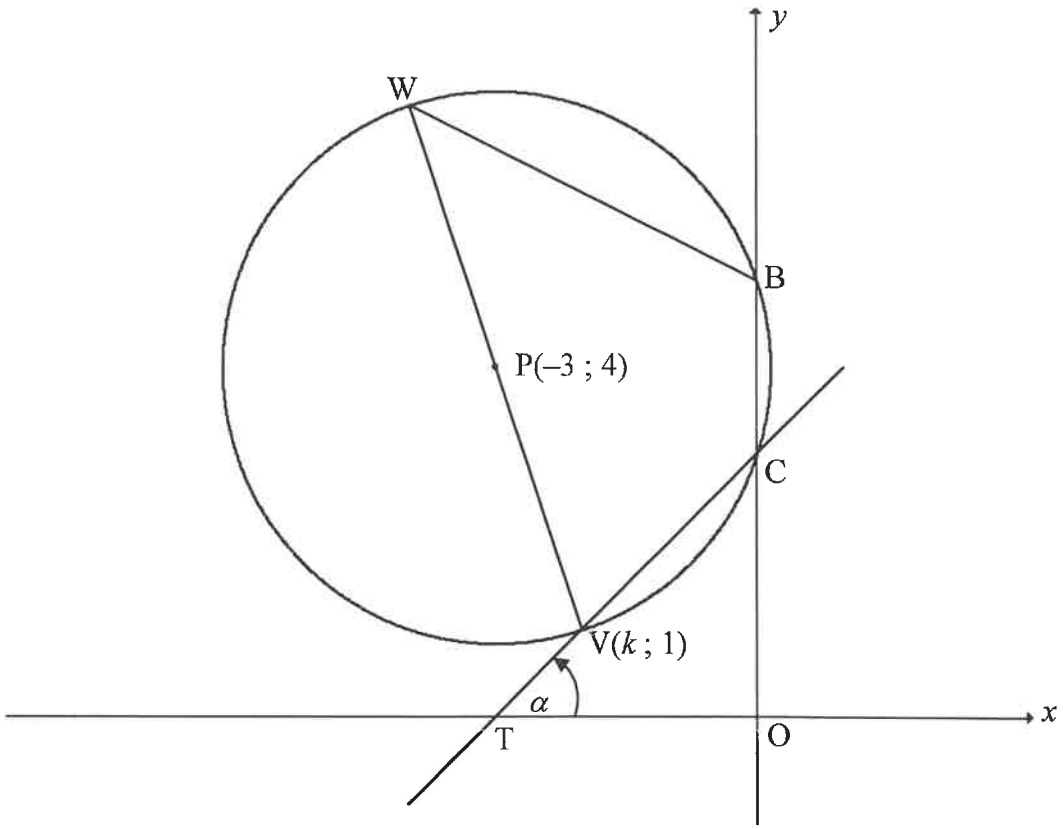
QUESTION/*VRAAG* 3



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

	Solution/*Oplossing*	Marks/ *Punte*
3.3		(3)
3.4		(2)
3.5		(3)
3.6		(3)
3.7		(4)
		[19]

QUESTION/*VRAAG* 4



	Solution/*Oplossing*	**Marks/ *Punte***
4.1		(5)
4.2		(4)

	Solution/*Oplossing*	Marks/ *Punte*
4.3.1		(3)
4.3.2		(2)
4.4.1		(2)
4.4.2		(2)
4.4.3		(2)
		[20]

