

Soek jy 'n fantastiese tutor?

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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
SENIORSERTIFIKAAT-EKSAMEN
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/
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)
	<i>'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede)</i>
R	A mark for the correct reason (A reason mark may only be awarded if the statement is correct)
	<i>'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is)</i>
S/R	Award a mark if statement AND reason are both correct
	<i>Ken 'n punt toe as die bewering EN rede beide korrek is</i>

QUESTION/VRAAG 1

1.1

26	13	3	18	12	34	24	58	16	10	15	69	20	17	40
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1.1.1(a)	$\bar{x} = \frac{375}{15}$ $\bar{x} = 25 \text{ MB}$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: Full marks</div>	✓ 375 ✓ answer (2)
1.1.1(b)	$\sigma = 17,65 \text{ MB}$	✓ answer (1)
1.1.2	$25 + 17,65 = 42,65$ $\therefore 2 \text{ days}$	✓ 42,65 ✓ 2 (2)
1.1.3	Overall $\bar{x} = \frac{80}{100} \times 25$ $= 20 \text{ MB}$ $\frac{375 + x}{30} = 20$ $x = 600 - 375$ $= 225$ 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)

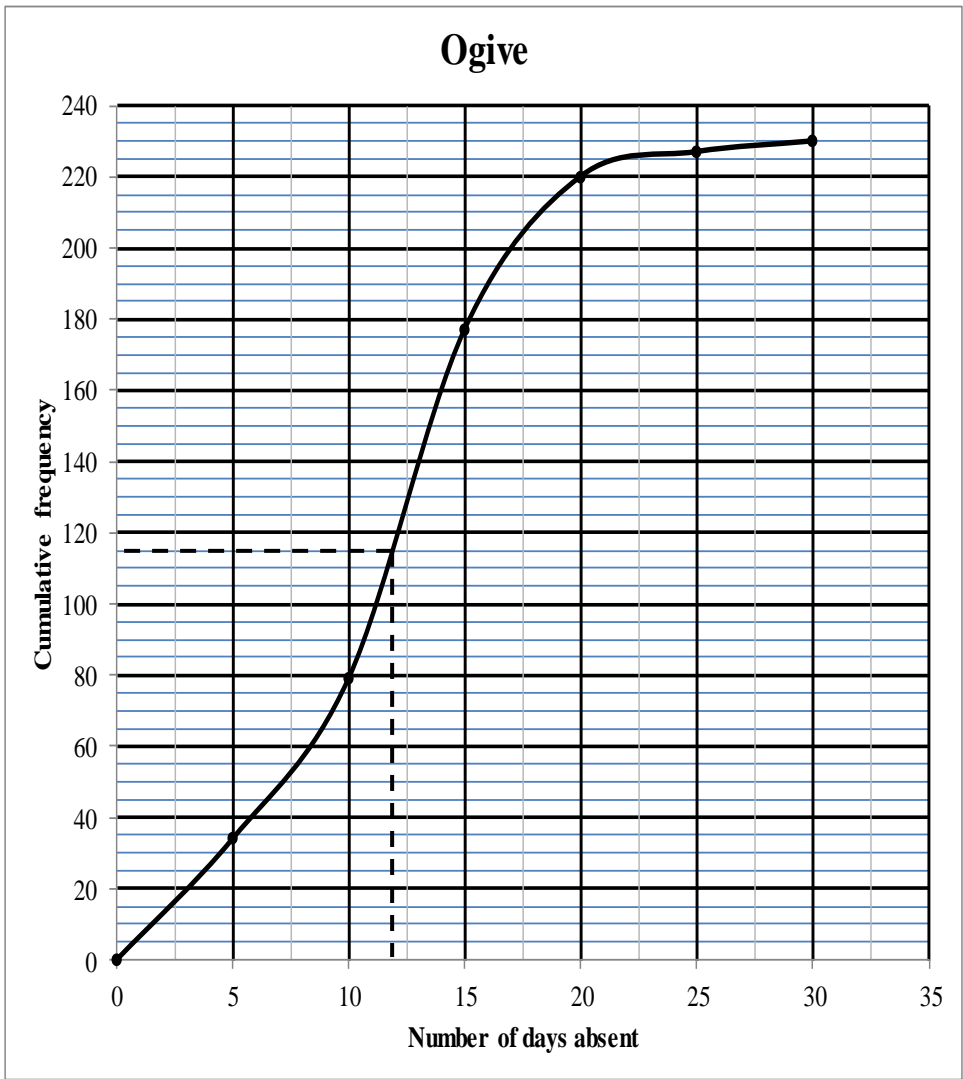
1.2

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

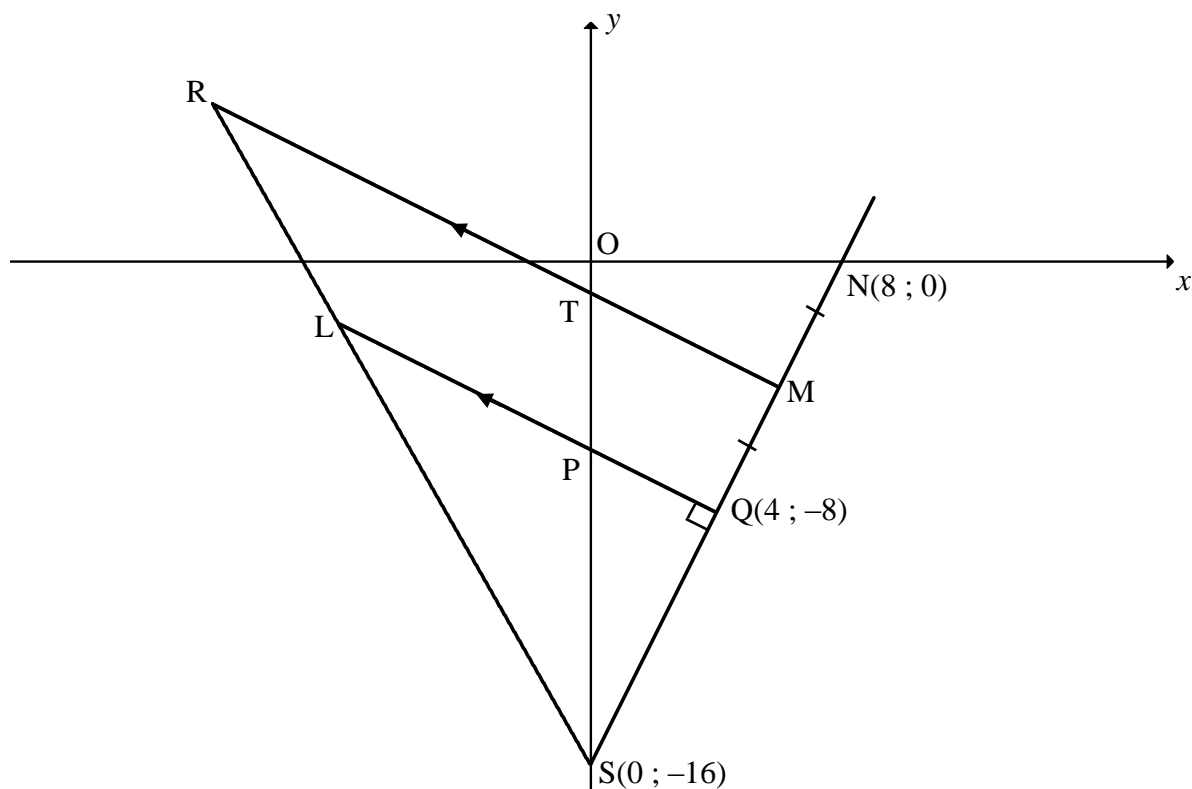
QUESTION/VRAAG 2

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	 <p style="text-align: center;">Ogive</p> <p>Cumulative frequency</p> <p>Number of days absent</p>	✓ grounding at (0; 0) ✓ shape ✓ upper limits ✓ All other points correct (4)
2.5	The median is at position 115. <input type="checkbox"/> value of median is 12 days (accept 11 – 14) <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: Full marks</div>	✓ reading off at 115 ✓ answer (2)

[9]

