



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
SENIORSERTIFIKAAT-EKSAMEN
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

**MATHEMATICS P1/
WISKUNDE VI**

MARKING GUIDELINES/NASIENRIGLYNE

2019

**MARKS: 150
PUNTE: 150**

Approved
M. Sasman
(Umalusi)
19-05-2019

These marking guidelines consist of 15 pages.
Hierdie nasienriglyne bestaan uit 15 bladsye.

DEPARTMENT OF
EDUCATION
PRIVATE BAG X895, PRETORIA

2019-05-19

APPROVED MARKING GUIDELINE
PUBLIC EXAMINATION

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19/5/2019

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2019-05-19

2863

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

Alo: (1/2) Need to see factors.


<p>1.1.1</p>	<p>$x^2 - 5x - 6 = 0$ $(x - 6)(x + 1) = 0$ ✓ $x = 6$ or $x = -1$ ✓</p> <p>OR/OF</p> <p>$x^2 - 5x - 6 = 0$ $x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-6)}}{2(1)}$ ✓ $x = \frac{5 \pm \sqrt{49}}{2}$ $x = 6$ or $x = -1$ ✓</p> <p>ALTERN: Completing square ✓</p>	<p>Wrong factors; CA answers. ✓ factors ✓ both answers (2)</p> <p>OR/OF</p> <p>✓ correct subst into correct formula Wrong formula: 0 Wrong sub: CA answers. $\frac{-5 \pm \sqrt{\Delta}}{2}$ W/S.</p> <p>✓ both answers (2)</p>
<p>1.1.2</p>	<p>$(3x - 1)(x - 4) = 16$ $3x^2 - 13x - 12 = 0$ ✓</p> <p>$x = \frac{13 \pm \sqrt{(-13)^2 - 4(3)(-12)}}{2(3)}$ ✓ $x = \frac{13 \pm \sqrt{313}}{6}$ $x = 5,12$ or $x = -0,78$ ✓ (P)</p> <p>OR/OF</p> <p>$3x^2 - 13x - 12 = 0$ ✓ $x^2 - \frac{13}{3}x = 4$ $x^2 - \frac{13}{3}x + \left(-\frac{13}{6}\right)^2 = 4 + \left(-\frac{13}{6}\right)^2$ ✓ $\left(x - \frac{13}{6}\right)^2 = \frac{313}{36}$ $x = \frac{13 \pm \sqrt{313}}{6}$ $x = 5,12$ or $x = -0,78$ ✓ ✓</p>	<p>✓ standard form ✓ correct subst into correct formula or $\frac{13 \pm \sqrt{313}}{6}$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = 5,12$ or $-0,78$ (4) * Alo: (3/4) loose subst.</p> <p>✓ ✓ answers (4)</p> <p>OR/OF</p> <p>✓ standard form ✓ adding $\left(-\frac{13}{6}\right)^2$ both sides</p> <p>✓ ✓ answers (4)</p>

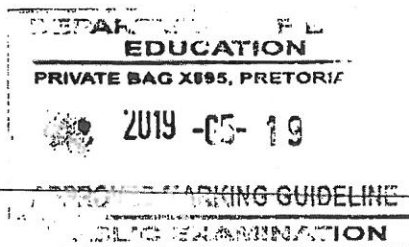
WF: B.
 $\frac{-13 \pm \sqrt{\Delta}}{6}$

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<p>1.1.3</p>	<p> $x(4-x) \geq 0$ $-x(x-4) \geq 0$ } ✓ or $-x(x-4) \geq 0$ $x(x-4) \leq 0$ → If sign not changed BD.  $0 \leq x \leq 4$ or $x \in [0; 4]$ ✓✓ Combo. </p>	<p> ✓ factorisation ↓ create critical-values. $x \in (0, 4)$ $0 < x < 4$ (2/3) ✓✓ $0 \leq x \leq 4$ A/o: (3/3) (3) </p>
<p>1.1.4</p>	<p> $\frac{5^{2x}-1}{5^x+1} = 4$ $(5^x+1)(5^x-1) = 4(5^x+1)$ $5^x-1 = 4$ ✓ $5^x = 5$ $x = 1$ ✓ * A/o: $x = 1$ (1/3) * No factors: $5^x - 1 = 4$ ✓ $x = 1$ ✓ * Trial & error: Shows $x = 1$ (3/3) OR/OF $(5^x-5)(5^x+1) = 0$ $5^x-5 = 0$ $5^x+1 = 0$ $x=1$ $x=0$ $\frac{5^{2x}-1}{5^x+1} = 4$ $5^{2x}-1 = 4 \cdot 5^x + 4$ $5^{2x} - 4 \cdot 5^x - 5 = 0$ ✓ $k^2 - 4k - 5 = 0$ $(5^x - 5)(5^x + 1) = 0$ ✓ $(k-5)(k+1) = 0$ $5^x = 5$ or $5^x = -1$ $x = 1$ ✓ → must N/A. </p>	<p> ✓ factors in numerator (k+1) $(k+1)(k-1) = 4$ $k-1 = 4$ $x = 1$ $\frac{5^{2x}-1}{5^x+1} = 4$ $5^{2x}-1 = 4(5^x+1)$ $5^x-1 = 4$ ✓ answer OR/OF ✓ standard form ✓ factors ✓ answer (3) </p>
<p>1.2</p>	<p> $x = 2 - 3y$ (1) $x^2 + 4xy - 5 = 0$ (2) Substitute (1) in (2): $(2-3y)^2 + 4y(2-3y) - 5 = 0$ ✓ $4 - 12y + 9y^2 + 8y - 12y^2 - 5 = 0$ $-3y^2 - 4y - 1 = 0$ $3y^2 + 4y + 1 = 0$ ✓ $(3y+1)(y+1) = 0$ $y = -\frac{1}{3}$ or $y = -1$ ✓ $x = 3$ or $x = 5$ ✓ OR/OF </p>	<p> ✓ $x = 2 - 3y$ $(2-3y)^2 + 4(2-3y)y - 5 = 0$ ✓ $9y^2 - 24y + 7 = 0$ ✓ ✓ correct subst into correct formula $y = \frac{7}{3}$ $y = \frac{1}{3}$ $x = -5$ $x = 1$ ✓ either standard form or formula. ✓ y-values (can use calculator) ✓ x-values (5) Becomes linear BD. (2/5) Swapping y & x: (3/5) except $x = -\frac{1}{3}$ $x = -1$ $y = \frac{7}{3}$ $y = 1$ (4/5) OR/OF </p>



