



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NASIONALE  
SENIOR SERTIFIKAAT**

**GRAAD 12**

**WISKUNDE V1  
NOVEMBER 2016**

**PUNTE: 150**

**TYD: 3 uur**

**Hierdie vraestel bestaan uit 9 bladsye en 1 inligtingsblad.**

**INSTRUKSIES EN INLIGTING**

Lees die volgende instruksies aandagtig deur voordat jy die vrae beantwoord.

1. Hierdie vraestel bestaan uit 12 vrae.
2. Beantwoord AL die vrae.
3. Nommer die antwoorde korrek volgens die nommeringstelsel wat in hierdie vraestel gebruik is.
4. Dui ALLE berekeninge, diagramme, grafieke, ensovoorts wat jy gebruik het om jou antwoorde te bepaal, duidelik aan.
5. Volpunte sal nie noodwendig aan slegs antwoorde toegeken word nie.
6. Jy mag 'n goedgekeurde, wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, tensy anders vermeld.
7. Indien nodig, rond antwoorde tot TWEE desimale plekke af, tensy anders vermeld.
8. Diagramme is NIE noodwendig volgens skaal geteken NIE.
9. 'n Inligtingsblad met formules is aan die einde van die vraestel ingesluit.
10. Skryf netjies en leesbaar.

**VRAAG 1**1.1 Los op vir  $x$ :

1.1.1  $x(x - 7) = 0$  (2)

1.1.2  $x^2 - 6x + 2 = 0$  (korrek tot TWEE desimale plekke) (3)

1.1.3  $\sqrt{x-1} + 1 = x$  (5)

1.1.4  $3^{x+3} - 3^{x+2} = 486$  (4)

1.2 Gegee:  $f(x) = x^2 + 3x - 4$ 

1.2.1 Los op vir  $x$  as  $f(x) = 0$  (2)

1.2.2 Los op vir  $x$  as  $f(x) < 0$  (2)

1.2.3 Bepaal die waardes van  $x$  waarvoor  $f'(x) \geq 0$  (2)

1.3 Los op vir  $x$  en  $y$ :  $x = 2y$  en  $x^2 - 5xy = -24$  (4)**[24]****VRAAG 2**Gegee die eindige rekenkundige ry:  $5 ; 1 ; -3 ; \dots ; -83 ; -87$ 2.1 Skryf die vierde term ( $T_4$ ) van die ry neer. (1)

2.2 Bereken die getal terme in die ry. (3)

2.3 Bereken die som van al die negatiewe getalle in die ry. (3)

2.4 Beskou die ry:  $5 ; 1 ; -3 ; \dots ; -83 ; -87 ; \dots ; -4187$   
Bepaal die getal terme in hierdie ry wat presies deelbaar deur 5 sal wees. (4)**[11]**

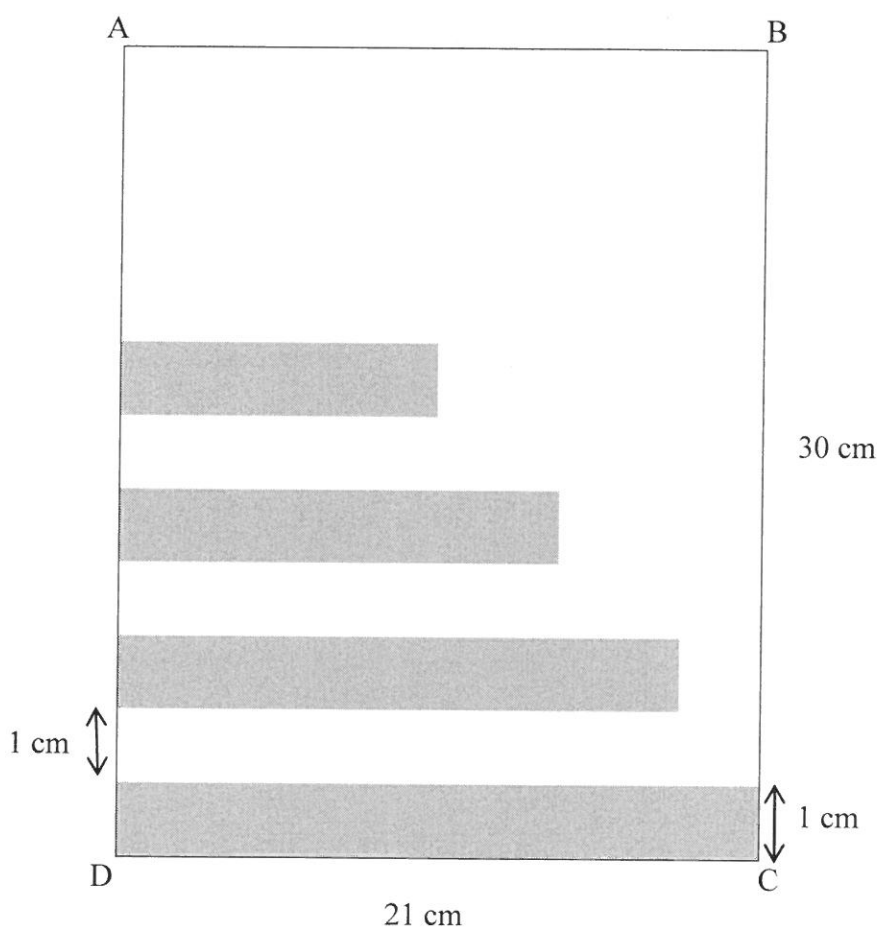
**VRAAG 3**

3.1 Die eerste vier terme van 'n kwadratiese getalpatroon is  $-1 ; x ; 3 ; x + 8$

3.1.1 Bereken die waarde(s) van  $x$ . (4)

3.1.2 As  $x = 0$ , bepaal die posisie van die eerste term in die kwadratiese getalpatroon waarvoor die som van die eerste  $n$  eerste verskille groter as 250 sal wees. (4)

3.2 Reghoeke van wydte 1 cm word geteken vanaf die rand van 'n vel (bladsy) papier wat 30 cm lank is sodat daar 'n 1 cm-spasie tussen een reghoek en die volgende een is. Die lengte van die eerste reghoek is 21 cm en die lengte van elke daaropvolgende reghoek is 85% van die lengte van die vorige reghoek totdat daar reghoeke langs die hele lengte van AD geteken is. Elke reghoek is grys ingekleur.