QUESTION/VRAAG 3

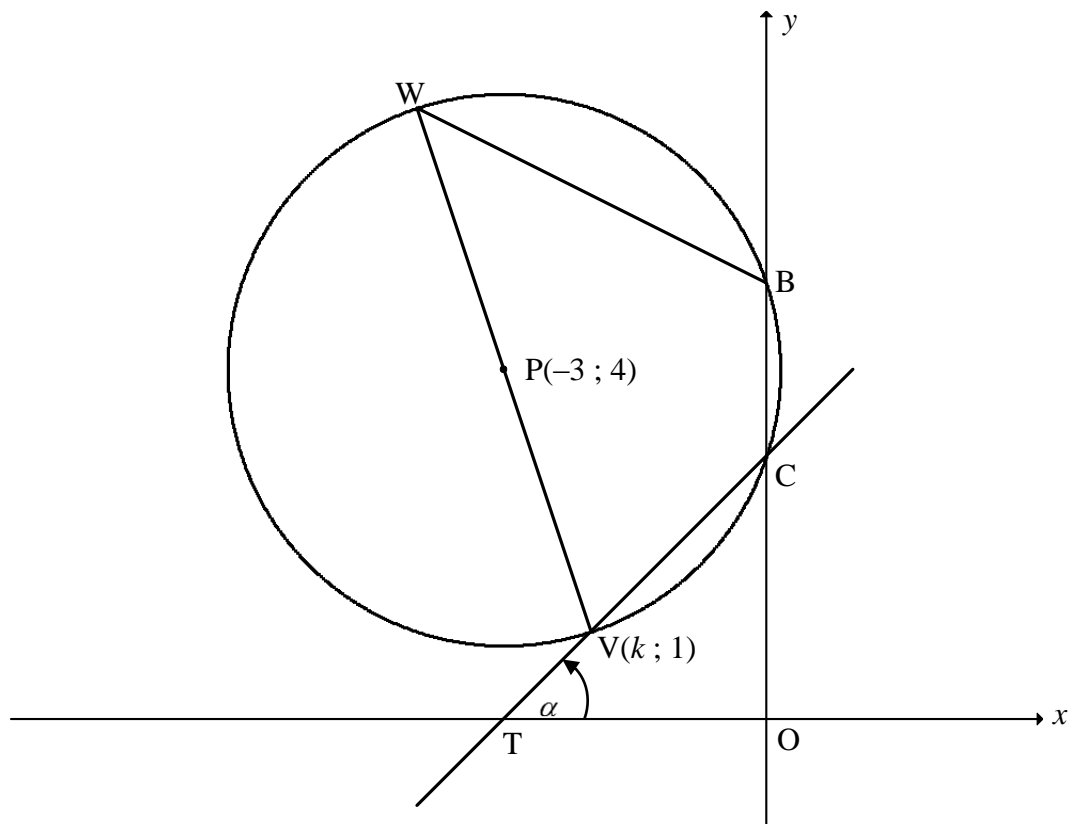


3.1	$M\left(\frac{4+8}{2}; \frac{-8+0}{2}\right)$ $M(6; -4)$	✓ x_M ✓ y_M (2)
3.2	$m_{NS} = \frac{0 - (-16)}{8 - 0} \text{ or } m_{NQ} = \frac{0 - (-8)}{8 - 4} \text{ or } m_{QS} = \frac{-8 - (-16)}{4 - 0}$ $= 2$	✓ subst N and Q or N and Q or Q and S into gradient formula ✓ answer (2)
3.3	$m_{LQ} \times 2 = -1 \quad [LQ \perp NS]$ $\therefore m_{LQ} = -\frac{1}{2}$ $-8 = -\frac{1}{2}(4) + c \quad \text{OR} \quad y + 8 = -\frac{1}{2}(x - 4)$ $c = -6 \quad \quad \quad y + 8 = -\frac{1}{2}x + 2$ $\therefore y = -\frac{1}{2}x - 6$	✓ m_{LQ} ✓ substitution of Q ✓ calculation of c or simplification (3)
3.4	OS is the radius of circle passing through S $(x - 0)^2 + (y - 0)^2 = (16)^2$ $x^2 + y^2 = 256$ <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: Full marks</div>	✓ identifying radius = 16 ✓ Equation of circle (2)

3.5	$m_{RM} = m_{LQ} = -\frac{1}{2} \quad [RM \parallel LQ]$ $-4 = -\frac{1}{2}(6) + c \quad \text{OR} \quad y + 4 = -\frac{1}{2}(x - 6)$ $c = -1 \quad y + 4 = -\frac{1}{2}x + 3$ $\therefore y = -\frac{1}{2}x - 1$ $T(0; -1)$	$\checkmark m_{RM}$ \checkmark substitution of $M(6; -4)$ \checkmark coordinates of T (3)
3.6	$T(0; -1), P(0; -6) \text{ and } S(0; -16)$ $\therefore PS = 10 \text{ units and } TS = 15 \text{ units}$ $\frac{LS}{RS} = \frac{PS}{TS} = \frac{2}{3} \quad [\text{prop theorem; } RM \parallel LP]$ $\text{OR } [\text{line } \parallel \text{ one side of } \Delta / \text{lyn } \parallel \text{ een sy v } \Delta]$ <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;">Answer only: Full marks</div> <p>OR</p> $M(6; -4), Q(4; -8) \text{ and } S(0; -16)$ $MS = \sqrt{180} = 6\sqrt{5} \text{ and } QS = \sqrt{80} = 4\sqrt{5}$ $\frac{LS}{RS} = \frac{QS}{MS} = \frac{2}{3} \quad [\text{prop theorem; } RM \parallel LQ]$ $\text{OR } [\text{line } \parallel \text{ one side of } \Delta / \text{lyn } \parallel \text{ een sy v } \Delta]$ <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;">Answer only: Full marks</div>	$\checkmark PS = 10 \text{ units}$ $\checkmark TS = 15 \text{ units}$ \checkmark answer (3) $\checkmark MS = 6\sqrt{5} \text{ units}$ $\checkmark QS = 4\sqrt{5} \text{ units}$ \checkmark answer (3)
3.7	$\text{area of PTMQ} = \text{area of } \Delta TSM - \text{area of } \Delta PSQ$ $= \frac{1}{2} ST \cdot \perp h_M - \frac{1}{2} PS \cdot \perp h_Q$ $= \frac{1}{2} (15)(6) - \frac{1}{2} (10)(4)$ $= 45 - 20$ $= 25 \text{ square units}$ <p>OR</p> $TM = \sqrt{45} = 3\sqrt{5} = 6,71$ $MQ = \sqrt{20} = 2\sqrt{5} = 4,47$ $PQ = \sqrt{20} = 2\sqrt{5} = 4,47$ $\text{area of trapezium PTMQ} = \frac{1}{2} (3\sqrt{5} + 2\sqrt{5})(2\sqrt{5})$ $= \frac{1}{2} (5\sqrt{5})(2\sqrt{5})$ $= 25 \text{ square units}$	$\checkmark \text{ area of } \Delta TSM - \text{area of } \Delta PSQ$ $\checkmark \text{ area } \Delta TSM = 45$ $\checkmark \text{ area } \Delta PSQ = 20$ \checkmark answer (4) $\checkmark TM = 3\sqrt{5}$ $MQ = 2\sqrt{5}$ $PQ = 2\sqrt{5}$ $\checkmark \text{ area of trapezium} = \frac{1}{2}$ $(\text{sum of } \parallel \text{sides})(\text{height})$ \checkmark substitute into formula \checkmark answer (4)