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	$y = \frac{2}{3} - \frac{x}{3} \dots\dots\dots(1)$ $x^2 + 4xy - 5 = 0 \dots\dots\dots(2)$ <p>Substitute (1) in (2):</p> $x^2 + 4x\left(\frac{2}{3} - \frac{x}{3}\right) - 5 = 0$ $3x^2 + 8x - 4x^2 - 15 = 0$ $-x^2 + 8x - 15 = 0$ $x^2 - 8x + 15 = 0$ $(x-5)(x-3) = 0$ $x = 3 \text{ or } x = 5$ $y = -\frac{1}{3} \text{ or } y = -1$	$y = \frac{2}{3} - \frac{x}{3}$ <p>correct subst into correct formula</p> <p>either standard form</p> <p>x - values</p> <p>y - values</p> <p>(5)</p>
<p>1.3</p>	$ab = 2\sqrt{10}$ $bc = 3\sqrt{2}$ $ac = 6\sqrt{5}$ $ab \cdot bc \cdot ac = 2\sqrt{10} \cdot 6\sqrt{5} \cdot 3\sqrt{2}$ $(abc)^2 = 36\sqrt{100}$ $abc = \sqrt{360} = 6\sqrt{10}$ <p>OR/OF</p> $ac = 6\sqrt{5} \therefore a = \frac{6\sqrt{5}}{c}$ $bc = 3\sqrt{2} \therefore b = \frac{3\sqrt{2}}{c}$ $ab = 2\sqrt{10}$ $\left(\frac{6\sqrt{5}}{c}\right)\left(\frac{3\sqrt{2}}{c}\right) = 2\sqrt{10}$ $18\sqrt{10} = 2\sqrt{10} \cdot c^2$ $c^2 = 9$ $c = 3$ $\text{Volume} = abc = 2\sqrt{10} \cdot 3 = \sqrt{360} = 6\sqrt{10}$	$\text{volume} = abc$ $ab \cdot bc \cdot ac = 2\sqrt{10} \cdot 6\sqrt{5} \cdot 3\sqrt{2}$ $(abc)^2 = 36\sqrt{100}$ <p>answer</p> <p>OR/OF</p> $a = \frac{6\sqrt{5}}{c}$ $b = \frac{3\sqrt{2}}{c}$ <p>value of c</p> <p>Volume = abc</p> <p>answer</p> <p>(5)</p> <p>[22]</p>

CAREFUL!
 $c = 3$
 $b = \sqrt{2}$
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QUESTION/VRAAG 2

2.1.1	59 ✓	✓ answer
2.1.2	<p>15 \ 29 \ 41 \ 51 14 / \ 12 / \ 10 / -2 / \ -2 /</p> <p>$2a = -2$ ✓ $a = -1$ ✓ $3(-1) + b = 14$ $b = 17$ ✓ $(-1) + (17) + c = 15$ $c = -1$ ✓ $T_n = -n^2 + 17n - 1$</p> <p><i>Handwritten notes:</i> $2a = 2 \times$ $a = 1$ ✓ $b = 11$ ✓ $c = 3$ ✓ A.O. ✓</p>	(1) ✓ second difference of -2 ✓ a ✓ b ✓ c
2.1.3	<p>$T_{27} = -(27)^2 + 17(27) - 1$ ✓ $= -271$ ✓</p> <p>$T_n = 2(27)^2 + 11(27) + 3$ ✓ $= 1029$</p> <p>A.O. $(\frac{2}{2})$</p>	(4) ✓ substitution ✓ answer CA 2.1.2. <i>No CA if not Quadratic.</i>
2.2.1	<p>$r = \frac{-18}{36} = -\frac{1}{2}$ ✓ -0.5</p>	(2) ✓ answer $(-27)^2 + 17(27) - 1 = 1187$ (1)
2.2.2	<p>$T_n = 36\left(-\frac{1}{2}\right)^{n-1}$ ✓</p> <p>$\frac{9}{4096} = 36\left(-\frac{1}{2}\right)^{n-1}$ BD: $36\left(-\frac{1}{2}\right)$</p> <p>$\frac{1}{16384} = \left(-\frac{1}{2}\right)^{n-1} \div 36$ ✓</p> <p>$\left(-\frac{1}{2}\right)^{14} = \left(-\frac{1}{2}\right)^{n-1}$ f $\left(\frac{1}{2}\right)^{14} = \left(-\frac{1}{2}\right)^{n-1}$ No Penalty. $n = 15$ ✓</p> <p>14 = n - 1 n = 15 ✓</p> <p>OR/OF Expansion in full ✓ Answer ✓</p> <p>$36; -18; 9; \frac{-9}{2}; \frac{9}{4}; \frac{-9}{8}; \dots; \frac{9}{4096}$</p> <p>If you look only at the denominator: 2; 4; 8; ...; 4096 $2^k = 4096$ ✓ $2^k = 2^{12}$ k = 12 ✓ ∴ n = 15 terms ✓</p> <p>A.O. $(\frac{1}{2})$</p>	<p>✓ $T_n = 36\left(-\frac{1}{2}\right)^{n-1}$</p> <p>✓ $\frac{1}{16384} = \left(-\frac{1}{2}\right)^{n-1}$</p> <p>✓ answer</p> <p>(3)</p> <p>OR/OF</p> <p>✓ $2^k = 4096$</p> <p>✓ k = 12 ✓ answer</p> <p>(3)</p>

