



14/12/23

# basic education

Department:  
Basic Education  
REPUBLIC OF SOUTH AFRICA

NATIONAL  
SENIOR CERTIFICATE/  
NATIONALE SENIOR  
SERTIFIKAAT

DEPARTMENT OF BASIC  
EDUCATION  
PRIVATE BAG X995, PRETORIA 0001  
2023 -11- 12  
APPROVED MARKING GUIDELINE  
PUBLIC EXAMINATION

GRADE 12/GRAAD 12

MATHEMATICS P1/WISKUNDE VI  
NOVEMBER 2023  
MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 50

APPROVED  
12/11/2023  
Prof. P. G. ...  
12/11/2023  
Umalusi

APPROVED  
12/11/2023  
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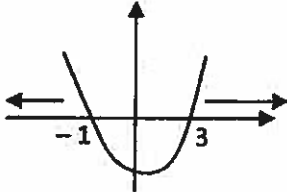
These marking guidelines consist of 17 pages.  
Hierdie nasienriglyne bestaan uit 17 bladsye.

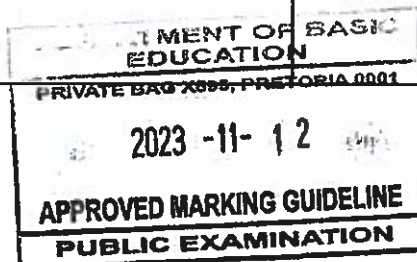
Approved  
2022-11-12

- 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**

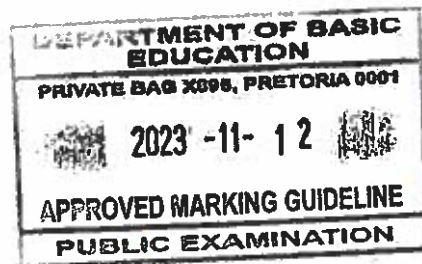
|       |  |   |
|-------|--|---|
| 1.1.1 | $x^2 + x - 12 = 0$<br>$(x - 3)(x + 4) = 0$<br>$x = 3$ or $x = -4$  | ✓ factors/formula<br>✓ answer<br>✓ answer (3)   |
| 1.1.2 | $3x^2 - 2x = 6$<br>$3x^2 - 2x - 6 = 0$<br>$x = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(-6)}}{2(3)}$<br>$x = 1,79$ or $x = -1,12$   | ✓ standard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



*Handwritten signatures and initials.*

|            |   |   |
|------------|---|---|
| <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><b>OR/OF</b></p> $\frac{1}{x} + \frac{1}{y} = 1 \quad \dots \quad (1)$ $x + 2 = 2y \quad \dots \quad (2)$ $y = \frac{x}{2} + 1$ $\frac{1}{x} + \frac{1}{\frac{x}{2} + 1} = 1$ $\frac{1}{x} + \frac{2}{x + 2} = 1$ $x + 2 + 2x = x^2 + 2x$ $x^2 - x - 2 = 0$ $(x + 1)(x - 2) = 0$ $x = -1 \quad \text{or} \quad x = 2$ $y = \frac{1}{2} \quad \text{or} \quad y = 2$ | $\checkmark x = 2y - 2$<br>$\checkmark$ substitution<br>$\checkmark$ standard form<br>$\checkmark$ y-values<br>$\checkmark$ x-values (5)<br><p><b>OR/OF</b></p> $\checkmark y = \frac{x}{2} + 1$<br>$\checkmark$ substitution<br>$\checkmark$ standard form<br>$\checkmark$ x-values<br>$\checkmark$ y-values (5) |
|------------|---|---|

|            |   |   |
|------------|---|---|
| <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><b>OR/OF</b></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 <math>m - 3 = 0</math> and <math>n - 1 = 0</math></p> $\therefore m + n = 4$ | $\checkmark \text{ factors}$ $\checkmark 2^m(3) = 3^n(2^3) \text{ (same bases)}$ $\checkmark m = 3 \text{ and } n = 1$ $\checkmark m + n = 4 \quad (4)$ <p><b>OR/OF</b></p> $\checkmark \text{ factors}$ $\checkmark 2^m(3) = 3^n(2^3) \text{ (same bases)}$ $\checkmark m - 3 = 0 \text{ and } n - 1 = 0$ $\checkmark m + n = 4 \quad (4)$ |
|            |   | <b>[24]</b>   |



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**QUESTION 2/VRAAG 2**

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

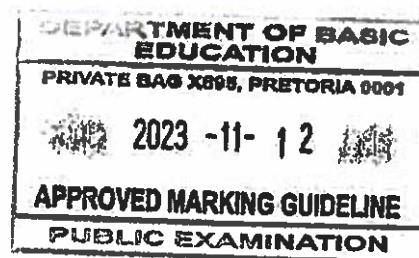
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2023 -11- 12

