



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE SENIOR
SERTIFIKAAT**

GRADE 12/GRAAD 12

**MATHEMATICS P1/WISKUNDE VI
NOVEMBER 2023
MARKING GUIDELINES/NASIENRIGLYNE**

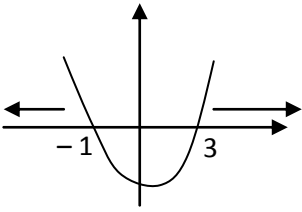
MARKS/PUNTE: 150

**These marking guidelines consist of 17 pages.
*Hierdie nasienriglyne bestaan uit 17 bladsye.***

- NOTE:**
- If a candidate answers a question TWICE, only mark the FIRST attempt.
 - Consistent Accuracy applies in all aspects of the marking memorandum.

- LET WEL:**
- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.
 - Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die memorandum van toepassing.

QUESTION 1/VRAAG 1

1.1.1	$x^2 + x - 12 = 0$ $(x - 3)(x + 4) = 0$ $x = 3$ or $x = -4$	✓ factors/formula ✓ answer ✓ answer (3)
1.1.2	$3x^2 - 2x = 6$ $3x^2 - 2x - 6 = 0$ $x = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(-6)}}{2(3)}$ $x = 1,79$ or $x = -1,12$	✓ standard form ✓ substitution into correct formula ✓ answer ✓ answer (4)
1.1.3	$\sqrt{2x+1} = x-1$ $2x+1 = (x-1)^2$ $2x+1 = x^2 - 2x+1$ $x^2 - 4x = 0$ $x(x-4) = 0$ $x = 0$ or $x = 4$ $x \neq 0$ or $x = 4$	✓ squaring both sides ✓ standard form ✓ both x-values ✓ valid answer (4)
1.1.4	$x^2 - 2x > 3$ $x^2 - 2x - 3 > 0$ $(x-3)(x+1) > 0$ CV's: $x = -1$; $x = 3$  $x < -1$ or $x > 3$	✓ standard form ✓ critical values/factors ✓ ✓ answer (4)

<p>1.2</p>	$\frac{1}{x} + \frac{1}{y} = 1 \quad \dots \quad (1)$ $x + 2 = 2y \quad \dots \quad (2)$ $x = 2y - 2$ $\frac{1}{2y - 2} + \frac{1}{y} = 1$ $y + 2y - 2 = 2y^2 - 2y$ $2y^2 - 5y + 2 = 0$ $(2y - 1)(y - 2) = 0$ $y = \frac{1}{2} \quad \text{or} \quad y = 2$ $x = -1 \quad \text{or} \quad x = 2$ <p>OR/OF</p> $\frac{1}{x} + \frac{1}{y} = 1 \quad \dots \quad (1)$ $x + 2 = 2y \quad \dots \quad (2)$ $y = \frac{x}{2} + 1$ $\frac{1}{x} + \frac{1}{\frac{x}{2} + 1} = 1$ $\frac{1}{x} + \frac{2}{x + 2} = 1$ $x + 2 + 2x = x^2 + 2x$ $x^2 - x - 2 = 0$ $(x + 1)(x - 2) = 0$ $x = -1 \quad \text{or} \quad x = 2$ $y = \frac{1}{2} \quad \text{or} \quad y = 2$	$\checkmark x = 2y - 2$ $\checkmark \text{substitution}$ $\checkmark \text{standard form}$ $\checkmark \text{y-values}$ $\checkmark \text{x-values} \quad (5)$ <p>OR/OF</p> $\checkmark y = \frac{x}{2} + 1$ $\checkmark \text{substitution}$ $\checkmark \text{standard form}$ $\checkmark \text{x-values}$ $\checkmark \text{y-values} \quad (5)$
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<p>1.3</p>	$2^{m+1} + 2^m = 3^{n+2} - 3^n$ $2^m(2+1) = 3^n(3^2 - 1)$ $2^m(3) = 3^n(8)$ $2^m(3) = 3^n(2^3)$ $\therefore m = 3 \text{ and } n = 1$ $\therefore m + n = 4$ <p>OR/OF</p> $2^{m+1} + 2^m = 3^{n+2} - 3^n$ $2^m(2+1) = 3^n(3^2 - 1)$ $2^m(3) = 3^n(8)$ $2^m(3) = 3^n(2^3)$ $2^{m-3} = 3^{n-1}$ <p>Only true if $m - 3 = 0$ and $n - 1 = 0$</p> $\therefore m + n = 4$	<p>✓ factors</p> <p>✓ $2^m(3) = 3^n(2^3)$ (same bases)</p> <p>✓ $m = 3$ and $n = 1$</p> <p>✓ $m + n = 4$ (4)</p> <p>OR/OF</p> <p>✓ factors</p> <p>✓ $2^m(3) = 3^n(2^3)$ (same bases)</p> <p>✓ $m - 3 = 0$ and $n - 1 = 0$</p> <p>✓ $m + n = 4$ (4)</p>
		<p>[24]</p>

