



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMNATIONS ***SENIORSERTIFIKAAT-EKSAMEN***

MATHEMATICS P1/*WISKUNDE VI*

2017

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS: 150
PUNTE: 150

These marking guidelines consist of 20 pages.
Hierdie nasienriglyne bestaan uit 20 bladsye.

NOTE:

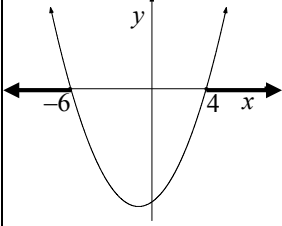
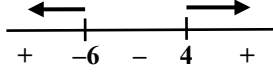
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking memorandum.

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/VRAAG 1

1.1.1	$3x^2 + 10x + 6 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-10 \pm \sqrt{(10)^2 - 4(3)(6)}}{2(3)}$ $x = -2,55 \text{ or } x = -0,78$ <p>OR/OF</p> $x^2 + \frac{10}{3}x + \frac{100}{36} = -2 + \frac{100}{36}$ $\left(x + \frac{5}{3}\right)^2 = \frac{7}{9}$ $x + \frac{5}{3} = \pm \frac{\sqrt{7}}{3}$ $x = \frac{-5 \pm \sqrt{7}}{3}$ $x = -0,78 \text{ or } x = -2,55$	<p>✓ substitution into correct formula</p> <p>✓ $x = -2,55$</p> <p>✓ $x = -0,78$</p> <p>(3)</p> <p>✓ for adding $\frac{100}{36}$ on both sides</p> <p>✓ $x = -2,55$</p> <p>✓ $x = -0,78$</p> <p>(3)</p>
1.1.2	$\sqrt{6x^2 - 15} = x + 1$ $6x^2 - 15 = (x + 1)^2$ $6x^2 - 15 = x^2 + 2x + 1$ $5x^2 - 2x - 16 = 0$ $(5x + 8)(x - 2) = 0$ $x = -\frac{8}{5} \text{ or } x = 2$ $\therefore x = 2$	<p>✓ concept of squaring both sides</p> <p>✓ standard form (accurate)</p> <p>✓ factors</p> <p>✓ both answers</p> <p>✓ correct selection</p> <p>(5)</p>

<p>1.1.3</p>	$x^2 + 2x - 24 \geq 0$ $(x + 6)(x - 4) \geq 0$  <p style="text-align: center;">OR</p>  $x \leq -6 \text{ or } x \geq 4$	<ul style="list-style-type: none"> ✓ factors ✓✓ $x \leq -6$ or $x \geq 4$ <p style="text-align: right;">(3)</p>
<p>1.2</p>	$y = -5x + 3$ $3x^2 - 2x(-5x + 3) = (-5x + 3)^2 - 105$ $3x^2 + 10x^2 - 6x = 25x^2 - 30x + 9 - 105$ $-12x^2 + 24x + 96 = 0$ $x^2 - 2x - 8 = 0$ $(x - 4)(x + 2) = 0$ $x = -2 \text{ or } x = 4$ $y = 13 \text{ or } y = -17$ <p style="text-align: center;">OR/OF</p> $x = \frac{3 - y}{5}$ $3\left(\frac{3 - y}{5}\right)^2 - 2y\left(\frac{3 - y}{5}\right) = y^2 - 105$ $3\left(\frac{9 - 6y + y^2}{25}\right) - 2y\left(\frac{3 - y}{5}\right) = y^2 - 105$ $27 - 18y + 3y^2 - 30y + 10y^2 = 25y^2 - 2625$ $12y^2 + 48y - 2652 = 0$ $y^2 + 4y - 221 = 0$ $(y - 13)(y + 17) = 0$ $y = -17 \text{ or } y = 13$ $x = \frac{3 + 17}{5} \text{ or } x = \frac{3 - 13}{5}$ $x = 4 \text{ or } x = -2$	<ul style="list-style-type: none"> ✓ y subject of formula ✓ substitution ✓ simplification ✓ factors ✓ values of x ✓ values of y ✓ x subject of formula ✓ substitution ✓ simplification ✓ factors ✓ values of y ✓ values of x <p style="text-align: right;">(6)</p>
<p>1.3.1</p>	$p^2 - 48p - 49 = 0$ $(p - 49)(p + 1) = 0$ $p = -1 \text{ or } p = 49$	<ul style="list-style-type: none"> ✓ factors ✓ $p = -1$ ✓ $p = 49$ <p style="text-align: right;">(3)</p>
<p>1.3.2</p>	$7^x = -1 \quad \text{or} \quad 7^x = 49$ <p>no solution $x = 2$</p>	<ul style="list-style-type: none"> ✓ $7^x = -1$ or $7^x = 49$ ✓ no solution ✓ $x = 2$ <p style="text-align: right;">(3)</p>