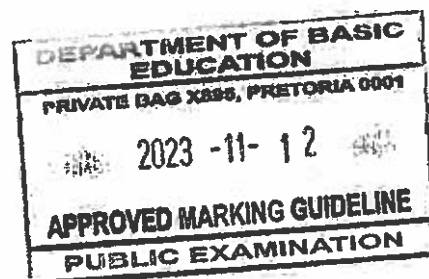
**APPROVED MARKING GUIDELINE**  
**PUBLIC EXAMINATION**

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



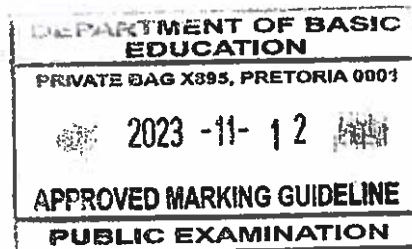
## QUESTION 3/VRAAG 3

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





## QUESTION 5/VRAAG 5

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



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><b>OR/OF</b></p> $f(x+h) = -4(x+h)^2 = -4x^2 - 8xh - 4h^2$ $f(x+h) - f(x) = -4x^2 - 8xh - 4h^2 - (-4x^2)$ $= -8xh - 4h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-8xh - 4h^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{h(-8x - 4h)}{h}$ $f'(x) = \lim_{h \rightarrow 0} (-8x - 4h)$ $f'(x) = -8x$ | <ul style="list-style-type: none"> <li>✓ substitution into correct formula</li> <li>✓ <math>f(x+h) = -4x^2 - 8xh - 4h^2</math></li> <li>✓ simplification</li> <li>✓ common factor</li> <li>✓ answer (5)</li> </ul> <p><b>OR/OF</b></p> <ul style="list-style-type: none"> <li>✓ <math>f(x+h) = -4x^2 - 8xh - 4h^2</math></li> <li>✓ simplification</li> <li>✓ substitution into correct formula</li> <li>✓ common factor</li> <li>✓ answer (5)</li> </ul> |
| <p>7.2.1</p>   | $f(x) = 2x^3 - 3x$ $f'(x) = 6x^2 - 3$  | <ul style="list-style-type: none"> <li>✓ <math>6x^2</math></li> <li>✓ <math>-3</math> (2)</li> </ul>  |
| <p>7.2.2</p>   | $D_x [7\sqrt[3]{x^2} + 2x^{-5}]$ $D_x [7x^{\frac{2}{3}} + 2x^{-5}]$ $= \frac{14}{3}x^{-\frac{1}{3}} - 10x^{-6}$  | <ul style="list-style-type: none"> <li>✓ <math>x^{\frac{2}{3}}</math> CA only if exponent is a fraction (<math>\frac{2}{3}</math>)</li> <li>✓ derivative with rational exp</li> <li>✓ <math>-10x^{-6}</math> (3)</li> </ul>   |
| <p>7.3</p>     | $-6x^2 + 8 > 0$ $x^2 < \frac{8}{6}$ <p>CV's: <math>x = -\frac{2}{\sqrt{3}}</math> or <math>x = \frac{2}{\sqrt{3}}</math></p> <p>Positive for: <math>-\frac{2}{\sqrt{3}} &lt; x &lt; \frac{2}{\sqrt{3}}</math></p>  | <ul style="list-style-type: none"> <li>✓ CV's: <math>x = \pm \frac{2}{\sqrt{3}}</math></li> <li>✓ answer (3)</li> </ul>   |
| <p>1, 1, 5</p> |  | <p>[13]</p>   |

Remember to make for line notation  
Answer only '0'

answer only full marks

$\geq$  or  $\leq$  ( $\frac{2}{3}$ )  
shows graph clearly without conclusion ( $\frac{2}{3}$ )

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$\sqrt{\frac{4}{3}} < x < \sqrt{\frac{8}{6}}$   
 $-\sqrt{\frac{8}{6}} < x < \sqrt{\frac{8}{6}}$   
 $-\frac{2\sqrt{3}}{3} < x < \frac{2\sqrt{3}}{3}$