QUESTION 2/VRAAG 2

<p>2.1.1</p>	<p>$7 + 12 + 17 + \dots$</p> <p>$T_n = a + (n-1)d$</p> <p>$T_{91} = 7 + (91-1)(5)$</p> <p>$T_{91} = 457$</p> <p>OR/OF</p> <p>$d = 5$</p> <p>$T_n = 5n + 2$</p> <p>$T_{91} = 5(91) + 2$</p> <p>$T_{91} = 457$</p>	<p>✓ $d = 5$</p> <p>✓ substitution into correct formula</p> <p>✓ answer (3)</p> <p>OR/OF</p> <p>✓ $d = 5$</p> <p>✓ substitution $n = 91$</p> <p>✓ answer (3)</p>
<p>2.1.2</p>	<p>$S_n = \frac{n}{2}[2a + (n-1)d]$</p> <p>$S_{91} = \frac{91}{2}[2 \times 7 + (91-1)(5)]$</p> <p>$S_9 = 21\ 112$</p> <p>OR/OF</p> <p>$S_n = \frac{n}{2}(a + l)$</p> <p>$S_{91} = \frac{91}{2}(7 + 457)$</p> <p>$S_{91} = 21\ 112$</p>	<p>✓ substitution into correct formula</p> <p>✓ answer (2)</p> <p>OR/OF</p> <p>✓ substitution into correct formula</p> <p>✓ answer (2)</p>
<p>2.1.3</p>	<p>$T_n = 7 + (n-1)(5)$</p> <p>$5n + 2 = 517$</p> <p>$5n = 515$</p> <p>$n = 103$</p>	<p>✓ substitution into correct formula</p> <p>✓ equate</p> <p>✓ answer (3)</p>
<p>2.2.1</p>	<p>$T_1 = 3; T_2 - T_1 = 9$ and $T_3 - T_2 = 21$</p> <p> $\begin{array}{ccccccc} 3 & & 12 & & 33 & & 66 & & 111 \\ & \swarrow & & \swarrow & & \swarrow & & \swarrow & \\ & 9 & & 21 & & 33 & & 45 & \\ & & \swarrow & & \swarrow & & \swarrow & & \\ & & 12 & & 12 & & 12 & & \end{array}$ </p> <p>$\therefore T_5 = 3 + 9 + 21 + 33 + 45 = 111$</p> <p>OR/OF</p> <p>$2a = 12$</p> <p>$a = 6$</p> <p>$3(6) + b = 9$</p> <p>$b = -9$</p> <p>$6 - 9 + c = 3$</p> <p>$T_5 = 6(5)^2 - 9(5) + 6 = 111$</p>	<p>✓ constant second diff = 12</p> <p>✓ first differences : 33 and 45 (2)</p> <p>OR/OF</p> <p>✓ constant second diff = 12</p> <p>✓ substitute 5 (2)</p>