QUESTION/VRAAG 2

2.1.1	$3; 2; k; \dots$ $r = \frac{2}{3}$	$\checkmark r = \frac{2}{3} / 0,67$ (1)
2.1.2	$r = \frac{T_3}{T_2}$ $T_3 = r \times T_2$ $= \frac{2}{3} \times 2$ $= \frac{4}{3}$ Thus $k = \frac{4}{3}$	$\checkmark \frac{2}{3} \times 2$ $\checkmark \frac{4}{3} / 1,34$ (2)
2.1.3	$T_n = a.r^{n-1}$ $\frac{128}{729} = 3 \times \left(\frac{2}{3}\right)^{n-1}$ $\left(\frac{2}{3}\right)^{n-1} = \frac{128}{2187}$ $\left(\frac{2}{3}\right)^{n-1} = \left(\frac{2}{3}\right)^7$ $n-1 = 7$ $n = 8$ OR / OF $T_n = a.r^{n-1}$ $\frac{128}{729} = 3 \times \left(\frac{2}{3}\right)^{n-1}$ $\left(\frac{2}{3}\right)^{n-1} = \frac{128}{2187}$ $n-1 = \log_{\frac{2}{3}} \frac{128}{2189}$ $n-1 = 7$ $n = 8$	$\checkmark \frac{128}{729} = 3 \times \left(\frac{2}{3}\right)^{n-1}$ $\checkmark \left(\frac{2}{3}\right)^{n-1} = \frac{128}{2187}$ $\checkmark \left(\frac{2}{3}\right)^7$ \checkmark answer OR / OF $\checkmark \frac{128}{729} = 3 \times \left(\frac{2}{3}\right)^{n-1}$ $\checkmark \left(\frac{2}{3}\right)^{n-1} = \frac{128}{2187}$ $\checkmark n-1 = \log_{\frac{2}{3}} \frac{128}{2189}$ \checkmark answer (4)
2.2.1	$T_n = a + (n-1)d$ $T_{18} = 100 + (18-1)(150)$ $= R 2\ 650$	\checkmark substitution of n , a and d into AS $\checkmark 2\ 650$ (2)

2.2.2	$S_n = \frac{n}{2}[2a + (n-1)d]$ $30\,500 = \frac{n}{2}[2(100) + (n-1)(150)]$ $61\,000 = n(150n + 50)$ $61\,000 = 150n^2 + 50n$ $3n^2 + n - 1\,220 = 0$ $(3n + 61)(n - 20) = 0$ $n = -\frac{61}{3} \text{ or } n = 20$ <p style="text-align: center;">N/A</p> $x = 100 + (20-1)(150)$ $= R\,2\,950$	<p>✓ substitute 30 500, a and d into sum formula for AS</p> <p>✓ simplification ✓ factors or quad formula ✓ $n = 20$</p> <p>✓ substitution T_n of AS ✓ 2 950</p> <p style="text-align: right;">(6) [15]</p>
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QUESTION/VRAAG 3

