

PHL

DEPARTMENT OF BASIC
EDUCATION
PRIVATE BAG X895, PRETORIA 000
12-11-2024

APPROVED MARKING
GUIDELINE
PUBLIC EXAMINATIONS



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE SENIOR
SERTIFIKAAT**

GRADE 12/GRAAD 12

MATHEMATICS P1/WISKUNDE VI

NOVEMBER 2024

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

APPROVED
11/11/2024
Prof. R. Ammer
11/11/2024

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

APPROVED
CLARE BROWNILL
11/11/2024

Approved
11/11/2024

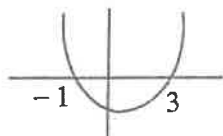
NOTE:

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

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die nasienriglyne van toepassing.

QUESTION 1/VRAAG 1

1.1.1	$x(x-3) = 0$ $x = 0$ or $x = 3$ $\checkmark$ $\checkmark$ acc	$\checkmark x = 0$ $\checkmark x = 3$ (2)
1.1.2	$2x^2 - 4x + 1 = 0$ $\checkmark$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(1)}}{2(2)}$ $\checkmark$ st+f CA std form $x = 1,71$ or $x = 0,29$ $\checkmark$ incor rounding 3/4 Answer only: $\frac{4}{4}$	$\checkmark$ standard form $\checkmark$ incorrect f $\frac{1}{4}$ std form $\checkmark$ correct substitution in correct formula $\checkmark$ answer $\checkmark$ answer (4)
1.1.3	$x^2 - 2x - 3 > 0$ $(x-3)(x+1) > 0$ $\checkmark$ fact CV: $x = 3$ or $x = -1$ $\checkmark$ c.v  Answer only: $\frac{3}{4}$ $x < -1$ or $x > 3$ OR/OF $x \in (-\infty; -1) \cup (3; \infty)$ $\checkmark$ both	including = sign $\checkmark$ factors $\checkmark$ critical values using and both answers must correct 3/4 No separator 4/4 (4)
1.1.4	$2^{2x} - 2^{x+2} - 32 = 0$ $2^{2x} - 2^2 \cdot 2^x - 32 = 0$ $\checkmark$ split exp $(2^x - 8)(2^x + 4) = 0$ $\checkmark$ fact $2^x = 8$ or $2^x \neq -4$ $\checkmark$ $2^x = 2^3$ no solution $x = 3$ $\checkmark$ Answer only: $\frac{1}{5}$ $2^{2x} - 2^2 \cdot 2^x - 32 = 0$ $2^{2x} - 2^2 \cdot 2^x - 32 = 0$ $\checkmark$ 0/5	$\checkmark$ use of exponential law $\checkmark$ factors $\checkmark 2^x = 8$ $\checkmark 2^x \neq -4$ $\checkmark$ answer (5)
1.1.5	$\sqrt{-2x+4} - x = 2$ $\sqrt{-2x+4} = 2+x$ $\checkmark$ $(\sqrt{-2x+4})^2 = (2+x)^2$ $\checkmark$ $-2x+4 = 4+4x+x^2$ $x^2 + 6x = 0$ $\checkmark$ $x(x+6) = 0$ $x = 0$ or $x \neq -6$ $\checkmark$ both	$\checkmark$ isolating the root $\checkmark$ squaring both sides $\checkmark$ standard form $\checkmark$ answers with selection (4)

1.2 <i>*If one soln crossed out ignore but if they get one soln for y penalise</i>	$y = 3 - 2x$ ✓ ... (1) $y^2 + xy = 2$... (2) Subs (1) into (2): $(3 - 2x)^2 + (3 - 2x)x = 2$ ✓ <i>sub in</i> $4x^2 - 12x + 9 - 2x^2 + 3x - 2 = 0$ $2x^2 - 9x + 7 = 0$ ✓ <i>std form</i> $(2x - 7)(x - 1) = 0$ $x = \frac{7}{2}$ or $x = 1$ ✓ <i>both</i> $y = -4$ $y = 1$ ✓ <i>both</i> <i>linear std form bld (5)</i> OR/OF $x = \frac{3 - y}{2}$ ✓ ... (1) $y^2 + xy = 2$... (2) Subs (1) into (2): $y^2 + \left(\frac{3 - y}{2}\right)y = 2$ ✓ <i>swop x and y (4/5)</i> $2y^2 + 3y - y^2 - 4 = 0$ $y^2 + 3y - 4 = 0$ ✓ $(y + 4)(y - 1) = 0$ $y = -4$ or $y = 1$ ✓ <i>both</i> $x = \frac{7}{2}$ or $x = 1$ ✓ <i>both</i> <i>linear std form bld (5)</i> OR/OF y-value independent.	✓ eq 1 ✓ substitution ✓ standard form ✓ both x-values ✓ both y-values (5) OR/OF ✓ eq 1 ✓ substitution ✓ standard form ✓ both y-values ✓ both x-values (5)
1.3 <i>no penalty for not including $n > 2$. If $\frac{n+1}{2}$ not seen (2/3)</i>	Product = $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \dots \times \frac{n}{n-1} \times \frac{n+1}{n} = \frac{n+1}{2}$ ✓ <i>Product</i> The product will be an integer value when $n + 1$ is divisible by 2 i.e. $n \in \{3; 5; 7; \dots\}$ Therefore, n must be an odd number, greater than 2. OR/OF For $n = 2$ the product is $\frac{3}{2}$ For $n = 3$ the product is $\left(\frac{3}{2}\right)\left(\frac{4}{3}\right) = 2$ For $n = 4$ the product is $\left(\frac{3}{2}\right)\left(\frac{4}{3}\right)\left(\frac{5}{4}\right) = \frac{5}{2}$ For $n = 5$ the product is $\left(\frac{3}{2}\right)\left(\frac{4}{3}\right)\left(\frac{5}{4}\right)\left(\frac{6}{5}\right) = 3$ $n \in \{3; 5; 7; \dots\}$ ✓ Therefore, n must be an odd number, greater than 2.	✓ $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \dots \times \frac{n+1}{n}$ ✓ statement $\left(\frac{n+1}{2}\right)$ ✓ n is odd for $n > 2$ (3) OR/OF ✓ generation of the four products ✓ identifying the pattern when n is odd ✓ n is odd for $n > 2$ (3)