2.2.2	$2a = 12$ $a = 6$ $3(6) + b = 9$ or $5 \times 6 + b = 21$ $b = -9$ $6 - 9 + c = 3$ $c = 6$ $T_n = 6n^2 - 9n + 6$	$\checkmark 2a = 12$ $\checkmark 3(6) + b = 9 / 5 \times 6 + b = 21$ $\checkmark 6 - 9 + c = 3$ (3)
2.2.3	$T_n' = 12n - 9 > 0$ $n > \frac{3}{4}$ $\therefore T_n$ is increasing for $n \in N$ OR/OF $n = -\frac{b}{2a} = -\frac{-9}{2(6)}$ $n = \frac{3}{4}$ $\therefore \text{min at } n = 1 \text{ for } n \in N$ $\therefore T_n$ is increasing for $n \in N$	$\checkmark T_n' = 12n - 9$ $\checkmark n > \frac{3}{4}$ \checkmark increasing for $n \in N$ (3) OR/OF $\checkmark n = -\frac{b}{2a} = \frac{9}{2(6)}$ $\checkmark n = \frac{3}{4}$ \checkmark increasing for $n \in N$ (3)
		[16]

QUESTION 3/VRAAG 3

3.1.1	$T_n = ar^{n-1}$ $T_n = 3(2)^{n-1}$	$\checkmark T_n = 3(2)^{n-1} \quad (1)$
3.1.2	$\sum_{p=1}^k \frac{3}{2} \cdot 2^p = 98\,301$ $\sum_{p=1}^k \frac{3}{2} \cdot 2^p = 3 + 6 + 12 + \dots$ $n = k$ $\frac{3[(2)^k - 1]}{2 - 1} = 98\,301$ $(2)^k = 32\,768$ $2^k = 2^{15} \quad \text{OR/OF} \quad k = \log_2 32\,768$ $\therefore k = 15$	$\checkmark \text{expansion}$ $\checkmark n = k$ $\checkmark \text{substitution into correct formula}$ $\checkmark k = 15 \quad (4)$
3.2	$S_{22} = \frac{22}{2} [2a + 21(3)]$ $S_{22} = 22a + 693$ $S_{\infty} = \frac{a}{1 - \frac{1}{3}}$ $= \frac{3a}{2}$ $\therefore 22a + 693 = \frac{3a}{2} + 734$ $44a + 1386 = 3a + 1468$ $41a = 82$ $a = 2$	$\checkmark \text{substitution into } S_n$ $\checkmark S_{22} = 22a + 693$ $\checkmark \text{substitution into } S_{\infty}$ $\checkmark S_{22} = S_{\infty} + 734$ $\checkmark \text{answer} \quad (5)$
		[10]

QUESTION 4/VRAAG 4

4.1	$y = -4$	✓ $y = -4$ (1)
4.2	x – intercept: $0 = 2^x - 4$ $4 = 2^x$ $x = 2$ $\therefore B(2; 0)$	✓ $y = 0$ ✓ $x = 2$ (2)
4.3	$y = 2^0 - 4 = -3$ $\therefore A(0; -3)$ $y = mx + c$ $m = \frac{3}{2}$ $k(x) = \frac{3}{2}x - 3$	✓ $y = -3$ ✓ gradient ✓ equation (3)
4.4	$k(1) = \frac{3}{2}(1) - 3 = \frac{-3}{2}$ $f(1) = 2^1 - 4 = -2$ Vertical distance = $-\frac{3}{2} - (-2) = \frac{1}{2}$ units	✓ $k(1)$ ✓ $f(1) = -2$ ✓ answer (3)
4.5	$g(x) = f(x) + 4$ $g(x) = 2^x ; x \in [-2; 4)$	✓ $g(x) = 2^x$ (1)
4.6	Range of $g : y \in \left[\frac{1}{4}; 16\right)$ Domain of $g^{-1} : x \in \left[\frac{1}{4}; 16\right)$ or/of $\frac{1}{4} \leq x < 16$	✓ ✓ $x \in \left[\frac{1}{4}; 16\right)$ (2)
4.7	$g : y = 2^x$ $g^{-1} : x = 2^y$ $g^{-1}(x) = \log_2 x, x \in \left[\frac{1}{4}; 16\right)$	✓ swap x and y ✓ equation (2)
		[14]