QUESTION/*VRAAG* 5

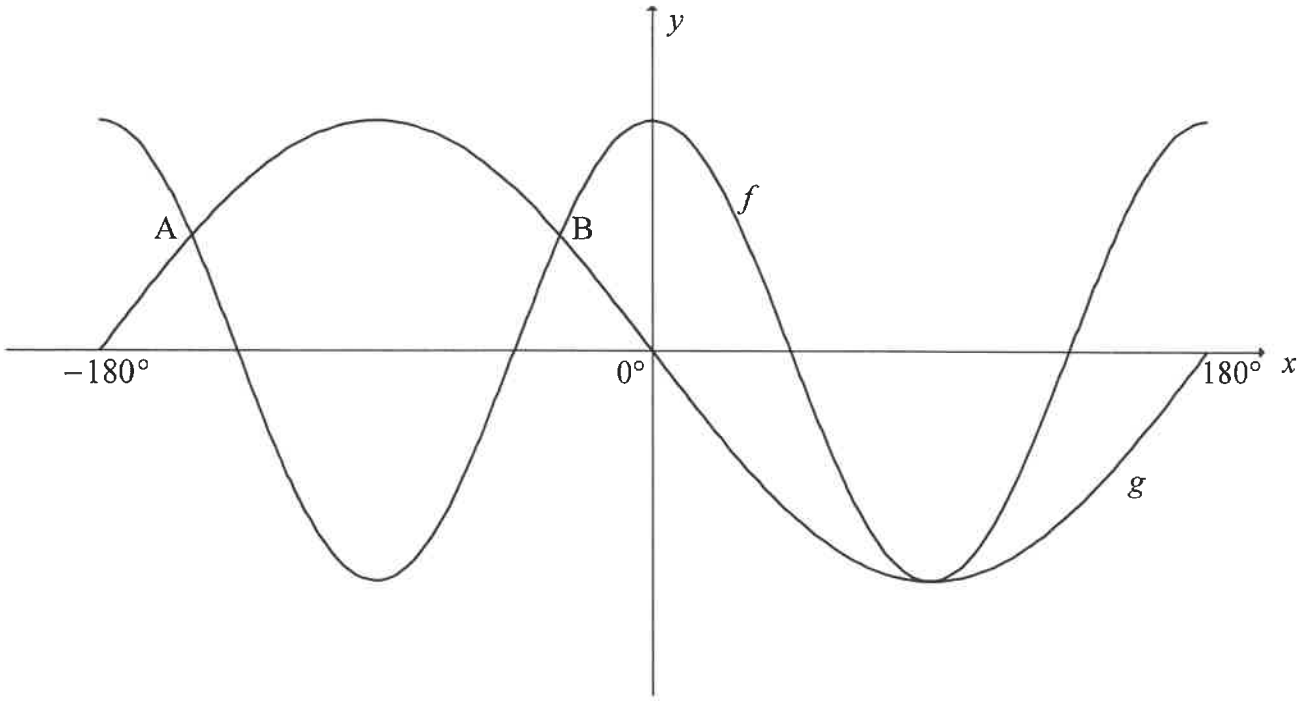
	Solution/*Oplossing*	**Marks/ *Punte***
5.1		(5)
5.2.1		(2)
5.2.2		(3)

	Solution/*Oplossing*	Marks/ *Punte*
5.3		(4)
5.4		(4)
		[18]

QUESTION/*VRAAG* 6

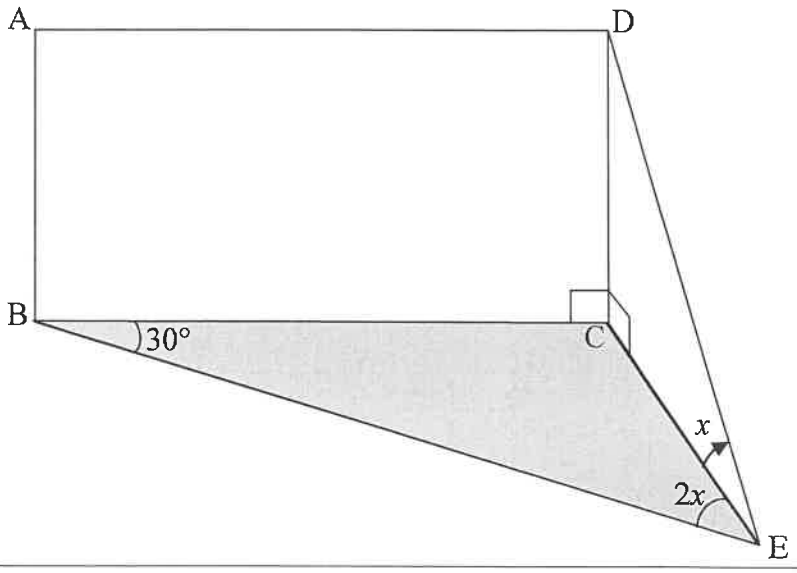
	Solution/*Oplossing*	**Marks/ *Punte***
6.1		(6)

6.2



	Solution/*Oplossing*	Marks *Punte*
6.2.1		(2)
6.2.2		(2)
6.2.3		(3)
		[13]

