

**NUMBERS
BEYOND
MEASURE**



MATHEMATICS

GRADE 12

2026

REVISION GUIDE

SOLUTIONS

PAPER 1 AND PAPER 2

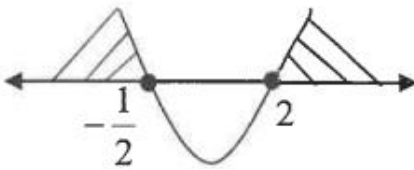
Contents

ALGEBRA, EQUATIONS AND INEQUALITIES.....	3
NUMBER PATTERNS	14
FUNCTIONS AND GRAPHS	18
FINANCE, GROWTH AND DECAY	26
PROBABILITY	28
STATISTICS	32
ANALYTICAL GEOMETRY	37
TRIGONOMETRY	44
MEASUREMENT	53
EUCLIDEAN GEOMETRY	55

ALGEBRA, EQUATIONS AND INEQUALITIES

PAPER A

QUESTION/VRAAG 1

1.1.1	$x(2x+1) = 0$ $x = 0 \quad \text{or/of} \quad x = -\frac{1}{2}$
1.1.2	$5x^2 + 2x - 6 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(2) \pm \sqrt{(2)^2 - 4(5)(-6)}}{2(5)}$ $= \frac{5 \pm \sqrt{124}}{10}$ $x = 0,91 \quad \text{or/of} \quad x = -1,31$
1.1.3	$2x^2 - 2 \geq 3x$ $2x^2 - 3x - 2 \geq 0$ $(2x+1)(x-2) \geq 0$  $x \leq -\frac{1}{2} \quad \text{or/of} \quad x \geq 2$

1.1.4	$\sqrt{2x+5} - \frac{3}{\sqrt{2x+5}} = -2$ $\text{Let } \sqrt{2x+5} = k$ $k - \frac{3}{k} = -2$ $k^2 - 3 = -2k$ $k^2 + 2k - 3 = 0$ $(k+3)(k-1) = 0$ $k = -3 \text{ or/of } k = 1$ $\sqrt{2x+5} = -3$ <i>no solution</i> or/of $\sqrt{2x+5} = 1$ $2x+5 = 1$ $2x = -4$ $x = -2$
1.2	$y + x = 2 \quad \text{and/en} \quad x^2 + 3xy + 8 = 0$ $\therefore y = 2 - x$ $x^2 + 3x(2-x) + 8 = 0$ $x^2 + 6x - 3x^2 + 8 = 0$ $-2x^2 + 6x + 8 = 0$ $x^2 - 3x - 4 = 0$ $(x-4)(x+1) = 0$ $x = 4 \text{ or } x = -1$ $y = 2 - 4 \quad \text{or / of} \quad y = 2 - (-1)$ $y = -2 \quad \quad \quad y = 3$
1.3	$x = \frac{4 \pm \sqrt{16 - 4m(-m+5)}}{2m}$ For non - real roots/Vir nie - reële wortels: $16 - 4m(-m+5) < 0$ $16 + 4m^2 - 20m < 0$ $m^2 - 5m + 4 < 0$ $(m-4)(m-1) < 0$ $1 < m < 4$

1.4

$$\begin{aligned}
 & -x^2 + 4x + 12 \\
 & = -1(x^2 - 4x - 12) \\
 & = -1(x^2 - 4x + 4 - 4 - 12) \\
 & = -1(x - 2)^2 + 16
 \end{aligned}$$

The maximum value of/Die maksimum waarde van $-x^2 + 4x + 12$ is 16

∴ max value of $\sqrt{-x^2 + 4x + 12}$ is 4

OR/OF

$$\begin{aligned}
 & \sqrt{-x^2 + 4x + 12} \\
 \text{max when } x &= \frac{-b}{2a} \\
 &= \frac{-4}{2(-1)} \\
 &= 2
 \end{aligned}$$

$$\begin{aligned}
 \text{max value } y &= -(2)^2 + 4(2) + 12 \\
 &= 16
 \end{aligned}$$

The maximum value of/Die maksimum waarde van $-x^2 + 4x + 12$ is 16

∴ max value of $\sqrt{-x^2 + 4x + 12}$ is 4

QUESTION/VRAAG 2

2.1

$$\begin{aligned}
 & \frac{2^{x-3} - 3 \cdot 2^{x+1}}{2^{x-2}} \\
 &= \frac{2^x \cdot 2^{-3} - 3 \cdot 2^x \cdot 2^1}{2^x \cdot 2^{-2}} \\
 &= \frac{2^x(2^{-3} - 3 \cdot 2)}{2^x \cdot 2^{-2}} \\
 &= \frac{1}{8} - 6 \\
 &= \frac{1}{4} \\
 &= -\frac{47}{2}
 \end{aligned}$$

2.2.1

$$16x^{-\frac{3}{2}} = 2$$

$$x^{-\frac{3}{2}} = \frac{1}{8}$$

$$\left(x^{-\frac{3}{2}}\right)^{-\frac{2}{3}} = \left(2^{-3}\right)^{-\frac{2}{3}}$$

$$x = 4$$

OR/OF

$$2 - 16x^{-\frac{3}{2}} = 0$$

$$2 = 2^4 \cdot x^{-\frac{3}{2}}$$

$$2^{-3} = x^{-\frac{3}{2}}$$

$$x = 2^{-3 \times -\frac{2}{3}}$$

$$x = 4$$

2.2.2

$$4^x + 8 = 9 \cdot 2^x$$

$$(2^2)^x - 9 \cdot 2^x + 8 = 0$$

$$2^{2x} - 9 \cdot 2^x + 8 = 0$$

$$(2^x - 8)(2^x - 1) = 0$$

$$2^x = 8 \quad \text{or} \quad 2^x = 1$$

$$2^x = 2^3 \quad 2^x = 2^0$$

$$x = 3 \quad x = 0$$

OR/OF

$$4^x + 8 = 9 \cdot 2^x$$

$$(2^2)^x - 9 \cdot 2^x + 8 = 0$$

$$2^{2x} - 9 \cdot 2^x + 8 = 0$$

$$\text{Let } 2^x = k$$

$$k^2 - 9 \cdot k + 8 = 0$$

$$(k - 8)(k - 1) = 0$$

$$k = 8 \quad \text{or} \quad k = 1$$

$$2^x = 8 \quad 2^x = 2^0$$

$$2^x = 2^3 \quad x = 0$$

$$x = 3$$

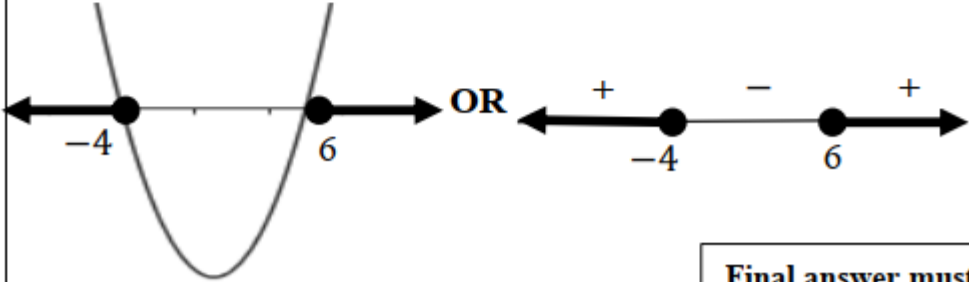
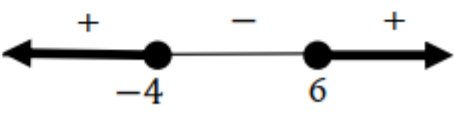
2.2.3	$\sqrt[5]{9} = 243$ $3^{\frac{2}{x}} = 3^5$ $\frac{2}{x} = 5 \quad \text{OR/ OF}$ $x = \frac{2}{5}$ $\left(\sqrt[5]{3^2}\right)^x = (3^5)^x$ $3^2 = 3^{5x}$ $2 = 5x$ $x = \frac{2}{5}$
2.3	$\frac{\sqrt{p^2 - q^2} \times (p+q)^{\frac{5}{2}}}{(p-q)^{\frac{1}{2}}}$ $= \frac{\sqrt{(p-q)(p+q)} \times (p+q)^{\frac{5}{2}}}{(p-q)^{\frac{1}{2}}}$ $= \frac{\cancel{(p-q)}^{\frac{1}{2}} (p+q)^{\frac{1}{2}} \times (p+q)^{\frac{5}{2}}}{\cancel{(p-q)}^{\frac{1}{2}}}$ $= (p+q)^{\frac{1}{2} + \frac{5}{2}}$ $= (p+q)^3$

	OR/OF $\frac{\sqrt{p^2 - q^2} \times (p+q)^{\frac{5}{2}}}{(p-q)^{\frac{1}{2}}}$ $= \sqrt{\frac{(p-q)(p+q)(p+q)^5}{(p-q)}}$ $= \sqrt{(p+q)^6}$ $= (p+q)^3$
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PAPER B

QUESTION 1

1.1.1	$4x^2 - 9 = 0$ $(2x+3)(2x-3) = 0$ $x = -\frac{3}{2} \quad \text{or} \quad x = \frac{3}{2}$ OR $4x^2 - 9 = 0$ $\sqrt{x^2} = \pm \sqrt{\frac{9}{4}}$ $x = -\frac{3}{2} \quad \text{or} \quad x = \frac{3}{2}$	Accept subst. to quadratic formula
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1.1.2	$-2x^2 + 6x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(6) \pm \sqrt{(6)^2 - 4(-2)(-3)}}{2(-2)} \quad \text{OR} \quad x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(3)}}{2(2)}$ $x = 2,37 \quad \text{or} \quad x = 0,63$ Penalise 1 mark for incorrect rounding
1.1.3	$x - 3 = \frac{2x^2 + x - 6}{x + 2}$ $(x - 3)(x + 2) = 2x^2 + x - 6$ $x^2 - x - 6 = 2x^2 + x - 6$ $2x^2 + 2x = 0$ $x(x + 2) = 0$ $x = 0 \quad \text{or} \quad x = -2$
1.1.4	$(x - 5)(x + 3) \geq 9$ $x^2 - 2x - 15 - 9 \geq 0$ $x^2 - 2x - 24 \geq 0$ $(x - 6)(x + 4) \geq 0$ CVs: $x = -4$ or $x = 6$  OR  Final answer must be given 2 or 0. $x \leq -4 \quad \text{or} \quad x \geq 6$ OR $x \in (-\infty; -4] \cup [6; \infty)$

1.2.1	$\frac{1}{2^y} = 4^{1-x}$ $2^{-y} = 2^{2(1-x)}$ $2^{-y} = 2^{2-2x}$ $-y = 2 - 2x$ $\therefore y = 2x - 2$ 1.2.1 is a proof, all marks are accuracy.
1.2.2	$x + 6 = x^2 - y$ $x + 6 = x^2 - (2x - 2)$ $x^2 - 3x - 4 = 0$ $(x - 4)(x + 1) = 0$ $x = 4 \text{ or } x = -1$ $y = 2(4) - 2 \text{ or } y = 2(-1) - 2$ $y = 6 \text{ or } y = -4$ OR $x + 6 = x^2 - y$ $y = x^2 - x - 6$ $(2x - 2) = x^2 - x - 6$ $x^2 - 3x - 4 = 0$ $(x - 4)(x + 1) = 0$ $x = 4 \text{ or } x = -1$ $y = 2(4) - 2 \text{ or } y = 2(-1) - 2$ $y = 6 \text{ or } y = -4$

1.3	$\Delta = 2 - (-2) = 4$ & $\Delta = 2 - (-7) = 9$ $k = -2$ or $k = -7$
1.4	$2a = 6$ $a = 3$ $b^2 - 4ac = 72$ $b^2 - 4(3)(b + 18) = 72$ $b^2 - 12b - 216 = 72$ $b^2 - 12b - 288 = 0$ $(b - 24)(b + 12) = 0$ $b \neq 24$ or $b = -12$ $c = -12 + 18$ $c = 6$

