



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE/  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE 12/GRAAD 12**

**SEPTEMBER 2020**

**MATHEMATICS P1/WISKUNDE VI  
MARKING GUIDELINE/NASIENRIGLYN**

**MARKS/PUNTE: 150**

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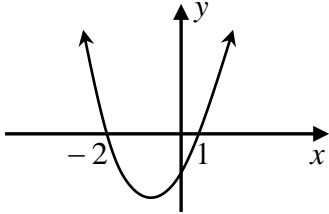
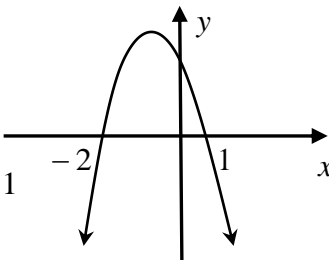
This marking guideline consists of 16 pages./  
*Hierdie nasienriglyn bestaan uit 16 bladsye.*

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**NOTE/LET WEL:**

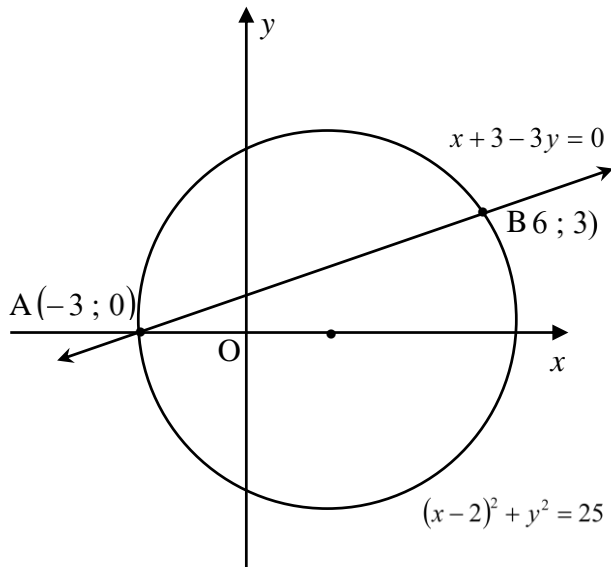
- If a candidate answers a question TWICE, mark the FIRST attempt ONLY.  
*Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk SLEGS die EERSTE poging.*
- Consistent accuracy applies in ALL aspects of the marking guideline.  
*Volgehoue akkuraatheid geld deurgaans in ALLE aspekte van die nasienriglyn.*
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out attempt.  
*Indien 'n kandidaat 'n poging vir 'n vraag deurgetrek het en nie die vraag weer beantwoord het nie, merk die poging wat deurgetrek is.*
- The mark for substitution is awarded for substitution into the correct formula.  
*Die punt vir substitusie word vir substitusie in die korrekte formule toegeken.*

**QUESTION 1/VRAAG 1**

1.1.1	$2x^2 + x - 3 = 0$ $(2x+3)(x-1) = 0$ $\therefore x = -\frac{3}{2} \quad \text{or / of} \quad x = 1$	<p>✓ factorisation / <i>faktorisering</i></p> <p>✓ <math>x = -\frac{3}{2}</math>   ✓ <math>x = 1</math></p> <p style="text-align: right;">(3)</p>
1.1.2	$x(7x+2) = 1$ $7x^2 + 2x - 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-2 \pm \sqrt{2^2 - 4(7)(-1)}}{2(7)}$ $= \frac{-2 \pm \sqrt{32}}{14}$ $= 0,26 \quad \text{or / of} \quad -0,55$	<p>✓ standard form / <i>standaardvorm</i></p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ 0,26   ✓ -0,55</p> <p style="text-align: right;">(4)</p>
1.1.3	$-x^2 - x + 2 \leq 0$ $x^2 + x - 2 \geq 0$ $(x+2)(x-1) \geq 0$ $\therefore x \leq -2 \quad \text{or / of} \quad x \geq 1$ <p style="text-align: center;"><b>OR/OF</b></p> $-x^2 - x + 2 \leq 0$ $(1-x)(x+2) \leq 0$ $\therefore x \leq -2 \quad \text{or / of} \quad x \geq 1$	 <p>✓ <math>x^2 + x - 2 \geq 0</math></p> <p>✓ <math>x^2 + x - 2 \geq 0</math></p> <p>✓ <math>x \leq -2</math>   ✓ <math>x \geq 1</math></p> <p style="text-align: center;"><b>OR/OF</b></p>  <p>✓ <math>1-x</math></p> <p>✓ factorisation / <i>faktorisering</i></p> <p>✓ <math>x \leq -2</math>   ✓ <math>x \geq 1</math></p> <p style="text-align: right;">(4)</p>