QUESTION/*VRAAG* 7

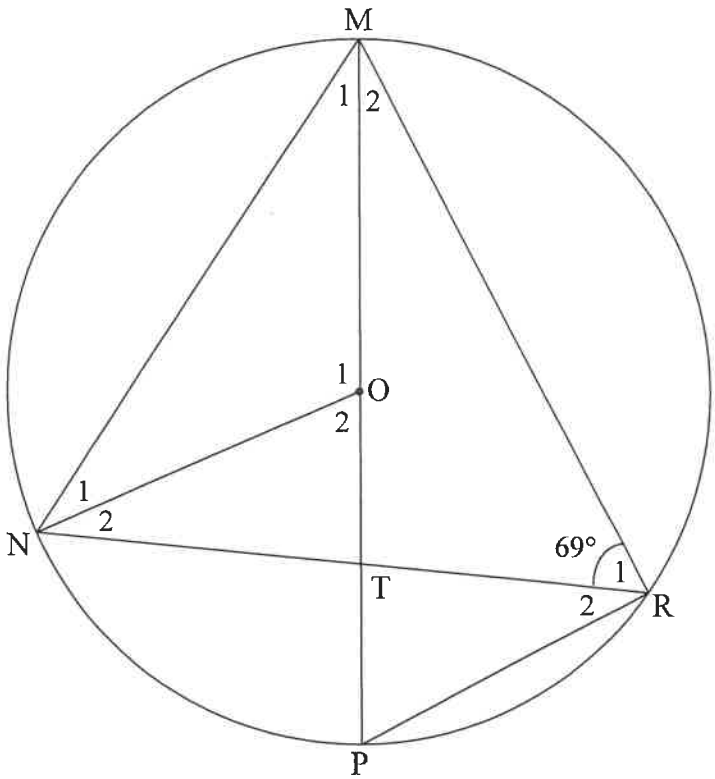


	Solution/*Oplossing*	**Marks/ *Punte***
7.1		(6)
7.2		(3)
		[9]

Provide reasons for your statements in QUESTIONS 8, 9 and 10.
Verskaf redes vir jou bewerings in VRAAG 8, 9 en 10.