	<p>OR</p> <p>$MQ = \sqrt{20} = 2\sqrt{5}$</p> <p>$PQ = \sqrt{20} = 2\sqrt{5}$</p> <p>$TP = 5$</p> <p>area of PTMQ = area of $\triangle MTP$ + area of $\triangle PQM$</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $\text{area of PTMQ} = \frac{1}{2} TP \times \perp h_M + \frac{1}{2} MQ \times PQ$ </div> <p>area of PTMQ = $\frac{1}{2}(5) \times 6 + \frac{1}{2}(2\sqrt{5})(2\sqrt{5})$</p> <p>area of PTMQ = $10 + 15 = 25$</p>	<p>✓ area of $\triangle MTP$ + area of $\triangle PQM$</p> <p>✓ area $\triangle MTP = 10$</p> <p>✓ area $\triangle PQM = 15$</p> <p>✓ answer</p> <p>(4)</p>
		[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	$m_{TC} = \frac{3-1}{0-(-2)}$ $= 1$ $\tan \alpha = 1$ $\therefore \alpha = 45^\circ$ <p>OR</p> $y = mx + 3$ $1 = m(-2) + 3$ $m_{TC} = 1$ $\tan \alpha = 1$ $\therefore \alpha = 45^\circ$	<p>✓ substitution into gradient formula</p> <p>✓ $\tan \alpha = 1$</p> <p>✓ answer</p> <p>(3)</p> <p>✓ substitution into equation of a line</p> <p>✓ $\tan \alpha = 1$</p> <p>✓ answer</p> <p>(3)</p>
4.3.2	$\hat{BCV} = 135^\circ$ [ext \angle of Δ /buite \angle v Δ] $\therefore \hat{VWB} = 45^\circ$ [opp \angle s of cyclic quad/teenoorst. \angle e v kvh] <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;">Answer only: Full marks</div> <p>OR</p> $\hat{TCO} = 45^\circ$ [\angle s of Δ / \angle e v Δ] $\therefore \hat{VWB} = 45^\circ$ [ext \angle s of cyclic quad/buite \angle v kvh] <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;">Answer only: Full marks</div>	<p>✓ $\hat{BCV} = 135^\circ$</p> <p>✓ answer</p> <p>(2)</p> <p>✓ $\hat{TCO} = 45^\circ$</p> <p>✓ answer</p> <p>(2)</p>
4.4.1	$Q(-3; -2)$	<p>✓ x_Q ✓ y_Q</p> <p>(2)</p>
4.4.2	$(x+3)^2 + (y+2)^2 = 10$	<p>✓ LHS ✓ RHS</p> <p>(2)</p>
4.4.3	$x = -2$ or $x = -4$	<p>✓ $x = -2$ ✓ $x = -4$</p> <p>(2)</p>
		[20]