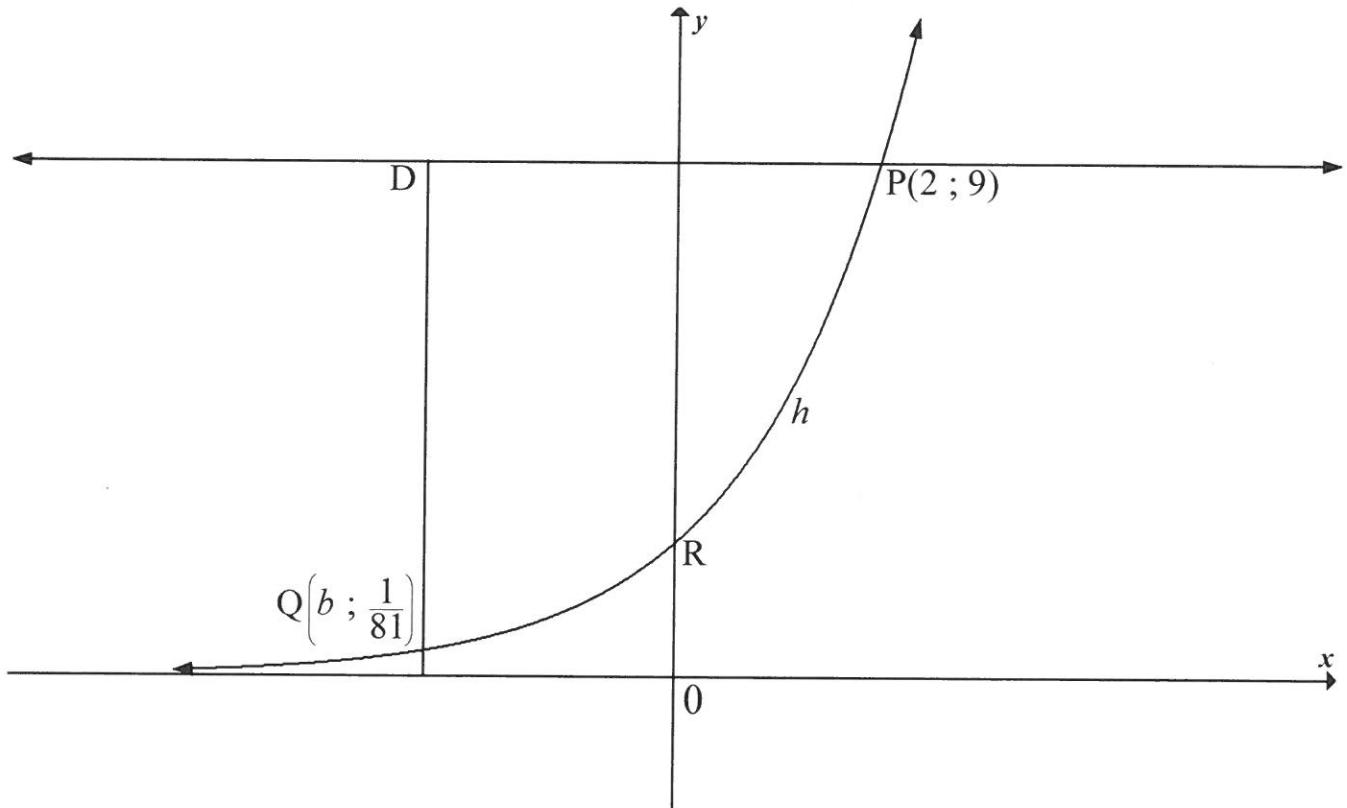
3.2.1 Bereken die lengte van die 10<sup>de</sup> reghoek. (3)

3.2.2 Bereken die persentasie van die bladsy wat grys ingekleur is. (4)  
[15]

**VRAAG 4**

Die skets hieronder toon die grafiek van  $h(x) = a^x$ ,  $a > 0$ . R is die  $y$ -afsnit van  $h$ .

Die punte  $P(2; 9)$  en  $Q\left(b; \frac{1}{81}\right)$  lê op  $h$ .

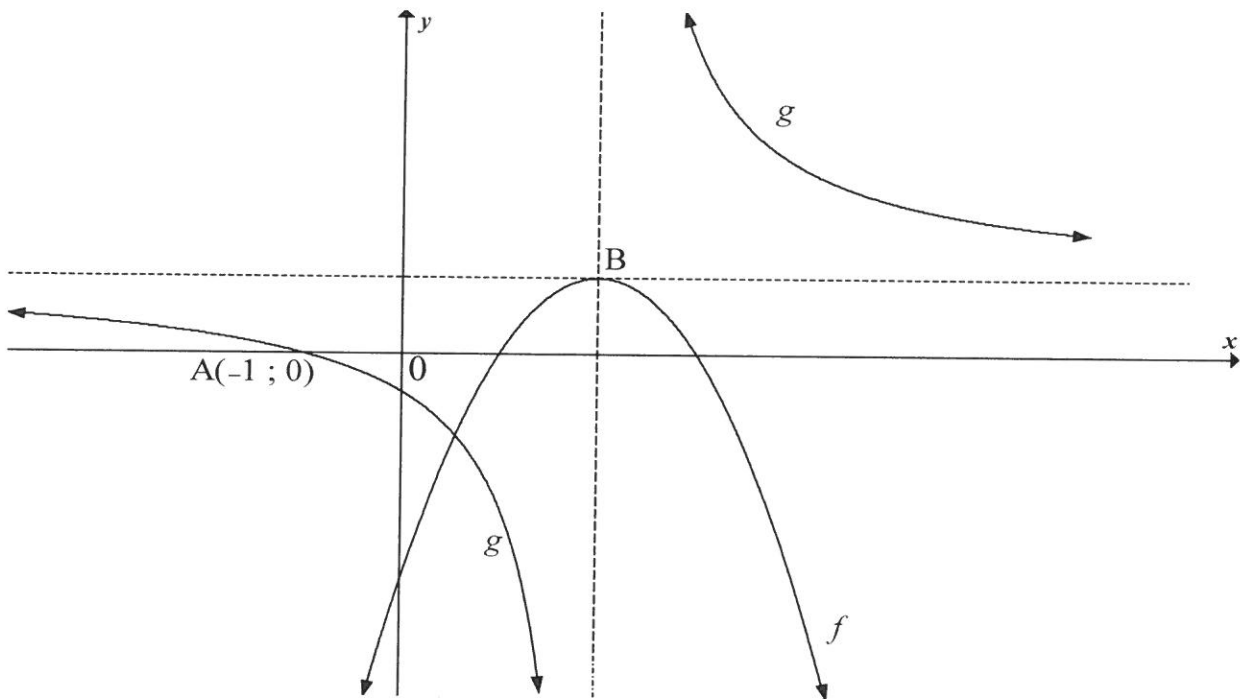


- 4.1 Skryf die vergelyking van die asimptoot van  $h$  neer. (1)
- 4.2 Bepaal die koördinate van R. (1)
- 4.3 Bereken die waarde van  $a$ . (2)
- 4.4 D is 'n punt sodat  $DQ \parallel y$ -as en  $DP \parallel x$ -as. Bereken die lengte van DP. (4)
- 4.5 Bepaal die waardes van  $k$  waarvoor die vergelyking  $h(x+2) + k = 0$  'n wortel kleiner as  $-6$  sal hê. (3)
- [11]

**VRAAG 5**

Die skets hieronder toon die parabool  $f$ , met vergelyking  $f(x) = -x^2 + 4x - 3$  en 'n hiperbool  $g$ , met vergelyking  $(x - p)(y + t) = 3$ .

- B, die draaipunt van  $f$ , lê op die snypunt van die asimptote van  $g$ .
- $A(-1; 0)$  is die  $x$ -afsnit van  $g$ .



- 5.1 Toon dat B se koördinate  $(2; 1)$  is. (2)
- 5.2 Skryf die waardeversameling van  $f$  neer. (1)
- 5.3 Vir watter waarde(s) van  $x$  sal  $g(x) \geq 0$  wees? (2)
- 5.4 Bepaal die vergelyking van die vertikale asimptoot van die grafiek van  $h$  as  $h(x) = g(x + 4)$  (1)
- 5.5 Bepaal die waardes van  $p$  en  $t$ . (4)
- 5.6 Skryf die waardes van  $x$  neer waarvoor  $f(x) \cdot g'(x) \geq 0$  (4)

**[14]**

**VRAAG 6**

Gegee:  $f(x) = -x + 3$  en  $g(x) = \log_2 x$

- 6.1 Skets, op dieselfde assestelsel, die grafieke van  $f$  en  $g$ , en dui ALLE afsnitte met die asse duidelik aan. (4)
- 6.2 Skryf die vergelyking van  $g^{-1}(x)$ , die inverse van  $g$ , in die vorm  $y = \dots$  neer. (2)
- 6.3 Verduidelik hoe jy VRAAG 6.1 en/of VRAAG 6.2 sal gebruik om die vergelyking  $\log_2(3-x) = x$  op te los. (3)
- 6.4 Skryf die antwoord neer vir  $\log_2(3-x) = x$ . (1)
- [10]**

**VRAAG 7**

'n Lening van R250 000 is op 1 Junie 2016 deur 'n bank aan Thabiso toegestaan teen 'n rentekoers van 15% p.j., maandeliks saamgestel, om 'n motor te koop. Thabiso het ingestem om die lening af te betaal deur maandelikse paaieimente te betaal wat op 1 Julie 2016 sou begin en 4 jaar later op 1 Junie 2020 sou eindig. Thabiso kon egter nie die eerste twee paaieimente betaal nie en het eers op 1 September 2016 met die maandelikse paaieimente begin.