3.1	<p>First differences: 17; 15 Second difference: -2</p> $T_n = an^2 + bn + c$ $a = \frac{\text{second difference}}{2} = \frac{-2}{2} = -1$ $3a + b = 17$ $3(-1) + b = 17$ $b = 20$ $a + b + c = 0$ $-1 + 20 + c = 0$ $c = -19$ $T_n = -n^2 + 20n - 19$ <p>OR / OF</p> <p>First differences: 17; 15</p> $T_n = T_1 + (n-1)d_1 + \frac{(n-1)(n-2)}{2}d_2$ $= (0) + (n-1)(17) + \frac{(n-1)(n-2)}{2}(-2)$ $= 17n - 17 - n^2 + 3n - 2$ $= -n^2 + 20n - 19$	<p>✓17; 15</p> <p>✓ value of a</p> <p>✓ value of b</p> <p>✓ value of c</p> <p>✓17; 15 ✓ value of a ✓ value of b ✓ value of c</p> <p style="text-align: right;">(4)</p>
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<p>3.2</p>	$56 = -n^2 + 20n - 19$ $n^2 - 20n + 75 = 0$ $(n - 15)(n - 5) = 0$ $n = 5 \text{ or } n = 15$	<p>✓ $T_n = 56$</p> <p>✓ factors</p> <p>✓ both answers</p> <p>(3)</p>
<p>3.3</p>	$\sum_{n=5}^{10} T_n - \sum_{n=11}^{15} T_n$ $= T_5 + T_6 + T_7 + T_8 + T_9 + T_{10} - T_{11} - T_{12} - T_{13} - T_{14} - T_{15}$ $= (T_5 - T_{15}) + (T_6 - T_{14}) + \dots + (T_9 - T_{13}) + T_{10}$ $= T_{10}$ <p>because by symmetry $T_5 = T_{15}$; $T_6 = T_{14}$</p> $T_{10} = -(10)^2 + 20(10) - 19$ $= 81$ <p>OR/OF</p> $0; 17; 32; 45; \overset{T_5}{56}; 65; 72; 77; 80; \overset{T_{10}}{81}; 80; 77; 72; 65; \overset{T_{15}}{56}$ <p>Hence,</p> $\sum_{n=5}^{10} T_n - \sum_{n=11}^{15} T_n$ $= (56 + 65 + 72 + 77 + 80 + 81) - (80 + 77 + 72 + 65 + 56)$ $= 81$	<p>✓✓ symmetry of terms</p> <p>✓ T_{10}</p> <p>✓ 81</p> <p>(4)</p> <p>✓ writing out the symmetry of terms</p> <p>✓</p> <p>$56 + 65 + 72 + 77 + 80 + 81$</p> <p>✓</p> <p>$80 + 77 + 72 + 65 + 56$</p> <p>✓ 81</p> <p>(4)</p> <p>[11]</p>

QUESTION/VRAAG 4

4.1	A (4; 3)	✓(4; 3) (1)
4.2	$y = \frac{6}{-4} + 3$ $= \frac{3}{2}$ $B\left(0; \frac{3}{2}\right)$	✓ x = 0 ✓ y = $\frac{3}{2}$ (2)
4.3	$0 = \frac{6}{x-4} + 3$ $-3 = \frac{6}{x-4}$ $-3(x-4) = 6$ $-3x + 12 = 6$ $x = 2$ C(2 ; 0)	✓ y = 0 ✓ x = 2 (2)
4.4	Average gradient = $\frac{0 - \frac{3}{2}}{2 - 0}$ $= -\frac{3}{4}$	$\frac{0 - \frac{3}{2}}{2 - 0}$ ✓ $-\frac{3}{4}$ (2)
4.5	$y = -x + 7$ OR/OF $m = -1$ $\therefore y - 3 = -(x - 4)$ $y = -x + 7$	✓ $m = -1$ ✓ $y = -x + 7$ OR/OF ✓ $m = -1$ ✓ $y = -x + 7$ (2) [9]