QUESTION 5/VRAAG 5

5.1	(1 ; 8)	✓ $x = 1$ ✓ $y = 8$ (2)
5.2	$y = -\frac{1}{2}(0-1)^2 + 8$ $= 7\frac{1}{2}$ $C\left(0; \frac{15}{2}\right)$	✓ $x = 0$ ✓ answer (2)
5.3	$8 = \frac{d}{1}$ $\therefore d = 8$	✓ substitution (1 ; 8) (1)
5.4	$y \in R; y \neq 0$	✓ $y \neq 0$ (1)
5.5	$-3 \leq x < 0$ or $x \geq 5$ OR/OF $x \in [-3 ; 0) \cup [5 ; \infty)$	✓ ✓ $-3 \leq x < 0$ ✓ $x \geq 5$ (3)
5.6	$-2x + k = \frac{8}{x}$ $-2x^2 + kx - 8 = 0$ $\Delta = (k)^2 - 4(-2)(-8)$ $k^2 - 64 < 0$ $CV : k = 8 ; k = -8$ $\therefore -8 < k < 8 \quad \text{or/of} \quad k \in (-8 ; 8)$ OR/OF $g'(x) = h'(x)$ $-\frac{8}{x^2} = -2$ $-8 = -2x^2$ $x = \pm 2$ $y = \pm 4 \quad \therefore B(2 ; 4) \text{ and } A(-2 ; -4)$ For tangents: $h(x) = -2x + k \quad \text{or} \quad h(x) = -2x + k$ $4 = -2(2) + k \quad \quad -4 = -2(-2) + k$ $k = 8 \quad \quad \quad k = -8$ $\therefore -8 < k < 8 \quad \text{or/of} \quad k \in (-8 ; 8)$	✓ $-2x + k = \frac{8}{x}$ ✓ standard form ✓ substitution into Δ ✓ $\Delta < 0$ or $\Delta = 0$ ✓ inequality (5) OR/OF ✓ $-\frac{8}{x^2}$ ✓ $= -2$ ✓ x -values ✓ y -values ✓ inequality (5)

<p>5.7</p>	$h(x) = -2x + 8$ $-2x + 8 = \frac{8}{x}$ $-2x^2 + 8x = 8$ $-2x^2 + 8x - 8 = 0$ $x^2 - 4x + 4 = 0$ $(x - 2)^2 = 0$ $\therefore x = 2$ $f(2) = \frac{15}{2}$ $h(2) = 4$ $4 = \frac{15}{2} + t$ $\therefore t = -\frac{7}{2}$ <p>OR/OF</p> $f(2) = \frac{15}{2}$ <p>Tangent point of contact (2 ; 4)</p> $\therefore 4 = -\frac{1}{2}(2 - 1)^2 + 8 + t$ $4 = \frac{15}{2} + t$ $\therefore t = -\frac{7}{2}$ <p>OR/OF</p> $g(x) = 8x^{-1}$ $g'(x) = -8x^{-2}$ $-2 = -8x^{-2}$ $\frac{1}{4} = \frac{1}{x^2}$ $x = 2$ $y = \frac{8}{2} = 4$ <p>R(2 ; 4)</p> $y = -\frac{1}{2}(x - 1)^2 + 8 + t$ $4 = -\frac{1}{2}(2 - 1)^2 + 8 + t$ $t = -\frac{7}{2}$	<p>✓ $x = 2$</p> <p>✓ $f(2)$</p> <p>✓ $h(2)$</p> <p>✓ answer</p> <p>(4)</p> <p>OR/OF</p> <p>✓ $x = 2$</p> <p>✓ $f(2)$</p> <p>✓ $h(2)$</p> <p>✓ answer</p> <p>(4)</p> <p>OR/OF</p> <p>✓ $x = 2$</p> <p>✓ $h(2)$</p> <p>✓ $f(2)$</p> <p>✓ answer</p> <p>(4)</p> <p style="text-align: right;">[18]</p>
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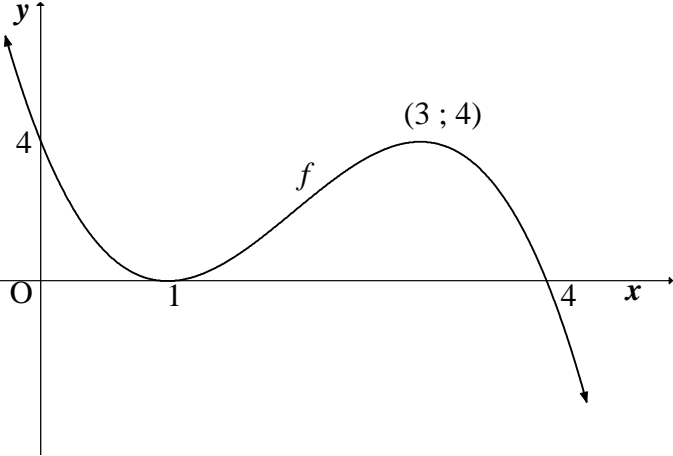
QUESTION 6/VRAAG 6