- 7.1 Bereken die bedrag wat Thabiso die bank op 1 Augustus 2016 geskuld het, 'n maand voordat hy sy eerste maandelikse paaieiment betaal het. (2)
- 7.2 Sy eerste maandelikse paaieiment is op 1 September 2016 betaal, en Thabiso gaan steeds sy laaste maandelikse paaieiment op 1 Junie 2020 betaal. Bereken sy maandelikse paaieiment. (4)
- 7.3 As Thabiso R9 000 as sy maandelikse paaieiment vanaf 1 September 2016 betaal, hoeveel maande vroeër kan hy sy lening afbetaal? (5)
- 7.4 As Thabiso R9 000 as 'n maandelikse paaieiment vanaf 1 September 2016 betaal, bereken die laaste paaieiment wat hy moet betaal om die lening af te betaal. (4)
- [15]**

**VRAAG 8**

- 8.1 Bepaal  $f'(x)$  vanuit eerste beginsels as  $f(x) = 3x^2$  (5)
- 8.2 John bepaal  $g'(a)$ , die afgeleide van 'n bepaalde funksie  $g$  by  $x = a$ , en kry die antwoord:  $\lim_{h \rightarrow 0} \frac{\sqrt{4+h} - 2}{h}$   
Skryf die vergelyking van  $g$  en die waarde van  $a$  neer. (2)
- 8.3 Bepaal  $\frac{dy}{dx}$  as  $y = \sqrt{x^3} - \frac{5}{x^3}$  (4)
- 8.4  $g(x) = -8x + 20$  is 'n raaklyn aan  $f(x) = x^3 + ax^2 + bx + 18$  by  $x = 1$ . Bereken die waardes van  $a$  en  $b$ . (5)  
[16]

**VRAAG 9**

Vir 'n sekere funksie  $f$  word die eerste afgeleide gegee as  $f'(x) = 3x^2 + 8x - 3$

- 9.1 Bereken die  $x$ -koördinate van die stasionêre punte van  $f$ . (3)
- 9.2 Vir watter waardes van  $x$  is  $f$  konkav na onder? (3)
- 9.3 Bepaal die waardes van  $x$  waarvoor  $f$  streng stygend is. (2)
- 9.4 As dit verder gegee word dat  $f(x) = ax^3 + bx^2 + cx + d$  en  $f(0) = -18$ , bepaal die vergelyking van  $f$ . (5)  
[13]

**VRAAG 10**

Die getal molekules van 'n sekere medisyne in die bloedstroom  $t$  uur nadat dit gedrink is, word voorgestel deur die vergelyking  $M(t) = -t^3 + 3t^2 + 72t$ ,  $0 < t < 10$ .

- 10.1 Bepaal die getal molekules van die medisyne in die bloedstroom 3 uur nadat die medisyne gedrink is. (2)
- 10.2 Bepaal die tempo waarteen die getal molekules van die medisyne in die bloedstroom verander presies 2 uur nadat die medisyne gedrink is. (3)
- 10.3 Hoeveel uur ná die drink van die medisyne sal die tempo waarteen die getal molekules van die medisyne in die bloedstroom verander, 'n maksimum wees? (3)  
[8]

**VRAAG 11**

'n Opname is onder 100 seuns en 60 meisies gedoen om te bepaal hoeveel van hulle TV gekyk het in die tydperk waarin eksamen geskryf is. Hulle terugvoering word in die gedeeltelik voltooide tabel hieronder getoon.

	HET IN EKSAMENTYD TV GEKYK	HET NIE IN EKSAMENTYD TV GEKYK NIE	TOTALE
<b>Manlik</b>	80	$a$	
<b>Vroulik</b>	48	12	
<b>Totale</b>	$b$	32	160

- 11.1 Bereken die waardes van  $a$  en  $b$ . (2)
- 11.2 Is die gebeurtenisse 'om manlik te wees' en 'het nie in eksamentyd TV gekyk nie', onderling uitsluitend? Gee 'n rede vir jou antwoord. (2)
- 11.3 As 'n leerder wat aan die opname deelgeneem het, ewekansig gekies word, wat is die waarskynlikheid dat die leerder:
- 11.3.1 TV gekyk het in die tydperk waarin die eksamen geskryf is? (2)
- 11.3.2 Nie manlik is nie en nie TV gekyk het in die tydperk waarin eksamen geskryf is nie? (2)
- [8]**

**VRAAG 12**

Die syfers 1 tot 7 word gebruik om 'n viersyferkode te skep om toegang tot 'n geslote vertrek te verkry. Hoeveel verskillende kodes is moontlik as die syfers nie herhaal mag word nie en die kode 'n ewe getal groter as 5 000 moet wees?

**[5]****TOTAAL: 150**

## INLIGTINGSBLAD

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; r \neq 1$$

$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

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

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

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

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$\text{oppervlakte } \triangle ABC = \frac{1}{2} ab \cdot \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \cos \alpha \cdot \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \cos \alpha \cdot \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2\sin \alpha \cdot \cos \alpha$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



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**GRADE 12/*GRAAD 12***

**NATIONAL  
SENIOR CERTIFICATE/  
*NASIONALE  
SENIOR SERTIFIKAAT***

**MATHEMATICS P1/*WISKUNDE V1***

**NOVEMBER 2016**

**MEMORANDUM**

**MARKS: 150**

***PUNTE: 150***

**This memorandum consists of 20 pages.  
*Hierdie memorandum 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.

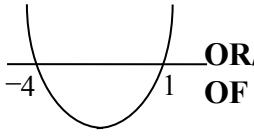
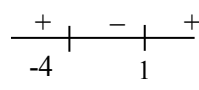
**LET WEL:**

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

**QUESTION/VRAAG 1**

1.1.1	$x(x-7) = 0$ $x = 0$ or $x = 7$	✓ $x = 0$ ✓ $x = 7$ (2)
1.1.2	$x^2 - 6x + 2 = 0$ $x = \frac{6 \pm \sqrt{(-6)^2 - 4(1)(2)}}{2(1)}$ $x = \frac{6 \pm \sqrt{28}}{2}$ $x = 0,35$ or $x = 5,65$ <b>OR/OF</b> $x^2 - 6x + 2 = 0$ $x^2 - 6x + 9 = -2 + 9$ $(x-3)^2 = 7$ $x - 3 = \pm\sqrt{7}$ $x = 3 \pm \sqrt{7}$ $x = 0,35$ or $x = 5,65$	✓ correct substitution into correct formula ✓ $x = 0,35$ ✓ $x = 5,65$ (3) ✓ $(x-3)^2 = 7$ ✓ $x = 0,35$ ✓ $x = 5,65$ (3)
1.1.3	$\sqrt{x-1} + 1 = x$ $\sqrt{x-1} = x-1$ $x-1 = x^2 - 2x + 1$ $x^2 - 3x + 2 = 0$ $(x-2)(x-1) = 0$ $x = 2$ or $x = 1$ Both answers are valid <b>OR/OF</b>	✓ isolate $\sqrt{x-1}$ ✓ $x^2 - 2x + 1$ ✓ standard form ✓ factors ✓ both answers (5)