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<p>2.2.3</p>	$S_{\infty} = \frac{a}{1-r}$ $= \frac{36}{1 - \left(-\frac{1}{2}\right)}$ $= 24$ <p>WF: $\left(\frac{0}{2}\right)$</p>	<p>CA if $-1 < r < 1$</p> <p>✓ correct subst into correct formula with $-1 < r < 1$</p> <p>✓ answer if $-1 < r < 1$</p>
<p>2.2.4</p>	$S_{250 \text{ even}} = \frac{-18 \left(\left(\frac{1}{4}\right)^{250} - 1 \right)}{\frac{1}{4} - 1}$ $= -24$ $S_{250 \text{ odd}} = \frac{36 \left(\left(\frac{1}{4}\right)^{250} - 1 \right)}{\frac{1}{4} - 1}$ $= 48$ $\frac{S_{\text{odd}}}{S_{\text{even}}} = \frac{48}{-24}$ $= -2$ <p>OR/OF</p> $\frac{T_1 + T_3 + T_5 + T_7 + \dots + T_{499}}{T_2 + T_4 + T_6 + T_8 + \dots + T_{500}}$ $= \frac{a + ar^2 + ar^4 + \dots + ar^{498}}{ar + ar^3 + ar^5 + \dots + ar^{499}}$ $= \frac{a + ar^2 + ar^4 + \dots + ar^{498}}{r(a + ar^2 + ar^4 + \dots + ar^{498})}$ $= \frac{1}{r}$ $= -2$ <p>A/O: $\left(\frac{1}{4}\right)$</p> <p>If $r = \frac{1}{4}$ $n \neq 250$ $n = 499$ $n = 500$ $\left(\frac{3}{4}\right)$</p>	<p>✓ $r = \frac{1}{4}$ and $n = 250$</p> <p>✓ $S_{250 \text{ even}} = -24$</p> <p>✓ $S_{250 \text{ odd}} = 48$</p> <p>✓ answer</p> <p>OR/OF</p> <p>✓ $a + ar^2 + ar^4 + \dots + ar^{498}$</p> <p>✓ $ar + ar^3 + ar^5 + \dots + ar^{499}$</p> <p>✓ $r(a + ar^2 + ar^4 + \dots + ar^{498})$</p> <p>✓ answer</p>

[17]

* If $r = -\frac{1}{2}$ $n = 250$ ⇒ Answer -2 $\left(\frac{1}{4}\right)$

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* $r = \frac{1}{2}$; $n \neq 250$ $\left(\frac{1}{4}\right)$

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* Reduced to less terms : $\left(\frac{1}{4}\right)$ max

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M.S.
dp

dp

$(2p+3; p+6; p-2)$

QUESTION/VRAAG 3 Sub p=11 30.

If only $T_2 - T_1 = T_3 - T_2$ (1/2)