QUESTION/VRAAG 5

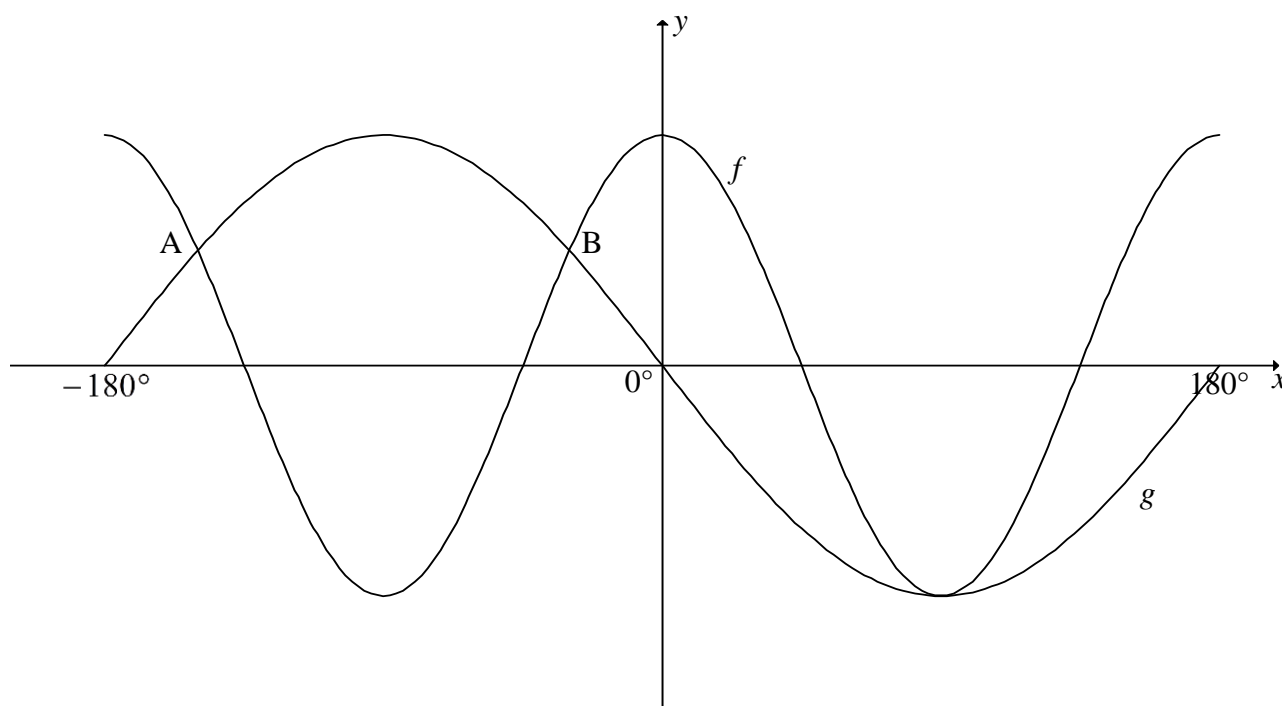
5.1	$\tan(-x) \cdot \cos x \cdot \sin(x - 180^\circ) - 1$ $= -\tan x \cdot \cos x \cdot \sin(-(180^\circ - x)) - 1$ $= \frac{-\sin x}{\cos x} \cdot \cos x \cdot (-\sin x) - 1$ $= \sin^2 x - 1$ $= -\cos^2 x$	$\checkmark -\tan x$ $\checkmark -\sin x \quad \checkmark \frac{-\sin x}{\cos x}$ $\checkmark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

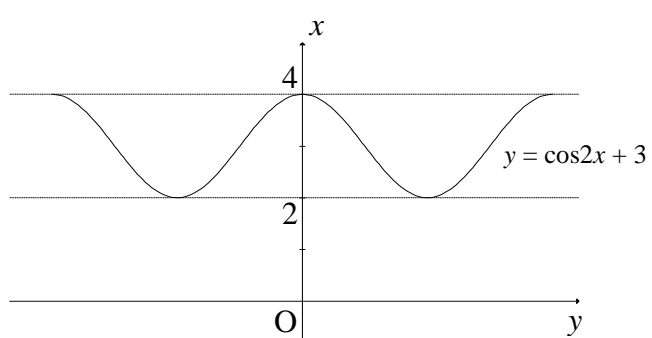
5.4	$\text{RHS} = \cos^2 x - \sin^2 x$ $\text{LHS} = \frac{\sin 4x \cdot \cos 2x - 2 \cos 4x \cdot \sin x \cdot \cos x}{\tan 2x}$ $= \frac{\sin 4x \cdot \cos 2x - \cos 4x \cdot \sin 2x}{\frac{\sin 2x}{\cos 2x}}$ $= \sin(4x - 2x) \left(\frac{\cos 2x}{\sin 2x} \right)$ $= \cos 2x$ $= \cos^2 x - \sin^2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