	$\sqrt{x-1} + 1 = x$ $\sqrt{x-1} = x-1$ <p>Let <math>x-1 = k</math></p> $\sqrt{k} = k \quad k \geq 0$ $k = k^2$ $k^2 - k = 0$ $k(k-1) = 0$ $(x-1)(x-2) = 0$ $x = 2 \text{ or } x = 1 \quad ; \quad x \geq 1$ <p>Both answers are valid</p> <p><b>OR/OF</b></p> $\sqrt{x-1} + 1 = x$ $\sqrt{x-1} = x-1$ <p>By inspection :</p> $x-1 = 0 \quad \text{or} \quad x-1 = 1$ $x = 2 \quad \text{or} \quad x = 1$	<p>✓ isolate <math>\sqrt{x-1}</math></p> <p>✓ <math>k^2</math></p> <p>✓ standard form</p> <p>✓ factors</p> <p>✓ both answers</p> <p>(5)</p> <p>✓ isolate <math>\sqrt{x-1}</math></p> <p>✓ <math>x-1 = 0</math></p> <p>✓ <math>x-1 = 1</math></p> <p>✓ <math>x = 2</math></p> <p>✓ <math>x = 1</math></p> <p>(5)</p>
1.1.4	$3^{x+3} - 3^{x+2} = 486$ $3^x 3^3 - 3^x 3^2 = 486$ $3^x (3^3 - 3^2) = 486$ $3^x = 27$ $3^x = 3^3$ $x = 3$ <p><b>OR/OF</b></p> $3^{x+3} - 3^{x+2} = 486$ $3^{x+2} (3^1 - 1) = 486$ $3^{x+2} = 243$ $3^{x+2} = 3^5$ $x+2 = 5$ $x = 3$	<p>✓ expansion</p> <p>✓ common factor</p> <p>✓ <math>3^x = 27</math></p> <p>✓ <math>x = 3</math></p> <p>(4)</p> <p>✓ common factor</p> <p>✓ <math>(3^1 - 1)</math></p> <p>✓ <math>3^{x+2} = 243</math></p> <p>✓ <math>x = 3</math></p> <p>(4)</p>
1.2.1	$f(x) = x^2 + 3x - 4$ $0 = (x+4)(x-1)$ $x = -4 \text{ or } x = 1$	<p>✓ factors</p> <p>✓ both answers</p> <p>(2)</p>

<p>1.2.2</p>	$x^2 + 3x - 4 < 0$ $(x + 4)(x - 1) < 0$  <p style="text-align: center;"><b>OR/</b> <b>OF</b></p>  $-4 < x < 1 \quad \text{OR/OF} \quad x \in (-4 ; 1)$	<p>✓ ✓ <math>-4 &lt; x &lt; 1</math></p> <p style="text-align: right;">(2)</p>
<p>1.2.3</p>	$2x + 3 \geq 0$ $x \geq -\frac{3}{2}$ <p><math>f'(x) \geq 0</math> when <math>f</math> is increasing</p> <p>The turning point occurs at <math>x = \frac{-4 + 1}{2}</math></p> $x \geq -\frac{3}{2}$	<p>✓ <math>2x + 3</math></p> <p>✓ <math>x \geq -\frac{3}{2}</math></p> <p>✓ <math>x = \frac{-4 + 1}{2}</math></p> <p>✓ <math>x \geq -\frac{3}{2}</math></p> <p style="text-align: right;">(2)</p>
<p>1.3</p>	$x = 2y \text{ and } x^2 - 5xy = -24$ $(2y)^2 - 5(2y)(y) = -24$ $4y^2 - 10y^2 = -24$ $-6y^2 = -24$ $y^2 = 4$ $y = -2 \text{ or } y = 2$ $x = -4 \text{ or } x = 4$ <p><b>OR/OF</b></p> $x = 2y \text{ and } x^2 - 5xy = -24$ $y = \frac{x}{2}$ $x^2 - 5(x)\left(\frac{x}{2}\right) = -24$ $x^2 - \frac{5}{2}x^2 = -24$ $-\frac{3}{2}x^2 = -24$ $x^2 = 16$ $x = -4 \text{ or } x = 4$ $y = -2 \text{ or } y = 2$ <p><b>OR/OF</b></p>	<p>✓ substitution of <math>2y</math></p> <p>✓ <math>-6y^2 = -24</math></p> <p>✓ both <math>y</math> – values</p> <p>✓ both <math>x</math> – values</p> <p style="text-align: right;">(4)</p> <p>✓ substitution of <math>\frac{x}{2}</math></p> <p>✓ <math>-\frac{3}{2}x^2 = -24</math></p> <p>✓ both <math>x</math> – values</p> <p>✓ both <math>y</math> – values</p> <p style="text-align: right;">(4)</p>

	$x = 2y \text{ and } x^2 - 5xy = -24$ $y = \frac{x}{2}$ $y = \frac{-x^2 - 24}{-5x}$ $\frac{x}{2} = \frac{x^2 + 24}{5x}$ $5x^2 = 2x^2 + 48$ $3x^2 = 48$ $x^2 = 16$ $x = -4 \text{ or } x = 4$ $y = -2 \text{ or } y = 2$	$\checkmark \text{ equating } \frac{x}{2} = \frac{x^2 + 24}{5x}$ $\checkmark 3x^2 = 48$ $\checkmark \text{ both } x - \text{ values}$ $\checkmark \text{ both } y - \text{ values} \quad (4)$
		<b>[24]</b>

**QUESTION/VRAAG 2**

2.1	$T_4 = -7$	$\checkmark -7$  <p style="text-align: right;">(1)</p>
2.2	$T_n = a + (n-1)d$ $-87 = 5 + (n-1)(-4)$ $-87 = 5 - 4n + 4$ $4n = 96$ $n = 24$ <b>OR/OF</b> $-4n + 9 = -87$ $-4n = -96$ $n = 24$	$\checkmark a = 5 \text{ and } d = -4$ $\checkmark -87 = 5 + (n-1)(-4)$ $\checkmark n = 24$  $\checkmark -4n + 9$ $\checkmark -4n + 9 = -87$ $\checkmark n = 24$  <p style="text-align: right;">(3)</p>
2.3	$-3; -7; \dots; -87$ $S_n = \frac{n}{2}[a + T_n]$ $S_{22} = \frac{22}{2}[-3 - 87]$ $= -990$ <b>OR/OF</b>	$\checkmark n = 22$ $\checkmark a = -3$ $\checkmark \text{ answer}$  <p style="text-align: right;">(3)</p>

	$-3; -7; \dots; -87$ $S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{22} = \frac{22}{2}[2(-3) + (22-1)(-4)]$ $= -990$ <p><b>OR/OF</b></p> <p>All negative terms can be written down and added to get the answer of <math>-990</math>. / <i>Alle negatiewe terme kan neergeskryf word en dan bymekaar getel word om <math>-990</math> te kry.</i></p> <p><b>OR/OF</b></p> $\text{Sum} = S_{24} - (5+1)$ $= \frac{24}{2}[5 - 87] - 6$ $= -990$	$\checkmark n = 22$ $\checkmark a = -3$ $\checkmark$ answer <p style="text-align: right;">(3)</p> $\checkmark a = -3$ $\checkmark \checkmark$ answer <p style="text-align: right;">(3)</p> $\checkmark \frac{24}{2}[5 - 87]$ $\checkmark -6$ $\checkmark$ answer <p style="text-align: right;">(3)</p>
2.4	$5; -15; -35 \dots$ $d = -20$ $T_n = -20n + 25$ <p>Last term in the sequence divisible by 5 is: / <i>Laaste term in die ry deelbaar deur 5 is:</i></p> $-4187 + 4(3)$ $= -4175$ $T_n = -20n + 25$ $-4175 = -20n + 25$ $20n = 4200$ $n = 210$ <p>There will be 210 terms in the sequence that is divisible by 5. / <i>Daar is 210 terme in die ry deelbaar deur 5.</i></p> <p><b>OR/OF</b></p>	$\checkmark d = -20$ $\checkmark T_n = -20n + 25$ $\checkmark -4175 = -20n + 25$ $\checkmark n = 210$ <p style="text-align: right;">(4)</p>