1, 1, 5 < 2 < 1, 1, 5

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0860123000  
0861201000

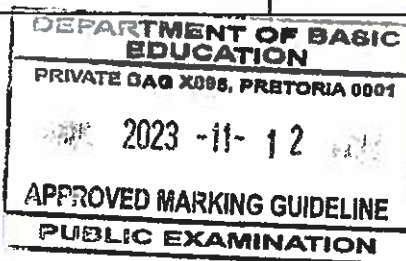
QUESTION 6/VRAAG 6

|              |   |   |
|--------------|---|---|
| <p>6.1.1</p> | $A = P(1+i)^n$ $19\ 319,48 = 18\ 500 \left(1 + \frac{r}{1200}\right)^6$ $\left(1 + \frac{r}{1200}\right) = \sqrt[6]{1,04429\dots}$ $\frac{r}{1200} = 0,00725\dots$ $r = 8,7\%$  | <p><math>(1+i)^6</math><br/>0,725 only<br/>get 2<sup>nd</sup> mark</p> <p>✓ <math>n = 6</math><br/>✓ substitution into correct formula</p> <p>✓ answer (3)</p>        |
| <p>6.1.2</p> | $1 + \frac{i}{100} = \left(1 + \frac{8,7}{1200}\right)^{12}$ $r = 9,06\%$   | <p>✓ substitution into correct formula</p> <p>✓ answer (2)</p>  |
| <p>6.2.1</p> | $A = P(1-in)$ $0 = 10\ 000(1 - 0,2n)$ $n = 5$   | <p>✓ substitution into correct formula</p> <p>✓ answer (2)</p>  |
| <p>6.2.2</p> | $F = \frac{x[(1+i)^n - 1]}{i}$ $20\ 000 = \frac{x \left[ \left(1 + \frac{8,7}{1200}\right)^{60} - 1 \right]}{\frac{8,7}{1200}}$ $x = R267,26$   | <p>✓ <math>i</math><br/>✓ <math>n</math><br/>✓ substitution into correct formula</p> <p>✓ answer (4)</p>  |
| <p>6.3</p>   | $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $1\ 600\ 000 = \frac{20\ 000 \left[ 1 - \left(1 + \frac{0,112}{12}\right)^{-n} \right]}{\frac{0,112}{12}}$ $\frac{56}{75} = 1 - \left(1 + \frac{0,112}{12}\right)^{-n}$ $\left(1 + \frac{0,112}{12}\right)^{-n} = \frac{19}{75}$ $-n = \log_{\left(1 + \frac{0,112}{12}\right)} \left(\frac{19}{75}\right)$ $-n = -147,80$ <p>Tino will make 147 withdrawals of R20 000</p> | <p>✓ <math>i</math><br/>✓ substitution into correct formula</p> <p>✓ correct use of logs</p> <p>✓ <math>-n = -147,80</math><br/>✓ <math>n = 147</math></p> <p>(5)</p> |
|              |   | <p>[16]</p>   |

Swap A  
 $\frac{1}{5}$

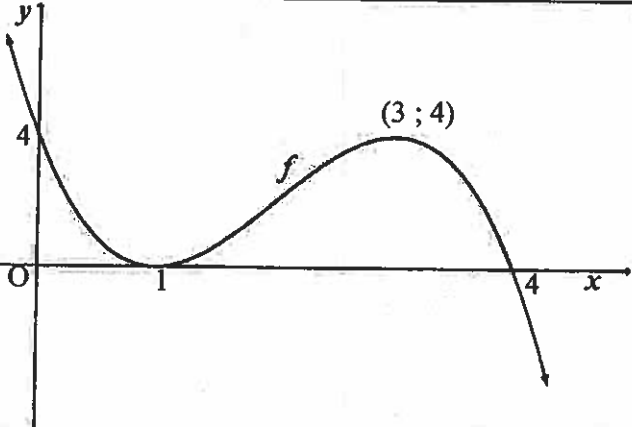
Answer (2)

using FV  $\left(\frac{2}{5}\right)$   
i and correct use of logs.  
Use A formula  
 $i \left(\frac{1}{5}\right)$