QUESTION/VRAAG 6

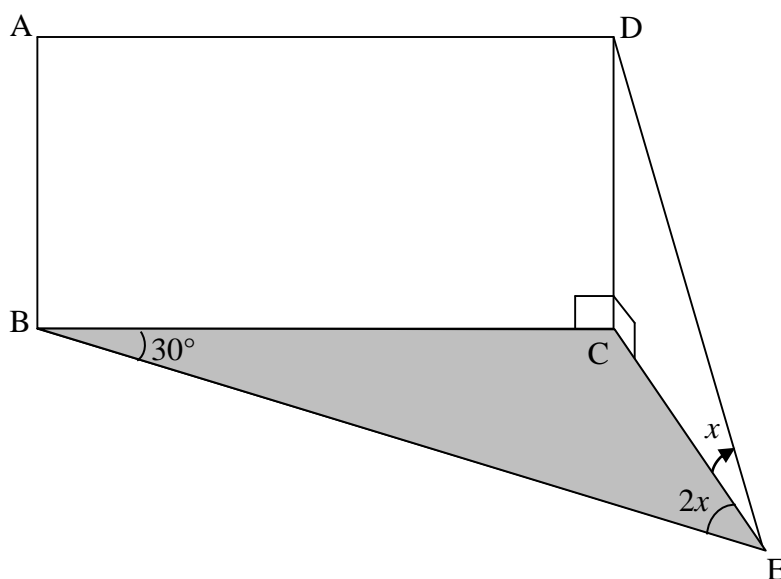
<p>6.1</p>	<p> $1 - 2\sin^2 x = -\sin x$ $2\sin^2 x - \sin x - 1 = 0$ $(2\sin x + 1)(\sin x - 1) = 0$ $\sin x = -\frac{1}{2}$ or $\sin x = 1$ ref $\angle = 30^\circ$ ref $\angle = 90^\circ$ $x = 210^\circ + k.360^\circ$ $x = 90^\circ + k.360^\circ$ or $x = 330^\circ + k.360^\circ$ $x = -150^\circ$ or $x = -30^\circ$ or $x = 90^\circ$ OR $\cos 2x = -\sin x$ $\cos 2x = -\cos(90^\circ - x)$ $2x = 180^\circ - (90^\circ - x) + k.360^\circ$ or $2x = 180^\circ + (90^\circ - x) + k.360^\circ$ $2x = 90^\circ + x + k.360^\circ$ or $2x = 270^\circ - x + k.360^\circ$ $x = 90^\circ + k.360^\circ$ $x = 90^\circ + k.120^\circ$ $x = -150^\circ$ or $x = -30^\circ$ or $x = 90^\circ$ OR $\cos 2x = -\sin x$ $\cos 2x = \cos(90^\circ + x)$ $2x = 90^\circ + x + k.360^\circ$ or $2x = 360^\circ - (90^\circ + x) + k.360^\circ$ $x = 90^\circ + k.360^\circ$ or $3x = 270^\circ + k.360^\circ$ $x = 90^\circ + k.120^\circ$ $x = -150^\circ$ or $x = -30^\circ$ or $x = 90^\circ$ OR $\cos 2x = -\sin x$ $\sin(90^\circ - 2x) = -\sin x$ $90^\circ - 2x = 180^\circ + x + k.360^\circ$ or $90^\circ - 2x = 360^\circ - x + k.360^\circ$ $x = -30^\circ + k.120^\circ$ $x = -270^\circ + k.360^\circ$ $x = -150^\circ$ or $x = -30^\circ$ or $x = 90^\circ$ </p>	<p> ✓ 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 ✓ $90^\circ - 2x$ in quadrant 3 ✓ $90^\circ - 2x$ in quadrant 4 ✓ both general solutions ✓ -150° and -30° ✓ 90° (A) (6) </p>
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6.2



6.2.1	$A(-150^\circ; 0,5)$ $B(-30^\circ; 0,5)$ $AB = -30^\circ - (-150^\circ)$ $AB = 120^\circ$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: Full marks</div>	$\checkmark AB = -30^\circ - (-150^\circ)$ \checkmark answer (2)
6.2.2	$x \in (0^\circ; 90^\circ)$ or $x \in (90^\circ; 180^\circ)$ OR $0^\circ < x < 90^\circ$ or $90^\circ < x < 180^\circ$	$\checkmark x \in (0^\circ; 90^\circ)$ $\checkmark x \in (90^\circ; 180^\circ)$ (2) $\checkmark 0^\circ < x < 90^\circ$ $\checkmark 90^\circ < x < 180^\circ$ (2)
6.2.3	$\cos 2x = k - 3$ $k - 3 < -1$ or $k - 3 > 1$ $k < 2$ or $k > 4$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: Full marks</div> OR  $k < 2$ or $k > 4$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: Full marks</div>	$\checkmark k - 3 < -1$ or $k - 3 > 1$ $\checkmark k < 2$ $\checkmark k > 4$ (3) \checkmark graph of $y = \cos 2x + 3$ $\checkmark k < 2$ $\checkmark k > 4$ (3)
[13]		