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QUESTION/VRAAG 2

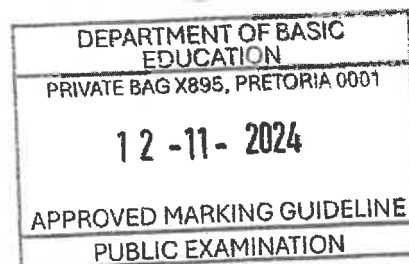
2.1.1	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{20} = \frac{20}{2}[2(7) + (20-1)(5)]$ $S_{20} = 1\,090$	✓ substitution ✓ answer (2)
2.1.2	$T_n = 7 + (n-1)(5)$ $T_n = 5n + 2$ $S_{75} - S_{20} = 14\,400 - 1\,090 = 13\,310$ $\sum_{n=1}^{75} (5n+2) - \sum_{n=1}^{20} (5n+2) = 13\,310$ $\therefore \sum_{n=21}^{75} (5n+2) = 13\,310$ OR/OF $T_{21} + T_{22} + T_{23} + \dots + T_{75} = 14\,400 - 1\,090$ $107 + 112 + 117 + \dots = 13\,310$ $T_n = 102 + 5n$ $\therefore \sum_{n=1}^{55} (5n+102) = 13\,310$ $\sum_{n=1}^{20} (5n+2) + \sum_{n=21}^{75} (5n+2) = 14\,400$	✓ general term ✓ $S_{75} - S_{20}$ ✓ $\sum_{n=21}^{75} \checkmark = 13\,310$ (4) OR/OF ✓ $S_{75} - S_{20}$ ✓ general term ✓ $\sum_{n=1}^{55} \checkmark = 13\,310$ (4)
2.2.1	$T_n = 2n - 1$ $98^{\text{th}} \text{ first difference} = 2(98) - 1 = 195$ $\text{Quadratic: } T_{98} = 9\,632 - 195 = 9\,437$ $T_{98} = (98)^2 - 2(98) + 29 = 9\,437$	✓ answer ✓ method ✓ answer (3)
2.2.2	$28 ; 29 ; 32$ $3a + b = 1$ $2a = 2 \Rightarrow a = 1$ $3(1) + b = 1 \Rightarrow b = -2$ $9a + 3b + c = 32$ $T_3 = 1(3)^2 - 2(3) + c = 32 \Rightarrow c = 29$ OR/OF $1 - 2 + c = 28 \Rightarrow c = 29$ $\therefore T_n = n^2 - 2n + 29$	✓ second difference ✓ $a = 1$ ✓ $b = -2$ ✓ method to calculate c ✓ $c = 29$ (5)

[14]