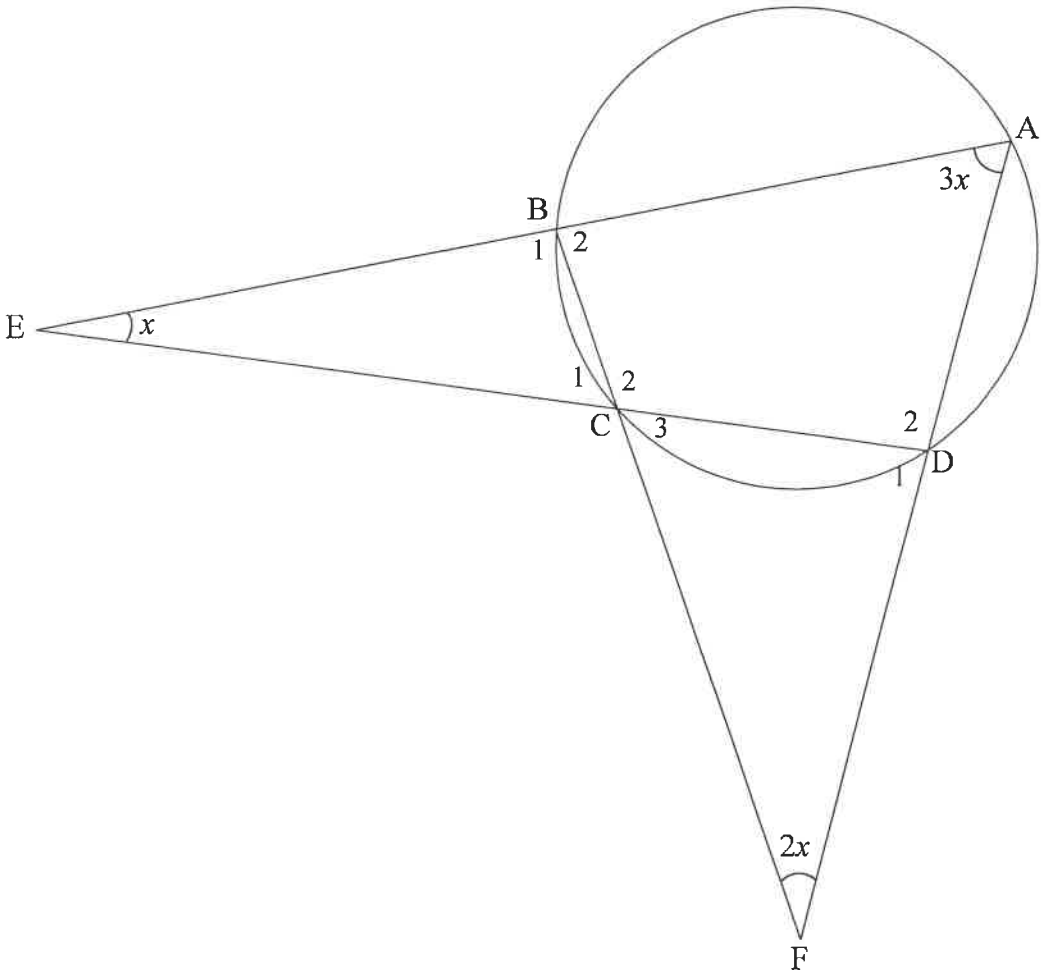
QUESTION/*VRAAG* 8

8.1



	Solution/*Oplossing*	Marks/ *Punte*
8.1.1		(2)
8.1.2		(2)
8.1.3		(2)
8.1.4		(4)

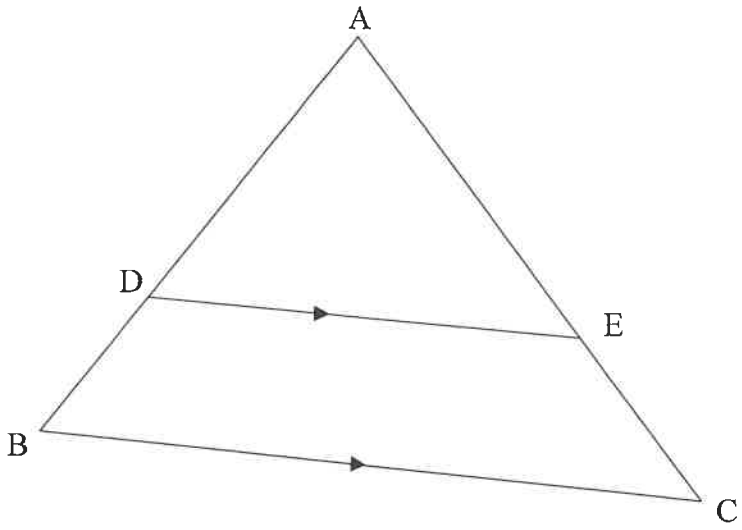
8.2



	Solution/*Oplossing*	Marks/ *Punte*
8.2		(6)
		[16]