<p>5 ; 1 ; -3 ; ... ; -83 ; -87 ; ..... ; - 4187</p> $T_n = -4n + 9$ $- 4187 = -4n + 9$ $4n = 4196$ $n = 1049$ <p>There are 1049 terms in the sequence./Daar is 1049 terme in die ry.</p> <p><math>T_1 ; T_6 ; T_{11} ; T_{16} \dots</math> are divisible by 5./is deelbaar deur 5.</p> <p>The largest integer value of <math>k</math> such that</p> $5k - 4 \leq 1049$ $5k \leq 1053$ $k \leq 210,6$ $k = 210$ <p><b>OR/OF</b></p> <p>5 ; 1 -3 ; -7 ; ... ; <b>-4175</b>; -4179 ; -4183 ; -4187</p> $T_n = a + (n-1)d$ $- 4175 = 5 + (n-1)(-4)$ $- 4180 = -4(n-1)$ $n = 1046$ <p>Number of terms divisible by 5</p> $= \frac{1046-1}{5} + 1$ $= 210$	<p>✓ <math>-4n + 9 = -4187</math></p> <p>✓ <math>n = 1049</math></p> <p>✓ <math>5k - 4 \leq 1049</math></p> <p>✓ <math>k = 210</math></p> <p>(4)</p> <p>✓ <math>d = -4</math></p> <p>✓ <math>-4175 = -4n + 9</math></p> <p>✓ 1046</p> <p>✓ <math>n = 210</math></p> <p>(4)</p> <p><b>[11]</b></p>
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**QUESTION/VRAAG 3**

<p>3.1.1</p>	<p><math>-1 ; x ; 3 ; x + 8 ; \dots</math></p> <p><math>-2x + 2 = 2x + 2</math> <math>4x = 0</math> <math>x = 0</math></p>	<p>✓ <math>x + 1 ; 3 - x</math> and <math>x + 5</math></p> <p>✓ calculating second differences</p> <p>✓ <math>-2x + 2 = 2x + 2</math></p> <p>✓ <math>x = 0</math> (4)</p>
<p>3.1.2</p>	<p>First differences/<i>Eerste verskille</i>: <math>1 ; 3 ; 5 ; \dots</math></p> $S_n = \frac{n}{2} [2(1) + (n-1)(2)]$ $= n^2$ <p><math>250 &lt; n^2</math> <math>n &gt; \sqrt{250}</math> <math>\therefore n &gt; 15,8</math></p> <p>The sum of the 16 first differences will be greater than 250. Therefore the 17<sup>th</sup> term of the quadratic number pattern is the first satisfying this condition. / <i>Die som van 16 eerste verskille sal groter as 250 wees. Gevolglik sal die 17<sup>de</sup> term van die kwadratiese getalpatroon die eerste wees wat aan die voorwaarde voldoen.</i></p>	<p>✓ <math>S_n = n^2</math></p> <p>✓ <math>S_n &gt; 250</math></p> <p>✓ <math>n &gt; 15,8</math></p> <p>✓ <math>n = 17</math> (4)</p>
<p>3.2.1</p>	<p><math>21 + 21(0,85) + 21(0,85)^2 + \dots</math></p> $T_n = ar^{n-1}$ $T_{10} = (21)(0,85)^9$ <p><math>= 4,86 \text{ cm}</math></p>	<p>✓ <math>n = 10 ; r = 0,85</math> or <math>\frac{17}{20}</math></p> <p>✓ substitution into correct formula</p> <p>✓ answer (3)</p>
<p>3.2.2</p>	$S_n = \frac{a(1-r^n)}{1-r}$ $S_{15} = \frac{21(1-(0,85)^{15})}{1-0,85}$ <p><math>= 127,77</math></p> <p>Area of the page = <math>30 \times 21 = 630</math> Percentage of paper covered in grey ink: <math>= \frac{127,77}{630} \times 100\%</math> <math>= 20,28\%</math></p>	<p>✓ <math>n = 15</math></p> <p>✓ 127,77</p> <p>✓ 630</p> <p>✓ 20,28 (4)</p> <p>[15]</p>

**QUESTION/VRAAG 4**

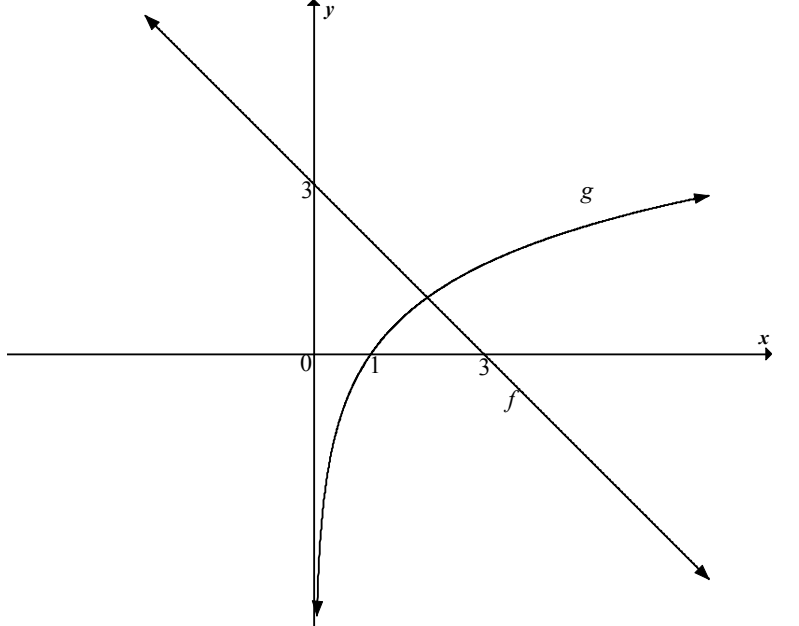
4.1	$y = 0$	✓ $y = 0$ (1)
4.2	$R(0 ; 1)$	✓ answer (1)
4.3	$y = a^x$ $9 = a^2$ $\therefore a = 3$	✓ substitution ✓ $a = 3$ (2)
4.4	$DP = 2 - b$ $y = 3^x$ $\frac{1}{81} = 3^b$ $3^{-4} = 3^b$ $b = -4$ $DP = 2 - (-4)$ $= 6$ units	✓ $\frac{1}{81} = 3^b$ ✓ $3^{-4}$ or use of logs ✓ $b = -4$  ✓ DP = 6 units (4)
4.5	$h(x + 2) + k = 0$ $h(x + 2) = -k$ $0 < -k < \frac{1}{81}$ $-\frac{1}{81} < k < 0$	✓✓ $-k < \frac{1}{81}$ or $k > -\frac{1}{81}$ ✓ $-\frac{1}{81} < k < 0$ (3)
		<b>[11]</b>