3.1.1	$p + 6 - (2p + 3) = p - 2 - (p + 6)$ $-p + 3 = -8$ $p = 11$	✓ equating i.t.o p ✓ simplifying
3.1.2	$T_n = 25 + (n-1)(-8) = 33 - 8n$ $33 - 8n < -55$ $-8n < -88$ $n > 11$ $33 - 8n = -55$ $n = 11$ If $n < 11$ \therefore Term 12 will be the first term smaller than -55 \therefore Term 12 sal die eerste term kleiner as -55 wees.	No Brackets: $p = 5$ (1/2). First mark (2) ✓ subst into T_n formula Full Expansion w.r. $n = 12$ ✓ $n > 11$ ✓ $n = 12$ Ab: (1/3) (3)
3.2	$S_6 = \frac{n}{2}[a+l] = \frac{6}{2}[(x-3) + (x-18)]$ $= 6x - 63$ $S_9 = \frac{n}{2}[a+l] = \frac{9}{2}[(x-3) + (x-27)]$ $= 9x - 135$ $6x - 63 = 9x - 135$ $3x = 72$ $x = 24$ $\therefore S_{15} = \frac{n}{2}[a+l] = \frac{15}{2}[(x-3) + (x-45)]$ $= \frac{15}{2}[2x - 48]$ $= \frac{15}{2}[2(24) - 48] = 0 = \text{RHS}$ OR/OF If $x \neq 24$ max. (3/5) $\sum_{k=7}^9 (x-3k) = 0$ $(x-21) + (x-24) + (x-27) = 0$ $\therefore 3x - 72 = 0$ $3x = 72$ $x = 24$ $\sum_{k=1}^{15} (24 - 3k)$ $= 21 + 18 + 15 + \dots + -21$ $S_n = \frac{n}{2}[a+l]$ $= \frac{15}{2}[21 - 21]$ $= 0 = \text{RHS}$ OR/OF	5 to x . ✓ $6x - 63$ ✓ $9x - 135$ ✓ 24 ✓ $\frac{15}{2}[(x-3) + (x-45)]$ S_{15} i.t.o. x ✓ substitution of x (5) OR/OF ✓ expansion ✓ $3x - 72 = 0$ ✓ 24 ✓ substitution of x ✓ sum of 15 terms (5)

$(x-3) + (x-6) + (x-9) + (x-12) + (x-15) + (x-18)$ $= (x-3) + (x-6) + (x-9) + (x-12) + (x-15) + (x-18)$ $+ (x-21) + (x-24) + (x-27) \quad \checkmark \text{all}$ $\therefore 3x - 72 = 0 \quad \checkmark$ $3x = 72$ $x = 24 \quad \checkmark$ <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin: 10px auto;"> $\sum_{k=1}^{15} (24 - 3k)$ $= 21 + 18 + 15 + \dots + -21$ </div> $S_n = \frac{n}{2}[a + l]$ $= \frac{15}{2}[21 - 21] \quad \checkmark$ $= 0 = \text{RHS}$	<p>\checkmark expansion</p> <p>$\checkmark 3x - 72 = 0$</p> <p>$\checkmark 24$</p> <p>\checkmark substitution of x</p> <p>\checkmark sum of 15 terms (5)</p> <p style="text-align: right;">[10]</p>
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QUESTION/VRAAG 4

4.1	$y > 0 \quad \checkmark$ OR/OF $y \in (0; \infty)$ $y \geq 0 \quad \checkmark$ $y \in [0; \infty) \quad \checkmark$ $y \in (0; \infty] \quad \checkmark$	\checkmark answer (1) OR/OF \checkmark answer (1)
4.2	$g: y = \left(\frac{1}{2}\right)^x$ $g^{-1}: x = \left(\frac{1}{2}\right)^y \quad \checkmark$ $y = \log_{\frac{1}{2}} x$ or $y = -\log_2 x$ or $y = \log_2 \frac{1}{x}$ $y = \frac{\log x}{\log \frac{1}{2}}$ $y = \left(\frac{1}{2}\right)^x \quad \checkmark$ $x = \log_{\frac{1}{2}} y \quad \checkmark$ $y = \log_{\frac{1}{2}} x \quad \checkmark$	$A/O: \left(\frac{2}{2}\right)$ $\checkmark x = \left(\frac{1}{2}\right)^y$ \checkmark equation (2)
4.3	Yes. The vertical line test cuts g^{-1} once <i>Ja. Die vertikale lyn toets sny g^{-1} slegs eenkeer.</i> OR/OF Yes. For every x -value there is a unique y -value <i>Ja. Vir elke x-waarde is daar 'n unieke y-waarde</i> OR/OF Yes. g is a one-to-one function / <i>Ja. g is 'n een-tot-een funksie</i> OR/OF Yes. The horizontal line cuts g only once <i>Ja. Die horisontale lyn sny g slegs een keer</i>	\checkmark yes \checkmark valid reason (2) OR/OF \checkmark yes \checkmark valid reason (2) OR/OF \checkmark yes \checkmark valid reason (2) OR/OF \checkmark yes \checkmark valid reason (2)

leave cut yes and gives valid reason. (2/2)

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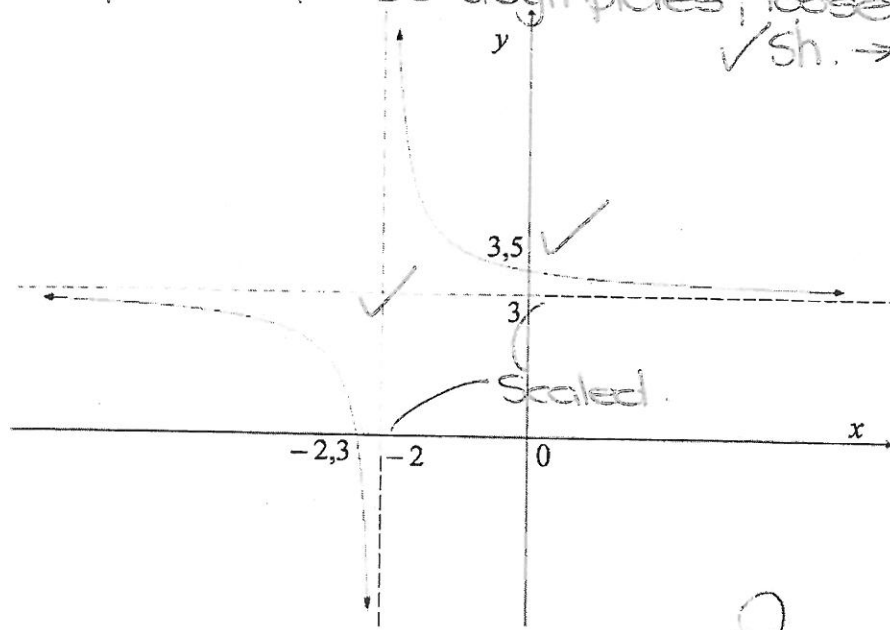
only: yes (1/2)