<p>1.1.4</p> $2^x + 2^{2-x} = \frac{17}{2}$ $2 \cdot 2^x + 2 \cdot 2^{2-x} = 17$ $2 \cdot 2^x + \frac{2^3}{2^x} = 17$ $2 \cdot 2^{2x} - 17 \cdot 2^x + 8 = 0$ <p>Let / Laat <math>k = 2^x</math>,</p> $\therefore 2k^2 - 17k + 8 = 0$ $(2k - 1)(k - 8) = 0$ $k = \frac{1}{2} \quad \text{or / of} \quad k = 8$ $\therefore 2^x = 2^{-1} \quad \text{or / of} \quad 2^x = 2^3$ $x = -1 \quad \text{or / of} \quad x = 3$ <p style="text-align: center;"><b>OR/OF</b></p> $2^x + 2^{2-x} = \frac{17}{2}$ $2 \cdot 2^x + 2 \cdot 2^{2-x} = 17$ $2 \cdot 2^x + \frac{2^3}{2^x} = 17$ $2 \cdot 2^{2x} - 17 \cdot 2^x + 8 = 0$ $(2 \cdot 2^x - 1)(2^x - 8) = 0$ $\therefore 2^x = 2^{-1} \quad \text{or / of} \quad 2^x = 2^3$ $x = -1 \quad \text{or / of} \quad x = 3$	<p>✓ standard form / <i>standaardvorm</i></p> <p>✓ substitution / <i>vervanging</i> <math>k = 2^x</math></p> <p>✓ factorisation / <i>faktorisering</i></p> <p>✓ <math>2^x = 2^{-1}</math> and/en <math>2^x = 2^3</math></p> <p>✓ both answers / <i>beide antwoorde</i></p> <p style="text-align: center;"><b>OR/OF</b></p> <p>✓ standard form / <i>standaardvorm</i></p> <p>✓ factorisation / <i>faktorisering</i></p> <p>✓ <math>2^x = 2^{-1}</math>    ✓ <math>2^x = 2^3</math></p> <p>✓ both answers / <i>beide antwoorde</i></p> <p style="text-align: right;">(5)</p>
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1.2