**QUESTION/VRAAG 5**

5.1	$f(x) = -x^2 + 4x - 3$ $f'(x) = 0 \quad \text{or} \quad x = -\frac{4}{2(-1)}$ $-2x + 4 = 0$ $x = 2$ $y = -(2)^2 + 4(2) - 3$ $= 1$ $B(2; 1)$ <p><b>OR/OF</b></p> $-x^2 + 4x - 3 = 0$ $x^2 - 4x + 3 = 0$ $(x - 3)(x - 1) = 0$ $x = 3 \text{ or } x = 1$ $x = \frac{3+1}{2}$ $x = 2$ $y = -(2)^2 + 4(2) - 3$ $= 1$ $B(2; 1)$	$\checkmark -2x + 4 = 0 \text{ or}$ $x = -\frac{4}{2(-1)}$ $\checkmark y = -(2)^2 + 4(2) - 3$ <p style="text-align: right;">(2)</p> $\checkmark x = \frac{3+1}{2}$ $\checkmark y = -(2)^2 + 4(2) - 3$ <p style="text-align: right;">(2)</p>
5.2	Range/Waardeversameling : $y \leq 1$ <p><b>OR/OF</b></p> Range/Waardeversameling : $y \in (-\infty; 1]$	$\checkmark y \leq 1$ <p style="text-align: right;">(1)</p> $\checkmark (-\infty; 1]$ <p style="text-align: right;">(1)</p>
5.3	$x \leq -1 \text{ or } x > 2$ <p><b>OR/OF</b></p> $(-\infty; -1] \cup (2; \infty)$	$\checkmark \text{critical values}$ $\checkmark x \leq -1 \text{ or } x > 2$ <p style="text-align: right;">(2)</p> $\checkmark \text{critical values}$ $\checkmark x \leq -1 \text{ or } x > 2$ <p style="text-align: right;">(2)</p>
5.4	$(x - p)(y + t) = 3$ Vertical asymptote of $h(x)$ / <i>vertikale asimptoot</i> at $x = 2$ Translation 4 units to the left / <i>Translasie 4 eenhede links</i> $x = 2 - 4 = -2$ is the equation of the vertical asymptote of $h(x + 4)$ $x = 2 - 4 = -2$ is die vergelyking van die vertikale asimptoot <p><b>OR/OF</b></p>	$\checkmark x = -2$ <p style="text-align: right;">(1)</p>

	<p><b>OR/OF</b></p> $h(x) = \frac{3}{x-2+4} + 1$ $= \frac{3}{x+2} + 1$ $x = -2$ <p>is the equation of the vertical asymptote / <i>is die vergelyking van die vertikale asimptoot</i></p>	<p>✓ <math>x = -2</math></p> <p>(1)</p>
5.5	$(x-p)(y+t) = 3$ $(y+t) = \frac{3}{(x-p)}$ $y = \frac{3}{x-p} - t$ <p>B(2;1) Point of intersection of the asymptotes <i>Snypunt van die asimptote</i> <math>p = 2</math> <math>-t = 1</math> <math>t = -1</math></p>	<p>✓ <math>\frac{3}{x-p}</math> ✓ <math>-t</math></p> <p>✓ <math>p = 2</math></p> <p>✓ <math>t = -1</math></p> <p>(4)</p>
5.6	<p><math>x</math>-intercepts of <math>f</math> / <math>x</math>-afsnitte van <math>f</math>: <math>x^2 - 4x + 3 = 0</math> <math>(x-3)(x-1) = 0</math> <math>x = 1</math> or <math>x = 3</math> <math>g'(x) &lt; 0</math> for <math>x \in R; x \neq 2</math> Hence <math>f(x) &lt; 0</math> <math>x \leq 1</math> or <math>x \geq 3</math> <b>OR/OF</b> <math>(-\infty; 1] \cup [3; \infty)</math></p>	<p>✓ both critical values</p> <p>✓ <math>x \leq 1</math> ✓ or ✓ <math>x \geq 3</math></p> <p>(4) <b>[14]</b></p>

**QUESTION/VRAAG 6**

<p>6.1</p>		<p>g:                  ✓ shape: increasing curve                  ✓ (1 ; 0):                  only on log graph</p> <p>f:                  ✓ (3 ; 0)                  ✓ (0 ; 3)</p> <p style="text-align: right;">(4)</p>
<p>6.2</p>	<p><math>y = \log_2 x</math>  <math>g^{-1} : x = \log_2 y</math>  <math>y = 2^x</math></p>	<p>✓ interchange <math>x</math> and <math>y</math>                  ✓ <math>y = 2^x</math></p> <p style="text-align: right;">(2)</p>
<p>6.3</p>	<p><math>\log_2(3 - x) = x</math>  <math>2^x = 3 - x</math>  <math>2^x = -x + 3</math></p> <p>Reflect the graph of <math>g</math> about the line <math>y = x</math> to obtain <math>g^{-1}</math> and determine the point of intersection of <math>f</math> and <math>g^{-1}</math>. / Reflekteer die grafiek van <math>g</math> om die lyn <math>y = x</math> en bepaal die snypunt van <math>f</math> and <math>g^{-1}</math></p>	<p>✓ ✓ <math>2^x = -x + 3</math></p> <p>✓ point of intersection of <math>f</math> and <math>g^{-1}</math></p> <p style="text-align: right;">(3)</p>
<p>6.4</p>	<p><math>x = 1</math></p>	<p>✓ answer (1)</p> <p style="text-align: right;"><b>[10]</b></p>

**QUESTION/VRAAG 7**

7.1	$A = P(1+i)^n$ $= 250000 \left(1 + \frac{0,15}{12}\right)^2$ $= R256\,289,06$	<p>✓ substituting <math>i</math> and <math>n</math> values in correct formula</p> <p>✓ answer</p> <p style="text-align: right;">(2)</p>
7.2	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $256\,289,06 = \frac{x \left[1 - \left(1 + \frac{0,15}{12}\right)^{-46}\right]}{\frac{0,15}{12}}$ $3203,6133 = x \left[1 - \left(1 + \frac{0,15}{12}\right)^{-46}\right]$ <p style="text-align: center;"><math>x = R\,7\,359,79</math> per month</p> <p><b>OR/OF</b></p> $250000 = \frac{x \left(1 + \frac{0,15}{12}\right)^{-2} \left[1 - \left(1 + \frac{0,15}{12}\right)^{-46}\right]}{\frac{0,15}{12}}$ <p style="text-align: center;"><math>x = R\,7\,359,79</math></p>	<p>✓ <math>i = \frac{0,15}{12}</math></p> <p>✓ <math>n = 46</math></p> <p>✓ substitution into correct formula</p> <p>✓ answer</p> <p style="text-align: right;">(4)</p> <p>✓ <math>i = \frac{0,15}{12}</math></p> <p>✓ <math>n = 46</math></p> <p>✓ substitution into correct formula</p> <p>✓ answer</p> <p style="text-align: right;">(4)</p>
7.3	$256\,289,06 = \frac{9\,000 \left[1 - \left(1 + \frac{0,15}{12}\right)^{-n}\right]}{\frac{0,15}{12}}$ $\left(1 + \frac{0,15}{12}\right)^{-n} = 0,6440429722$ $-n \log \left(1 + \frac{0,15}{12}\right) = \log 0,6440429722$ <p style="text-align: center;"><math>n = 35,41872568</math> months/ <i>maande</i></p> <p style="text-align: center;"><math>\therefore</math> 36 payments are required</p> <p style="text-align: center;"><math>\therefore</math> 36 <i>paaieimente moet betaal word</i></p> <p><math>\therefore</math> Thabiso will pay his loan off 10 months sooner./Thabiso <i>los sy lening 10 maande vroeër af.</i></p> <p><b>OR/OF</b></p>	<p>✓ <math>x = 9\,000</math></p> <p>✓ substitute into correct formula</p> <p>✓ use of logs</p> <p>✓ <math>n = 35,42</math></p> <p>✓ 10 months</p> <p style="text-align: right;">(5)</p>