QUESTION/VRAAG 3

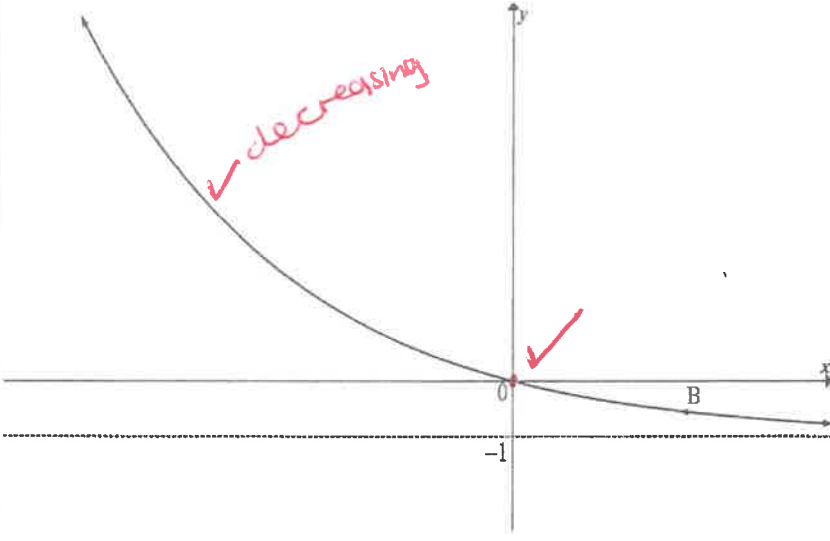
3.1	2nd circle: $\frac{6}{2} = 3$ cm 3rd circle: $\frac{3}{2} = 1,5$ cm ✓✓ acc OR/OF 3rd circle = $6\left(\frac{1}{2}\right)^2 = 1,5$	✓✓ radius 3rd circle (2) OR/OF ✓✓ radius 3rd circle (2)
3.2	only CA if $r = \frac{1}{2}$ or $r = \frac{1}{4}$ $36\pi; 9\pi; \frac{9}{4}\pi; \dots$ $r = \frac{1}{4}$ ✓, $a = 36\pi$ ✓ $u = 113,10$ ✓ $36\pi\left(\left(\frac{1}{4}\right)^{10} - 1\right)$ ✓ sub in $S_{10} = \frac{1}{\frac{1}{4} - 1}$ ✓ $S_{10} = 150,80$ ✓ 113,10; 28,27; 7,07... expand seq ✓✓ 1st 7 terms ✓ Last 3 terms ✓ ans ✓ If use radii max (2/4) ✓ sub in ✓	if $c = 2\pi r$ (2/4) ✓a ✓r if use 36; 9, $\frac{9}{4}$ (3/4) lose marks for a $S_n = 113,10\left(\left(\frac{1}{4}\right)^{10} - 1\right)$ ✓ substitution 0,25 - 1 ✓ answer = 150,80 do not penalise for rounding (4)
3.3	CA IF $r = \frac{1}{2}$ or $r = \frac{1}{4}$ $6; 3; \frac{3}{2} \dots$ radius = $\frac{1}{2}\left(\frac{3}{128}\right) = \frac{3}{256}$ ✓ $= 0,01 = \frac{3}{256}$ ✓ $\frac{3}{256} = 6\left(\frac{1}{2}\right)^{n-1}$ ✓ equate $\frac{1}{512} = \left(\frac{1}{2}\right)^{n-1}$ ✓ $\left(\frac{1}{2}\right)^9 = \left(\frac{1}{2}\right)^{n-1}$ ✓ same base or/of $n-1 = \log_{\left(\frac{1}{2}\right)}\left(\frac{1}{512}\right)$ $\therefore n-1=9$ $\therefore n=10$ ✓ $\therefore n-1=9$ $\therefore n=10$ n cannot be rounded. use diameter and radius (3/4) a.o (1/4)	✓ $\frac{3}{256}$ ✓ equating to radius general term ✓ simplification ✓ answer (4) Expand Sequence 1st 4 terms ✓ 2nd 4 ✓ 1st 2 ✓ answ ✓ $\therefore n=10$

OR/OF <u>12, 6, 3, $\frac{3}{2}$, $\frac{3}{4}$, $\frac{3}{8}$, $\frac{3}{16}$, $\frac{3}{32}$</u> 12 ; 6 ; 3 ; ... diameter = $\frac{3}{128}$ $\frac{3}{128} = 12 \left(\frac{1}{2}\right)^{n-1}$ ✓ <i>equate</i> $\frac{1}{512} = \left(\frac{1}{2}\right)^{n-1}$ $\left(\frac{1}{2}\right)^9 = \left(\frac{1}{2}\right)^{n-1}$ ✓ <i>or/of</i> $n-1 = \log_{\left(\frac{1}{2}\right)}\left(\frac{1}{512}\right)$ $\therefore n-1=9$ ✓ $\therefore n=10$ ✓ $\therefore n-1=9$ $\therefore n=10$	OR/OF <u>$\frac{3}{64}$, $\frac{3}{128}$</u> $\therefore n=10$ ✓ $12 \left(\frac{1}{2}\right)^{n-1}$ ✓ equating general term of diameter to $\frac{3}{128}$ ✓ simplification ✓ answer (4)
[10]	



Handwritten signatures and initials.