QUESTION/VRAAG 5

<p>5.1</p>		<p>f:</p> <ul style="list-style-type: none"> ✓ x-intercepts ✓ y-intercept ✓ shape ✓ TP <p>g:</p> <ul style="list-style-type: none"> ✓ x-intercept and y-intercept ✓ shape <p>(6)</p>
<p>5.2</p>	<p>$y = -20\frac{1}{4}$</p>	<p>✓✓ $y = -20\frac{1}{4} / -\frac{81}{4}$</p> <p>(2)</p>
<p>5.3</p>	<p>$-20\frac{1}{4} < k < -14$</p>	<p>✓ $-20\frac{1}{4} < k$</p> <p>✓ $k < -14$</p> <p>(2)</p>
<p>5.4</p>	<p>Reflecting in the x-axis: $y = -2x + 14$</p> <p style="text-align: center;">$y = -2(x + 7) + 14$</p> <p>Shifting 7 units to the left: $= -2x - 14 + 14$</p> <p style="text-align: center;">$= -2x$</p>	<p>✓ $y = -2x + 14$</p> <p>✓ $y = -2x$</p> <p>(2)</p> <p>[12]</p>

QUESTION/VRAAG 6

6.1	$f : y = b^x$ $f^{-1} : x = b^y$ $y = \log_b x$	✓ interchange x and y ✓ answer (2)
6.2	$y = x$	✓ answer (1)
6.3	P(0; 1)	✓ answer (1)
6.4	T(1; 0) $y = mx + c$ $y = -x + 1$	✓ coordinates of T ✓ $y = -x + 1$ (2)
6.5	At point R, PT and OR intersect: $-x + 1 = x$ $2x = 1$ $x = \frac{1}{2}$ $y = \frac{1}{2}$ Substitute $\left(\frac{1}{2}; \frac{1}{2}\right)$ into the equation of f : $y = b^x$ $\frac{1}{2} = b^{\frac{1}{2}}$ $b = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$ OR/OF At point R, PT and OR intersect: $-x + 1 = x$ $2x = 1$ $x = \frac{1}{2}$ $y = \frac{1}{2}$ Substitute $\left(\frac{1}{2}; \frac{1}{2}\right)$ into the equation of g : $y = \log_b x$ $\frac{1}{2} = \log_b \left(\frac{1}{2}\right)$ $b^{\frac{1}{2}} = \frac{1}{2}$ $b = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$	✓ $-x + 1 = x$ ✓ $x = \frac{1}{2}$ ✓ $y = \frac{1}{2}$ ✓ substitution ✓ $b = \frac{1}{4}$ ✓ $-x + 1 = x$ ✓ $x = \frac{1}{2}$ ✓ $y = \frac{1}{2}$ ✓ substitution ✓ $b = \frac{1}{4}$ (5) [11]

QUESTION/VRAAG 7

7.1	$A = P(1-i)^n$ $331527 = 500000(1-i)^3$ $(1-i)^3 = \frac{331527}{500000}$ $1-i = \sqrt[3]{\frac{331527}{500000}}$ $i = 0,12800\dots$ $= 12,8\%$	<p>✓ substitution of A, P & n in correct formula</p> <p>✓ $1-i = \sqrt[3]{\frac{331527}{500000}}$ or</p> <p>$1-i = \sqrt[3]{0,663054}$</p> <p>✓ answer</p> <p style="text-align: right;">(3)</p>
7.2	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $46\,000 = \frac{1900 \left[1 - \left(1 + \frac{0,24}{12} \right)^{-n} \right]}{\frac{0,24}{12}}$ $\frac{46}{95} = 1 - \left(1 + \frac{0,24}{12} \right)^{-n}$ $\left(1 + \frac{0,24}{12} \right)^{-n} = \frac{49}{95}$ $n = -\log_{\left(1 + \frac{0,24}{12} \right)} \frac{49}{95} \quad \text{OR/OF} \quad -n \log \left(1 + \frac{0,24}{12} \right) = \log \frac{49}{95}$ $= 33,43276544\dots \text{ months}$ <p>It will take him 34 months to pay back the loan.</p>	<p>✓ $i = \frac{0,24}{12} / 0,02 / \frac{1}{50}$</p> <p>✓ substitution of P, x and i in correct formula</p> <p>✓ 33,43</p> <p>✓ answer</p> <p style="text-align: right;">(4)</p>
7.3	$F = \frac{x[(1+i)^n - 1]}{i}$ $= \frac{3500 \left[\left(1 + \frac{0,075}{4} \right)^{4 \times 6,5} - 1 \right]}{\frac{0,075}{4}}$ $= R\,115\,902,69$ $A = P(1+i)^n$ $= 115\,902,69 \left(1 + \frac{0,075}{4} \right)^{4 \times 3,5}$ $= R\,150\,328,12$	<p>✓ $i = \frac{0,075}{4} / 0,01875$</p> <p>✓ $n = 4 \times 6,5 = 26$</p> <p>✓ substitution into correct formula</p> <p>✓ 115 902,69</p> <p>✓ substitution into correct formula</p> <p>✓ 150 328,12</p> <p style="text-align: right;">(6)</p> <p style="text-align: right;">[13]</p>