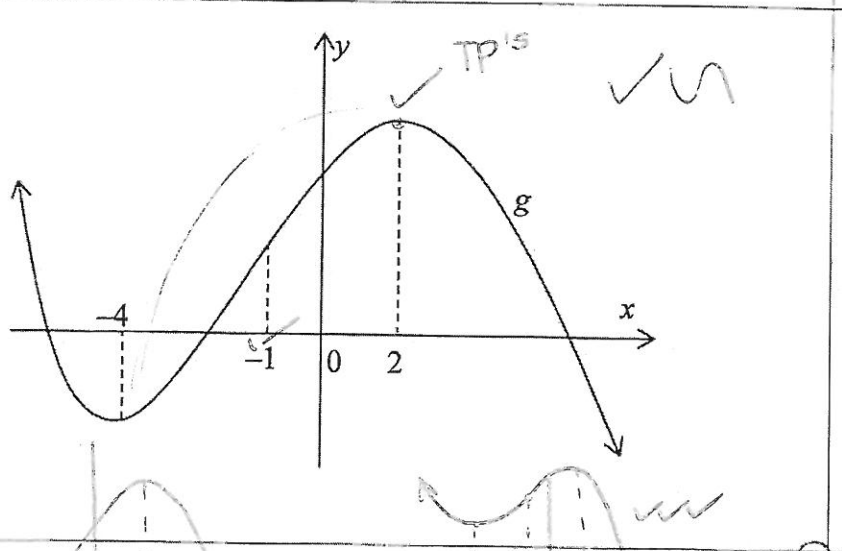
$(a, 2)$ on $g(x) = \left(\frac{1}{2}\right)^x$ CA from 4.2.

4.4.1	$y = -\log_2 x$ $2 = -\log_2 a$ $a = 2^{-2} = \frac{1}{4}$ or $a = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$	$2 = \log_{1/2} a$ $g(x) = \left(\frac{1}{2}\right)^x$ $a = \left(\frac{1}{2}\right)^2$	✓ correct subst into correct formula ($a; 2$) ✓ answer (2)
4.4.2	$M'\left(2; \frac{1}{4}\right)$ or $M'(2; a)$	$M'(2; a)$ CA from 4.4.1.	✓ answer (1) Accept $(-1; 2)$
4.5	$M''\left(-1; \frac{9}{4}\right)$	CA 4.4.2 $(x-3; y+2)$	✓ -1 reflection $x = -0,5$ ✓ $\frac{9}{4}$ Explain. (3)

[11]

QUESTION/VRAAG 5

5.1.1	$x = -2$ $y = 3$	Ver. as = -2 Hor. as = 3 $p = -2$ & $q = 3$	✓ answer ✓ answer (2)
5.1.2	$\left(0; \frac{7}{2}\right)$	$y = \frac{7}{2}$ Only $\frac{7}{2}$	✓ answer (1)
5.1.3	$\frac{1}{x+2} + 3 = 0$ $1 + 3(x+2) = 0$ $3x = -7$ $x = -\frac{7}{3}$ x-intercept $\left(-\frac{7}{3}; 0\right)$	Only $x = -\frac{7}{3}$	✓ $y = 0$ ✓ answer (2)
5.1.4	• If both cross asymptotes, loose shape mark. 	✓ Sh. → loose if square curving. ✓ asymptotes at $y = 3$ and $x = -2$ ✓ intercepts at $y = 3,5$ and $x = -2,3$ ✓ shape (reasonable representation in correct quadrants)	(3)