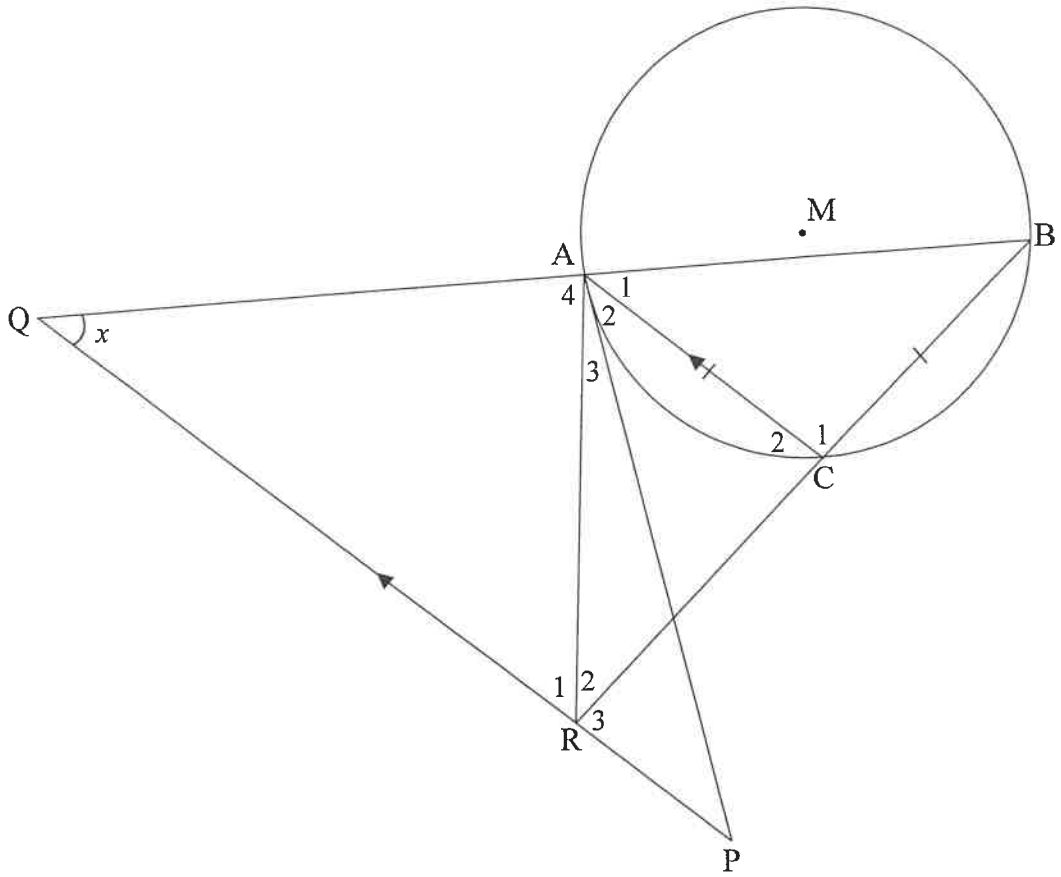
QUESTION/*VRAAG* 9

9.1



	Solution/*Oplossing*	**Marks/ *Punte***
9.1		(6)

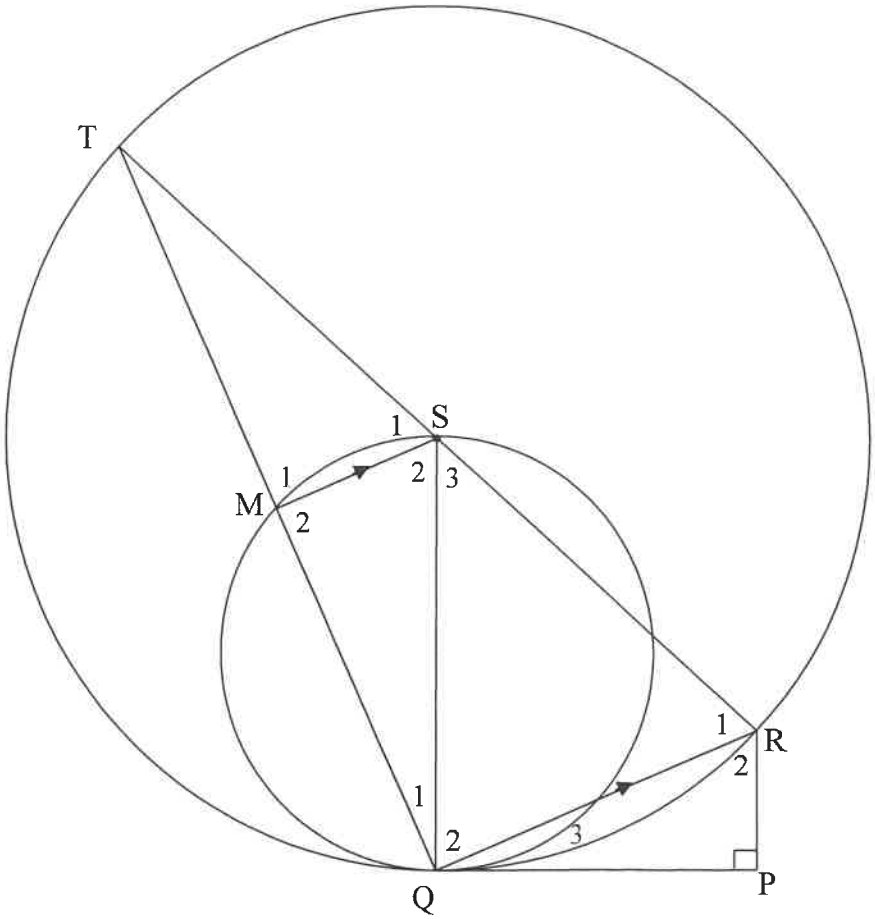
9.2



	Solution/*Oplossing*	Marks/ *Punte*
9.2.1		(6)

	Solution/*Oplossing*	Marks/ *Punte*
9.2.2		(2)
9.2.3		(3)
		[17]

QUESTION/*VRAAG* 10



	Solution/*Oplossing*	**Marks/ *Punte***
10.1.1		(3)

	Solution/*Oplossing*	Marks/ *Punte*
10.1.2		(6)
10.2		(6)
		[15]

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

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

TOTAL/*TOTAAL*: 150

RE-MARK/RE-CHECK *HERMERK/HERSIEN*				
Question *Vraag*	Marks *Punte*			Initials *Voorletters*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
TOTAL *TOTAAL*				
HASH TOTAL *KAF-TOTAAL*				