QUESTION 2

2.1.1	$2x \cdot (27x^3)^{\frac{2}{3}} \cdot \left(\frac{2x}{27x^3}\right)^0$ $= 2x \cdot (3^3 x^3)^{\frac{2}{3}} \times 1$ $= 2x \cdot (3x)^{3 \times \frac{2}{3}}$ $= 2x(3x)^2$ $= 2x(3^2 x^2)$ $= 18x^3$
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2.1.2	$\frac{(6-2\sqrt{3})^2}{\sqrt{3}}$ $= \frac{36 - 24\sqrt{3} + 12}{\sqrt{3}}$ $= \frac{48 - 24\sqrt{3}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ $= \frac{48\sqrt{3} - 24 \times 3}{3}$ $= \frac{3(16\sqrt{3} - 24)}{3}$ $= 16\sqrt{3} - 24$
2.2.1	$\frac{2^{m+4} - 4 \cdot 2^{m+1}}{5 \cdot 2^{m+3}}$ $= \frac{2^m \cdot 2^4 - 4 \cdot 2^m \cdot 2^1}{2^m \cdot 5 \cdot 2^3} \quad \text{OR} \quad = \frac{2^m \cdot 2^4 - 2^2 \cdot 2^m \cdot 2^1}{2^m \cdot 5 \cdot 2^3}$ $= \frac{2^m (2^4 - 4 \times 2)}{2^m \cdot 5 \cdot 8} \quad \text{OR} \quad = \frac{2^m \cdot 2^3 (2^1 - 1)}{2^m \cdot 2^3 \cdot 5}$ $= \frac{8}{40} \text{ or } \frac{1}{5} \text{ or } 0,2$ OR

$$\frac{2^{m+4} - 4 \cdot 2^{m+1}}{5 \cdot 2^{m+3}}$$

$$= \frac{2^m (2^4 - 4 \times 2)}{2^m \cdot 5 \cdot 8} \quad \text{OR} \quad = \frac{2^m \cdot 2^3 (2^1 - 1)}{2^m \cdot 2^3 \cdot 5}$$

$$= \frac{8}{40} \quad \text{or} \quad \frac{1}{5} \quad \text{or} \quad 0,2$$

OR

$$\frac{2^{m+4} - 4 \cdot 2^{m+1}}{5 \cdot 2^{m+3}}$$

$$= \frac{2^m \cdot 16 - 8 \cdot 2^m}{5 \cdot 2^m \cdot 8}$$

$$= \frac{2^m \cdot 8}{5 \cdot 2^m \cdot 8}$$

$$= \frac{8}{40} \quad \text{or} \quad \frac{1}{5} \quad \text{or} \quad 0,2$$

OR

$$\frac{2^{m+4} - 4 \cdot 2^{m+1}}{5 \cdot 2^{m+3}}$$

$$= \frac{2^{m+4}}{2^m \cdot 5 \cdot 8} - \frac{4 \cdot 2^{m+1}}{2^m \cdot 5 \cdot 8}$$

$$= \frac{2^{m+4-m}}{40} - \frac{4 \cdot 2^{m+1-m}}{40}$$

$$= \frac{16}{40} - \frac{8}{40}$$

$$= \frac{8}{40} \quad \text{or} \quad \frac{1}{5} \quad \text{or} \quad 0,2$$

2.2.2	$5 = \frac{1}{125^x}$ $5 = \frac{1}{5^{3x}}$ $5 \cdot 5^{3x} = 1$ $5^{1+3x} = 5^0$ $1 + 3x = 0$ $x = -\frac{1}{3}$
2.3	$\sqrt{x^2 - 53} - 2\sqrt{2x - 5} = 0$ $\sqrt{x^2 - 53} = 2\sqrt{2x - 5}$ $(\sqrt{x^2 - 53})^2 = (2\sqrt{2x - 5})^2$ $x^2 - 53 = 4(2x - 5)$ $x^2 - 53 = 8x - 20$ $x^2 - 8x - 33 = 0$ $(x - 11)(x + 3) = 0$ $x = 11 \text{ or } x = -3$

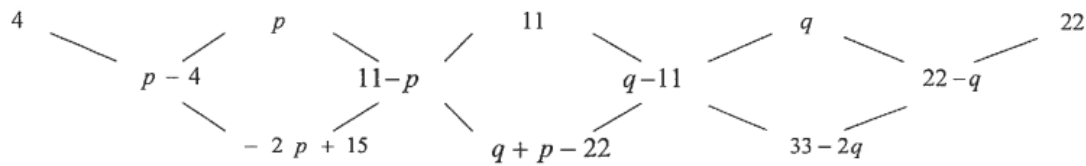
NUMBER PATTERNS

PAPER A

QUESTION/VRAAG 3

3.1.1	$7 \quad \quad \quad 2 \quad \quad \quad -3$ $\quad \quad \quad \diagdown \quad \diagup \quad \diagdown \quad \diagup$ $\quad \quad \quad -5 \quad \quad \quad -5 \quad \quad \quad$ $T_n = an + b$ $= -5n + 12$
3.1.2	$T_{20} = -5(20) + 12$ $= -88$
3.1.3	$-5n + 12 = -138$ $-5n = -150$ $n = 30$ $30^{\text{th}} \text{ term}(T_{30})$
3.2	$6 \quad \quad \quad 2x+1 \quad \quad \quad 3x-3$ $\quad \quad \quad \diagdown \quad \diagup \quad \diagdown \quad \diagup$ $\quad \quad \quad 2x-5 \quad \quad \quad x-4 \quad \quad \quad$ $2x - 5 = x - 4$ $x = 1$

QUESTION/VRAAG 4



4.1

1st difference/1^{ste} verskil:

$$p-4; 11-p; q-11; 22-q$$

2nd difference/2^{de} verskil:

$$-2p+15; q+p-22; 33-2q$$

$$-2p+15=1$$

$$-2p=-14$$

$$p=7$$

$$33-2q=1$$

$$-2q=-32$$

$$q=16$$

$$q+p-22=1$$

$$q+7-22=1$$

$$q=16$$

4.2

$$2a=1$$

$$a=\frac{1}{2}$$

$$3a+b=3$$

$$3\left(\frac{1}{2}\right)+b=3$$

$$b=\frac{3}{2}$$

$$a+b+c=4$$

$$\frac{1}{2}+\frac{3}{2}+c=4$$

$$c=2$$

$$T_n=\frac{1}{2}n^2+\frac{3}{2}n+2$$

4.3	$T_n = 232$ $\frac{1}{2}n^2 + \frac{3}{2}n + 2 = 232$ $\frac{1}{2}n^2 + \frac{3}{2}n - 230 = 0$ $n^2 + 3n - 460 = 0$ $(n+23)(n-20) = 0$ $n \neq -23 \text{ or } n = 20$
4.4	$\frac{1}{2}n^2 + \frac{3}{2}n + 2 + \frac{1}{2}(n+1)^2 + \frac{3}{2}(n+1) + 2 = 1227$ $\frac{1}{2}n^2 + \frac{3}{2}n + 2 + \frac{1}{2}(n^2 + 2n + 1) + \frac{3}{2}n + \frac{3}{2} + 2 = 1227$ $\frac{1}{2}n^2 + \frac{3}{2}n + 2 + \frac{1}{2}n^2 + n + \frac{1}{2} + \frac{3}{2}n + \frac{3}{2} + 2 = 1227$ $n^2 + 4n + 6 = 1227$ $n^2 + 4n - 1221 = 0$ $(n+37)(n-33) = 0$ $n \neq -37 \quad n = 33$ $T_{34} - T_{33} = \frac{1}{2}(34)^2 + \frac{3}{2}(34) + 2 - \left(\frac{1}{2}(33)^2 + \frac{3}{2}(33) + 2 \right)$ $T_{34} - T_{33} = 631 - 596$ $T_{34} - T_{33} = 35$

PAPER B

QUESTION 3

3.1.	14
3.2	$2 ; 6 ; 10 ; 14$ $T_n = 4n - 2$
3.3	$T_{10} = 4(10) - 2 \quad \text{or} \quad T_5 = [2(10) - 1] \times 2$ $T_{10} = 38$ Answer only full marks
3.4	$T_n = 4n - 2$ $710 = 4n - 2$ $4n = 712$ $n = 178$ Answer only full marks OR If n is a decimal, it must be rounded to whole number

3.5	2 ; 6 ; 14 ; 26.....hearts qu 4 ; 8 ; 12.....first difference 4 ; 4 second difference $2a = 4$ $3(2) + b = 4$ $2 - 2 + c = 2$ $a = 2$ $b = -2$ $c = 2$ $T_n = 2n^2 - 2n + 2$ $266 = 2n^2 - 2n + 2$ $2n^2 - 2n + 2 - 266 = 0$ $n^2 - n - 132 = 0$ $(n - 12)(n + 11) = 0$ $n = 12$ or $n = -11$ n must be a positive whole number Only the 12th message.
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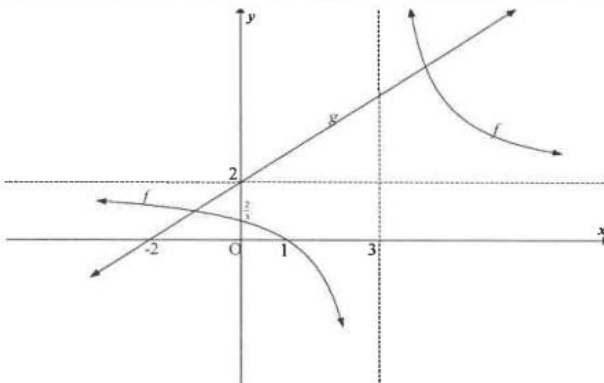
QUESTION 4

4.1.	$-7 ; m ; 5 ; n$ $(m + 7) ; (5 - m) ; (n - 5)$.....first difference $-2m - 2 ; m + n - 10$ second difference $\therefore -2m - 2 = 4$ $\therefore m + n - 10 = 4$ $-2m = 6$ $-3 + n - 10 = 4$ $m = -3$ $n = 17$ 4.1 is a proof, all marks are accuracy.
4.2	4 ; 8 ; 12 $4n = 292$ $n = 73$ $\therefore T_{73}$ and T_{74} in a quadratic sequence
4.3	$T_n = 2n^2 - 2n - 7$ $1005 = 2n^2 - 2n - 7$ $2n^2 - 2n - 1012 = 0$ $n^2 - n - 506 = 0$ $(n - 23)(n + 22) = 0$ $n = 23$ or $n = -22$ $T_{23} = 1005$

FUNCTIONS AND GRAPHS

PAPER A

QUESTION/VRAAG 5

5.1	$x=3$ $y=2$
5.2	$0 = \frac{4}{x-3} + 2$ $-2 = \frac{4}{x-3}$ $-2(x-3) = 4$ $-2x + 6 = 4$ $x = 1$ OR/OF $(1; 0)$
5.3	$y = \frac{4}{0-3} + 2$ $= \frac{2}{3}$ OR/OF $\left(0; \frac{2}{3}\right)$
5.4	

5.5	$\frac{4}{x-3} + 2 = x + 2$ $\frac{4}{x-3} = x + 2 - 2$ $\frac{4}{x-3} = x$ $x(x-3) = 4$ $x^2 - 3x - 4 = 0$ $(x-4)(x+1) = 0$ $x = 4 \text{ or } x = -1$
5.6	$-1 < x < 3$

5.7	$y = x + c$ $2 = (3) + c$ $-1 = c$ $\therefore y = x - 1$ Is an axis of symmetry of/ <i>simmetrie-as van</i> f $Q(\sqrt{4} + 3; \sqrt{4} + 2) = Q(5; 4)$ OR/ OF $x - 1 = \frac{4}{x-3} + 2$ $x - 3 = \frac{4}{x-3}$ $(x-3)^2 = 4$ $x^2 - 6x + 5 = 0$ $(x-5)(x-1) = 0$ $x = 5 \text{ or } x = 1$ $y = 5 - 1 = 4$ $Q(5; 4)$
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QUESTION/VRAAG 6

6.1	$y = -4$
6.2	$D(3;25)$
6.3	$y \leq 25$ <i>or</i> $y \in (-\infty; 25]$
6.4	$f(0) = -(x-3)^2 + 25$ $= -(0-3)^2 + 25$ $= 16 \quad E(0;16)$ $g(0) = 2\left(\frac{1}{2}\right)^{0+1} - 4$ $= -3 \quad B(0;-3)$ $EB = 16 - (-3) = 19 \text{ units/eenhede}$
6.5	$x > 3$ or/ of $x \in (3; \infty)$ Accept/Aanvaar $x \geq 3$ or/of $x \in [3; \infty)$