$$(x-2)^2 + y^2 = 25 \quad (1)$$

$$x + 3 - 3y = 0 \quad (2)$$

$$x = 3y - 3 \quad (3)$$

$$(3y - 3 - 2)^2 + y^2 = 25$$

$$(3y - 5)^2 + y^2 = 25$$

$$9y^2 - 30y + 25 + y^2 = 25$$

$$10y^2 - 30y = 0$$

$$10y(y - 3) = 0$$

$$\therefore y = 0 \text{ or / of } y = 3$$

$$x = -3 \text{ or / of } x = 6$$

$$\therefore A(-3; 0) \text{ and/en } B(6; 3)$$

**OR/OF**

$$\checkmark x = 3y - 3$$

✓ substitution / *vervanging*

✓ standard form / *standaardvorm*

✓ factorisation / *faktorisering*

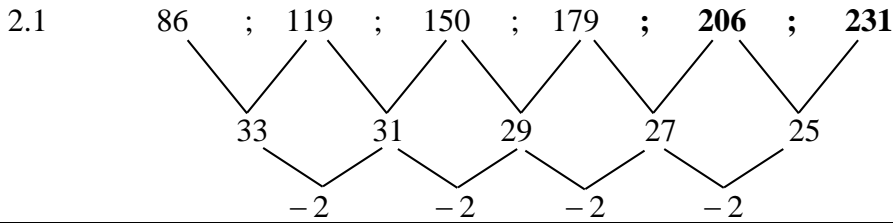
✓ *x and y values / x en y waardes*

✓ both sets of coordinates  
*beide stelle van koördinate*

**OR/OF**

	$(x-2)^2 + y^2 = 25 \quad (1)$ $x+3-3y=0 \quad (2)$ $y = \frac{1}{3}(x+3) \quad (3)$ $(x-2)^2 + \left(\frac{x}{3}+1\right)^2 = 25$ $x^2 - 4x + 4 + \frac{x^2}{9} + \frac{2x}{3} + 1 - 25 = 0$ $9x^2 - 36x + 36 + x^2 + 6x - 216 = 0$ $10x^2 - 30x - 180 = 0$ $x^2 - 3x - 18 = 0$ $(x+3)(x-6) = 0$ $\therefore x = -3 \quad \text{or / of} \quad x = 6$ $\therefore y = 0 \quad \text{or / of} \quad y = 3$ $\therefore A(-3 ; 0) \quad B(6 ; 3)$	<p>✓ <math>y = \frac{1}{3}(x+3)</math></p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ standard form / <i>standaardvorm</i></p> <p>✓ factorisation / <i>faktorisering</i></p> <p>✓ x and y values / <i>x en y waardes</i></p> <p>✓ both sets of coordinates / <i>beide stelle koördinate</i></p> <p style="text-align: right;">(6)</p>
<p>1.3</p>	$(x+m)(x+n) = p^2$ $x^2 + nx + mx + mn - p^2 = 0$ $x^2 + (m+n)x + (mn - p^2) = 0$ <p>For real roots / <i>Vir reële wortels:</i></p> $b^2 - 4ac \geq 0$ $\therefore (m+n)^2 - 4(1)(mn - p^2) \geq 0$ $m^2 + 2mn + n^2 - 4mn + 4p^2 \geq 0$ $m^2 - 2mn + n^2 + 4p^2 \geq 0$ $(m-n)^2 + (2p)^2 \geq 0$ <p>Now/Maar: <math>(m-n)^2 \geq 0</math> and/en <math>(2p)^2 \geq 0</math></p> $\therefore \Delta \geq 0$	<p>✓ <math>x^2 + (m+n)x + (mn - p^2) = 0</math></p> <p>✓ <math>(m+n)^2 - 4(1)(mn - p^2) \geq 0</math></p> <p>✓ <math>(m-n)^2 + (2p)^2 \geq 0</math></p> <p>✓ explanation / <i>verduideliking</i></p> <p style="text-align: right;">(4)</p>
		<p>[26]</p>

## QUESTION 2/VRAAG 2



2.1.1	206 ; 231	✓ 206    ✓ 231	(2)	
2.1.2	$2a = -2$ $\therefore a = -1$ $3a + b = 33$ $-3 + b = 33$ $\therefore b = 36$ $a + b + c = 86$ $-1 + 36 + c = 86$ $\therefore c = 51$ $T_n = -n^2 + 36n + 51$	✓ $a = -1$  ✓ $b = 36$  ✓ $c = 51$ ✓ $T_n = -n^2 + 36n + 51$	(4)	
2.1.3	$326 = -n^2 + 36n + 51$ $n^2 - 36n + 275 = 0$ $(n - 11)(n - 25) = 0$ $\therefore n = 11$ or/of $n = 25$	✓ substitution / <i>vervanging</i>  ✓ method / <i>metode</i> ✓ answers / <i>antwoorde</i>	(3)	
2.1.4	$86 + k ; 119 + k ; 150 + k ; 179 + k$ 	$2a = -2$ $\therefore a = -1$  $3a + b = 33$ $-3 + b = 33$ $\therefore b = 36$  $a + b + c = 86 + k$ $-1 + 36 + c = 86 + k$ $\therefore c = 51 + k$  $\therefore T_n + k = -n^2 + 36n + (51 + k)$	✓ $a = -1$ and/en $b = 36$  ✓ $c = 51 + k$	(2)