	$256289,06 \left(1 + \frac{0,15}{12}\right)^n = \frac{9000 \left[ \left(1 + \frac{0,15}{12}\right)^n - 1 \right]}{\frac{0,15}{12}}$ $3203,61325 \left(1 + \frac{0,15}{12}\right)^n = 9000 \left(1 + \frac{0,15}{12}\right)^n - 9000$ $9000 = 5796,38675 \left(1 + \frac{0,15}{12}\right)^n$ $n = \log_{\left(1 + \frac{0,15}{12}\right)} 1,5523691425$ $n = 35,41872568$ <p>∴ 36 payments are required ∴ 36 paaiemente moet betaal word ∴ Thabiso will pay his loan off 10 months sooner./Thabiso los sy lening 10 maande vroeër af.</p>	<p>✓ 9 000</p> <p>✓ substitute into correct formula</p> <p>✓ use of logs</p> <p>✓ <math>n = 35,42</math></p> <p>✓ 10 months</p> <p>(5)</p>
<p>7.4</p>	<p>The balance of his loan after the 35<sup>th</sup> payment was made: <i>Die balans van sy lening nadat die 35<sup>ste</sup> paaiemente betaal is:</i></p> $\text{Balance} = 256289,06 \left(1 + \frac{0,15}{12}\right)^{35} - \frac{9000 \left[ \left(1 + \frac{0,15}{12}\right)^{35} - 1 \right]}{\frac{0,15}{12}}$ $= \text{R } 3\,735,45$ <p>Final instalment = <math>3\,735,45 \left(1 + \frac{0,15}{12}\right)</math> = R 3 782,14</p> <p><b>OR/OF</b></p> $P = \frac{x[1 - (1 + i)^{-n}]}{i}$ <p>Final instalment</p> $= \frac{9\,000 \left[ 1 - \left(1 + \frac{0,15}{12}\right)^{-0,41872568} \right]}{\frac{0,15}{12}} \left(1 + \frac{0,15}{12}\right)$ $= \text{R } 3\,782,14$ <p><b>OR/OF</b></p>	<p>✓ <math>256289,06 \left(1 + \frac{0,15}{12}\right)^{35}</math></p> <p>✓ <math>\frac{9000 \left[ \left(1 + \frac{0,15}{12}\right)^{35} - 1 \right]}{\frac{0,15}{12}}</math></p> <p>✓ <math>3\,735,45 \left(1 + \frac{0,15}{12}\right)</math></p> <p>✓ answer</p> <p>(4)</p> <p>✓ 0,41872568</p> <p>✓ <math>\frac{9\,000 \left[ 1 - \left(1 + \frac{0,15}{12}\right)^{-0,41872568} \right]}{\frac{0,15}{12}}</math></p> <p>✓ <math>\times \left(1 + \frac{0,15}{12}\right)</math></p> <p>✓ answer</p> <p>(4)</p>

	$\text{Balance} = 256289,06 \left(1 + \frac{0,15}{12}\right)^{36} - \frac{9000 \left( \left(1 + \frac{0,15}{12}\right)^{36} - 1 \right)}{\frac{0,15}{12}}$ $= R \text{ } - 5 \text{ } 217,86$ $\text{Final payment} = 9 \text{ } 000 - 5217,86$ $= R \text{ } 3 \text{ } 782,14$	<p>✓ <math>256289,06 \left(1 + \frac{0,15}{12}\right)^{36}</math></p> <p>✓ <math>\frac{9000 \left( \left(1 + \frac{0,15}{12}\right)^{36} - 1 \right)}{\frac{0,15}{12}}</math></p> <p>✓ <math>9 \text{ } 000 - 5217,86</math></p> <p>✓ answer</p> <p style="text-align: right;">(4)</p>
<b>[15]</b>		

**QUESTION/VRAAG 8**

8.1	$f(x + h) = 3(x + h)^2$ $= 3(x^2 + 2xh + h^2)$ $= 3x^2 + 6xh + 3h^2$ $f(x + h) - f(x) = 3x^2 + 6xh + 3h^2 - 3x^2$ $= 6xh + 3h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{6xh + 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(6x + 3h)}{h}$ $= \lim_{h \rightarrow 0} (6x + 3h)$ $= 6x$ <p><b>OR/OF</b></p> $f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{3(x + h)^2 - 3x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{3x^2 + 6xh + 3h^2 - 3x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{6xh + 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(6x + 3h)}{h}$ $= \lim_{h \rightarrow 0} (6x + 3h)$ $= 6x$	<p>✓ <math>3(x + h)^2</math></p> <p>✓ <math>6xh + 3h^2</math></p> <p>✓ <math>f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}</math></p> <p>✓ <math>\lim_{h \rightarrow 0} (6x + 3h)</math></p> <p>✓ <math>6x</math></p> <p style="text-align: right;">(5)</p> <p>✓ <math>f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}</math></p> <p>✓ <math>3(x + h)^2 - 3x^2</math></p> <p>✓ <math>6xh + 3h^2</math></p> <p>✓ <math>\lim_{h \rightarrow 0} (6x + 3h)</math></p> <p>✓ <math>6x</math></p> <p style="text-align: right;">(5)</p>
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<p>8.2</p>	$\lim_{h \rightarrow 0} \frac{\sqrt{4+h} - 2}{h}$ $g(x) = \sqrt{x}$ $a = 4$	<p>✓ answer ✓ answer</p> <p>(2)</p>
<p>8.3</p>	$y = \sqrt{x^3} - \frac{5}{x^3}$ $y = x^{\frac{3}{2}} - 5x^{-3}$ $\frac{dy}{dx} = \frac{3}{2}x^{\frac{1}{2}} + 15x^{-4}$	<p>✓ <math>x^{\frac{3}{2}}</math> ✓ <math>-5x^{-3}</math> ✓ <math>\frac{3}{2}x^{\frac{1}{2}}</math> ✓ <math>15x^{-4}</math></p> <p>(4)</p>
<p>8.4</p>	$f(x) = x^3 + ax^2 + bx + 18$ $f'(x) = 3x^2 + 2ax + b$ <p>At <math>x = 1</math>, <math>m_{\text{tan}} = -8</math></p> $f'(1) = -8$ $3(1)^2 + 2a(1) + b = -8$ $3 + 2a + b = -8$ $2a + b = -11 \dots\dots(1)$ $y = f(1)$ $= g(1)$ $= -8(1) + 20$ $= 12$ $1 + a + b + 18 = 12$ $a + b = -7 \dots\dots(2)$ $a = -4$ $b = -3$	<p>✓ <math>3x^2 + 2ax + b</math></p> <p>✓ <math>f'(1) = -8</math> or <math>3(1)^2 + 2a(1) + b = -8</math></p> <p>✓ <math>1 + a + b + 18 = 12</math></p> <p>✓ <math>a = -4</math> ✓ <math>b = -3</math></p> <p>(5) <b>[16]</b></p>

**QUESTION/VRAAG 9**

9.1	$f'(x) = 3x^2 + 8x - 3 = 0$ $(3x - 1)(x + 3) = 0$ $x = \frac{1}{3} \quad \text{or} \quad x = -3$	✓ equating derivative to zero ✓ factors ✓ x – values (3)
9.2	$f''(x) = 6x + 8$ $6x + 8 < 0$ $x < -\frac{4}{3}$ <p><b>OR</b></p> $x = \frac{\frac{1}{3} - 3}{2}$ $= \frac{4}{3}$ $\therefore x < -\frac{4}{3}$	✓ $6x + 8$ ✓✓ $x < -\frac{4}{3}$ ✓ $\frac{\frac{1}{3} - 3}{2}$ ✓✓ $x < -\frac{4}{3}$ (3)
9.3	$x \leq -3 \quad \text{or} \quad x \geq \frac{1}{3}$ <p><b>OR/OF</b></p> $[-\infty; -3] \cup \left[\frac{1}{3}; \infty\right]$	✓ $x \leq -3$ ✓ $x \geq \frac{1}{3}$ ✓ $[-\infty; -3]$ ✓ $\left[\frac{1}{3}; \infty\right]$ (2) (2)
9.4	$f(0) = -18$ $d = -18$ $f(x) = ax^3 + bx^2 + cx - 18$ $f'(x) = 3ax^2 + 2bx + c$ $f'(x) = 3x^2 + 8x - 3$ $3a = 3 \quad 2b = 8$ $a = 1 \quad b = 4 \quad c = -3$ $f(x) = x^3 + 4x^2 - 3x - 18$ <p><b>OR/OF</b></p> $f'(x) = 3x^2 + 8x - 3$ <p>By integration/<i>Deur integrasie</i></p> $f(x) = x^3 + 4x^2 - 3x + d$ $f(0) = d = -18$ $a = 1$ $b = 4$ $c = -3$	✓ $d = -18$ ✓ $f'(x) = 3ax^2 + 2bx + c$ ✓ $a = 1$ ✓ $b = 4$ ✓ $c = -3$ (5) ✓ $f(x) = x^3 + 4x^2 - 3x + d$ ✓ $d = -18$ ✓ $a = 1$ ✓ $b = 4$ ✓ $c = -3$ (5)
		[13]