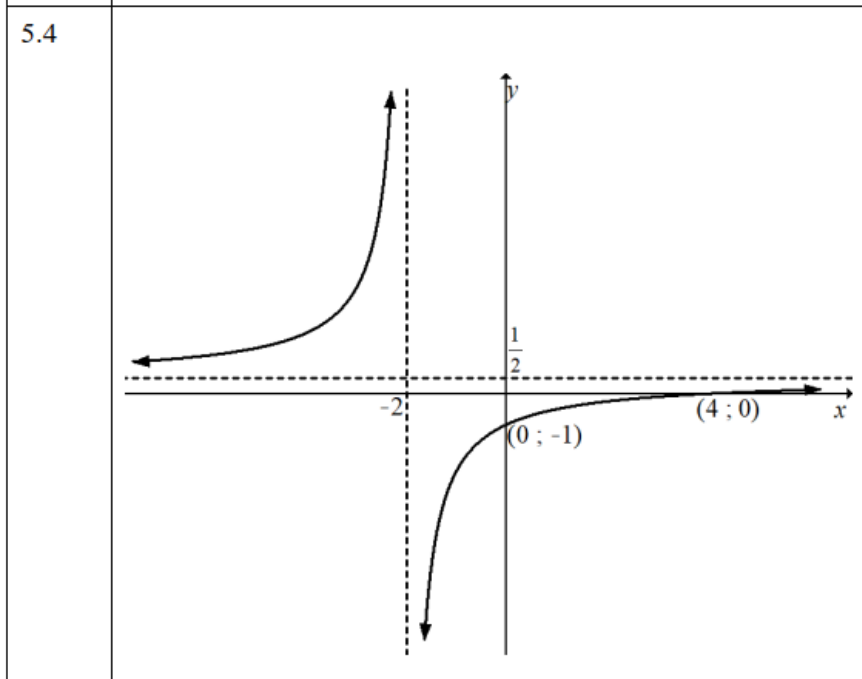
6.6	$0 = 2\left(\frac{1}{2}\right)^{x+1} - 4$ $4 = 2\left(\frac{1}{2}\right)^{x+1}$ $2 = \left(\frac{1}{2}\right)^{x+1}$ $2 = 2^{-x-1}$ $1 = -x - 1$ $x = -2$ $A(-2;0)$ $B(0;-3)$ $\text{Ave gradient/Gemid gradiënt} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-3 - 0}{0 + 2}$ $= -\frac{3}{2}$
6.7	$t(x) = -g(x)$ $= -\left(2\left(\frac{1}{2}\right)^{x+1} - 4\right)$ $= -2\left(\frac{1}{2}\right)^{x+1} + 4$ $\text{Range/Waardeversameling: } y < 4 \text{ or } y \in (-\infty; 4)$
6.8	Turning point/ draaipunt ; (3;27)
6.9	$f(x) = -(x-3)^2 + 25$ $= -x^2 + 6x + 16$ $-x^2 + 6x + 16 = 2x + k$ $-x^2 + 4x + 16 - k = 0$ tangent has one point of intersection thus two equal roots/ raaklyn het een snypunt dus twee gelyke wortels $\Delta = (4)^2 - 4(-1)(16 - k) = 0$ $16 + 64 - 4k = 0$ $80 = 4k$ $k = 20$

PAPER B

QUESTION 5

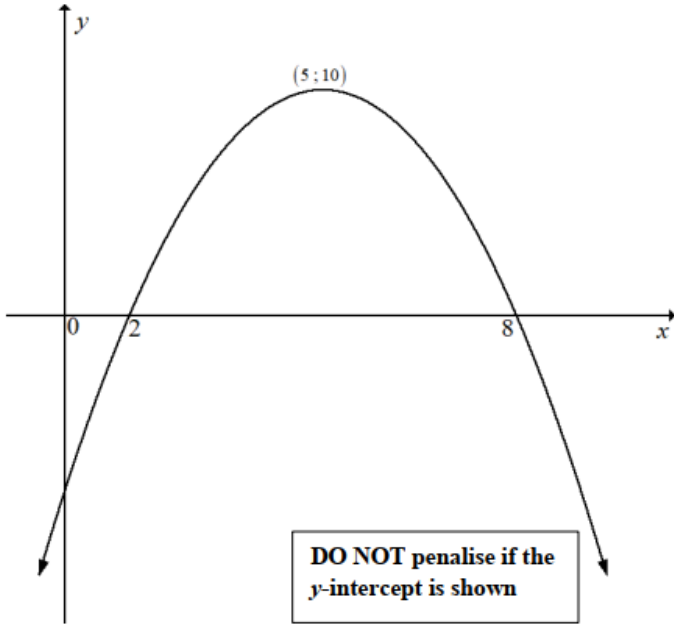
5.1	$f(x) = \frac{-3}{x+2} + \frac{1}{2}$ $f(0) = \frac{-3}{(0)+2} + \frac{1}{2}$ $y = -1$
5.2	$x = -2$ $y = \frac{1}{2}$

5.3	$f(x) = \frac{-3}{x+2} + \frac{1}{2}$ $0 = \frac{-3}{x+2} + \frac{1}{2}$ $-\frac{1}{2} = \frac{-3}{x+2}$ $-x-2 = -6$ $-x = -4$ $x = 4$ Answer only full marks, and ALL marks are accuracy since it is given
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5.5	$y > \frac{1}{2} \text{ or } -1 \leq y \leq 0$ OR $y \in \left(-\infty; \frac{1}{2}\right) \text{ or } y \in [-1; 0]$
5.6	$p(x) = \frac{3}{x-2} + 2$ OR $p(x) = \frac{-3}{-x+2} + 2$

QUESTION 6

6.1	 DO NOT penalise if the y-intercept is shown
6.2.1	$-x^2 + 9 = 0$ $x^2 - 9 = 0$ $(x+3)(x-3) = 0$ $x = -3 \text{ or } x = 3$ $A(-3; 0)$ Answer only full marks OR $-x^2 + 9 = 0$ $x^2 = 9$ $x = \pm 3$ $x = -3 \text{ or } x = 3$ $A(-3; 0)$ Answer only full marks

6.2.2	Other x – intercept in h is $(9 \ 0)$ $y = a(x - x_1)(x - x_2)$ $y = a(x + 3)(x - 9)$ $-\frac{27}{4} = a(0 + 3)(0 - 9)$ OR $-9 = a(3 + 3)(3 - 9)$ $-\frac{27}{4} = a(-27)$ OR $-9 = -36a$ $a = \frac{1}{4}$ $\therefore y = \frac{1}{4}(x + 3)(x - 9)$ $\therefore y = \frac{1}{4}(x^2 - 6x - 27)$ $\therefore y = \frac{1}{4}x^2 - \frac{3}{2}x - \frac{27}{4}$ $a = \frac{1}{4}$ and $b = -\frac{3}{2}$	Since 6.2.2 is a proof, all marks are accuracy.
6.2.3	$C(3 ; -9)$ $y \in \mathbb{R} : y \geq -9$ OR $C(3 ; -9)$ $y \in [-9 ; \infty)$	Answer only full marks Answer only full marks
6.2.4	Reflection about x – axis, and shift of 5 units up OR shift of 5 units down , and reflection about the x – axis	Must be in this order Must be in this order
6.2.5	$\frac{1}{4}x^2 - \frac{3}{2}x - \frac{27}{4} = -x^2 + 9$ $\frac{5}{4}x^2 - \frac{3}{2}x - \frac{63}{4} = 0$ $5x^2 - 6x - 63 = 0$ $(x + 3)(5x - 21) = 0$ $x = -3$ or $x = \frac{21}{5} = 4,2$ $y = 0$ or $y = -\frac{216}{25} = -8,64$ $D(4,2 ; -8,64)$	
6.2.6	$h(-1) = -5$ & $h(7) = -5$ $\therefore k = -5$	Answer only full marks

QUESTION 7

7.1	$h(x) = 2^x + q$ $-7\frac{3}{4} = 2^{-2} + q$ $q = -8$
7.2	$2^x - 8 = 0$ $2^x = 2^3$ $x = 3$ $A(3; 0)$ Answer only full marks
7.3	$f(0) = 2^0 - 8$ $f(0) = -7$ $B(0; -7)$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{0 - (-7)}{3 - 0}$ $m = \frac{7}{3}$
7.4	$0 \leq x < 3$ OR $x \in [0; 3)$
7.5	$7 < k < 8$ OR $k \in (7; 8)$

FINANCE, GROWTH AND DECAY

PAPER A

QUESTION/VRAAG 7

7.1	$1 + i_{eff} = \left(1 + \frac{i_{nom}}{m}\right)^m$ $1 + i_{eff} = \left(1 + \frac{0,115}{12}\right)^{12}$ $i_{eff} = \left(1 + \frac{0,115}{12}\right)^{12} - 1$ $i_{eff} = 12,13\%$
7.2	$A = P(1 - i)^n$ $= 4\,700(1 - 0,18)^4$ $= R\,2\,124,97$
7.3.1	$A = P(1 + i)^n$ $= 20\,000\left(1 + \frac{0,072}{4}\right)^{2 \times 4}$ $= R\,23\,068,12$
7.3.2	$A = P(1 + i)^n$ $= 23\,068,12\left(1 + \frac{0,078}{12}\right)^{2 \times 12}$ $= R\,26\,949,12$ $R\,26\,949,12 - R\,2\,500$ $= R\,24\,449,12$ $A = P(1 + i)^n$ $= 24\,449,12\left(1 + \frac{0,078}{12}\right)^{3 \times 12}$ $= R\,30\,871,61$

PAPER B

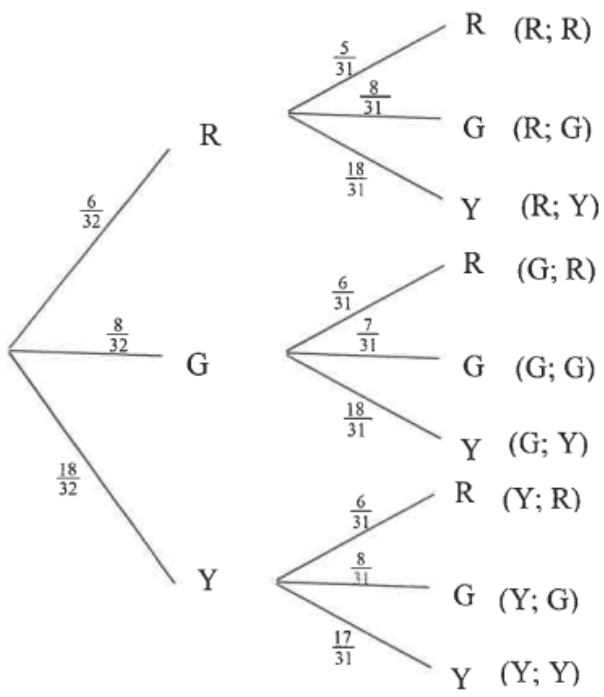
QUESTION 8

8.1.	$A = P(1 + i \cdot n)$ $A = R\ 15\ 000(1 + 0,10 \times 6)$ $A = R\ 24\ 000$ $\text{Interest} = R24\ 000 - R15\ 000$ $= R\ 9\ 000$ OR $\text{Interest} = p \times i \times n$ $= 15\ 000 \times 0,1 \times 6$ $= R\ 9\ 000$
8.2	$A = P(1 - i)^n$ $R277\ 216 = P(1 - 0,0825)^3$ $\frac{455625}{(1 - 0,0825)^3} = P$ $\therefore P = R358\ 922$
8.3	$1 + i_{\text{eff}} = \left(1 + \frac{i_{\text{nom}}}{m}\right)^m$ $1 + 0,12 = \left(1 + \frac{i_{\text{nom}}}{4}\right)^4$ $i_{\text{nom}} = 4 \cdot \left(\sqrt[4]{1,12} - 1\right) \times 100\%$ $r = 11,49\%$
8.4	$A = P(1 + i)^n$ $A = R25\ 0000 \left(1 + \frac{0,0925}{2}\right)^{19}$ $A = R59\ 022$
8.5	$6\ 500 \left(1 + \frac{0,13}{12}\right)^{12 \times 2} \left(1 + \frac{0,105}{4}\right)^{4 \times 3} - x \left(1 + \frac{0,105}{4}\right)^{4 \times 2} = 7\ 428,30$ $x = \frac{6\ 500 \left(1 + \frac{0,13}{12}\right)^{24} \left(1 + \frac{0,105}{4}\right)^{12} - 7\ 428,30}{\left(1 + \frac{0,105}{4}\right)^8}$ $x = R3\ 300$