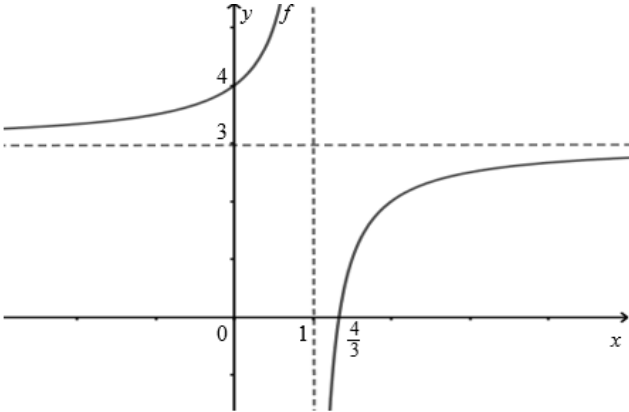
<p>2.2.1</p>	$2y - 1 ; 4y - 1 ; 6y - 1$ $d = 4y - 1 - (2y - 1)$ $= 2y$ $T_n = 2yn - 1$ $T_{30} = 2y(30) - 1$ $= 60y - 1$ <p style="text-align: center;"><b>OR/OF</b></p> $T_n = a + (n - 1)d$ $T_{30} = (2y - 1) + (30 - 1)(2y)$ $= 2y - 1 + 58y$ $= 60y - 1$	$\checkmark d = 2y$ $\checkmark 2yn - 1$ $\checkmark 60y - 1$ <p style="text-align: center;"><b>OR/OF</b></p> $\checkmark d = 2y$ $\checkmark \text{substitution / vervanging}$ $\checkmark \text{answer / antwoord}$ <p style="text-align: right;">(3)</p>
<p>2.2.2</p>	$S_n = \frac{n}{2}[2a + (n - 1)d]$ $S_{30} = \frac{30}{2}[2(2y - 1) + 29(2y)]$ $= 15(4y - 2 + 58y)$ $= 15(62y - 2)$ $\therefore -2820 = 15(62y - 2)$ $-188 = 62y - 2$ $-186 = 62y$ $\therefore y = -3$ <p style="text-align: center;"><b>OR/OF</b></p> $S_n = \frac{n}{2}[a + l]$ $S_{30} = \frac{30}{2}[2y - 1 + 60y - 1]$ $-2820 = 15[62y - 2]$ $-188 = 62y - 2$ $-186 = 62y$ $\therefore y = -3$	$\checkmark d = 2y$ $\checkmark \text{substitution into correct formula}$ $\text{vervanging in die korrekte formule}$ $\checkmark \text{equating to } -2820 /$ $\text{stel gelyk aan } -2820$ $\checkmark \text{answer / antwoord}$ <p style="text-align: center;"><b>OR/OF</b></p> $\checkmark d = 2y$ $\checkmark \text{substituting } a \text{ and } l /$ $\text{vervanging van } a \text{ en } l$ $\checkmark \text{equating to } -2820$ $\text{stel gelyk aan } -2820$ $\checkmark \text{answer / antwoord}$ <p style="text-align: right;">(4)</p>
		<b>[18]</b>

## QUESTION 3/VRAAG 3

3.1	$1 + 4 + 4^2 + 4^3 + \dots + 4^{n-1}$ $\therefore T_n = 4^{n-1}$ $\therefore \text{Sum/Som: } \sum_{n=1}^7 4^{n-1}$ <p>For original sequence:/Vir oorspronklike ry:</p> $\text{Sum/Som: } \sum_{n=1}^{5000} n$ $S_n : \sum_{n=1}^{5000} n - \sum_{n=1}^7 4^{n-1}$	$\checkmark T_n = 4^{n-1}$ $\checkmark \sum_{n=1}^7 4^{n-1}$ $\checkmark \sum_{n=1}^{5000} n$ $\checkmark \text{answer / antwoord}$ <p style="text-align: right;">(4)</p>
3.2	$S_\infty = \frac{1}{a-r}$ $\therefore 1 + x + x^2 + x^3 + \dots = \frac{1}{1-x} \text{ and/en}$ $1 - x + x^2 - x^3 + \dots = \frac{1}{1+x}$ $\text{Sum/Som: } \frac{1}{1-x} + \frac{1}{1+x}$ $= \frac{1+x+1-x}{(1-x)(1+x)}$ $= \frac{2}{1-x^2}$ $\therefore \frac{2}{1-x^2} = 8$ $8 - 8x^2 = 2$ $-8x^2 = -6$ $x^2 = \frac{3}{4}$ $x = \pm \frac{\sqrt{3}}{2}$	$\checkmark \frac{1}{1-x}$ $\checkmark \frac{1}{1+x}$ $\checkmark \frac{2}{1-x^2}$ $\checkmark \text{equating sum to 8}$ $\text{stel som gelyk aan 8}$ $\checkmark x^2 = \frac{3}{4}$ $\checkmark \text{answer / antwoord}$ <p style="text-align: right;">(6)</p>
		<b>[10]</b>