QUESTION/VRAAG 4

4.1	$f(x) = a^x - 1$ $-\frac{5}{9} = a^2 - 1$ ✓ sub in $a^2 = \frac{4}{9}$ $a = \frac{2}{3}$ ✓ ans. accept $a = \pm \frac{2}{3}$ if $a = \frac{2}{3}$ is consistently used in all sub question	✓ substitution ✓ answer (2)
4.2	$y > -1$ ✓ give even if $a = -\frac{2}{3}$ OR/OF $y \in (-1; \infty)$	✓ answer (1) ✓ answer (1)
4.3		extra asymptote asymptote must be drawn (seen) ✓ (0; 0) ✓ asymptote ✓ decreasing shape (3) ✓ asympt' acc
4.4	$\frac{19}{8} = \left(\frac{2}{3}\right)^x - 1$ ✓ sub in $\frac{27}{8} = \left(\frac{2}{3}\right)^x$ $\left(\frac{3}{2}\right)^3 = \left(\frac{3}{2}\right)^{-x}$ $\therefore x = -3$ ✓ value x $\therefore C\left(-3; \frac{19}{8}\right)$ $C'\left(\frac{19}{8}; -3\right)$ ✓ ans. CA from 4.1 provided 'a' is positive	✓ substitution ✓ answer ✓ answer (3)

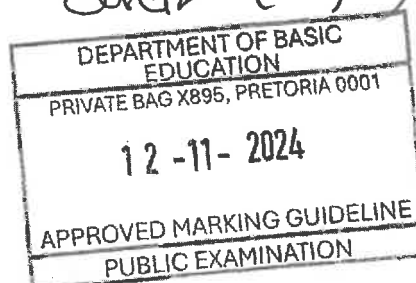
[9]

A candidate who chooses $a = -\frac{2}{3}$

QUESTION/VRAAG 5

5.1	$p = -1$ ✓ <i>ans around -1</i>	✓ $p = -1$ (1)
5.2	$y = x - 3$ ✓ <i>sub in</i> $y = 1 - 3$ ✓ <i>ans</i> $y = -2$ ✓ <i>ans</i>	✓ substitution $x - 1 + q = x - 3$ ✓ <i>sub in</i> $q = -2$ ✓ <i>ans</i> (2)
5.3	$1 = \frac{a}{0-1} - 2$ ✓ <i>sub in</i> $3 = \frac{a}{-1}$ ✓ <i>ans</i> $a = -3$ ✓ <i>ans</i>	✓ substitute (0; 1) ✓ answer (2)
5.4	$\frac{-3}{x-1} - 2 = 0$ ✓ <i>x-value</i> $-3 = 2x - 2$ $2x = -1$ $\therefore x = -\frac{1}{2}$ ✓ $x \in \left[-\frac{1}{2}; 1\right)$ ✓ <i>OR/OF</i> $-\frac{1}{2} \leq x < 1$ ✓ <i>ans</i>	✓ <i>x-intercept</i> ✓ <i>ans</i> (3)
5.5	f is reflected in the y-axis, then translated 2 units to the right OR/OF f is reflected in the x-axis, then translated 4 units down OR/OF f is reflected about the line $x = 1$ ✓ <i>vertical asymptote</i> OR/OF f is reflected about the line $y = -2$ ✓ <i>horizontal asymptote</i> <i>if only write reflection</i> ✓ <i>ans</i>	✓ reflection in y-axis ✓ translation 2 units right (2) OR/OF ✓ reflection in x-axis ✓ translation 4 units down (2) OR/OF ✓✓ reflection about line $x = 1$ (2) OR/OF ✓✓ reflection about line $y = -2$ (2)

90° anticlockwise ✓
 270° clockwise ✓
 centre (-1, 2)