PROBABILITY

PAPER A

QUESTION/VRAAG 8

8.1	Given/Gegee: $P(G) = 0,25$ Let x be the total number of balls $P(G) = \frac{8}{x} = \frac{1}{4}$ $x = 32$ $n(S) = 32$ OR/OF Let x be the number of yellow balls $\therefore x + 14$ be the total number of balls $P(G) = \frac{8}{x + 14} = \frac{1}{4}$ $x + 14 = 32$ $n(S) = 32$
8.2	
8.3	$P(G, G) + P(R, R) + P(Y, Y)$ $= \left(\frac{8}{32} \times \frac{7}{31} \right) + \left(\frac{6}{32} \times \frac{5}{31} \right) + \left(\frac{18}{32} \times \frac{17}{31} \right)$ $= \frac{49}{124}$

QUESTION/VRAAG 9

9.1	$P(V) \times P(M)$ $\frac{32}{150} \times \frac{67}{150} = 0,095$ $P(V \text{ and/en } M) = \frac{12}{150} = 0,08$ $P(V \text{ and/en } M) \neq P(V) \times P(M)$ The events are not independent/<i>Die gebeurtenisse is nie onafhanklik</i> OR/OF $P(V) \times P(F)$ $\frac{32}{150} \times \frac{83}{150} = 0,118$ $P(V \text{ and } F) = \frac{20}{150} = 0,133$ $P(V \text{ and } F) \neq P(V) \times P(F)$ The events are not independent/<i>Die gebeurtenisse is nie onafhanklik</i>
9.2.1	$P(A \text{ and/en } B) = 0,12 \neq 0$ Events are not mutually exclusive/ <i>Gebeurtenisse nie onderling uitsluitend nie</i>
9.2.2	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $0,83 = P(A) + 4P(A) - 0,12$ $0,95 = 5P(A)$ $P(A) = 0,19$ $P(B) = 4(0,19) = 0,76$
9.2.3	$P(\text{not } A) = 1 - P(A)$ $= 1 - 0,19$ $= 0,81$

PAPER B

QUESTION 9

9.1.1	$P(A \text{ and } C) = 0$
9.1.2	$P(A \text{ or } C) = P(A) + P(C) - P(A \text{ and } C)$ $P(A \text{ or } C) = 0,47 + \frac{3}{7} - 0$ $P(A \text{ or } C) = 0,90$ OR $P(A \text{ or } C) = P(A) + P(C)$ $P(A \text{ or } C) = 0,47 + \frac{3}{7}$ $P(A \text{ or } C) = 0,90$
9.2.1	$P(A \text{ and } B) = P(A) \times P(B)$ $P(A \text{ and } B) = \frac{2}{5} P(B) \times P(B)$ $P(A \text{ and } B) = \frac{2}{5} P(B)^2$
9.2.2	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $0,7 = \frac{2}{5} P(B) + P(B) - \frac{2}{5} P(B)^2$ $0,7 = \frac{7}{5} P(B) - \frac{2}{5} P(B)^2$ $\frac{2}{5} P(B)^2 - \frac{7}{5} P(B) + \frac{7}{10} = 0$ OR $4P(B)^2 - 14P(B) + 7 = 0$ $P(B) = \frac{-\left(-\frac{7}{5}\right) \pm \sqrt{\left(-\frac{7}{5}\right)^2 - 4\left(\frac{2}{5}\right)\left(\frac{7}{10}\right)}}{2\left(\frac{2}{5}\right)}$ $P(B) = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(4)(7)}}{2(4)}$ $P(B) = 0,60 \quad \text{or} \quad P(B) \neq 2,90$

QUESTION 10

10.1.1

Let the number of females who will love to buy Gucci be x

	Gucci	Louis Vuitton	
Males	y	$2x$	45
Females	x	$3y$	85
	$x + y$	$2x + 3y$	130

$$y + 2x = 45 \dots \text{line 1}$$

$$x + 3y = 85 \dots \text{line 2}$$

$$y = 45 - 2x \dots \text{OR} \quad x = 85 - 3y$$

$$x + 3(45 - 2x) = 85 \quad \text{OR} \quad y + 2(85 - 3y) = 45$$

$$x + 135 - 6x = 85 \quad \text{OR} \quad y + 170 - 6y = 45$$

$$-5x = -50 \quad \text{OR} \quad -5y = -125$$

$$x = 10 \quad y = 25$$

$$x = 10$$

x must be a positive whole number

OR

	Gucci	Louis Vuitton	
Males	y	$45 - y$	45
Females	$85 - 3y$	$3y$	85
	$85 - 2y$	$45 + 2y$	130

$$45 - y = 2(85 - 3y)$$

$$45 - y = 170 - 6y$$

$$5y = 125$$

$$y = 25$$

$x = 10$ females who would love Gucci items

10.2

$$P(\text{M and G}) = \frac{25}{130}$$

$$= 0,19$$

$$P(\text{M}) \times P(\text{G}) = \frac{45}{130} \times \frac{35}{130}$$

$$= \frac{63}{675}$$

$$= 0,09$$

$$P(\text{M and G}) \neq P(\text{M}) \times P(\text{G})$$

Both events are NOT independent

STATISTICS

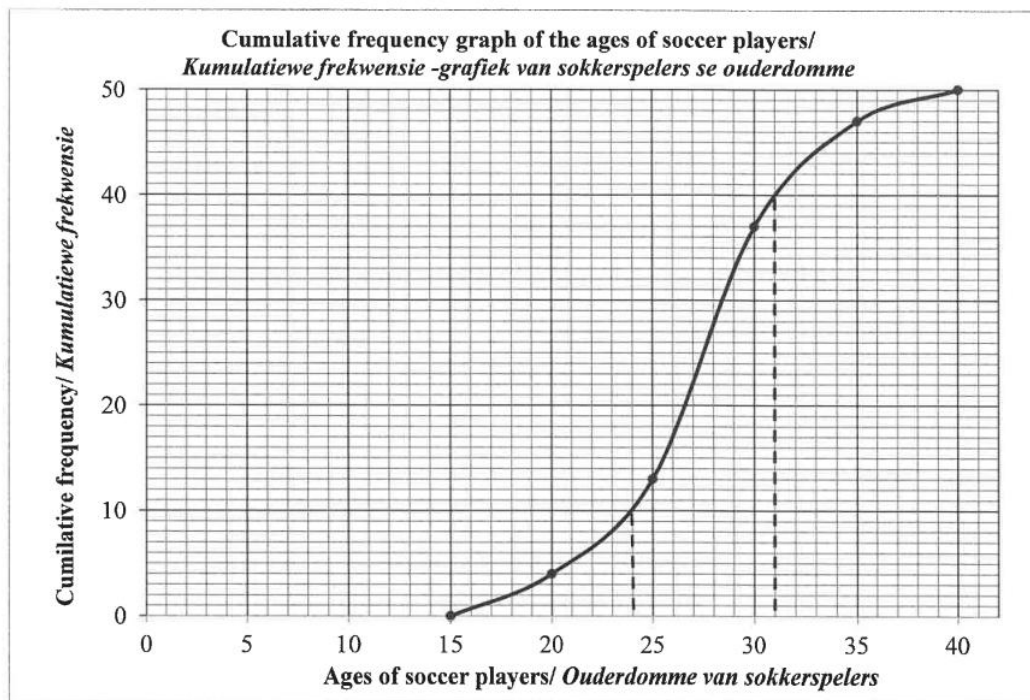
PAPER A

QUESTION/VRAAG 1

4	12	13	16	17	18	20	22	22	25
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1.1	4 minutes/ <i>minute</i>
1.2	Mean/ <i>gemiddeld</i> $= \frac{169}{10} = 16,9$
1.3	Standard deviation/ <i>Standardafwyking</i> $= 5,79$
1.4	$(16,9 - 2 \times 5,79; 16,9 + 2 \times 5,79)$ $(5,32 ; 28,48)$ $\therefore$ 1 member of the team completed the obstacle race outside of 2 standard deviations of the mean./ <i>1 lid van die span het die hundernisbaan buite twee standardafwykings van die gemiddeld voltooi.</i>
1.5	$\frac{169 + x + 5}{20} = 18$ $x = 18 \times 20 - 174$ $x = 186$

QUESTION/VRAAG 2



2.1.1 50 players/ *spelers*

2.1.2 $40 - 10 = 30$ players/ *spelers*

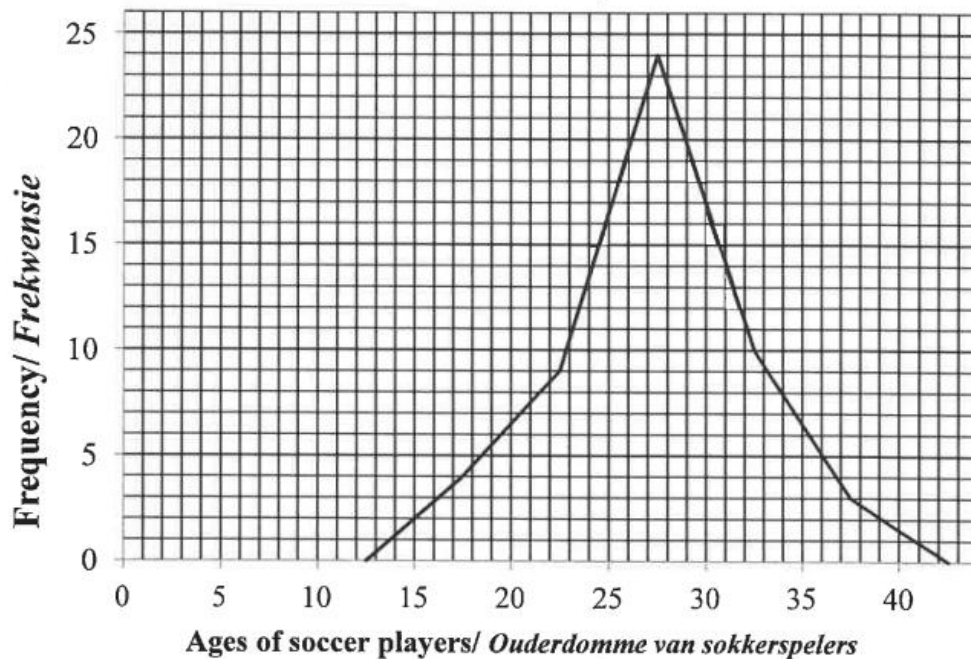
2.1.3

Class interval/ <i>Klas interval</i>	Frequency/ <i>Frekwensie</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>
$15 \leq x < 20$	4	4
$20 \leq x < 25$	9	13
$25 \leq x < 30$	24	37
$30 \leq x < 35$	10	47
$35 \leq x < 40$	3	50

2.1.4

Class interval/ <i>Klas- interval</i>	Class midpoint/ <i>Klas- middelpunt</i>	Frequency/ <i>Frekwensie</i>
$15 \leq x < 20$	17,5	4
$20 \leq x < 25$	22,5	9
$25 \leq x < 30$	27,5	24
$30 \leq x < 35$	32,5	10
$35 \leq x < 40$	37,5	3

**Frequency polygon of the ages of soccer players/
*Frekwensie- veelhoek van sokkerspelers se ouderomme***



2.2

The claim is not valid. / *Die bewering is nie geldig nie*

Range of class/ *Omvang van klas A* = 60

Range of class/ *Omvang van klas B* = 40

The range of class A is bigger than the range of class B. Therefore the marks of class A are more spread out than the class B./

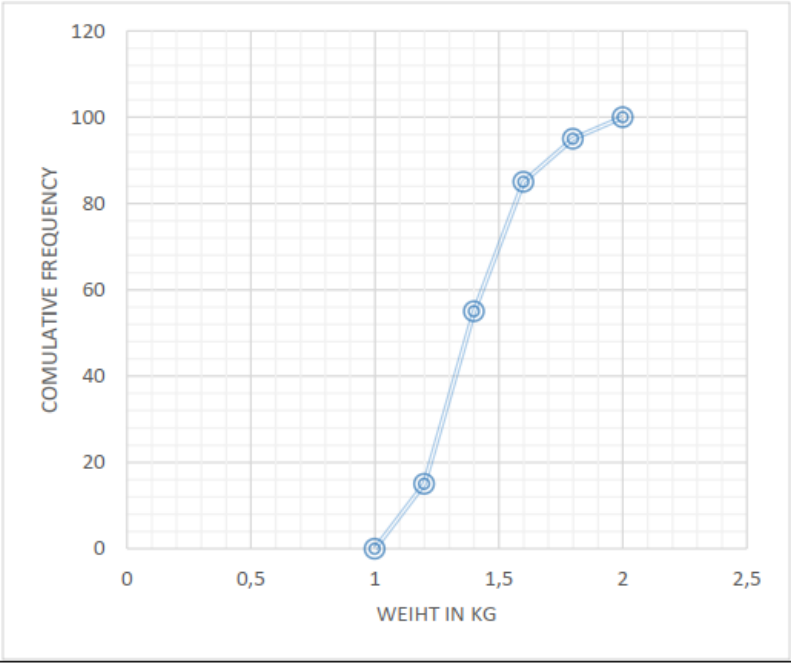
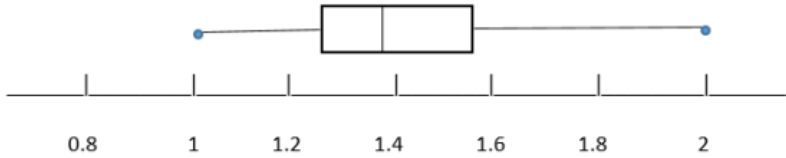
Die omvang van klas A is groter as die omvang van klas B. Dus is die punte in klas A meer verspreid as klas B

At least 25% of class A have lower marks than any learner in class B./
ten minste 25% van klas A het laer punte as enige leerder in klas B.