## QUESTION 4/VRAAG 4

4.1	$f(x) = \frac{a}{x-1} + 3,$ $x = 1; \quad y = 3$	$\checkmark x = 1 \quad \checkmark y = 3$  (2)
4.2	$y = \frac{a}{0-1} + 3$ $= 3 - a$ $0 = \frac{a}{x-1} + 3$ $-3 = \frac{a}{x-1}$ $-3x + 3 = a$ $x = 1 - \frac{a}{3} \text{ or/of } \frac{3-a}{3}$	$\checkmark 3 - a$  $\checkmark y = 0$  $\checkmark x = 1 - \frac{a}{3} \text{ or/of } \frac{3-a}{3}$  (3)
4.3		$\checkmark$ asymptotes / <i>asimptote</i> $\checkmark$ y-intercepts / <i>y-afsnitte</i> $\checkmark$ x-intercepts / <i>x-afsnitte</i> $\checkmark$ shape / <i>vorm</i>  (4)
4.4	$f(x) = \frac{a}{x+2} + 1 \text{ or/of } f(x) = \frac{-1}{x+2} + 1$	$\checkmark x + 2 \quad \checkmark + 1$  (2)
		<b>[11]</b>

## QUESTION 5/VRAAG 5

5.1	$(0 ; -7)$	$\checkmark y = -7$ (1)
5.2	$q = -8$	$\checkmark q = -8$ (1)
5.3	$g(x) = b^x - 8$ $-5 = b^1 - 8$ $\therefore b = 3$  At turning point of $f$ : / <i>By die draaipunt van <math>f</math>:</i> $x = -\frac{b}{2a} = -\frac{3}{4}$ $\Rightarrow -\frac{3}{2a} = -\frac{3}{4}$ $\therefore -6a = -12$ $a = 2$ $\therefore -5 = 2(1)^2 + 3(1) + c$ $c = -10$	$\checkmark$ substituting $(1 ; -5)$ / <i>vervangings van <math>(1; -5)</math></i>  $\checkmark x = -\frac{b}{2a}$ $\checkmark -\frac{b}{2a} = -\frac{3}{4}$ $\checkmark b = 3$ $\checkmark$ simplifying / <i>vereenvoudiging</i>  $\checkmark f(1) = -5$ (6)
5.4	$y > -8 ; y \in \mathbb{R}$	$\checkmark\checkmark y > -8$ (accuracy) / <i>(akkuraatheid)</i> (2)
5.5	$y + 9x = -28$ $y = -9x - 28$ $y = 2x^2 + 3x - 10$ $\therefore 2x^2 + 3x - 10 = -9x - 28$ $2x^2 + 12x + 18 = 0$ $x^2 + 6x + 9 = 0$ $(x + 3)(x + 3) = 0$ $\therefore x = -3$ $y = 2(-3)^2 + 3(-3) - 10$ $= -1$ $\therefore T(-3 ; -1)$  <p style="text-align: center;"><b>OR/OF</b></p> $y = -9x - 28$ $\therefore m = -9$ $f(x) = 2x^2 + 3x - 10$ $f'(x) = 4x + 3 = -9$ $\therefore 4x = -12$ $x = -3$ $y = -9(-3) - 28$ $= -1$ $\therefore T(-3 ; -1)$	$\checkmark 2x^2 + 3x - 10 = -9x - 28$ $\checkmark$ standard form / <i>standaardvorm</i>  $\checkmark$ factorisation / <i>faktorisering</i> $\checkmark x = -3$  $\checkmark y = -1$  <p style="text-align: center;"><b>OR/OF</b></p> $\checkmark m = -9$  $\checkmark f'(x) = 4x + 3$ $\checkmark$ equating gradients / <i>stel gradiënte gelyk</i>  $\checkmark x = -3$  $\checkmark y = -1$ (5)