QUESTION/VRAAG 6

6.1	$x = \frac{-4}{2(-1)} = 2$ ✓ OR/OF $f'(x) = -2x + 4 = 0$ implied ✓ $x = 2$ ✓ $y = -(2)^2 + 4(2) + 5$ ✓ $= 9$ ✓ $\therefore B(2; 9)$ ✓ <i>CA from x-value (positive) y-value positive. a.o. (3/3)</i>	✓ method for x ✓ value of x ✓ value for y (3)
6.2	$x^2 - 4x - 5 = 0$ $(x-5)(x+1) = 0$ $x = 5$ or $x = -1$ ✓ $\therefore A(-1; 0)$ ✓ Equation of AC: $\frac{8-0}{3+1} = \frac{y-0}{x+1}$ OR/OF $m = \frac{8-0}{3+1} = 2$ ✓ $8x + 8 = 4y$ ✓ $2x + 2 = y$ ✓ $y - 0 = 2(x + 1)$ ✓ Sub in $y = 2x + 2$ ✓ <i>co-ords. CA negative A method</i>	If m is negative (3/3) ✓ $A(-1; 0)$ ✓ method for gradient ✓ substitute point or C into equation of a straight line (3)
6.3	$EH = -x^2 + 4x + 5 - (2x + 2)$ ✓ $EH = -x^2 + 2x + 3$ ✓ Max EH at: $-2x + 2 = 0$ OR/OF $x = \frac{-b}{2a} = \frac{-(-2)}{2(-1)}$ ✓ $x = 1$ ✓ $x = 1$ ✓ Max length of EH $= -(1)^2 + 2(1) + 3$ ✓ $= 4$ ✓ <i>g-f (3/4) Trial error not showing 4</i>	✓ difference $5-9$ $-x^2 + 2x + 3$ equating to zero $-x^2 + 2x + 3 = 0$ bld If not used to find midpoint $\frac{2}{4}$ ✓ x-value $\frac{4}{4}$ $EH = -(1)^2 + 2(1) + 3$ ✓ (4)
6.4	$k(x) = f(x+m)$ $= -x^2 - 2mx - m^2 + 4x + 4m + 5$ $k'(x) = -2x - 2m + 4$ ✓ $k'(x) = 2$ ✓ $-2x - 2m + 4 = 2$ equate ✓ $-2x = 2m - 2$ ✓ $x = 1 - m$ ✓ $k(1-m) = g(1-m)$ ✓ $-(1-m)^2 - 2m(1-m) - m^2 + 4(1-m) + 4m + 5 = 2(1-m) + 2$ ✓ $-1 + 2m - m^2 - 2m + 2m^2 - m^2 + 4 - 4m + 4m + 5 = 2 - 2m + 2$ ✓ $-2m - 4 = 0$ ✓ $\therefore m = -2$ ✓ <i>sub in (1-m)</i>	(His) derivative $= 2$ ✓ ✓ $k'(x)$ ✓ $k'(x) = 2$ ✓ $x = 1 - m$ ✓ substitution ✓ answer (5)

2	OR/OF $k(x) = f(x+m) = g(x)$ $-x^2 - 2mx - m^2 + 4x + 4m + 5 = 2x + 2$ ✓ equate $0 = x^2 + (2m-2)x + m^2 - 4m - 3$ ✓ simplify $\Delta = (2m-2)^2 - 4(1)(m^2 - 4m - 3)$ ✓ Δ $b^2 - 4ac$ $\Delta = 4m^2 - 8m + 4 - 4m^2 + 16m + 12$ $\Delta = 8m + 16 = 0$ equate = 0 ✓ $\therefore m = -2$ ✓	OR/OF ✓ equating ✓ simplification ✓ substitution into Δ ✓ $\Delta = 0$ ✓ answer (5)
3	OR/OF $f(x) = -x^2 + 4x + 5$ $f'(x) = -2x + 4 = 2$ $-2x = -2$ ✓ $x = 1$ ✓ $f(1) = -(1)^2 + 4(1) + 5$ $\therefore y = 8$ ✓ $\therefore$ translate 2 units to the right ✓ $\therefore m = -2$ ✓	OR/OF ✓ $f'(x) = 2$ ✓ x-value ✓ y-value ✓ 2 units to the right ✓ answer (5)
		[15]

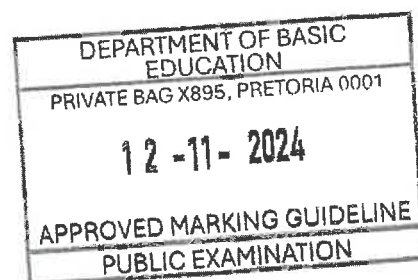
Do not assume $\in (1, 8)$
unless calculated above.

(0/5)

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APPROVED MARKING GUIDELINE
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QUESTION/VRAAG 7

7.1	$A = P(1+i)^n$ $A = 5\,000 \left(1 + \frac{6,8}{400}\right)^{64}$ $= R\,14\,706,56$	<i>i, n ✓</i> <i>n = 64</i> <i>i = 0,068</i> <i>= $\frac{6,8}{4}$</i> <i>✓ sub</i> <i>✓ ans</i> <i>independent</i>	✓ i, n ✓ substitution into correct formula ✓ answer (3)
7.2	$A = P(1-in)$ $\frac{1}{2}P = P(1-4i)$ $\frac{1}{2} = (1-4i)$ $i = \frac{1}{8}$ $\therefore r = 12,5\%$	<i>sub in</i> <i>no need to penalise if P is not there</i>	✓ substitution into correct formula ✓ answer (2)
	OR/OF $r = \frac{50\%}{4}$ $r = 12,5\%$	<i>a.o. $\left(\frac{2}{2}\right)$</i>	OR/OF ✓ method ✓ answer (2)
7.3.1	Already paid: $2\,300,98 \times 60 = R\,138\,058,80$ Interest: $138\,058,80 - 100\,000 = R\,38\,058,80$ <i>using FV CA $\left(\frac{1}{2}\right)$ - subtract</i>		✓ amount already paid ✓ interest (2)



7.3.2

Balance after 2 years:

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

$$P = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-36} \right]}{\frac{13,5}{1200}}$$

$$= R\,67\,804,94$$

$$R\,67\,804,94 - R\,20\,000 = R\,47\,804,94$$

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

$$47\,804,94 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}}$$

$$0,766 = (1,01125)^{-n}$$

$$\log_{1,01125} 0,766 = -n$$

$$n = 23,83$$

$\therefore$ 12 months earlier

- ✓ $n = 36$
- ✓ i
- ✓ substitution into correct formula
- ✓ answer
- ✓ answer

- ✓ substitution into correct formula

- ✓ answer in months

(7)

OR/OF

$$A = 100\,000 \left(1 + \frac{13,5}{1200} \right)^{12 \times 2}$$

$$= R\,130\,799,12$$

$$F = \frac{2\,300,98 \left[\left(1 + \frac{13,5}{1200} \right)^{12 \times 2} - 1 \right]}{\frac{13,5}{1200}}$$

$$= R\,62\,993,92$$

$$\text{Balance outstanding} = A - F = 130\,799,12 - 62\,993,92$$

$$= R\,67\,805,20$$

$$R\,67\,805,20 - R\,20\,000 = R\,47\,805,20$$

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

$$47\,805,20 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}}$$

$$0,766... = (1,01125)^{-n}$$

$$\log_{1,01125} 0,766... = -n$$

$$n = 23,80$$

$\therefore$ 12 months' earlier

OR/OF

- ✓ $n = 24$
- ✓ i

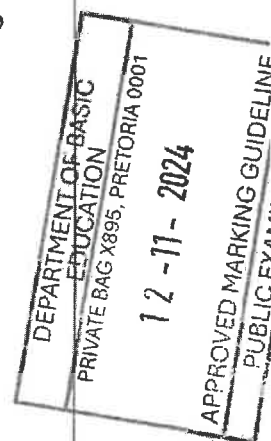
- ✓ substitution into both correct formulae

- ✓ answer

- ✓ answer

- ✓ substitution into correct formula

- ✓ answer in months (7)



OR/OF	OR/OF
$100\,000 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}} + 20\,000 \left(1 + \frac{13,5}{1200} \right)^{-24}$ $84\,709,38 = \frac{2\,300,98 \left[1 - \left(\frac{809}{800} \right)^{-n} \right]}{0,135}$ $0,4142 = 1 - \left(\frac{809}{800} \right)^{-n}$ $\left(\frac{809}{800} \right)^{-n} = 0,5858$ $-n = \log_{\left(\frac{809}{800} \right)} 0,5858$ $n = 47,80 \text{ months after starting payments}$ $\therefore 12 \text{ months earlier}$ CA only $n = 23$ or 37.	$n = 24$ ✓ i ✓ $n = 24$ ✓ $= 100\,000$ ✓ substitution into correct P formula ✓ substitution into correct A formula ✓ simplification ✓ answer in months (7)
14	

in any option:

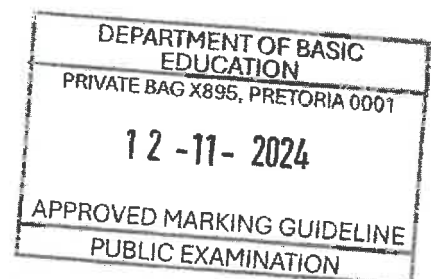
$$A = 20\,000 \left(1 + \frac{0,135}{12} \right)^{36} = R\,29\,918,18$$

$$\text{Total payments} = 138\,058,80 - 29\,918,18$$

$$\text{Balance} = R\,108\,140,48$$

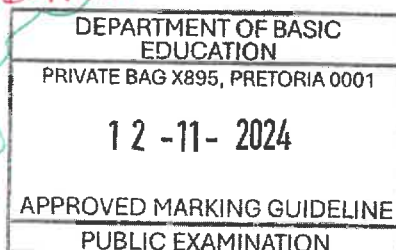
$$\text{No of months} = \frac{108\,140,48}{2300,98} = 47 \text{ months}$$