Class A performed worse at the bottom end. /
Klas A het slegter gevorder aan die onderste groep

PAPER B

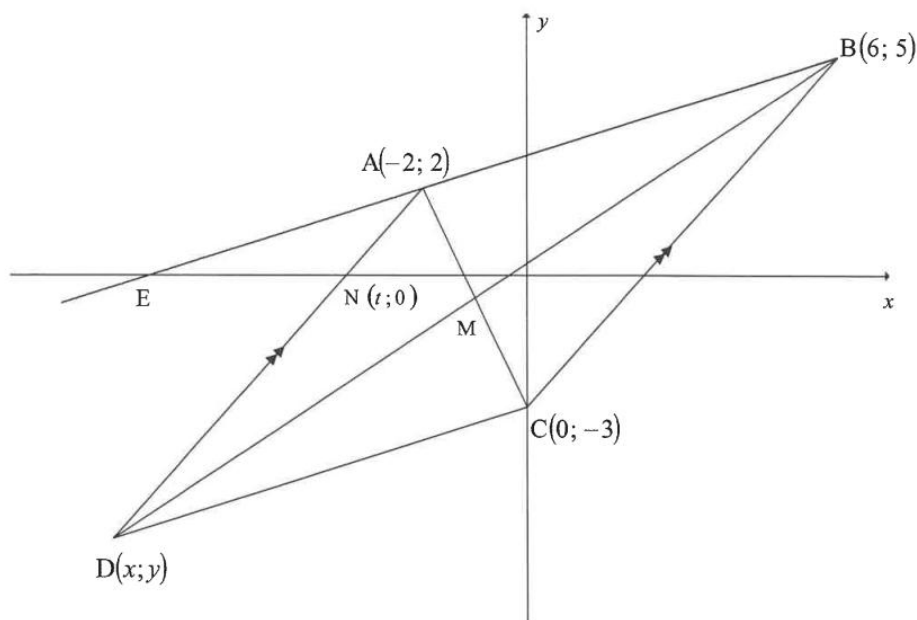
		QUESTION 1 / VRAAG 1
1.1		$\frac{519+x}{15} = 37,6$ $519+x = 564$ $x = 45$ OR/OF <i>total number of scores / totale aantal lopies = $15 \times 37,6 = 564$</i> <i>Sum of the first 14 scores / Som van die eerste 14 lopies = 519</i> $519+x = 564$ $x = 45$
1.2		$\delta x = 25,27$
1.3		$(\bar{x} - \delta x; \bar{x} + \delta x)$ $= 37,6 - 25,27; 37,6 + 25,27)$ $= (12,33; 62,87)$ $\therefore$ 8 scores lie within ONE standard deviation of the mean / $\therefore$ 8 lopies lê binne EEN standaardafwyking van die gemiddeld $\frac{8}{15} \times 100 = 53,33\%$
1.4		
	1.4.1	New average runs per over = 35,6 runs per over / <i>Nuwe gemiddelde lopies per boulbeurt = 35,6 lopies per boulbeurt</i>
	1.4.2	New standard deviation = 25,27 <i>Nuwe standaardafwyking = 25,27/</i>

QUESTION 2 / VRAAG 2																				
2.1		<table> <tr> <th>Weights in kg / <i>Gewig in kg</i></th><th>Number of chickens / <i>Aantal hoenders</i></th><th>Cumulative frequency / <i>Kumulatiewe frekwensie</i></th></tr> <tr> <td>$1 \leq w < 1,2$</td><td>15</td><td>15</td></tr> <tr> <td>$1,2 \leq w < 1,4$</td><td>40</td><td>55</td></tr> <tr> <td>$1,4 \leq w < 1,6$</td><td>30</td><td>85</td></tr> <tr> <td>$1,6 \leq w < 1,8$</td><td>10</td><td>95</td></tr> <tr> <td>$1,8 \leq w < 2$</td><td>5</td><td>100</td></tr> </table>	Weights in kg / <i>Gewig in kg</i>	Number of chickens / <i>Aantal hoenders</i>	Cumulative frequency / <i>Kumulatiewe frekwensie</i>	$1 \leq w < 1,2$	15	15	$1,2 \leq w < 1,4$	40	55	$1,4 \leq w < 1,6$	30	85	$1,6 \leq w < 1,8$	10	95	$1,8 \leq w < 2$	5	100
Weights in kg / <i>Gewig in kg</i>	Number of chickens / <i>Aantal hoenders</i>	Cumulative frequency / <i>Kumulatiewe frekwensie</i>																		
$1 \leq w < 1,2$	15	15																		
$1,2 \leq w < 1,4$	40	55																		
$1,4 \leq w < 1,6$	30	85																		
$1,6 \leq w < 1,8$	10	95																		
$1,8 \leq w < 2$	5	100																		
2.2																				
2.3		$Q_1 = 1,28$ $Q_2 = 1,38$ $Q_3 = 1,52$																		
2.4																				
2.5		The data is skewed to the right / <i>Data is skeef na regs</i> OR / <i>OF</i> Positively skewed / <i>Positief skeef</i>																		

ANALYTICAL GEOMETRY

PAPER A

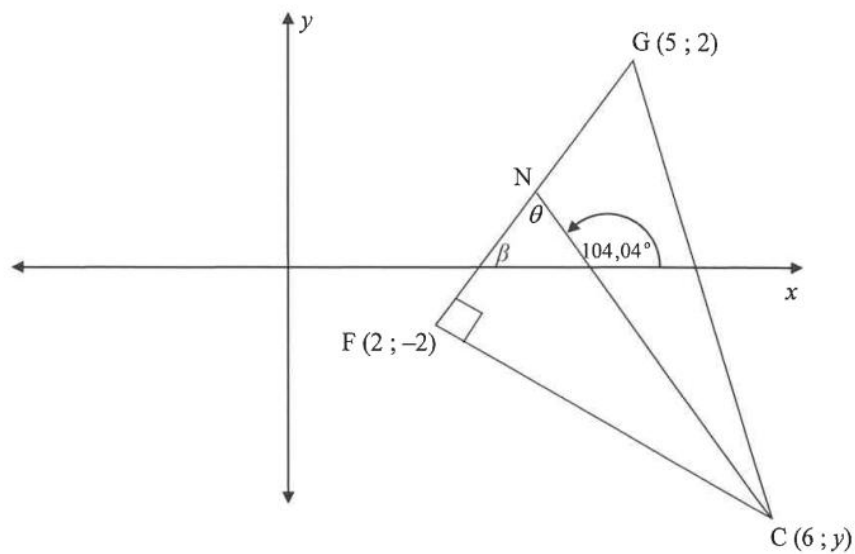
QUESTION/VRAAG 3



3.1	$m_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-3 - 5}{0 - 6}$ $= \frac{-8}{-6}$ $= \frac{4}{3}$	OR/ OF $m_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{5 - (-3)}{6 - 0}$ $= \frac{8}{6}$ $= \frac{4}{3}$
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3.2	$m_{AD} = m_{BC} = \frac{4}{3} \text{ (AD} \parallel \text{BC)}$ $y = \frac{4}{3}x + c$ $2 = \frac{4}{3}(-2) + c$ $\frac{14}{3} = c$ $\therefore y = \frac{4}{3}x + \frac{14}{3}$
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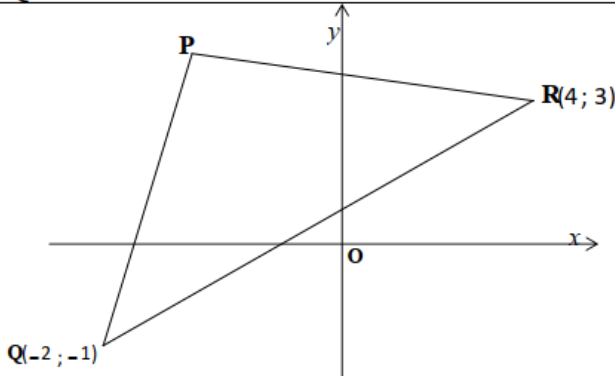
3.3	$y = \frac{4}{3}x + \frac{14}{3}$ $0 = \frac{4}{3}t + \frac{14}{3}$ $\frac{-14}{3} = \frac{4}{3}t$ $t = \frac{-14}{4} = \frac{-7}{2}$
3.4	$AN = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{\left((-2) - \left(-\frac{7}{2}\right)\right)^2 + (2 - 0)^2}$ $= \sqrt{\frac{25}{4}}$ $= \frac{5}{2}$
3.5	$\frac{3}{8}x - 3 = \frac{4}{3}x + \frac{14}{3}$ $\frac{23}{24}x = -\frac{23}{3}$ $x = -8$ $y = \frac{4}{3}(-8) + \frac{14}{3}$ $= -6$ $D(-8; -6)$
3.6	$m_{AB} = \frac{5-2}{6-(-2)} = \frac{3}{8}$ $m_{AB} = m_{DC}$ $\therefore AB \parallel DC$ $\text{but/maar } AD \parallel BC$ $\therefore ABCD \text{ is a parallelogram [oppsides are } \parallel / \text{teenoorst sye is } \parallel]$
3.7	M is the midpoint of AC [diagonals bisect] <i>M is die middelpunt van AC [hoelyste halveer]</i> $M\left(\frac{(-2)+0}{2}; \frac{2+(-3)}{2}\right)$ $M\left(-1; -\frac{1}{2}\right)$

QUESTION/VRAAG 4


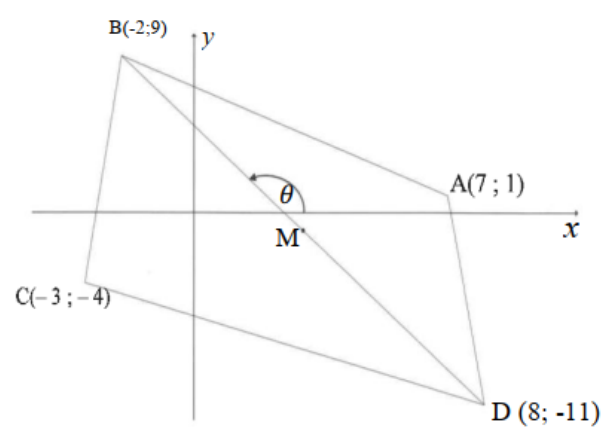
4.1	$m_{FG} = \frac{2 - (-2)}{5 - 2}$ $= \frac{4}{3}$
4.2	$m_{FC} = \frac{-3}{4} \quad (FC \perp FG)$ $\frac{y+2}{6-2} = \frac{-3}{4}$ $y = -5$
4.3	$\tan \beta = \frac{4}{3}$ $\beta = 53,13^\circ$ $\theta = 104,04^\circ - 53,13^\circ \text{ [ext } \angle \text{ of } \Delta / \text{buite } \angle \text{ van } \Delta]$ $\theta = 50,91^\circ$

4.4	$FC = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(6 - 2)^2 + (-5 - (-2))^2}$ $= \sqrt{16 + 9}$ $= 5$ $\sin \theta = \frac{FC}{NC}$ $\sin 50,91^\circ = \frac{5}{NC}$ $NC = \frac{5}{\sin 50,91^\circ}$ $= 6,44 \text{ unit}$
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PAPER B