5.6	$y = \log_3 x$	✓ ✓ $y = \log_3 x$ (2)
5.7	$p(x) = f(x) + 1$ $= 2x^2 + 3x - 10 + 1$ $= 2x^2 + 3x - 9$ $= (2x - 3)(x + 3)$ $\therefore$ when/wanneer: $y = 0$ , $x = \frac{3}{2}$ or / of $-3$  $\therefore x < -3$ or / of $0 < x < \frac{3}{2}$	✓ $p(x) = 2x^2 + 3x - 9$  ✓ $x$ -intercepts / $x$ -afsnitte  ✓ $x < -3$ ✓ $0 < x < \frac{3}{2}$ (accuracy/akkuraatheid) (4)
		[21]

## QUESTION 6/VRAAG 6

6.1	$A = P(1-i)^n$ $\frac{1}{3}x = x(1-i)^4$ $\frac{1}{3} = (1-i)^4$ $3^{\frac{1}{4}} - 1 = -i$ $-0,24 = -i$ $\therefore i = 0,24$ $\therefore r = 24\%$	$\checkmark \frac{1}{3}x = x(1-i)^4$ $\checkmark i = 0,24$ $\checkmark \text{answer / antwoord}$ <p style="text-align: right;">(3)</p>
6.2.1	$F = \frac{x[(1+i)^n - 1]}{i}$ $R596458,10 = \frac{x \left[ \left(1 + \frac{0,095}{12}\right)^{72} - 1 \right]}{\frac{0,095}{12}}$ $x = \frac{R596458,10 \times \frac{0,095}{12}}{\left[ \left(1 + \frac{0,095}{12}\right)^{72} - 1 \right]}$ $= R6178,13$	$\checkmark i = \frac{0,095}{12}$ $\checkmark n = 72$ $\checkmark F = R596458,10$ $\checkmark \text{substitution into correct formula /}$ $\text{vervanging in die korrekte formule}$ $\checkmark \text{answer / antwoord}$ <p style="text-align: right;">(5)</p>
6.2.2	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $= \frac{R6178,13 \left[ 1 - \left(1 + \frac{0,095}{12}\right)^{-72} \right]}{\frac{0,095}{12}}$ $= R338070,29$ $A = P(1+i)^n$ $R338070,29 = P \left(1 + \frac{0,095}{12}\right)^5$ $\therefore P = \frac{R338070,29}{\left(1 + \frac{0,095}{12}\right)^5}$ $= R325000$	$\checkmark n = -72$ $\checkmark \text{substitution into correct formula /}$ $\text{vervanging in die korrekte formule}$ $\checkmark A = R338070,29$ $\checkmark n = 5$ $\checkmark \text{substitution into correct formula /}$ $\text{vervanging in die korrekte formule}$ $\checkmark \text{answer / antwoord}$ <p style="text-align: right;">(6)</p>
<b>[14]</b>		