6.1.1	$A = P(1+i)^n$ $19\,319,48 = 18\,500 \left(1 + \frac{r}{1200}\right)^6$ $\left(1 + \frac{r}{1200}\right) = \sqrt[6]{1,04429\dots}$ $\frac{r}{1200} = 0,00725\dots$ $r = 8,7\%$	<p>✓ $n = 6$ ✓ substitution into correct formula</p> <p>✓ answer (3)</p>
6.1.2	$1 + \frac{i}{100} = \left(1 + \frac{8,7}{1200}\right)^{12}$ $r = 9,06\%$	<p>✓ substitution into correct formula</p> <p>✓ answer (2)</p>
6.2.1	$A = P(1-in)$ $0 = 10\,000(1 - 0,2n)$ $n = 5$	<p>✓ substitution into correct formula</p> <p>✓ answer (2)</p>
6.2.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $20\,000 = \frac{x \left[\left(1 + \frac{8,7}{1200}\right)^{60} - 1 \right]}{\frac{8,7}{1200}}$ $x = R267,26$	<p>✓ i ✓ n ✓ substitution into correct formula</p> <p>✓ answer (4)</p>
6.3	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $1\,600\,000 = \frac{20\,000 \left[1 - \left(1 + \frac{0,112}{12}\right)^{-n} \right]}{\frac{0,112}{12}}$ $\frac{56}{75} = 1 - \left(1 + \frac{0,112}{12}\right)^{-n}$ $\left(1 + \frac{0,112}{12}\right)^{-n} = \frac{19}{75}$ $-n = \log_{\left(1 + \frac{0,112}{12}\right)} \left(\frac{19}{75}\right)$ $-n = -147,80$ <p>Tino will make 147 withdrawals of R20 000</p>	<p>✓ i ✓ substitution into correct formula</p> <p>✓ correct use of logs</p> <p>✓ $-n = -147,80$ ✓ $n = 147$</p> <p>(5)</p>
		[16]