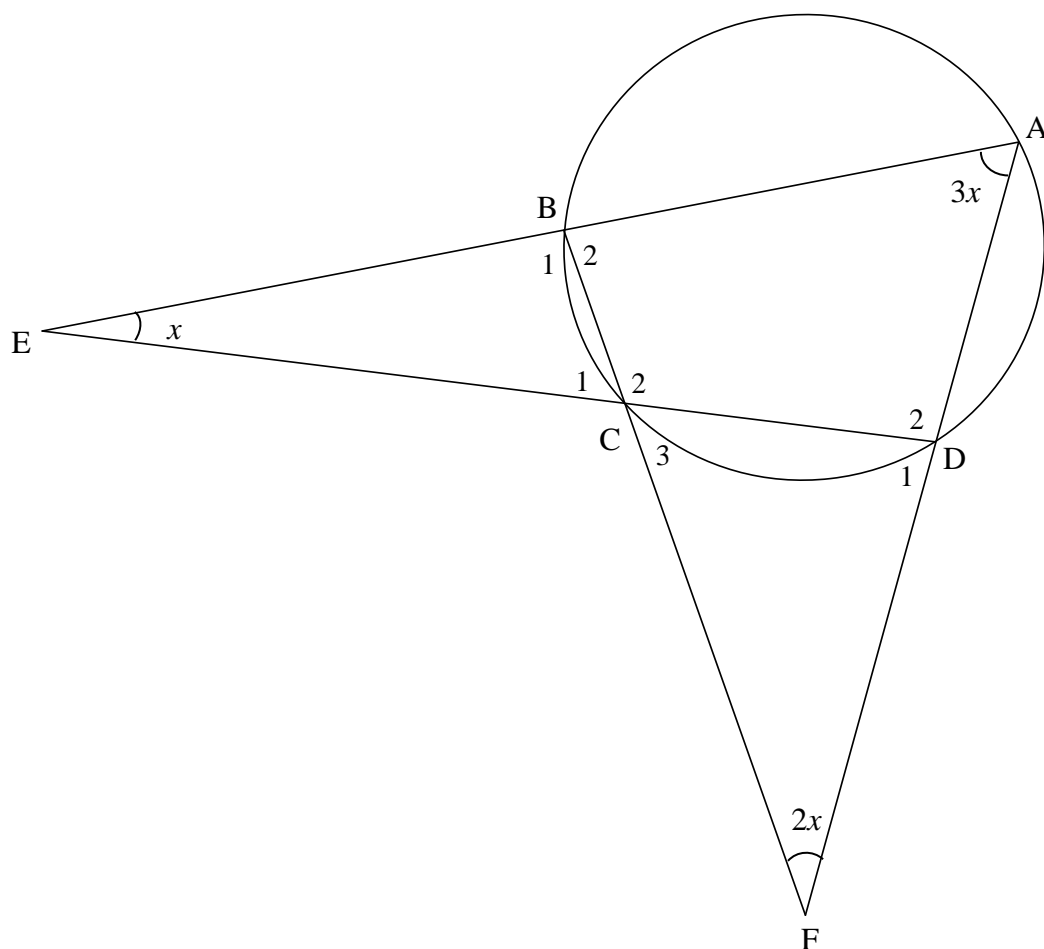
QUESTION/VRAAG 7



7.1	<p>In $\triangle BCE$:</p> $\frac{CE}{\sin \hat{B}} = \frac{BC}{\sin \hat{E}}$ $\frac{CE}{\sin 30^\circ} = \frac{BC}{\sin 2x}$ $CE = \frac{BC \sin 30^\circ}{\sin 2x}$ <p>In $\triangle CDE$:</p> $\frac{DC}{CE} = \tan \hat{E}$ $DC = \frac{BC \cdot \sin 30^\circ}{\sin 2x} (\tan x)$ $DC = \frac{BC}{4 \sin x \cos x} \left(\frac{\sin x}{\cos x} \right)$ $DC = \frac{BC}{4 \cos^2 x}$	<p>✓ correct use of sine rule</p> <p>✓ $CE = \frac{BC \sin 30^\circ}{\sin 2x}$</p> <p>✓ correct trig ratio</p> <p>✓ Subst CE</p> <p>✓ $2 \sin x \cos x$ ✓ $\frac{\sin x}{\cos x}$</p> <p>(6)</p>
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7.2	$DC = \frac{BC}{4 \cos^2 30^\circ}$ $= \frac{BC}{4 \left(\frac{\sqrt{3}}{2} \right)^2}$ $= \frac{BC}{3}$ $\therefore BC = 3DC$ <p>But $AB = DC$ [opp sides of rectangle/<i>teenoorst. sye v reghoek</i>]</p> $\therefore BC = 3AB$ <p>Area of rectangle = $(AB)(BC)$ $= (AB)(3AB)$ $= 3AB^2$</p>	$\checkmark DC = \frac{BC}{3}$ $\checkmark BC = 3AB$ $\checkmark \text{ substitution into area formula}$ <p style="text-align: right;">(3)</p>
[9]		