QUESTION 7/VRAAG 7

<p>7.1</p>	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-2(x+h)^2 - (-2x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{-2(x^2 + 2xh + h^2) + 2x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-2x^2 - 4xh - 2h^2 + 2x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $= \lim_{h \rightarrow 0} (-4x - 2h)$ $= -4x$ <p style="text-align: center;"><b>OR/OF</b></p> $f(x) = -2x^2$ $f(x+h) - f(x) = -2(x+h)^2 - (-2x^2)$ $= -2x^2 - 2xh - 2h^2 + 2x^2$ $= -4xh - 2h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-4xh - 2h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4xh - 2h)}{h}$ $= \lim_{h \rightarrow 0} (-4xh - 2h)$ $= -4x$	<p>✓ substitution / <i>vervanging</i></p> <p>✓ expansion / <i>uitbreiding</i></p> <p>✓ <math>-2x^2 - 4xh - 2h^2 + 2x^2</math></p> <p>✓ factorisation / <i>faktorisering</i></p> <p>✓ <math>-4x</math></p> <p style="text-align: center;"><b>OR/OF</b></p> <p>✓ <math>-2x^2 - 2xh - 2h^2 + 2x^2</math></p> <p>✓ <math>-4xh - 2h^2</math></p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ factorisation / <i>faktorisering</i></p> <p>✓ <math>-4x</math></p> <p style="text-align: right;">(5)</p>
<p>7.2</p>	$y = 7x^4 - \frac{2}{\sqrt{x^3}}$ $= 7x^4 - 2x^{-\frac{3}{2}}$ $\therefore \frac{dy}{dx} = 28x^3 + 3x^{-\frac{5}{2}}$	<p>✓ <math>2x^{-\frac{3}{2}}</math></p> <p>✓ <math>28x^3</math> ✓ <math>+ 3x^{-\frac{5}{2}}</math></p> <p style="text-align: right;">(3)</p>
<p>7.3</p>	$D_t \left[ \frac{1}{2}gt^2 - \frac{5}{t} + 3g \right]$ $= D_t \left[ \frac{1}{2}gt^2 - 5t^{-1} + 3g \right]$ $= gt + 5t^{-2}$	<p>✓ <math>5t^{-1}</math></p> <p>✓ <math>gt</math> ✓ <math>+ 5t^{-2}</math></p> <p>✓ <math>D_t(3g) = 0</math></p> <p style="text-align: right;">(4)</p>
<b>[12]</b>		

## QUESTION 8/VRAAG 8

8.1	(0 ; 9)	✓ (0 ; 9) (1)
8.2	$f(x) = 2x^3 + x^2 - 12x + 9$ $f(1) = 2(1)^3 + (1)^2 - 12(1) + 9$ $= 0$ $\therefore f(x) = (x-1)(2x^2 + 3x - 9)$ $\therefore 0 = (x-1)(x+3)(2x-3)$ $\therefore x = 1$ or / of $x = -3$ or / of $x = \frac{3}{2}$ $D(-3;0), E(1;0), F\left(\frac{3}{2};0\right)$	✓ method / <i>metode</i> ✓ $2x^2 + 3x - 9$ ✓ factorisation / <i>faktorisering</i>  ✓ $D(-3;0)$ ✓ $E(1;0)$ ✓ $F\left(\frac{3}{2};0\right)$ (6)
8.3	For concave down / <i>Vir konkkaaf afwaarts</i> $f''(x) < 0$ $f'(x) = 6x^2 + 2x - 12$ $f''(x) = 12x + 2$ $\therefore 12x + 2 < 0$ $x < -\frac{1}{6}$	✓ $f''(x) < 0$ ✓ $f'(x) = 6x^2 + 2x - 12$ ✓ $f''(x) = 12x + 2$  ✓ $x < -\frac{1}{6}$ (4)
8.4	$6x^2 + 2x - 12 \leq 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-2 \pm \sqrt{2^2 - 4(6)(-12)}}{2 \cdot 6}$ $= \frac{-2 \pm \sqrt{292}}{12}$ $= -1,59$ or / of $1,26$ $\therefore -1,59 \leq x \leq 1,26$	✓ substitution into correct formula <i>vervanging in die korrekte formule</i>  ✓ <i>x-values / x-waardes</i>  ✓✓ answer / <i>antwoord</i> <i>(accuracy / akkuraatheid)</i> (4)
		[15]