		QUESTION 3 / VRAAG 3
		
3.1		$y = 5x + 9$ and $5y + x - 19 = 0$ $5(5x + 9) + x = 19$ $26x = -26$ $x = -1$ $y = 5(-1) + 9$ $y = 4$
3.2		$m_{PQ} = 5$ $m_{PR} = -\frac{1}{5}$ $m_{PQ} \times m_{PR} = 5 \times -\frac{1}{5}$ $= -1$ $\therefore PQ \perp PR$

3.3	$PR = \sqrt{(-1-4)^2 + (4-3)^2}$ $= \sqrt{26}$ $PQ = \sqrt{(-1-(-2))^2 + (4-(-1))^2}$ $= \sqrt{26}$ $\text{Area of } \triangle PQR = \frac{1}{2} PQ \times PR$ $= \frac{1}{2} (\sqrt{26}) \times (\sqrt{26})$ $= 13 \text{ square units}$ <i>/vierkante eenhede</i>
3.4	$m_{QR} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{3 - (-1)}{4 - (-2)}$ $= \frac{2}{3}$ $y = mx + c \text{ at } P(-1;4)$ $4 = \frac{2}{3}(-1) + c$ $c = \frac{14}{3}$ $y = \frac{2}{3}x + \frac{14}{3}$
3.5	$\frac{x-1}{2} = \frac{4-2}{2}$ $x = 3$ $\frac{y+4}{2} = \frac{3-1}{2}$ $y = -2$ $\therefore S(3; -2)$

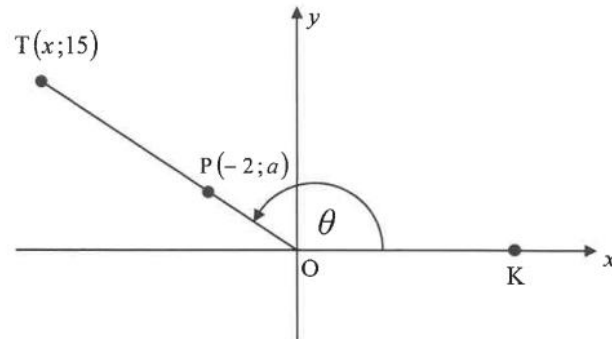
		QUESTION 4 / VRAAG 4
		
4.1		$m_{AC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{1 - (-4)}{7 - (-3)}$ $= \frac{1}{2}$
4.2		$y = mx + c \text{ at } A(7; 1)$ $1 = \frac{1}{2}(7) + c$ $c = -\frac{5}{2}$ $y = \frac{1}{2}x - \frac{5}{2}$ OR / OF $y = mx + c \text{ at } C(-3; -4)$ $-4 = \frac{1}{2}x - 3 + c$ $-4 = -\frac{3}{2} + c$ $\therefore c = -\frac{5}{2}$ $y = \frac{1}{2}x - \frac{5}{2}$

4.3		Midpoint of AC / <i>Middelpunt van AC</i> $= m\left(\frac{7-3}{2}; \frac{1-4}{2}\right)$ $= m\left(2; -\frac{3}{2}\right)$ $y = \frac{1}{2}x - \frac{5}{2} \text{ at/by } M\left(2; -\frac{3}{2}\right)$ $-\frac{3}{2} = \frac{1}{2}x - \frac{5}{2}$ $x = 2$ $\therefore LHS = RHS / LK = RK$ $\therefore M \text{ lies on AC} / M \text{ lê op AC}$
4.4	4.4.1	$m_{BD} = -2$ $\tan \theta = -2$ $\theta = 180^\circ - \tan^{-1}(-2)$ $\theta = 116,57^\circ$
	4.4.2	$m_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{9 - (-4)}{-2 - (-3)}$ $= 13$ $\tan \alpha = 13$ $\alpha = \tan^{-1}(13)$ $\alpha = 85,6^\circ$ $\therefore CBD = 116,57^\circ - 85,6^\circ$ $= 30,97^\circ$

TRIGONOMETRY

PAPER A

QUESTION/VRAAG 5



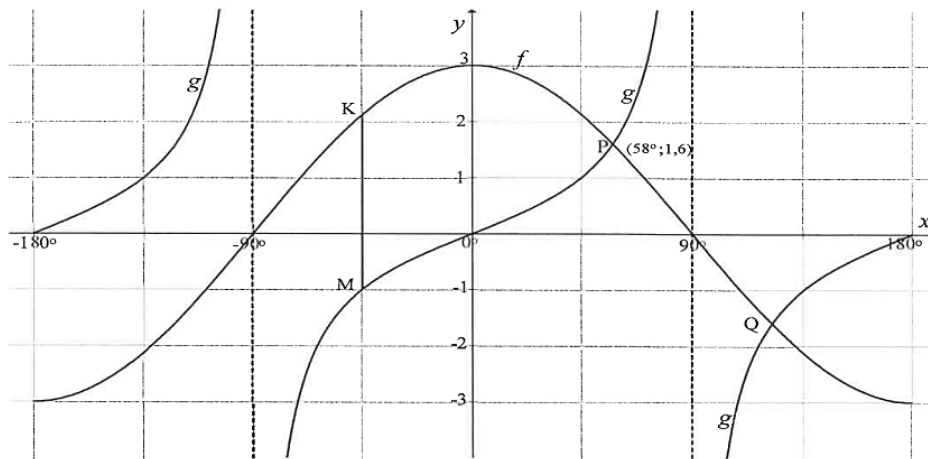
5.1.1	$x^2 + y^2 = r^2 \quad [\text{Pythagoras}]$ $(x)^2 + (15)^2 = 17^2$ $x^2 = 64$ $x = -8 \quad (\text{P is in quadrant 2/ is in kwadrant 2})$
5.1.2	$\tan \theta = \frac{15}{-8}$
5.1.3	$\cos(180^\circ - \theta)$ $= -\cos \theta$ $= -\left(\frac{-8}{17}\right)$ $= \frac{8}{17}$
5.1.4	$\sin^2 \theta$ $= \left(\frac{15}{17}\right)^2$ $= \frac{225}{289}$
5.1.5	$\tan \theta = \frac{a}{-2} = \frac{15}{-8}$ $\frac{a}{-2} = \frac{15}{-8}$ $a = \frac{15}{4}$

$$\begin{aligned}
 5.2 \quad \text{LHS} &= \frac{\sin 120^\circ \cdot \cos 210^\circ \cdot \tan 315^\circ \cdot \cos 27^\circ}{\cos 540^\circ \cdot \sin 63^\circ} \\
 &= \frac{\sin 60^\circ \cdot (-\cos 30^\circ) \cdot (-\tan 45^\circ) \cdot \sin 63^\circ}{\cos 180^\circ \cdot \sin 63^\circ} \\
 &= \frac{\frac{\sqrt{3}}{2} \cdot \frac{-\sqrt{3}}{2} \cdot (-1)}{-1} \\
 &= -\frac{3}{4}
 \end{aligned}$$

$$\begin{aligned}
 5.3 \quad \text{LHS} &= \frac{1}{\cos \theta} - \frac{\cos \theta}{1 + \sin \theta} \\
 &= \frac{1 + \sin \theta - \cos^2 \theta}{\cos \theta (1 + \sin \theta)} \\
 &= \frac{1 + \sin \theta - (1 - \sin^2 \theta)}{\cos \theta (1 + \sin \theta)} \\
 &= \frac{\sin \theta (1 + \sin \theta)}{\cos \theta (1 + \sin \theta)} \\
 &= \frac{\sin \theta}{\cos \theta} \\
 &= \tan \theta \\
 &= \text{RHS}
 \end{aligned}$$

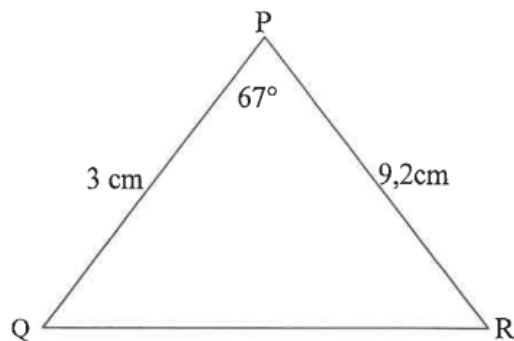
$$\begin{aligned}
 5.4 \quad 3 \sin x &= 2 \tan x. \\
 3 \sin x &= 2 \times \frac{\sin x}{\cos x} \\
 3 \sin x \cos x &= 2 \sin x \\
 3 \sin x \cos x - 2 \sin x &= 0 \\
 \sin x (3 \cos x - 2) &= 0 \\
 \sin x &= 0 \\
 x &= 360^\circ k, \quad k \in \mathbb{Z} \\
 \text{or} \\
 x &= 180^\circ + 360^\circ k, \quad k \in \mathbb{Z} \\
 \text{or}
 \end{aligned}$$

$$\begin{aligned}
 \cos x &= \frac{2}{3} \\
 x &= 48,19^\circ + 360^\circ k, \quad k \in \mathbb{Z} \\
 \text{or} \\
 x &= 311,81^\circ + 360^\circ k, \quad k \in \mathbb{Z}
 \end{aligned}$$

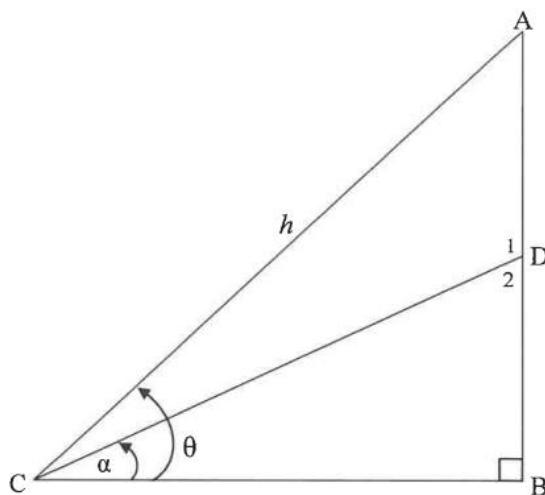
QUESTION/VRAAG 6


6.1	$-3 \leq y \leq 3$ or/ of $y \in [-3; 3]$
6.2	$c = 1$
6.3	$a = 3, b = 1$
6.4	$Q(122^\circ; -1,6)$
6.5	$K(-45^\circ; \frac{3\sqrt{2}}{2})$ $M(-45^\circ; -1)$ $KM = \frac{3\sqrt{2}}{2} + 1$ $= \frac{3\sqrt{2} + 2}{2}$ $= 3,12$
6.6	$f(x) = 3\cos(\theta - 45^\circ)$

QUESTION/VRAAG 7



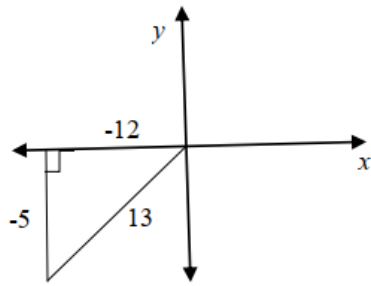
7.1	$QR^2 = PR^2 + PQ^2 - 2PR \cdot PQ \cos \hat{P}$ $QR^2 = (3)^2 + (9,2)^2 - 2(3)(9,2)\cos 67^\circ$ $QR = \sqrt{(3)^2 + (9,2)^2 - 2(3)(9,2)\cos 67^\circ}$ $QR = 8,49 \text{ cm}$
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7.2.1	$\hat{ACD} = \theta - \alpha$
7.2.2	$\hat{D}_1 = 90^\circ + \alpha$ $\frac{\sin(90^\circ + \alpha)}{h} = \frac{\sin(\theta - \alpha)}{AD}$ $\frac{\cos \alpha}{h} = \frac{\sin(\theta - \alpha)}{AD}$ $AD = \frac{h \sin(\theta - \alpha)}{\cos \alpha}$