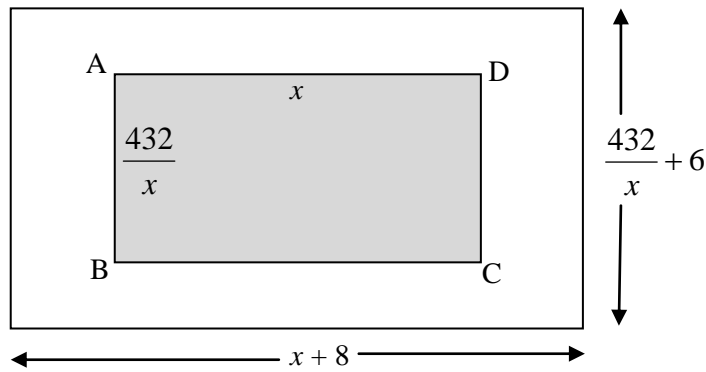
QUESTION 7/VRAAG 7

<p>7.1</p>	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-4(x+h)^2 - (-4x^2)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-4x^2 - 8xh - 4h^2 + 4x^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-8xh - 4h^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{h(-8x - 4h)}{h}$ $f'(x) = \lim_{h \rightarrow 0} (-8x - 4h)$ $f'(x) = -8x$ <p>OR/OF</p> $f(x+h) = -4(x+h)^2 = -4x^2 - 8xh - 4h^2$ $f(x+h) - f(x) = -4x^2 - 8xh - 4h^2 - (-4x^2)$ $= -8xh - 4h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-8xh - 4h^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{h(-8x - 4h)}{h}$ $f'(x) = \lim_{h \rightarrow 0} (-8x - 4h)$ $f'(x) = -8x$	<p>✓ substitution into correct formula</p> <p>✓ $f(x+h) = -4x^2 - 8xh - 4h^2$</p> <p>✓ simplification</p> <p>✓ common factor</p> <p>✓ answer (5)</p> <p>OR/OF</p> <p>✓ $f(x+h) = -4x^2 - 8xh - 4h^2$</p> <p>✓ simplification</p> <p>✓ substitution into correct formula</p> <p>✓ common factor</p> <p>✓ answer (5)</p>
<p>7.2.1</p>	$f(x) = 2x^3 - 3x$ $f'(x) = 6x^2 - 3$	<p>✓ $6x^2$</p> <p>✓ -3 (2)</p>
<p>7.2.2</p>	$D_x \left[7\sqrt[3]{x^2} + 2x^{-5} \right]$ $D_x \left[7x^{\frac{2}{3}} + 2x^{-5} \right]$ $= \frac{14}{3}x^{-\frac{1}{3}} - 10x^{-6}$	<p>✓ $x^{\frac{2}{3}}$</p> <p>✓ derivative with rational exp</p> <p>✓ $-10x^{-6}$ (3)</p>
<p>7.3</p>	$-6x^2 + 8 > 0$ $x^2 < \frac{8}{6}$ <p>CV's: $x = -\frac{2}{\sqrt{3}}$ or $x = \frac{2}{\sqrt{3}}$</p> <p>Positive for: $-\frac{2}{\sqrt{3}} < x < \frac{2}{\sqrt{3}}$</p>	<p>✓ CV's: $x = \pm \frac{2}{\sqrt{3}}$</p> <p>✓ ✓ answer (3)</p>
<p>[13]</p>		

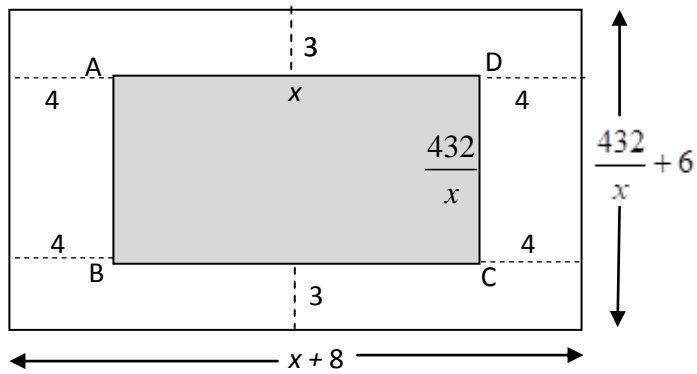
QUESTION 8/VRAAG 8

<p>8.1</p>	$f'(x) = -3x^2 + 12x - 9$ $-3x^2 + 12x - 9 = 0$ $x^2 - 4x + 3 = 0$ $(x - 3)(x - 1) = 0$ $\therefore x = 3 \text{ or } x = 1$ $f(3) = -(3)^3 + 6(3)^2 - 9(3) + 4 = 4$ $f(1) = -(1)^3 + 6(1)^2 - 9(1) + 4 = 0$ $\therefore \text{turning points are: } (3 ; 4) \text{ and } (1 ; 0)$	<p>✓ $f'(x) = -3x^2 + 12x - 9$ ✓ $f'(x) = 0$ ✓ both x-values ✓ both y-values (4)</p>
<p>8.2</p>		<p>✓ y-intercept ✓ both x-intercepts ✓ both turning points ✓ shape (4)</p>
<p>8.3</p>	<p>$0 < k < 4$ or/of $k \in (0 ; 4)$</p>	<p>✓✓ k between y-values of turning points (2)</p>
<p>8.4</p>	$f''(x) = -6x + 12 = 0$ $x = 2$ <p>Max at (2 ; 2)</p> $f'(2) = 3$ $\therefore y - 2 = 3(x - 2) \quad \text{or} \quad 2 = 3(2) + c$ $g(x) = 3x - 4 \quad \quad \quad g(x) = 3x - 4$ <p>OR/OF</p> <p>Point of inflection: $x = \frac{3+1}{2}$ $x = 2$</p> <p>Max at (2 ; 2)</p> $f'(2) = 3$ $\therefore y - 2 = 3(x - 2) \quad \text{or} \quad 2 = 3(2) + c$ $g(x) = 3x - 4 \quad \quad \quad g(x) = 3x - 4$	<p>✓ $f''(x) = -6x + 12$ ✓ $f''(x) = 0$ ✓ x-value ✓ y-value ✓ gradient at x-value ✓ equation of tangent (6)</p> <p>OR/OF</p> <p>✓✓ $\frac{3+1}{2}$ ✓ x-value ✓ y-value ✓ gradient at x-value ✓ equation of tangent (6)</p>
<p>8.5</p>	<p>$\tan \theta = 3$ $\therefore \theta = 71,57^\circ$</p>	<p>✓ gradient of g ✓ answer (2)</p>
<p>[18]</p>		