QUESTION/VRAAG 8

8.1	$f(x+h) = 3 - 2(x+h)^2$ $= 3 - 2x^2 - 4xh - 2h^2$ $f(x+h) - f(x) = 3 - 2x^2 - 4xh - 2h^2 - 3 + 2x^2$ $= -4xh - 2h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-4xh - 2h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $= \lim_{h \rightarrow 0} (-4x - 2h)$ $= -4x$ <p>OR/OF</p> $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{3 - 2(x+h)^2 - (3 - 2x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{3 - 2x^2 - 4xh - 2h^2 - 3 + 2x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-4xh - 2h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $= \lim_{h \rightarrow 0} (-4x - 2h)$ $= -4x$	$\checkmark 3 - 2x^2 - 4xh - 2h^2$ $\checkmark -4xh - 2h^2$ $\checkmark f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $\checkmark \lim_{h \rightarrow 0} (-4x - 2h)$ $\checkmark -4x \quad (5)$ $\checkmark f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $\checkmark 3 - 2x^2 - 4xh - 2h^2$ $\checkmark -4xh - 2h^2$ $\checkmark \lim_{h \rightarrow 0} (-4x - 2h)$ $\checkmark -4x \quad (5)$
8.2	$y = \frac{12x^2 + 2x + 1}{6x}$ $= 2x + \frac{1}{3} + \frac{1}{6x}$ $= 2x + \frac{1}{3} + \frac{1}{6}x^{-1}$ $\frac{dy}{dx} = 2 - \frac{1}{6}x^{-2}$ $= 2 - \frac{1}{6x^2}$	$\checkmark \frac{12x^2}{6x} + \frac{2x}{6x} + \frac{1}{6x}$ $\checkmark \frac{1}{6}x^{-1}$ $\checkmark 2$ $\checkmark -\frac{1}{6}x^{-2}$ <p style="text-align: right;">(4)</p>

<p>8.3</p>	$y = x^3 + bx^2 + cx - 4$ $y' = 3x^2 + 2bx + c$ $y'' = 6x + 2b$ <p>At point of inflection:</p> $y'' = 6x + 2b = 0$ <p>Substitute $x = 2$:</p> $6(2) + 2b = 0$ $2b = -12$ $b = -6$ $y = x^3 - 6x^2 + cx - 4$ <p>Substitute (2; 4):</p> $4 = 2^3 - 6(2)^2 + c(2) - 4$ $2c = 24$ $c = 12$ $y = x^3 - 6x^2 + 12x - 4$	$\checkmark y' = 3x^2 + 2bx + c$ $\checkmark y'' = 6x + 2b$ $\checkmark y'' = 0$ $\checkmark \text{sub } x = 2 \text{ into } y'' = 0$ $\checkmark \text{value of } b$ $\checkmark \text{substitute } (2; 4)$ $\checkmark \text{value of } c$ <p style="text-align: right;">(7) [16]</p>
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QUESTION/VRAAG 9