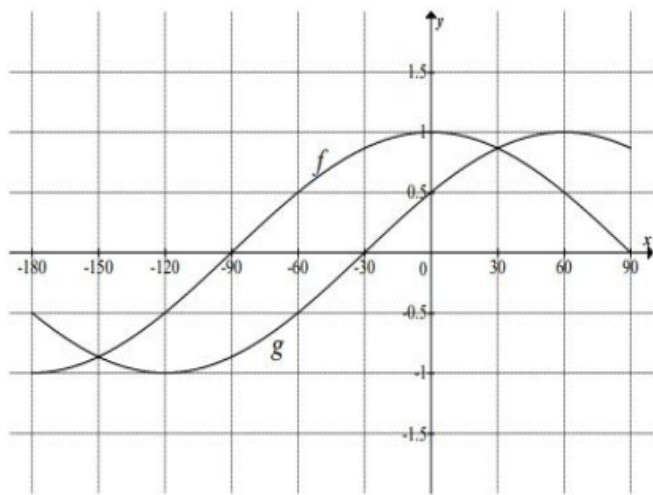
7.2.3	$AD = \frac{17 \sin(58^\circ - 23^\circ)}{\cos 23^\circ}$ $AD = 10,59 \text{ units}$
7.2.4	$\text{Area of } \triangle ADC = \frac{1}{2} \times AD \times AC \times \sin \hat{A}$ $= \frac{1}{2} \times 10,59 \times 17 \times \sin 32^\circ$ $= 47,70 \text{ unit}^2$

PAPER B

		QUESTION 5 / VRAAG 5
5.1		 $r = \sqrt{(-12)^2 + (-5)^2}$ $= 13$ $\sin \theta + \cos \theta = \frac{-5}{13} + \frac{-12}{13}$ $= \frac{-17}{13}$
5.2		$\sin(220^\circ) = \sin(180^\circ + 40^\circ)$ $= -\sin 40^\circ$ $-p$
5.3	5.3.1	$\frac{\sin 120^\circ \cdot \cos 210^\circ \cdot \tan 315^\circ \cdot \cos 60^\circ \cdot 27^\circ}{\sin 63^\circ \cdot \cos 540^\circ} =$ $= \frac{\sin(180^\circ - 60^\circ) \cdot \cos(180^\circ + 30^\circ) \cdot \tan(360^\circ - 45^\circ) \cdot \cos 27^\circ}{\sin(90^\circ - 27^\circ) \cdot \cos(360^\circ + 180^\circ)}$ $= \frac{\sin(60^\circ) \cdot -\cos(30^\circ) \cdot -\tan(45^\circ) \cdot \cos 27^\circ}{\cos(27^\circ) \cdot \cos(180^\circ)}$ $= \frac{\frac{\sqrt{3}}{2} \cdot (-\frac{\sqrt{3}}{2}) \cdot (-1)}{-1}$ $= -\frac{3}{4}$

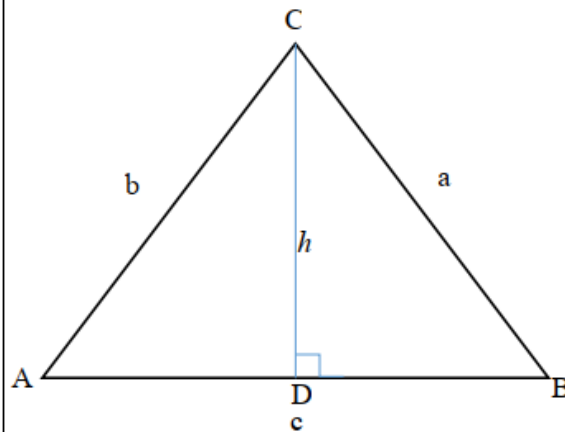
5.3.2	$\frac{\cos(180^\circ - x) \cdot \sin(x - 90^\circ) - 1}{\tan^2(540^\circ + x) \sin(90^\circ + x) \cdot \cos(-x)}$ $= \frac{(-\cos x)(-\cos x) - 1}{\tan^2(x) \cos(x) \cos(x)}$ $= \frac{\cos^2 x - 1}{\frac{\sin^2 x}{\cos^2 x} \cdot \cos^2 x}$
5.4	$\frac{\cos x}{1 - \sin x} - \frac{\cos x}{1 + \sin x} = 2 \tan x$ $L.H.S = \frac{\cos x}{1 - \sin x} - \frac{\cos x}{1 + \sin x}$ $= \frac{\cos x((1 + \sin x) - \cos x(1 - \sin x))}{(1 - \sin x)(1 + \sin x)}$ $= \frac{\cos x + \sin x \cdot \cos x - \cos x + \sin x \cos x}{1 - \sin^2 x}$ $= \frac{2 \sin x \cdot \cos x}{\cos^2 x}$ $= \frac{2 \sin x}{\cos x}$ $= 2 \tan x$ $\therefore L.H.S = R.H.S$

5.5	$x = 90^\circ$
5.6	$\sin 2x = \cos(x + 30^\circ)$ $\sin 2x = \sin(90^\circ - (x + 30^\circ))$ $2x = 90^\circ - (x + 30^\circ) + k \cdot 360^\circ; k \in \mathbb{Z}$ $3x = 60^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ $x = 20^\circ + k \cdot 120^\circ; k \in \mathbb{Z}$ OR $\sin 2x = \sin(90^\circ + (x + 30^\circ))$ $2x = 90^\circ + x + 30^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ $x = 120^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$

		QUESTION 6 / VRAAG 6
		
6.1		$b = 30^\circ$
6.2		$Period = 360^\circ$
6.3		$x = -150^\circ$ $x = 30^\circ$
6.4		$\sin(90^\circ - x) > g(x)$ $\cos x > g(x)$ $f(x) > g(x)$ $\therefore -150^\circ < x < 30^\circ$ or $x \in (-150^\circ; 30^\circ)$
6.5		$h(x) = \cos x + 3$ Range / Waardeversameling: $2 \leq y \leq 4$ OR / OF Range / Waardeversameling: $y \in [2; 4]$

QUESTION 7 / VRAAG 7

7.1



Let $CD = h$ / Laat $CD = h$
 = height of $\triangle ABC$ with base AB /
 hoogte van $\triangle ABC$ met basis AB

$$\sin A = \frac{h}{b} \text{ and/en } \sin B = \frac{h}{a}$$

$$h = b \cdot \sin A \text{ and/en } h = a \cdot \sin B$$

$$\frac{a \cdot \sin B}{\sin A \cdot \sin B} = \frac{b \cdot \sin A}{\sin A \cdot \sin B}$$

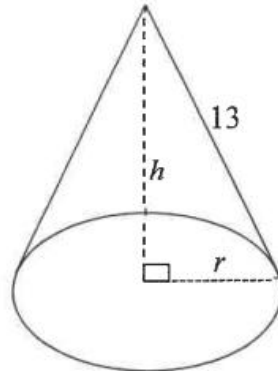
$$\therefore \frac{a}{\sin A} = \frac{b}{\sin B}$$

7.2		
7.2.1		$B_1 = \theta + \beta$
7.2.2		In $\triangle BGT$ $\sin(\theta + \beta) = \frac{h}{BT}$ $BT = \frac{h}{\sin(\theta + \beta)}$ In $\triangle ABT$ $A = \theta$ $\frac{x}{\sin \beta} = \frac{BT}{\sin \theta}$ $\frac{x}{\sin \beta} = \frac{h}{\sin(\theta + \beta) \sin \theta}$ $\therefore x = \frac{h}{\sin(\theta + \beta) \sin \theta}$

MEASUREMENT

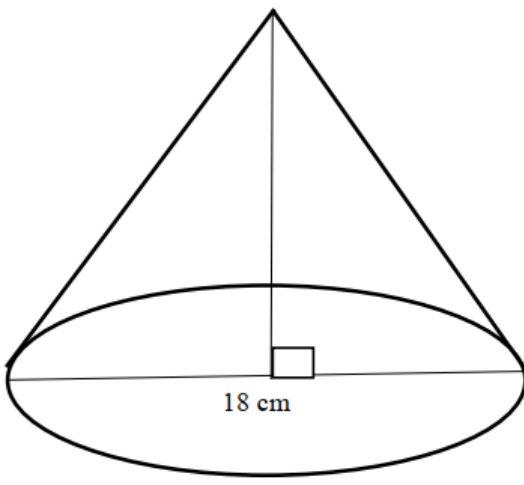
PAPER A

QUESTION/VRAAG 8



8.1	$r^2 = 13^2 - h^2 \text{ (Pythagoras)}$ $r^2 = 169 - h^2$ $V = \frac{1}{3} Ah$ $= \frac{1}{3} \pi r^2 h$ $= \frac{1}{3} \pi (169 - h^2) h$ $= \frac{169\pi h - \pi h^3}{3}$
8.2	$r = \sqrt{13^2 - 12^2} \text{ (Pythagoras)}$ $= 5$ Total surface area/ buite oppervlakte = $\pi r^2 + \pi r s$ $= \pi(5^2) + \pi(5)(13)$ $= 90\pi$ $= 282,74 \text{ cm}^2$

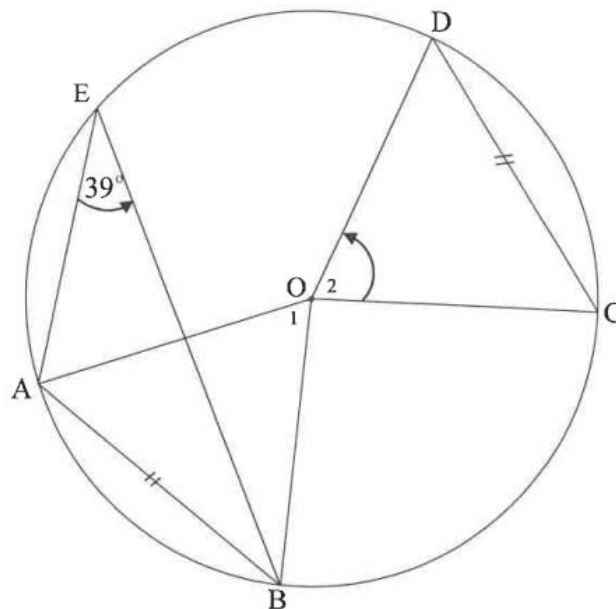
PAPER B

		QUESTION 8 / VRAAG 8
		 18 cm
8.1		9 cm
8.2		$V = \frac{1}{3} \pi r^2 h$ $3392,92 = \frac{1}{3} (9)^2 h$ $h = \frac{3(3392,92)}{\pi(9)^2}$ $= 40 \text{ cm}$
8.3		$\text{Slant height/Skuinshoogte} = \sqrt{h^2 + r^2}$ $= \sqrt{(40)^2 + (9)^2}$ $= 41 \text{ cm}$
8.4		$\text{Total surface area (TSA)}$ $\text{Totale buite oppervlakte (TBO)}$ $TSA / TBO = \pi r^2 + \pi r s$ $= \pi(9)^2 + \pi(9)(41)$ $= 450\pi$ $= 1\,413,72 \text{ cm}^2$

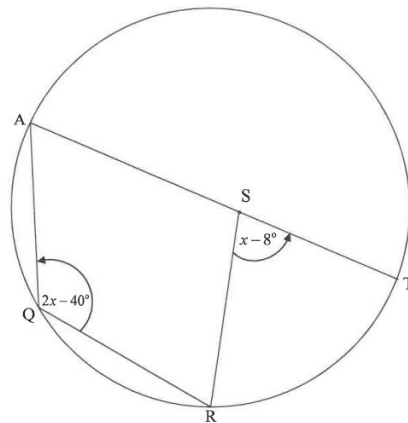
EUCLIDEAN GEOMETRY

PAPER A

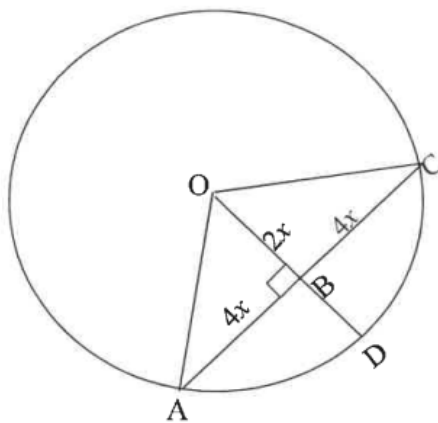
QUESTION/VRAAG 9



9.1.1	$\hat{O}_1 = 78^\circ$ [angle at centre = $2 \times \angle$ at circumference] [middelpuntshoek = $2 \times$ omtrekshoek]
9.1.2	$\hat{O}_2 = 78^\circ$ [equal chords; equal $\angle^s$ / gelyke koorde; gelyke hoeke]