$$\therefore 60 - 47 = 13 \text{ months earlier}$$



QUESTION/VRAAG 8

8.1.1	$\frac{d}{dx}[3x - 5x^2]$ $= 3 - 10x$ <i>✓ ✓ acc</i>	$\checkmark 3$ $\checkmark -10x$ (2)
8.1.2	$g(x) = \frac{2}{x^2} - \sqrt[3]{x^7}$ $g(x) = 2x^{-2} - x^{\frac{7}{3}}$ $g'(x) = -4x^{-3} - \frac{7}{3}x^{\frac{4}{3}}$ <i>CA only exp negative in 1st 2nd fraction exponent</i> <i>✓ ✓ acc</i>	$\checkmark 2x^{-2} \checkmark -x^{\frac{7}{3}}$ $\checkmark -4x^{-3} \checkmark -\frac{7}{3}x^{\frac{4}{3}}$ (4)
8.2	$f(x) = x^3 - 4x^2 + 2x + 3$ $f'(x) = 3x^2 - 8x + 2$ $m = f'(2) = 3(2)^2 - 8(2) + 2$ $m = -2$ $y = f(2) = (2)^3 - 4(2)^2 + 2(2) + 3$ $y = -1$ $y + 1 = -2(x - 2)$ $y = -2x + 3$ <i>Accept as ans. no need to simplify</i>	$\checkmark m = -2$ $\checkmark y = -1$ $\checkmark \text{answer}$ (3)
8.3.1	$f(x) = -6x^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-6(x+h)^2 + 6x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-6x^2 - 12xh - 6h^2 + 6x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-12xh - 6h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-12x - 6h)}{h}$ $= \lim_{h \rightarrow 0} (-12x - 6h)$ $= -12x$ <i>Do not worry about f'(x) f(x) etc.</i> <i>sub in</i> <i>expansion</i> <i>simplification</i> <i>c.f.</i> <i>ans</i> <i>penalise notation</i> $\lim =$ $\lim_{h \rightarrow 0}$ omitted	$\checkmark \text{substitution}$ $\checkmark f(x+h) = -6x^2 - 12xh - 6h^2$ $\checkmark \text{simplification}$ $\checkmark \text{common factor}$ $\checkmark \text{answer}$ (5)



	OR/OF $f(x) = -6x^2$ $f(x+h) = -6x^2 - 12xh - 6h^2$ ✓ $f(x+h) - f(x) = -6x^2 - 12xh - 6h^2 + 6x^2 = -12xh - 6h^2$ ✓ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-12xh - 6h^2}{h}$ ✓ $= \lim_{h \rightarrow 0} \frac{h(-12x - 6h)}{h}$ ✓ $= \lim_{h \rightarrow 0} (-12x - 6h)$ $= -12x$ ✓	OR/OF $f(x+h) = -6x^2 - 12xh - 6h^2$ ✓ ✓ simplification ✓ substitution ✓ common factor ✓ answer (5)
8.3.2	$x \geq 0$ ✓ OR/OF $x \leq 0$ ✓	✓ answer (1) ✓ answer (1)
8.3.3	$y = -6x^2$ $x = -6y^2$ ✓ $y^2 = -\frac{1}{6}x$ $y = \pm \sqrt{-\frac{1}{6}x}$ ✓ $\therefore y = -\sqrt{-\frac{1}{6}x}$; $x \leq 0$ ✓ no penalty	✓ swopping x and y $y = \pm \sqrt{-\frac{1}{6}x}$ ✓ answer (3)
		(18)

$$y = -\sqrt{\frac{1}{6}x} \quad \frac{2}{3}$$

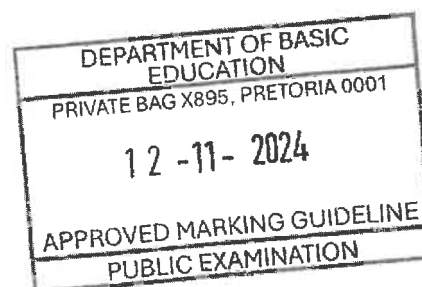
$$y = -6x^2$$

$$x = 6y^2$$

$$y = \pm \sqrt{\frac{x}{6}}$$

$$y = -\sqrt{\frac{x}{6}}$$

$$\frac{2}{3}$$



QUESTION/VRAAG 9

9.1	$1 < x < \frac{5}{2}$ ✓✓ accept $1 \leq x \leq \frac{5}{2}$ ✓✓ answer (2)
9.2	$(1; 0)$ and $(\frac{5}{2}; 0)$ ✓✓ Accept not in 10-cords ✓ $x=1$ ✓ $x=\frac{5}{2}$ (2)
9.3	$\frac{\frac{5}{2}+1}{2} = \frac{7}{4}$ ✓ method. $x \geq \frac{7}{4}$ ✓ $\frac{1}{2}$ ✓ method ✓ answer (2)
9.4	$-9 < k < -8$ ✓✓ value b/w -9 and -8 ✓✓ answer (2)
	$-9 \leq k \leq -8$ ✓✓ if -8 or -9 included in list of values ✓ $\frac{1}{2}$ ✓ $\frac{2}{2}$ ✓ $\frac{0}{2}$ ✓ [8]