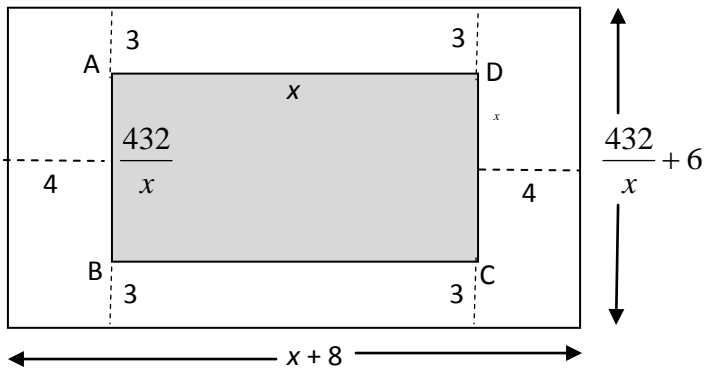
QUESTION 9/VRAAG 9



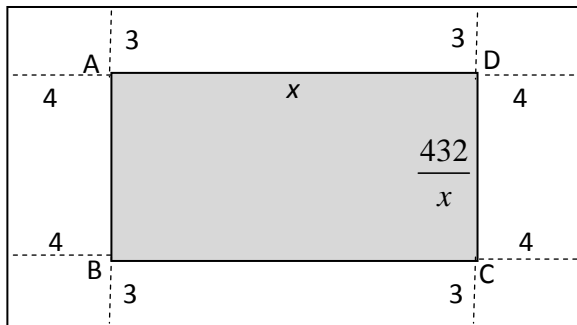
<p>9.1</p>	$432 = xb$ $\therefore b = \frac{432}{x}$ $A(x) = (x + 8) \left(\frac{432}{x} + 6 \right)$ $A(x) = 432 + 6x + \frac{3456}{x} + 480$ $A(x) = \frac{3456}{x} + 6x + 480$	$\checkmark b = \frac{432}{x}$ $\checkmark (x + 8)$ $\checkmark \left(\frac{432}{x} + 6 \right)$ <p style="text-align: right;">(3)</p>
<p>9.2</p>	$A(x) = 3456x^{-1} + 6x + 480$ $A'(x) = -\frac{3456}{x^2} + 6$ $-\frac{3456}{x^2} + 6 = 0$ $3456 = 6x^2$ $\therefore x = \sqrt{576} = 24 \text{ cm}$	$\checkmark 3456x^{-1} + 6x + 480$ $\checkmark A'(x) = -\frac{3456}{x^2} + 6$ <p style="text-align: right;">(3)</p>
		<p>[6]</p>



$$\text{total area} = 2(x+8)(3) + 2\left(\frac{432}{x}\right)(4) + \left(\frac{432}{x}\right)(x)$$