**QUESTION 9/VRAAG 9**

<p>Area of/van <math>\Delta PBA = \frac{1}{2}bh = \frac{1}{2} \times t \times 12 = 6t \text{ cm}^2</math></p> <p>Area of/van <math>\Delta ACS = \frac{1}{2}t(7-t) = \frac{7}{2}t - \frac{t^2}{2} \text{ cm}^2</math></p> <p>Area of/van <math>\Delta BQC = \frac{1}{2}(12-t)7 = 42 - \frac{7t}{2} \text{ cm}^2</math></p> <p>Area of rectangle/van reghoek: <math>PBQS = 12 \times 7 = 84 \text{ cm}^2</math></p> <p><math>\therefore</math> Area of/van <math>\Delta ABC</math>:</p> $A(t) = 84 - 6t - \frac{7t}{2} + \frac{t^2}{2} - 42 + \frac{7t}{2}$ $= \frac{1}{2}t^2 - 6t + 42$ <p><math>a &gt; 0</math>, so <math>A(t)</math> is a min graph / is 'n min grafiek</p> $A'(t) = t - 6$ <p>At min / By min : <math>A'(t) = 0</math></p> $\therefore t - 6 = 0$ $t = 6$ <p>Smallest area / Kleinste oppervlakte:</p> $A(6) = \frac{1}{2}(6)^2 - 6(6) + 42$ $= 24 \text{ cm}^2$	<p>✓ Area of/van <math>\Delta PBA</math></p> <p>✓ Area of/van <math>\Delta ACS</math></p> <p>✓ Area of/van <math>\Delta BQC</math></p> <p>✓ subtracting from 84 / trek van 84 af</p> <p>✓ <math>A'(t) = 0</math></p> <p>✓ smallest area / kleinste area</p> <p style="text-align: right;">(6)</p> <p style="text-align: right;"><b>[6]</b></p>
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QUESTION 10/VRAAG 10

<p>10.1</p>		<p>Correct entries of: Korrekte waarde van:</p> <ul style="list-style-type: none"> <li>✓ 12</li> <li>✓ 5 ; 12 ; 24</li> <li>✓ <math>2y+3</math> ; <math>y</math> ; <math>y</math></li> <li>✓ <math>x</math></li> </ul> <p>(4)</p>
<p>10.2</p>	$x + y + 5 + 24 = 60$ $x + y = 31$ $2y + 3 + x + 5 + 12 = x + y + 12 + 24$ $2y + x + 20 = x + y + 36$ $\therefore y = 16 \text{ and/en } x = 15$	<ul style="list-style-type: none"> <li>✓ <math>x + y + 5 + 24 = 60</math></li> <li>✓ <math>2y + 3 + x + 5 + 12 = x + y + 12 + 24</math></li> <li>✓ <math>y = 16</math> and/en ✓ <math>x = 15</math> (4)</li> </ul>
<p>10.3</p>	$P(M \text{ or/of } (P \text{ and/en } A)) = \frac{2y + 3 + 5 + 12 + x + 24}{135}$ $= \frac{35 + 5 + 12 + 15 + 24}{135}$ $= \frac{91}{135} \text{ or/of } 0,67$	<ul style="list-style-type: none"> <li>✓ <math>2y + 3 + 5 + 12</math> ✓ <math>24</math></li> <li>✓ answer / antwoord</li> </ul> <p>(3)</p>
<b>[11]</b>		

QUESTION 11/VRAAG 11

<p>11.1</p>	<p><math>7! = 5\,040</math> ways / maniere</p>	<p>✓ ✓ <math>7!</math> (2)</p>														
<p>11.2</p>	<p>Sample space/Steekproefruimte:</p> <table border="1" style="margin-left: 20px;"> <tr> <td>5</td><td>4</td><td>2</td><td>3</td><td>1</td><td>2</td><td>1</td> </tr> </table> <p>Possible outcomes/Moontlike uitkomst:</p> <table border="1" style="margin-left: 20px;"> <tr> <td>3</td><td>2</td><td>2</td><td>2</td><td>1</td><td>1</td><td>3</td> </tr> </table> <p>Probability/Waarskynlikheid = <math>\frac{3 \times 2 \times 2 \times 2 \times 1 \times 1 \times 3}{5 \times 4 \times 2 \times 3 \times 1 \times 2 \times 1}</math></p> $= \frac{72}{240}$ $= \frac{3}{10} = 0,3$	5	4	2	3	1	2	1	3	2	2	2	1	1	3	<ul style="list-style-type: none"> <li>✓ arrangement / rangskikking</li> <li>✓ arrangement / rangskikking</li> <li>✓ <math>3 \times 2 \times 2 \times 2 \times 1 \times 1 \times 3</math> and/en <math>5 \times 4 \times 2 \times 3 \times 1 \times 2 \times 1</math></li> <li>✓ answer / antwoord</li> </ul> <p>(4)</p>
5	4	2	3	1	2	1										
3	2	2	2	1	1	3										
<b>[6]</b>																

TOTAL/TOTAAL: 150