5.2.1	$-2x+4=0$ ✓ $2x=4$ ✓ $x=2$ ✓ $\therefore S(2; 0)$	Only: $(2; 0)$ $\left(\frac{3}{2}\right)$ Only: $x=2$ $\left(\frac{1}{2}\right)$ $\checkmark y=0$ $\checkmark x=2$
5.2.2	Equation of k : $y=a(x+1)^2+18$ ✓ $0=a(2+1)^2+18$ or $0=a(-4+1)^2+18$ ✓ $9a=-18$ $a=-2$ ✓ Not No: $y=-2(x+1)^2+18$	Can use x-intercepts and complete square. $\checkmark y=a(x+1)^2+18$ \checkmark substitute $(2; 0)$ or $(-4; 0)$ $y=a(x-2)(x+4)+18$ $\checkmark a \cdot x^2 + 2ax - 8a + 18$ $-8a + 18 = 16$ (3)
5.2.3	$-2x^2-4x+16=-2x+4$ ✓ $-2x^2-2x+12=0$ $x^2+x-6=0$ ✓ $(x+3)(x-2)=0$ ✓ $x=-3$ or $x=2$ $y=-2(-3)+4=10$ ✓ $T(-3; 10)$ ✓	\rightarrow BD not $= -2x+4$ \checkmark equating $a=-2$ \checkmark standard form factors \checkmark choosing $x=-3$ \checkmark answer
5.2.4	$x < -3$ or $x > 2$ \hookrightarrow "and" $\left(\frac{1}{2}\right)$ OR/OF $(-\infty; -3) \cup (2; \infty)$	Only $x < -3$ $\left(\frac{1}{2}\right)$ Only $x > 2$ $\left(\frac{1}{2}\right)$ $x \leq -3$ or $x \geq 2$ $\left(\frac{1}{2}\right)$ $2 < x < 0$ $\left(\frac{1}{2}\right)$ $x \leq -1$ $\left(\frac{1}{2}\right)$ $x = -1$ $\left(\frac{1}{2}\right)$ $y < -1$ $\left(\frac{1}{2}\right)$ $\checkmark \checkmark$ answer OR/OF $\checkmark \checkmark$ answer
5.2.5(a)	$x < -1$ ✓ Accuracy OR/OF $(-\infty; -1)$	$\checkmark \checkmark$ answer OR/OF $\checkmark \checkmark$ answer
5.2.5(b)		down-up-down \checkmark shape of cubic with local min tp moving to local max tp \checkmark turning points at $x=2$ and $x=-4$ \checkmark point of inflection at $x=-1$

$\left(\frac{10}{3}\right)$

Handwritten sketches of cubic functions and other mathematical notes, including a signature 'M2' and various scribbles.

QUESTION/VRAAG 6
NO (P) rounding.

* Swap A ↔ P : Depr. (1/3) logs
* " " " Appr. (1/3) logs

<p>6.1.1</p>	<p>$A = P(1-i)^n$ $79866,96 = 180000(1-0,15)^n$ ✓ $(1-0,15)^n = \frac{79866,96}{180000}$ <i>0,443705...</i> $n = \frac{\log\left(\frac{79866,96}{180000}\right)}{\log(1-0,15)}$ ✓ $n = 4,999... \text{ years}$ $n \approx 5 \text{ years}$ ✓ <i>n = 4,999 (3/3)</i></p>	<p>$A \leftrightarrow P$: (1/3) ✓ substitution $A = P(1+i)^n$ CA use of logs (1/3) use of logs (correct). ✓ answer</p>
<p>6.1.2</p>	<p>$A = P(1+i)^n$ $= 49\,000\left(1 + \frac{0,1}{4}\right)^{20}$ ✓ <i>sign sub.</i> $= R80\,292,21$ The money will be enough to buy the car. <i>Die geld sal genoeg wees om die motor te koop.</i> ✓ <i>or</i></p>	<p>(3) ✓ values of i and n. ✓ substitution ✓ conclusion (consistent with answer) Independent. (3)</p>
<p>6.2.1</p>	<p>$P = \frac{x[1-(1+i)^{-n}]}{i}$ $7853,15 \left[1 - \left(1 + \frac{0,1025}{12}\right)^{-234} \right]$ ✓ $P = \frac{0,1025}{12}$ ✓ <i>sub</i> $P = R793\,749,25$ ✓ OR/OF Balance Outstanding / <i>Uitstaande balans</i> ✓ <i>Both</i> $= 800\,000\left(1 + \frac{0,1025}{12}\right)^6 - \frac{7853,15 \left[\left(1 + \frac{0,1025}{12}\right)^6 - 1 \right]}{\frac{0,1025}{12}}$ ✓ <i>A-F</i> $= 841\,885,56 - 48\,136,62$ $= R793\,748,94$ ✓</p>	<p>* If P with $n=6$ ✓ <i>Wang for: (3/4)</i> ✓ $n = 234$ ✓ $i = \frac{0,1025}{12}$ ✓ ✓ substitution in present value formula ✓ answer OR/OF ✓ $n = 6$ in both <i>Wang n: (3/4)</i> ✓ $i = \frac{0,1025}{12}$ ✓ A - F ✓ R793 748,94</p>

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6.2.2 $A = P(1+i)^n$ 6.2.1.

$= 793749,25 \left(1 + \frac{0,1025}{12}\right)^3$ CA

$= R814\,263,3052$
... 262,9872

New instalment/Nuwe paaiement:

$P = \frac{x[1-(1+i)^{-n}]}{i}$

$814\,263,3052 = \frac{x \left[1 - \left(1 + \frac{0,1025}{12}\right)^{-231}\right]}{\frac{0,1025}{12}}$ ✓

$x = R8\,089,20$ ✓

substit

3 less than 6.2.1.
✓ $n = 231$ CA ✓

- ✓ substitution of new P
- ✓ substitution of n and i into formula
- ✓ answer (5)

NO interest added (3/5) [15]

QUESTION/VRAAG 7

7.1 $f(x) = x^2 + 2$

$f(x+h) = (x+h)^2 + 2$
 $= x^2 + 2xh + h^2 + 2$ ✓

$f(x+h) - f(x) = x^2 + 2xh + h^2 + 2 - (x^2 + 2)$
 $= 2xh + h^2$

$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

$= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ ✓

$= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ ✓

$= \lim_{h \rightarrow 0} (2x+h)$ ✓

$= 2x$ ✓

NOT: Dep lim bc soon
lim
NOT if
lim $2x + 0$
 $= 2x$

OR/OF

$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

$= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + 2 - (x^2 + 2)}{h}$ ✓

$= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ ✓

$= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ ✓

$= \lim_{h \rightarrow 0} (2x+h)$ ✓

$= 2x$ ✓

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(N) only in 7.1.
Drop "2" max (3/4)

✓ $x^2 + 2xh + h^2 + 2$

NOT NS!
✓ $\lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$

✓ $\lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$

A/O: (0/4)

✓ answer (4)

OR/OF

✓ $x^2 + 2xh + h^2 + 2$

✓ $\lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$

✓ $\lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$

✓ answer (4)

No (u) pen.