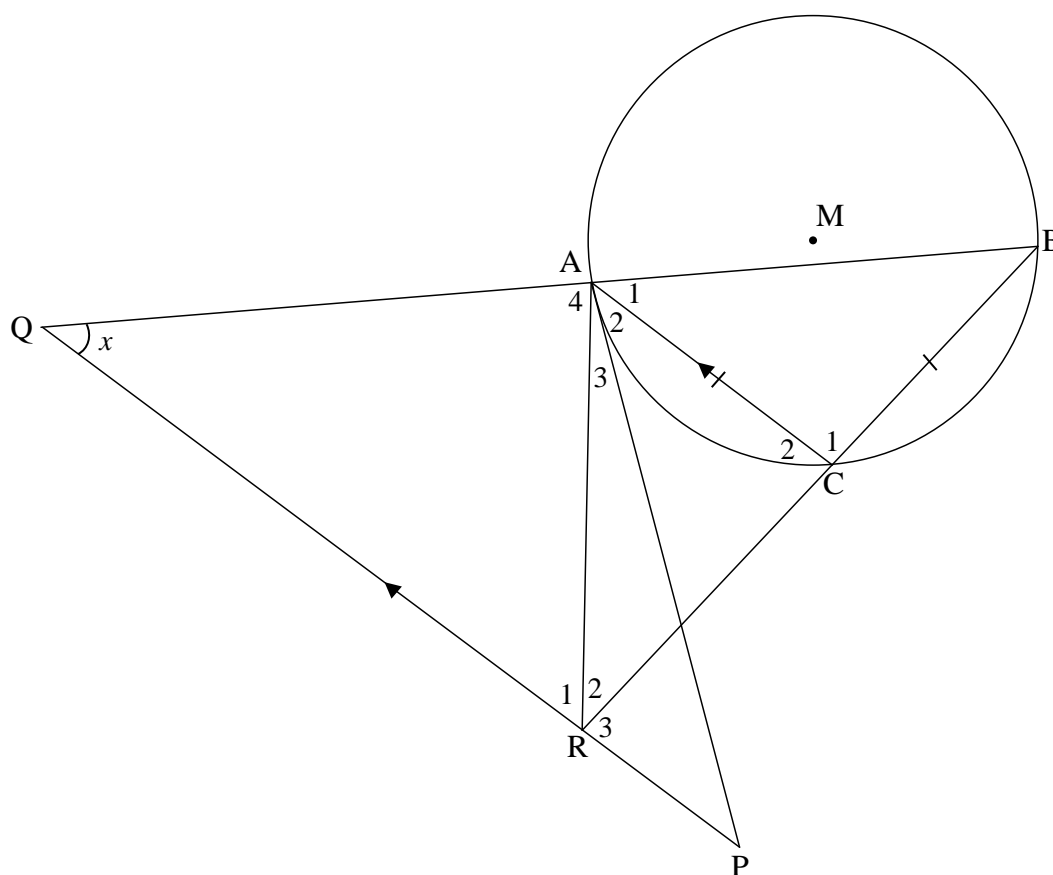
8.2



8.2	$\hat{D}_1 = 4x$ $\hat{D}_2 = 180^\circ - 4x$ $\hat{B}_1 = 5x$ $\hat{B}_1 = \hat{D}_2$ $180^\circ - 4x = 5x$ $9x = 180^\circ$ $x = 20^\circ$ OR $\hat{C}_1 = 3x$ $\hat{B}_2 = 4x$ $\hat{C}_1 = \hat{C}_3 = 3x$ $\hat{D}_2 = 5x$ $4x + 5x = 180^\circ$ $x = 20^\circ$	[ext \angle of Δ /buite \angle v Δ] [\angle s on a str line/ \angle e op 'n reguitlyn] [ext \angle of Δ /buite \angle v Δ] [ext \angle of cyclic quad/buite \angle v kvh] [ext \angle of cyclic quad/buite \angle v kvh] [ext \angle of Δ /buite \angle v Δ] [vert opp \angle s] [ext \angle of Δ /buite \angle v Δ] [opp \angle of cyclic quad/teenoorst. \angle e v kvh]	✓ S/R ✓ S ✓ S ✓ S ✓ R ✓ answer (6) ✓ S ✓ R ✓ S ✓ S ✓ S/R ✓ answer (6)
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	<p>OR</p> <p>$\hat{C}_3 = 3x$ [ext \angle of cyclic quad/<i>buite</i> \angle v <i>kvh</i>]</p> <p>$\hat{D}_1 = 4x$ [ext \angle of Δ/<i>buite</i> \angle v Δ]</p> <p>$2x + 3x + 4x = 180^\circ$ [sum of \angles in Δ/<i>le</i> v Δ]</p> <p>$9x = 180^\circ$</p> <p>$x = 20^\circ$</p>	<p>✓ S ✓R</p> <p>✓ S</p> <p>✓ S ✓R</p> <p>✓ answer</p> <p>(6)</p>
[16]		

9.2



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

	<p>OR</p> <p>In $\triangle ABC$ and $\triangle BQR$:</p> $\hat{A}_1 = \hat{B} = x \quad [\text{proved in 9.2.1}]$ $\hat{B} = \hat{Q} = x \quad [\text{proved in 9.2.1}]$ $\hat{C}_1 = \hat{B}RQ = 180^\circ - 2x \quad [\text{sum of } \angle\text{s of } \triangle]$ $\therefore \triangle ABC \parallel \triangle BQR$ $\therefore \frac{BA}{BQ} = \frac{BC}{QR}$ <p>OR</p> <p>In $\triangle ABC$ and $\triangle BQR$:</p> $\hat{A}_1 = \hat{B} = x \quad [\text{proved in 9.2.1}]$ $\hat{B} = \hat{Q} = x \quad [\text{proved in 9.2.1}]$ $\hat{C}_1 = \hat{B}RQ = 180^\circ - 2x \quad [\text{sum of } \angle\text{s of } \triangle]$ $\therefore \triangle ABC \parallel \triangle BQR \quad [\angle\angle\angle]$ $\therefore \frac{BA}{BQ} = \frac{BC}{QR}$ <p>OR</p> <p>In $\triangle ABC$ and $\triangle QBR$:</p> <p>\hat{B} is common</p> $\hat{A}_1 = \hat{Q} = x \quad [\text{corres } \angle\text{s}; PQ \parallel CA]$ $\hat{C}_1 = \hat{B}RQ = 180^\circ - 2x \quad [\text{sum of } \angle\text{s of } \triangle]$ $\therefore \triangle ABC \parallel \triangle QBR \quad [\angle\angle\angle]$ <p>But $QR = BR$ [sides opp = \angles/sye teenoor = \anglee]</p> $\therefore \frac{BA}{BQ} = \frac{BC}{QR}$	<p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p>(3)</p> <p>✓ S</p> <p>✓ S</p> <p>✓ R</p> <p>(3)</p> <p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p>(3)</p>
[17]		

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

TOTAL/TOTAAL: 150