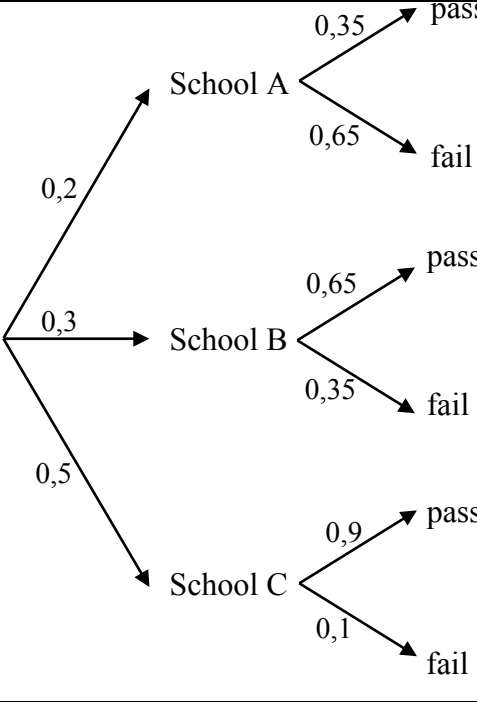
<p>9.1</p>	<p>(0 ; 1)</p>	<p>\checkmark answer (1)</p>
<p>9.2</p>	$f(x) = x^3 - x^2 - x + 1$ $f(x) = x^2(x - 1) - (x - 1)$ $f(x) = (x - 1)(x^2 - 1)$ $f(x) = (x - 1)(x - 1)(x + 1)$ $f(x) = 0$ $(x - 1)(x - 1)(x + 1) = 0$ <p>x-intercepts: (-1; 0); (1; 0)</p> <p>OR</p> $f(x) = x^3 - x^2 - x + 1$ $f(x) = (x - 1)(x^2 - 1)$ $f(x) = (x - 1)(x - 1)(x + 1)$ $f(x) = 0$ $(x - 1)(x - 1)(x + 1) = 0$ <p>x-intercepts: (-1; 0); (1; 0)</p> <p>OR</p>	$\checkmark (x - 1)$ $\checkmark (x^2 - 1)$ $\checkmark (x - 1)(x - 1)(x + 1)$ $\checkmark (-1; 0)$ $\checkmark (1; 0)$ <p style="text-align: right;">(5)</p> $\checkmark (x - 1)$ $\checkmark (x^2 - 1)$ $\checkmark (x - 1)(x - 1)(x + 1)$ $\checkmark (-1; 0)$ $\checkmark (1; 0)$ <p style="text-align: right;">(5)</p>

	$f(x) = x^3 - x^2 - x + 1$ $f(x) = (x + 1)(x^2 - 2x + 1)$ $f(x) = (x + 1)(x - 1)(x - 1)$ $f(x) = 0$ $(x - 1)(x - 1)(x + 1) = 0$ <p>x-intercepts: $(-1; 0); (1; 0)$</p>	<ul style="list-style-type: none"> ✓ $(x + 1)$ ✓ $(x^2 - 2x + 1)$ ✓ $(x - 1)(x - 1)(x + 1)$ ✓ $(-1; 0)$ ✓ $(1; 0)$ <p style="text-align: right;">(5)</p>
<p>9.3</p>	$f(x) = x^3 - x^2 - x + 1$ $f'(x) = 3x^2 - 2x - 1$ $f'(x) = 0$ $(3x + 1)(x - 1) = 0$ $x = -\frac{1}{3} \text{ or } x = 1$ $y = \frac{32}{27} \quad y = 0$ $\left(-\frac{1}{3}; \frac{32}{27}\right) (1; 0)$	<ul style="list-style-type: none"> ✓ $f'(x) = 3x^2 - 2x - 1$ ✓ $f'(x) = 0$ ✓ factorisation ✓ x value ✓ x value ✓ $y = \frac{32}{27}$ <p style="text-align: right;">(6)</p>
<p>9.4</p>		<ul style="list-style-type: none"> ✓ y- and x-intercepts ✓ shape ✓ turning points <p style="text-align: right;">(3)</p>
<p>9.5</p>	$f'(x) < 0$ $-\frac{1}{3} < x < 1$ <p>OR/OF</p> $\left(-\frac{1}{3}; 1\right)$	<ul style="list-style-type: none"> ✓ $x > -\frac{1}{3}$ ✓ $x < 1$ ✓ $\left(-\frac{1}{3}; 1\right)$ <p style="text-align: right;">(2)</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">[17]</p>