<p>7.2.1</p>	<p>$y = 4x^3 + 2x^{-1}$ $\frac{dy}{dx} = 12x^2 - 2x^{-2}$ CA only if neg.</p>	<p>$\checkmark + 2x^{-1}$ $12x^2 + 2x^{-1}$ $= 12x^2 + -2x^{-2}$ $\checkmark 12x^2$ $\checkmark -2x^{-2}$ $12x^2 + 2x^{-1}$ $= 24x - 2x^{-2}$ (3)</p>
<p>7.2.2</p>	<p>$y = 4\sqrt[3]{x} + (3x^3)^2$ $= 4x^{\frac{1}{3}} + 9x^6$ CA only fraction. $\frac{dy}{dx} = \frac{4}{3}x^{-\frac{2}{3}} + 54x^5$</p>	<p>$\checkmark 4x^{\frac{1}{3}}$ $\checkmark 9x^6$ A/O: 4/4 $\checkmark \frac{4}{3}x^{-\frac{2}{3}}$ $\checkmark 54x^5$ Chain rule: $2(3x^3)(9x^2)$ (4) $= 54x^6$</p>
<p>7.3</p>	<p>Point of contact: (1; 5) $m = 2$ $y - y_1 = m(x - x_1)$ or $y = 2x + c$ $y - 5 = 2(x - 1)$ $5 = 2 + c$ $c = 3$ $y = 2x + 3$ NO CA</p>	<p>$\checkmark m = 2$ \checkmark substitution of (1; 5) No CA on third mark \checkmark answer NO CA. (3)</p>

A/O: (2/3)

[14]

QUESTION/VRAAG 8


$h(x) = (2x+3)(x-1)(x+3)$
 $(2x+3)(x^2+2x-3)$
 $2x^3+7x^2-9x-9$
 $b(x) = -2x^3 - 9$

<p>8.1</p>	<p>$h(x) = -2(x + \frac{3}{2})(x-1)(x+3)$ $h(x) = -(2x+3)(x^2+2x-3)$ $h(x) = -2x^3 - 7x^2 + 9$ OR/OF $h(x) = -(2x+3)(x-1)(x+3)$ $h(x) = -(2x+3)(x^2+2x-3)$ $h(x) = -2x^3 - 7x^2 + 9$</p>	<p>$\checkmark \checkmark -2(x + \frac{3}{2})(x-1)(x+3)$ \checkmark correct simplification (3) OR/OF $\checkmark \checkmark -(2x+3)(x-1)(x+3)$ \checkmark correct simplification (3)</p>
<p>8.2</p>	<p>$h'(x) = -6x^2 - 14x$ $-6x^2 - 14x = 0$ $-2x(3x+7) = 0$ $x = 0$ or $x = -\frac{7}{3}$ Both.</p>	<p>\checkmark first derivative $\checkmark = 0$ \checkmark both answers (3)</p>
<p>8.3</p>	<p>$x < -\frac{7}{3}$ or $x > 0$ OR/OF $x \in (-\infty; -\frac{7}{3}) \cup (0; \infty)$ $x \in (-\infty; -\frac{7}{3}] \cup [0; \infty)$</p>	<p>$\checkmark \checkmark$ answer (Not Combo marks) (2) OR/OF $\checkmark \checkmark$ answer (2)</p>

Handwritten signatures and marks.

<p>8.4</p>	<p>$y = 4x + 7$ ✓ $-6x^2 - 14x = 4$ ✓ $0 = 6x^2 + 14x + 4$ $0 = 3x^2 + 7x + 2$ ✓ $0 = (3x+1)(x+2)$ $x = -\frac{1}{3}$ or $x = -2$ ✓</p> <p>BD if not = 4 $h(x) = 4x + 7$ $-2x^3 - 7x^2 - 4x + 9 = 0$ $-6x^2 - 14x - 4 = 0$ $(3x+1)(x+2) = 0$ $x = -\frac{1}{3}$ $x = -2$ ✓</p>	<p>✓ $y = 4x + 7$ ✓ $h'(x) = 4$ ✓ standard form May use calculator. ✓ both answers</p> <p>(4) [12]</p>
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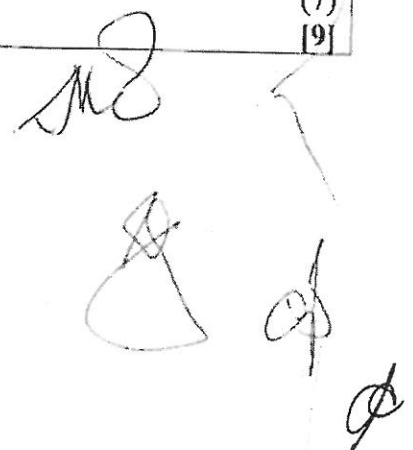
QUESTION/VRAAG 9