QUESTION/VRAAG 10

10.1	$-6t + 18 = 0$ ✓ equate zero and deriving $18 = 6t$ ✓ value t $3 = t$ ✓ $s'(3) = -3(3)^2 + 18(3) = 27$ ✓ ans $s''(t) = 0$ ✓ = 0 ✓ value of t ✓ answer (3)
10.2	$-3t^2 + 18t = 0$ ✓ fact $-3t(t-6) = 0$ ✓ values $t = 0$ or $t = 6$ ✓ If mistake with a and b do not CA the answer. $s(t) = at^3 + bt^2$ $s'(t) = 3at^2 + 2bt$ $3a = -3$ and $2b = 18$ $a = -1$ $b = 9$ both ✓ $s(t) = -1t^3 + 9t^2$ ✓ $s(6) = -(6)^3 + 9(6)^2$ ✓ $s(6) = 108$ ✓ ans ✓ a and b ✓ substitution ✓ answer (5)
	[8]

$$s(t) = at^3 + bt^2 + ct + d$$

$$s'(t) = 3at^2 + 2bt + c$$

$$-3t^2 + 18t + 0 = 3at^2 + 2bt + c$$

$$-3 = 3a \mid 18 = 2b \mid c = 0$$

$$-1 = a \mid 9 = b$$

$$\therefore 1. P(\text{at least 2}) = \frac{4+5+3+x}{44-2x}$$

$$= \frac{12+x}{44-2x}$$

QUESTION/VRAAG 11

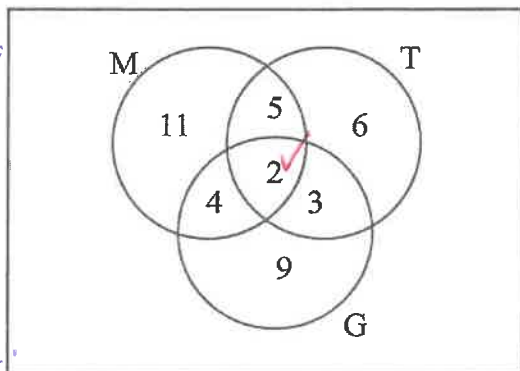
11.1

$$2. P(M) = \frac{22}{44-2x}$$

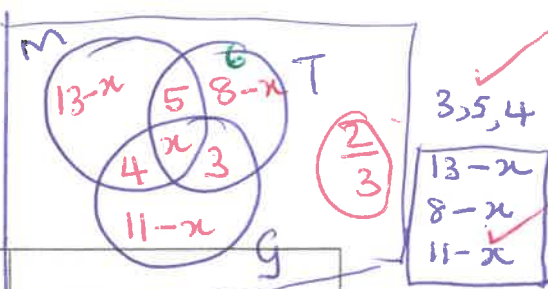
$$P(T) = \frac{16}{44-2x}$$

$$P(M) \times P(T) = \frac{16 \times 22}{(44-2x)^2}$$

$$P(M \text{ and } T) = \frac{5+x}{44-2x}$$



accept
max



✓2 ✓

✓3; 4; 5

✓6; 9; 11

✓ 2 intersections
✓ only
ans in terms of x
if x worked out
(3) $\frac{2}{3}$

11.2

$$P(\text{at least two subjects}) = \frac{4+2+5+3}{40} = \frac{14}{40} = \frac{7}{20} = 0,35$$

CA from 11.1

✓ (4 + 2 + 5 + 3) or 14
in numerator
✓ 40 in denominator
(2)

11.3

$$P(M) \times P(T) = \frac{22}{40} \times \frac{16}{40} = \frac{11}{50} = 0,22$$

$$P(M) + P(T) = \frac{1}{4}$$

$$P(M \text{ and } T) = \frac{7}{40} = 0,175$$

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

Events M and T are not independent

$$\checkmark \frac{22}{40} \times \frac{16}{40}$$

$$\checkmark \frac{11}{50}$$

$$\checkmark \frac{7}{40}$$

✓ answer

(4)

[9]

QUESTION/VRAAG 12

12.1

$$26 \times 10 \times 26 \times 10 = 67\,600$$

✓ letters
✓ digits

✓ for correct letters
✓ for correct digits

(2)

12.2

$$18 \times 9 \times 19 \times 5 = 15\,390$$

$$\underline{18} \quad \underline{9} \quad \underline{19} \quad \underline{5} = 15\,390$$

$$\frac{4}{4}$$

✓ product

$$\frac{4}{4}$$

Given that its multiplication

✓ 18
✓ 19
✓ 9
✓ 5

(4)

12.3

$$24 \times 9 \times 25 \times 5 = 27\,000$$

$$\frac{27\,000 - 15\,390}{15\,390} \times 100 = 75,44\%$$

✓ answer

$$\checkmark 24 \times 9 \times 25 \times 5$$

✓ answer

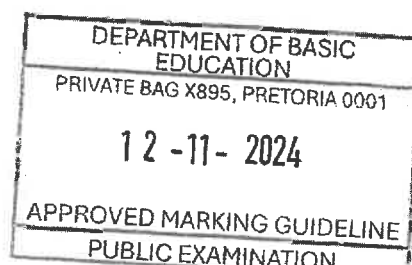
(2)

[8]

$$\frac{12.3 - 12.2}{12.2} \times 100\%$$

$$= 75,44\%$$

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TOTAL/TOTAAL: 150

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