**QUESTION/VRAAG 10**

10.1	$M(t) = -t^3 + 3t^2 + 72t$ $M(3) = -(3)^3 + 3(3)^2 + 72(3)$ $= 216$ <p>216 molecules/molekules</p>	$\checkmark M(3) = -(3)^3 + 3(3)^2 + 72(3)$ $\checkmark 216$ <p style="text-align: right;">(2)</p>
10.2	$M(t) = -t^3 + 3t^2 + 72t$ $M'(t) = -3t^2 + 6t + 72$ $M'(2) = -3(2)^2 + 6(2) + 72$ $= 72$ <p>72 molecules per hour/molekules per uur</p>	$\checkmark M'(t) = -3t^2 + 6t + 72$ $\checkmark M'(2)$ $\checkmark 72$ <p style="text-align: right;">(3)</p>
10.3	$M(t) = -t^3 + 3t^2 + 72t$ $M'(t) = -3t^2 + 6t + 72$ $M''(t) = 0$ $-6t + 6 = 0$ $t = 1$ <p>Maximum rate of change of the number of molecules of the drug in the bloodstream is after 1 hour./Maksimum tempo van verandering van die getal molekules in die bloedstroom is na 1 uur</p>	$\checkmark M''(t)$ $\checkmark M''(t) = 0$ $\checkmark \text{answer}$ <p style="text-align: right;">(3) <b>[8]</b></p>

**QUESTION/VRAAG 11**

11.1	<table border="1" data-bbox="252 331 1115 577"> <thead> <tr> <th></th> <th>Watches TV during exams</th> <th>Do not watch TV during exams</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Male</td> <td>80</td> <td><math>a</math></td> <td><math>80+a</math></td> </tr> <tr> <td>Female</td> <td>48</td> <td>12</td> <td>60</td> </tr> <tr> <td>Total</td> <td><math>b</math></td> <td>32</td> <td>160</td> </tr> </tbody> </table> <p data-bbox="252 584 400 613"><math>a + 12 = 32</math></p> <p data-bbox="316 629 400 658"><math>a = 20</math></p> <p data-bbox="316 674 459 752"><math>b = 80 + 48</math> <math>= 128</math></p>		Watches TV during exams	Do not watch TV during exams	Total	Male	80	$a$	$80+a$	Female	48	12	60	Total	$b$	32	160	<p data-bbox="1142 629 1254 658">✓ <math>a = 20</math></p> <p data-bbox="1142 696 1270 725">✓ <math>b = 128</math></p> <p data-bbox="1382 741 1425 770">(2)</p>
	Watches TV during exams	Do not watch TV during exams	Total															
Male	80	$a$	$80+a$															
Female	48	12	60															
Total	$b$	32	160															
11.2	<p data-bbox="252 777 296 806">No</p> <p data-bbox="252 815 759 893"><math>P(\text{M and not watching TV}) = \frac{20}{160} \neq 0</math></p>	<p data-bbox="1142 777 1209 806">✓ No</p> <p data-bbox="1142 844 1254 873">✓ reason</p> <p data-bbox="1382 889 1425 918">(2)</p>																
11.3.1	<p data-bbox="252 925 762 1003"><math>P(\text{watching TV}) = \frac{128}{160} = \frac{4}{5} = 0,8 = 80\%</math></p>	<p data-bbox="1142 925 1222 954">✓ 128</p> <p data-bbox="1142 965 1222 994">✓ 160</p> <p data-bbox="1382 1001 1425 1030">(2)</p>																
11.3.2	<p data-bbox="252 1048 1011 1126"><math>P(\text{female and not watching TV}) = \frac{12}{160} = \frac{3}{40} = 0,075 = 7,5\%</math></p>	<p data-bbox="1142 1081 1209 1111">✓ 12</p> <p data-bbox="1142 1122 1222 1151">✓ 160</p> <p data-bbox="1382 1158 1425 1187">(2)</p> <p data-bbox="1382 1198 1425 1227"><b>[8]</b></p>																

**QUESTION/VRAAG 12**

<p>12.</p>	<p>We want to create codes that are even numbers greater than 5000. The digit 6 can be used in one of two places in these codes and therefore this presents two scenarios. <i>Ons wil kodes kry wat ewe getalle groter as 5000 is. Die syfer 6 kan in twee posisies in die kode gebruik word en twee opsies is moontlik:</i></p> <p>CASE 1: The first digit is a 6./<i>Die eerste syfer is 'n 6.</i></p> $\begin{array}{ccccccc} & & & & & & 2 \\ & & & & & & 4 \\ 6 & & & & & & \\ \hline 1 & \times & 5 & \times & 4 & \times & 2 \\ \hline \end{array}$ <p>Number of codes starting with 6./<i>Getal kodes wat met 6 begin.</i> <math>= 1 \times 5 \times 4 \times 2 = 40</math></p> <p>CASE 2: The first digit is a 5 or 7./<i>Die eerste syfer is 'n 5 of 7.</i></p> $\begin{array}{ccccccc} & & & & & & 2 \\ & & & & & & 4 \\ 5 & & & & & & 6 \\ 7 & & & & & & \\ \hline 2 & \times & 5 & \times & 4 & \times & 3 \\ \hline \end{array}$ <p>Number of codes not starting with 6./<i>Getal kodes wat nie met 6 begin</i> <math>= 2 \times 5 \times 4 \times 3 = 120</math></p> <p>Therefore total number of possible codes./<i>Die totale getal moontlike kodes</i> <math>= 40 + 120 = 160.</math></p> <p><b>OR/OF</b></p> $\begin{aligned} & (3 \times 5 \times 4 \times 1) + (3 \times 5 \times 4 \times 1) + (2 \times 5 \times 4 \times 1) \\ & = 60 + 60 + 40 \\ & = 160 \end{aligned}$ <p><b>OR/OF</b></p> $\begin{aligned} & (3 \times 5 \times 4 \times 3) - (1 \times 5 \times 4 \times 1) \\ & = 180 - 20 \\ & = 160 \end{aligned}$	<p>✓ <math>1 \times 5 \times 4 \times 2</math> ✓ 40</p> <p>✓ <math>2 \times 5 \times 4 \times 3</math> ✓ 120 ✓ 160</p> <p>[5]</p> <p>✓ <math>(3 \times 5 \times 4 \times 1)</math> ✓ <math>(3 \times 5 \times 4 \times 1)</math> ✓ <math>(2 \times 5 \times 4 \times 1)</math> ✓✓ 160</p> <p>[5]</p> <p>✓✓ <math>(3 \times 5 \times 4 \times 3)</math> ✓✓ <math>(1 \times 5 \times 4 \times 1)</math> ✓ 160</p> <p>[5]</p>
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**TOTAL/TOTAAL: 150**