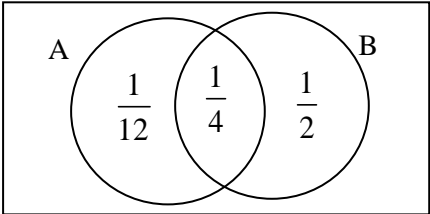
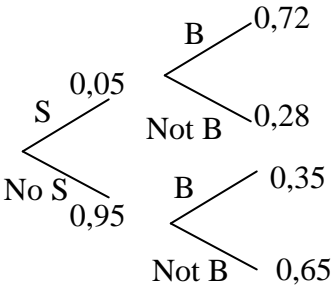


$$\text{total area} = 2(4)\left(\frac{432}{x} + 6\right) + (x)\left(\frac{432}{x} + 6\right)$$



$$\text{total area} = 4(4)(3) + 2(x)(3) + \left(\frac{432}{x}\right)(x) + 2\left(\frac{432}{x}\right)(4)$$

QUESTION 10/VRAAG 10

<p>10.1.1</p>	$P(A \text{ and } B) = P(A) \times P(B)$ $= \frac{1}{3} \times \frac{3}{4}$ $= \frac{1}{4}$	<p>✓ $\frac{1}{3} \times \frac{3}{4}$</p> <p>✓ $\frac{1}{4}$</p> <p>(2)</p>
<p>10.1.2</p>	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $= \frac{1}{3} + \frac{3}{4} - \frac{1}{4}$ $= \frac{5}{6}$ <p>OR/OF</p>  $P(A \text{ or } B) = \frac{1}{12} + \frac{1}{4} + \frac{1}{2} = \frac{5}{6}$	<p>✓ substitution</p> <p>✓ answer</p> <p>(2)</p> <p>OR/OF</p> <p>✓ substitution</p> <p>✓ answer</p> <p>(2)</p>
<p>10.2.1</p>		<p>✓ branch 1 with probabilities</p> <p>✓ branch 2 with probabilities</p> <p>✓ branch 3 with probabilities</p> <p>(3)</p>
<p>10.2.2</p>	$P(\text{NOT below } 0^\circ)$ $= P(S; \text{NOT below } 0^\circ) + P(NS ; \text{NOT below } 0^\circ)$ $= 0,05 \times 0,28 + 0,95 \times 0,65$ $= 0,6315$	<p>✓ value of $P(S; \text{NOT below } 0^\circ)$</p> <p>✓ value of $P(NS ; \text{NOT below } 0^\circ)$</p> <p>✓ answer</p> <p>(3)</p>
<p>10.3.1</p>	<p>$n(S) = 10!$</p>	<p>✓ 10!</p> <p>(1)</p>

<p>10.3.2</p>	<p>4 Options; $2 \times 8 \times 7 \times 6 \times 5 \times 4 \times 1 \times 3 \times 2 \times 1 = 80\ 640$ $8 \times 2 \times 7 \times 6 \times 5 \times 4 \times 3 \times 1 \times 2 \times 1 = 80\ 640$ $8 \times 7 \times 2 \times 6 \times 5 \times 4 \times 3 \times 1 \times 1 \times 1 = 80\ 640$ $8 \times 7 \times 6 \times 2 \times 5 \times 4 \times 3 \times 2 \times 1 \times 1 = 80\ 640$</p> <p>Total number of possibilities = 322 560</p> <p>$P(5 \text{ learners in between}) = \frac{322\ 560}{10!} = \frac{4}{45}$</p> <p>OR/OF</p> <p>$2 \times 8 \times 7 \times 6 \times 5 \times 4 \times 1 \times 3 \times 2 \times 1$ 4 possible starting positions $\therefore 4(2 \times 8! \times 1) = 322\ 560$ $8(8!) = 322\ 560$</p> <p>$P(5 \text{ learners in between}) = \frac{322\ 560}{10!} = \frac{4}{45}$</p>	<p>✓ (2×8!)</p> <p>✓✓4(2 × 8!) or 322 560</p> <p>✓ $\frac{322\ 560}{n(S)}$ (4)</p> <p>OR/OF</p> <p>✓ (2×8!)</p> <p>✓✓4(2 × 8!) or 322 560</p> <p>✓ $\frac{322\ 560}{n(S)}$</p> <p>(4)</p> <p>[15]</p>
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TOTAL/TOTAAL: 150