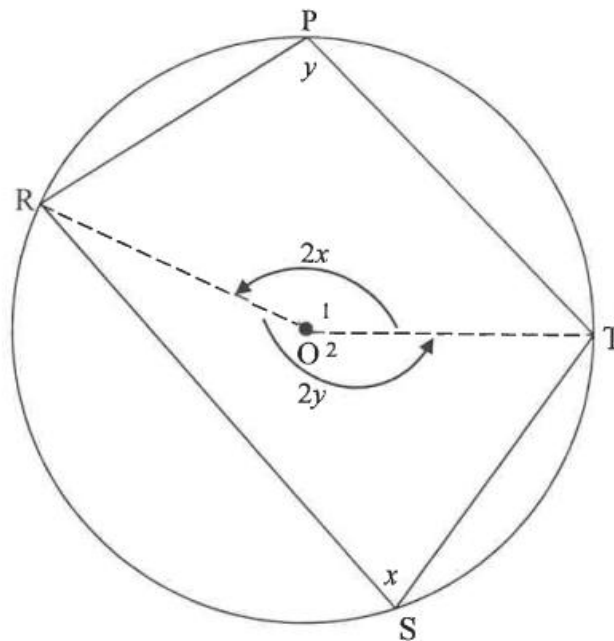


9.2	$x - 8^\circ + 180^\circ = 2(2x - 40^\circ)$ $4x - 80^\circ = 172^\circ + x$ $3x = 252^\circ$ $x = 84^\circ$	[angle at centre = $2 \times \angle$ at circumference/ <i>middelpuntshoek = $2 \times$ omtrekshoek</i>]
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9.3	$AB = BC = 4x$ $OA^2 = (4x)^2 + (2x)^2$ $OA = \sqrt{16x^2 + 4x^2}$ $= \sqrt{20x^2}$ $= 2\sqrt{5}x$ $OD = OA = 2\sqrt{5}x$ $BD = 2\sqrt{5}x - 2x$ $= 2x(\sqrt{5} - 1)$	[line from centre $\perp$ to chord/ <i>lyn van middelpunt $\perp$ aan koord</i>] [Pythagoras] [radii]
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QUESTION/VRAAG 10



10.1

Construction: Draw radii OR and OT
Konstruksie: teken radiese OR en OT

Let/ laat: $\hat{S} = x$ and/en $\hat{P} = y$

$$\hat{O}_1 = 2\hat{S} \left[\begin{array}{l} \text{angle at centre} = 2 \text{ times angle at circumference/} \\ \text{middelpuntshoek} = 2 \text{ keer omtrekshoek} \end{array} \right]$$

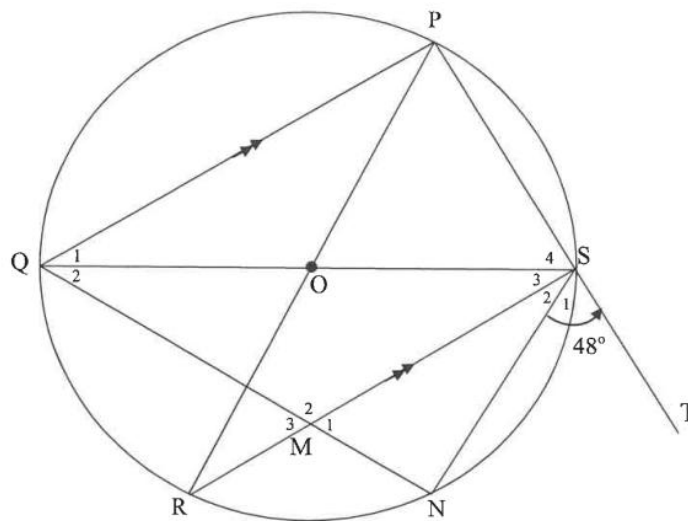
$$\hat{O}_1 = 2x$$

Similarly/ in die selfde manier: $\hat{O}_2 = 2y$

$$2x + 2y = 360^\circ \left[\text{anlges around a pt / hoeke om 'n punt} \right]$$

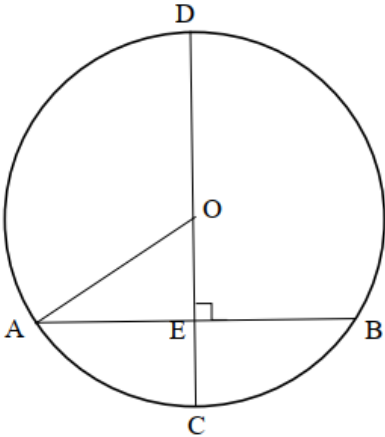
$$x + y = 180^\circ$$

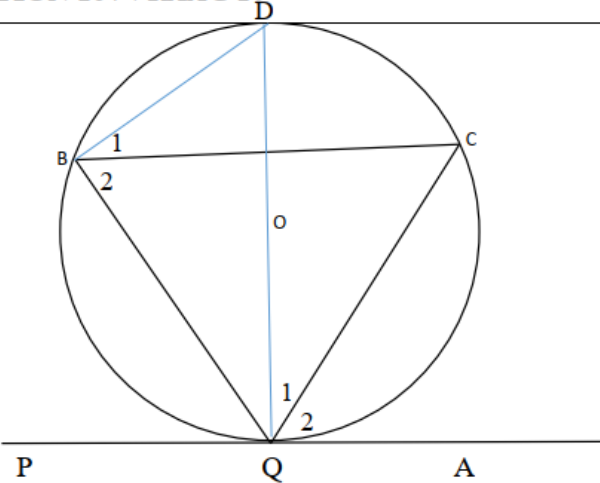
$$\therefore \hat{S} + \hat{P} = 180^\circ$$

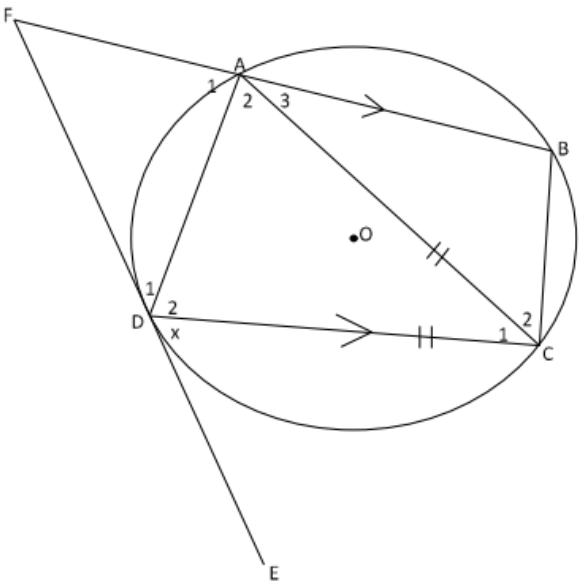


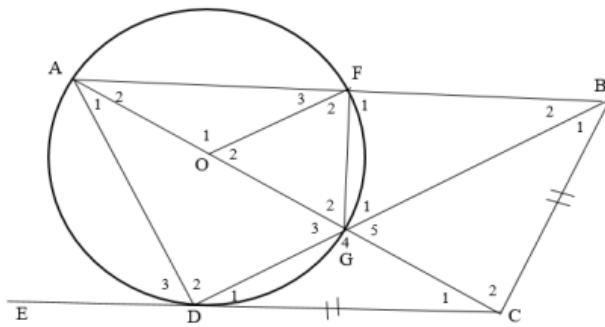
10.2.1(a)	$\hat{Q} = \hat{S}_1 = 48^\circ$ [ext $\angle$ of cyclic quad/ buite $\angle$ van 'n koodervierhoek] $\hat{Q}_1 = \hat{Q}_2 = 24^\circ$ [QS bisects/ halveer $P\hat{Q}N$]
10.2.1(b)	$\hat{R} = \hat{Q}_1 = 24^\circ$ [$\angle^s$ in the same segment/ in dieselfde segment]
10.2.1(c)	$\hat{M}_1 = \hat{Q} = 48^\circ$ [corresp/ ooreenkomst $\angle^s$, $PQ \parallel SR$] OR/OF $\hat{S}_3 = \hat{Q}_1 = 24^\circ$ [alt $\angle^s$ / ooreenkomst $\angle^s$, $PQ \parallel SR$] $\hat{M}_1 = 48^\circ$ [ext $\angle$ of Δ / buite $\angle$ van Δ]
10.2.2	$\hat{M}_1 = \hat{S}_1 = 48^\circ$ $\therefore ST$ is a tangent to circle MNS. [converse tan – chord theorem] $\therefore ST$ is 'n raaklyn aan MNS [omgekrd raaklyn-koord st.]

PAPER B

		QUESTION 9 / VRAAG 9
9.1		Bisects the chord / <i>Halveer die koord</i>
		
9.2	9.2.1	AE = 12 cm (line from centre perpendicular to chord) / <i>(lyn van middelpunt loodreg op koord)</i>
	9.2.2	OE = 18 - x cm
	9.2.3	$AO^2 = AE^2 + OE^2$ (Pythagoras) $x^2 = 12^2 + (18 - x)^2$ $x^2 = 144 + 324 - 36x + x^2$ $36x = 468$ $x = 13$

		QUESTION 10 / VRAAG 10 
10.1		Construction: Draw diameter AD and join DB. / <i>Konstruksie: Teken middellyn AD en verbind DB.</i> Proof / Bewys: $\hat{A}_2 + \hat{A}_1 = 90^\circ \text{ (tan } \perp \text{ rad)}$ $\hat{B}_2 + \hat{B}_1 = 90^\circ \text{ (angles in semi-circle) / (hoeke in semi-sirkel)}$ $\hat{A}_1 + \hat{B}_1 \text{ (angles in the same segment) / (hoeke in dieselfde segment)}$ $\therefore \hat{A}_2 = \hat{B}_2$ $C\hat{A}Q = \hat{B}$

10.2	
10.2.1	$\hat{F} = x$ (corr. angles $FB \parallel DC$) / (ooreenkomstige hoeke, $FB \parallel DC$) $\hat{A}_2 = x$ (tan-chord theorem) / (raaklyn-koord stelling) $\hat{D}_2 = x$ (angles opp = sides) / (hoeke teenoor = sye) $\hat{A}_1 = x$ (alt. angles, $FB \parallel DC$) / (verw. binnehoeke, $FB \parallel DC$) $\hat{BCD} = x$ (ext. angle of cyclic quad.) / (buitehoek van KVH)
10.2.2	$\hat{B} = x$ (opp. angles of a cyclic quad) / (teenoorst hoeke van KVH) $\hat{F} + \hat{B} = x + 180^\circ - x = 180^\circ$ $\therefore FD \parallel BC$ (Co-interior angles are supplementary) / (Ko-binnehoeke is suplementêr) $\therefore FBCD$ is a parallelogram (two pairs of opp, sides $\parallel$) /

QUESTION 11 / VRAAG 11		
		
11.1		$\hat{D}_1 = x$ (tan-chord theorem) / (raaklyn-koord stelling) $\hat{B}_1 = \hat{D}_1 = x$ (angles opp = sides) / (hoeke teenoor = sye) $\therefore \hat{A}_1 = \hat{B}_1$ $\therefore ADCB$ is a cyclic quad (converse angles in same segment) / (omgekeerde hoeke in selfde segment)
11.2		$\hat{A}_2 = \hat{D}_1 = x$ (angles in same segment) / (hoeke in selfde segment) $\hat{A}_2 = \hat{A}_1$ OR / OF $\hat{A}_2 = \hat{A}_1 = x$ (= chords = angles) / (= koorde = hoeke)
11.3		$\hat{D}_2 = 90^\circ$ (angles in semi-circle) / (hoeke in semi-sirkel) $\hat{C}_2 = \hat{D}_2 = 90^\circ$ (angles in same segment) / (hoeke in selfde segment)
11.4		$\hat{A}_1 + \hat{A}_2 = \hat{G}_1$ (ext angle of cyclic quad.) / (buitehoek van KVH) $\hat{A}_2 = \hat{F}_3$ (angles opp = sides) / (hoeke teenoor = sye) $\hat{A}_2 + \hat{F}_3 = \hat{O}_2$ (ext angle of a Δ) / (buitehoek van Δ) But / Maar $\hat{A}_1 = \hat{F}_3$ (both = $\hat{A}_2$) / (beide = $\hat{A}_2$) OR / OF $\hat{A}_1 + \hat{A}_2 = \hat{G}_1$ (ext angle of cyclic quad.) / (buitehoek van KVH) $\hat{O}_2 = 2\hat{A}_2$ (angle at centre = 2x angle at circum.) / (hoek by middelpunt = 2x hoek by omtrek) But / Maar $\hat{A}_1 = \hat{A}_2$ (proven in 11.2) / (bewys in 11.2) $\therefore \hat{O}_2 = \hat{A}_1 + \hat{A}_2$ $\hat{G}_1 = \hat{O}_2$

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