QUESTION/VRAAG 10

10.1	$60 = 2b + 2r + \frac{1}{2}(2\pi r)$ $2b = 60 - 2r - \pi r$ $b = 30 - r - \frac{1}{2}\pi r$	$\checkmark 60 = 2b + 2r + \frac{1}{2}(2\pi r)$ $\checkmark b = 30 - r - \frac{1}{2}\pi r$ <p style="text-align: right;">(2)</p>
10.2	<p>Area = area of rectangle + area of semicircle</p> $A(r) = \text{length} \times \text{breadth} + \frac{1}{2}(\text{area of circle})$ $= (2r)\left(30 - r - \frac{1}{2}\pi r\right) + \frac{1}{2}(\pi r^2)$ $= 60r - 2r^2 - \pi r^2 + \frac{1}{2}\pi r^2$ $= 60r - 2r^2 - \frac{1}{2}\pi r^2$ $= 60r - \left(2 + \frac{1}{2}\pi\right)r^2$ <p>For a maximum,</p> $A'(r) = 0$ $60 - 2\left(2 + \frac{1}{2}\pi\right)r = 0$ $60 - (4 + \pi)r = 0$ $r = \frac{60}{4 + \pi}$ $= 8,40 \text{ m}$	$\checkmark (2r)\left(30 - r - \frac{1}{2}\pi r\right)$ $\checkmark \frac{1}{2}(\pi r^2)$ $\checkmark 60r - 2r^2 - \frac{1}{2}\pi r^2$ $\checkmark A'(r) = 0$ $\checkmark 60 - 2\left(2 + \frac{1}{2}\pi\right)r$ $\checkmark \text{answer}$ <p style="text-align: right;">(6) [8]</p>

QUESTION/VRAAG 11

11.1	$8 \times 7 \times 6 \times 5 \times 4$ or $\frac{8!}{3!}$ $= 6720$	$\checkmark 8 \times 7 \times 6 \times 5 \times 4 / \frac{8!}{3!}$ $\checkmark 6720$ (2)
11.2	$P(A \text{ and } B) = P(A) \times P(B)$ $= 0,4 \times 0,35$ $= 0,14$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $= 0,4 + 0,35 - 0,14$ $= 0,61$	$\checkmark 0,4 \times 0,35$ $\checkmark 0,14$ \checkmark substitution \checkmark answer (4)
		
11.3.1	$100\% - 20\%$ or/of $1 - 0,2$ $= 80\%$ or/of $= 0,8$ OR/OF $30\% + 50\% = 80\%$ or/of $0,3 + 0,5 = 0,8$	$\checkmark 100\% - 20\%$ or $1 - 0,2$ $\checkmark 80\%$ or $0,8$ $\checkmark 30\% + 50\%$ or $0,3 + 0,5$ $\checkmark 80\%$ or $0,8$ (2)
11.3.2	$0,3 \times 0,35 = 0,105$ $= 10,5\%$	$\checkmark 0,3$ $\checkmark 0,35$ $\checkmark 0,105 = 10,5\%$ (3)
11.3.3	$(0,2 \times 0,35) + (0,3 \times 0,65) + (0,5 \times 0,9)$ $= 0,715$ $= 71,5\%$	$\checkmark 0,2 \times 0,35$ $\checkmark 0,3 \times 0,65$ $\checkmark 0,5 \times 0,9$ \checkmark answer (4) [15]

TOTAL/TOTAAL: 150



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/ SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P1/WISKUNDE VI

2016

MARKING GUIDELINE (ADDENDUM)

MARKS/PUNTE: 150

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, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.

Once a candidate has reached 2 errors related to marks: stop marking.