<p>9.1</p>	<p>Volume of Sphere $= \frac{4}{3}\pi(8)^3$ or $= \frac{2048\pi}{3}$ or $= 2144,66$ ✓</p>	<p>✓ answer (1)</p>
<p>9.2</p>	<p>$r^2 + x^2 = 8^2$ (Pythagoras) $r^2 = 64 - x^2$</p> 	<p>✓ substitution or reason Pythagoras (1)</p>
<p>9.3</p>	<p>$V_{cone} = \frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi(64 - x^2)(8 + x)$ $= \frac{\pi}{3}(512 + 64x - 8x^2 - x^3)$ $\frac{dV}{dx} = \frac{64\pi}{3} - \frac{16\pi}{3}x - \frac{3\pi}{3}x^2$ $0 = 64 - 16x - 3x^2$ $0 = (8 - 3x)(x + 8)$ $x = \frac{8}{3}$ $x \neq -8$ ✓ $x = \frac{8}{3}$ $\frac{V_{cone}}{V_{sphere}} = \frac{\frac{1}{3}\pi\left(\frac{512}{9}\right)\left(\frac{32}{3}\right)}{\frac{2048\pi}{3}}$ $= \frac{8}{27} = 0,3$ ✓</p>	<p>$h = 8 + x$ or $h = 8$ (BD) ✓ $h = 8 + x$ ✓ $\frac{1}{3}\pi(64 - x^2)(8 + x)$ ✓ expansion $\frac{dV}{dx} = \frac{64\pi}{3} - \frac{16\pi}{3}x - \frac{3\pi}{3}x^2$ $= 0$ implied. ✓ $x = \frac{8}{3}$ ✓ volume of the cone ✓ $\frac{8}{27}$ or 0,3 (7) [9]</p>

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QUESTION/VRAAG 10

Tree can include yellow balls.

<p>10.1</p>	<p>No Outcomes needed.</p> <p>P(One Red and One Blue) = P(Red, Blue) + P(Blue, Red)</p> <p>$\left(\frac{3}{12} \times \frac{2}{11}\right) + \left(\frac{2}{12} \times \frac{3}{11}\right)$</p> <p>$= \frac{1}{11}$</p> <p><i>0,09</i></p>	<p>Only Tree: $\left(\frac{2}{4}\right)$</p> <p>f den. stays 12; 30.</p> <p>✓ $\left(\frac{3}{12}\right) \times \left(\frac{2}{11}\right)$ ✓ $\left(\frac{2}{12}\right) \times \left(\frac{3}{11}\right)$ ✓ addition of products ✓ answer</p> <p>(4)</p>
<p>10.2.1</p>	<p>$a = 0,48 \times 250$ $a = 120$</p> <p>$c = 0,48 \times 200 = 96$</p>	<p>✓ $\left(\frac{0}{1}\right)$ ✓ answer</p> <p>(1)</p>
<p>10.2.2</p>	<p>$b = 150$ ($b = a + 30$) $b = 126$</p> <p>$P(S) \times P(F)$ $= \frac{200}{250} \times \frac{150}{250}$ $= 0,48$ $= P(S \text{ and } F)$</p> <p>These events are independent / <i>Hierdie gebeurtenisse is onafhanklik</i></p> <p>$P(F) \times P(S)$ $= \frac{126}{250} \times \frac{200}{250}$ $= 0,4032$ $\neq P(S \text{ and } F)$ <i>Not Indep.</i></p>	<p>✓ $b = (c + 30) CA.$ ✓ $P(S) \times P(F)$ ✓ $\frac{200}{250}$ and $\frac{150}{250}$ ✓ conclusion (with realistic probabilities)</p> <p>(4)</p>
<p><i>A10: Independent $\left(\frac{0}{4}\right)$</i></p>		<p><i>No b: max $\left(\frac{1}{1}\right)$</i></p> <p>[9]</p>

QUESTION/VRAAG 11

<p>11.1</p>	<p>10×9 $= 90$</p> <p><i>10P2</i></p>	<p>✓✓ 10×9 (<i>2 or 0</i>)</p> <p>(2)</p>
<p>11.2.1</p>	<p>$10!$ $= 3\,628\,800$</p> <p><i>10! not in denominator.</i></p>	<p>✓ $10!$</p> <p>(1)</p>
<p>11.2.2</p>	<p>$2! \times 2! \times 2! \times 2! \times 2! \times 4!$ $= 768$</p> <p><i>✓ or multiplied.</i> $(2!)^5 \times 4!$ ✓ or $2^5 \times 4!$ ✓ $= 768$</p>	<p>✓ $2! \times 2! \times 2! \times 2! \times 2!$ ✓ $4!$ ✓ $2! \times 2! \times 2! \times 2! \times 2! \times 4!$ or 768</p> <p>No CA on answer.</p> <p>(3)</p>
<p><i>A10: $\left(\frac{3}{3}\right)$</i></p>		<p>TOTAL/TOTAAL: 150</p> <p>[6]</p>

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ONLY: 4! $\left(\frac{1}{3}\right)$
of $\frac{2!}{4!}$ $\left(\frac{0}{1}\right)$ $\frac{4!}{2!}$