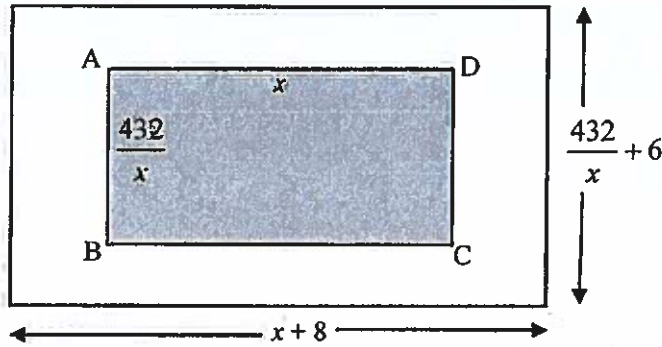
*[Handwritten signatures]*

**QUESTION 8/VRAAG 8**

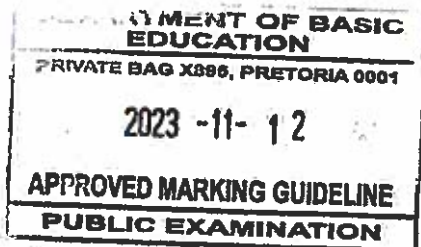
|             |  |   |
|-------------|--|---|
| <p>8.1</p>  | $f'(x) = -3x^2 + 12x - 9$ $-3x^2 + 12x - 9 = 0$ $x^2 - 4x + 3 = 0$ $(x-3)(x-1) = 0$ $\therefore x = 3 \text{ or } x = 1$ $f(3) = -(3)^3 + 6(3)^2 - 9(3) + 4 = 4$ $f(1) = -(1)^3 + 6(1)^2 - 9(1) + 4 = 0$ $\therefore \text{turning points are: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

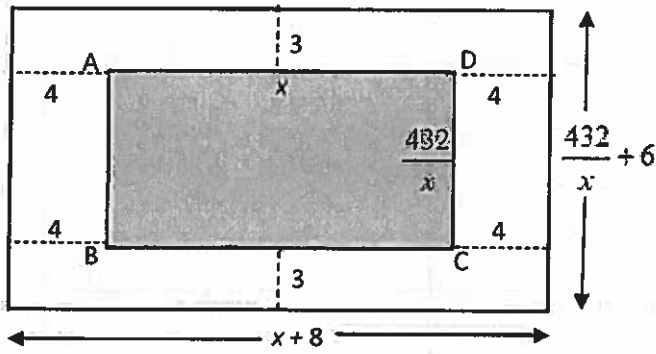


QUESTION 9/VRAAG 9

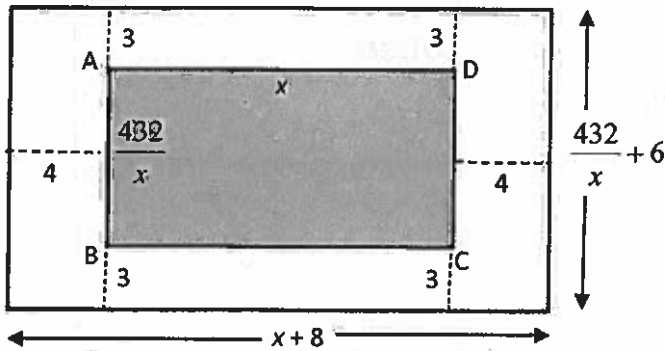


|            |  |  |
|------------|--|--|
| <p>9.1</p> | $432 = xb$ $\therefore b = \frac{432}{x}$ $A(x) = (x+8)\left(\frac{432}{x} + 6\right)$ $A(x) = 432 + 6x + \frac{3456}{x} + 480$ $A(x) = \frac{3456}{x} + 6x + 480$ | $\checkmark b = \frac{432}{x}$ $\checkmark (x+8)$ $\checkmark \left(\frac{432}{x}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

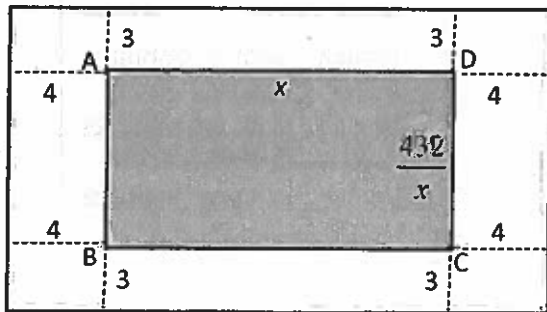




$$\text{total area} = 2(x+8)(3) + 2\left(\frac{432}{x}\right)(4) + \left(\frac{432}{x}\right)(x)$$



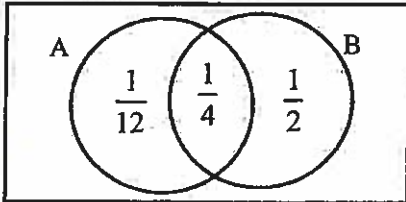
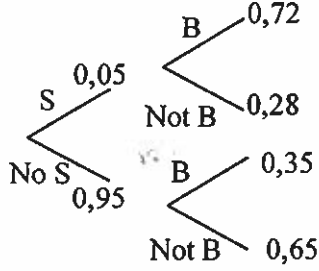
$$\text{total area} = 2(4)\left(\frac{432}{x} + 6\right) + (x)\left(\frac{432}{x} + 6\right)$$



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

|                                  |
|----------------------------------|
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**QUESTION 10/VRAAG 10**

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

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

TOTAL/TOTAAL: 150