QUESTION/VRAAG 1

1.1.1	<ul style="list-style-type: none"> • incorrect rounding 2/3 – only rounding penalization • use of calculator 2/3 – this is where use of calculator for factors get used • answer in surd form 2/3 (at least simplified under square root)
1.1.2	<ul style="list-style-type: none"> • CA mark only if quadratic equation • check answers • if $6x^2 - 15 = x + 1$ breakdown 0/3 • both answer must be seen before selection if no factors are shown • if in the context of their incorrect sum, both of the answers are NA, both need to be shown as NA
1.1.3	$(x + 6)(x - 4) \geq 0$ <ul style="list-style-type: none"> • $x \geq 4$ or / and $x \geq -6$, award 1/3 marks (factors) • $x \leq 4$ or / and $x \leq -6$, award 1/3 marks (factors) • $-6 \leq x \leq 4$, award 1/3 marks (factors) • $x \leq -6$ and $x \geq 4$, award 2/3 marks • equal is left out: -1 <p>Answer only 3/3</p>
1.2	<p>NB: At the second error related to a mark (two skills) – no further marking. If incorrect algebra leads to the equation being linear: max 2/6 These marks will be the changing of the formula and the substitution mark.</p>
1.3.2	<p>CA from 1.3.1</p> <ul style="list-style-type: none"> • If $7^x = p$ can award 1 mark for the concept • If answer $x = 2$ only 2/3

QUESTION/VRAAG 2

2.1.2	<p>CA from 2.1.1 Answer only 2/2</p>
2.1.3	<p>Answer only 1/4</p> <ul style="list-style-type: none"> • If $n = 7$ 2/4 • Incorrect working that leads to use of logs and an not a natural number max 2/4
2.2.1	<p>Answer only 2/2</p>
2.2.2	<ul style="list-style-type: none"> • Answer only 1/6

	<ul style="list-style-type: none"> S_n has to equal 30 500 otherwise a BD
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QUESTION/VRAAG 3

3.2	$n = 5$ only 1/3
3.3	Answer only 1/4

QUESTION/VRAAG 4

4.1	$x = 4$; $y = 3$ 1/1
4.3	$y = 0$ can be implied
4.4	CA from 4.2 and 4.3

QUESTION/VRAAG 5

5.1	Only working out, but no sketch max 4/6 – loose shape mark per graph not sketched
5.2	CA from turning point in 5.1
5.3	CA from sketch (TP to y -intercept)
5.4	Answer only 2/2

QUESTION/VRAAG 6

6.1	Answer only 2/2 If answer not in terms of b max 1/2
6.3	Coordinate from not needed

QUESTION/VRAAG 7

Penalise candidates a maximum of one mark (overall) for notation error in 7.1 and 7.2

7.1	<ul style="list-style-type: none"> Interchange A and P – breakdown 0/3 Wrong formula 0/3 Early rounding: answer is 12,93% – 2/3
7.3	<ul style="list-style-type: none"> i and n incorrect – learner can still get the substitution mark 1/6 If quarterly is taken as monthly consistently in both parts 5/6 $A = P(1 + i)^n$ <ul style="list-style-type: none"> If 10 years is used: $= 115\,902,69 \left(1 + \frac{0,075}{4}\right)^{4 \times 10}$ 5/6 $= R\,243\,667,94$

QUESTION/VRAAG 8**Penalise candidates a maximum of one mark (overall) for notation error in 8.1 and 8.2**

8.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ <p style="text-align: center;"> <u>Notation</u> <u>formula</u> </p>	Formula can be implied
8.2	<ul style="list-style-type: none"> • If function and derivative is mixed but splitting of fractions is evident max ¾ • If they start with differentiation – breakdown 0/4 	
8.3	$y'' = 0$ can be implied	

QUESTION/VRAAG 9

9.2	No working is shown(calculator used) <ul style="list-style-type: none"> • If the cubic becomes a quadratic 2/5 • If three brackets 5/5 	
9.3	$f'(x) = 0$ cannot be implied $f'(x) = 3x^2 - 2x - 1$ $x = -\left(\frac{-2}{2(3)}\right)$ BE CAREFUL 1/6 for derivative $= \frac{1}{3}$	
9.4	If dots only indicated on the graph 1/3 – x and y-intercepts	
9.5	Only CA from a cubic graph Each answer gets evaluated independently	

QUESTION/VRAAG 10

10.2	Derivative equal to zero is an independent mark $A'(r) = 0$ can be implied if working is correct
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QUESTION/VRAAG 11**If percentages are used – penalize once per question**

11.1	Answer only 2/2 2 or 0 marks
11.3.2	Do not penalize rounding
11.3.3	Do not penalize rounding