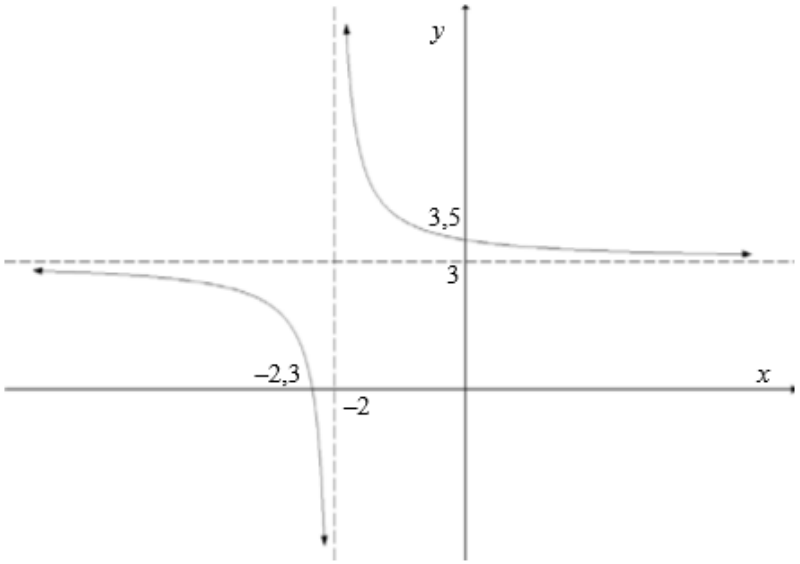
NATIONAL (May/June)

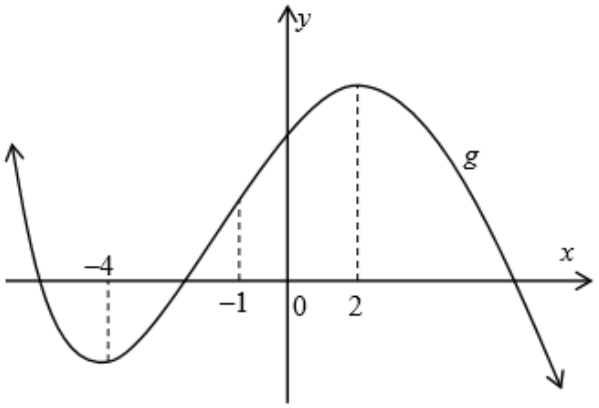
QUESTION/*VRAAG* 4

4.1	$y > 0$ **OR/*OF*** $y \in (0\ ;\ \infty)$	✓answer (1) ✓answer (1)
4.2	$y = \left(\frac{1}{2}\right)^x$ $x = \left(\frac{1}{2}\right)^y$ $y = \log_{\frac{1}{2}} x$ or $y = -\log_2 x$	✓ $x = \left(\frac{1}{2}\right)^y$ ✓ equation (2)
4.3	Yes. The vertical line test cuts g^{-1} once **OR/*OF*** For every x-value there is a unique y-value	✓ yes ✓ valid reason (2)
4.4.1	$y = -\log_2 x$ $2 = -\log_2 a$ $a = 2^{-2} = \frac{1}{4}$	✓ substitution $(a\ ;\ 2)$ ✓answer (2)
4.4.2	$M'\left(2;\frac{1}{4}\right)$	✓ answer (1)
4.5	$M''\left(-1;\frac{9}{4}\right)$	✓ -1 ✓✓ $\frac{9}{4}$ (4)
		[11]

QUESTION/*VRAAG* 5

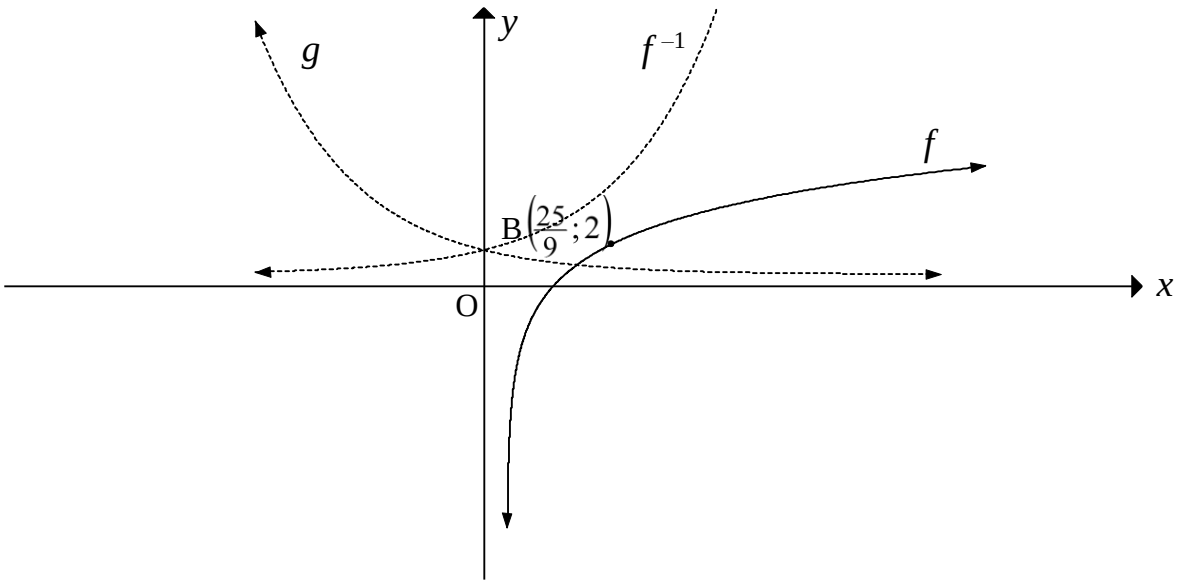
5.1.1	$x = -2$ $y = 3$	✓ answer ✓ answer (2)
5.1.2	$\left(0\ ;\ \frac{7}{2}\right)$	✓ answer (1)

5.1.3	$\frac{1}{x+2}+3=0$ $1+3(x+2)=0$ $3x=-7$ $x=-\frac{7}{3}$ x-intercept $\left(-\frac{7}{3};0\right)$	✓ $y=0$ ✓ answer (2)
5.1.4		✓ asymptotes ✓ intercepts ✓ shape (3)
5.2.1	$-2x+4=0$ $2x=4$ $x=2$ ∴ S(2 ; 0)	✓ $y=0$ ✓ $x=2$ (2)
5.2.2	Equation of k: $y=a(x+1)^2+18$ $0=a(2+1)^2+18$ $9a=-18$ $a=-2$ $y=-2(x+1)^2+18$	✓ $y=a(x+1)^2+18$ ✓ substitute (–1 ; 18) and (2 ; 0) ✓ a (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)	✓ equating ✓ standard form ✓ factors ✓ substituting –3 ✓ answer (5)

5.2.4	$x < -3$ or $x > 2$ **OR/*OF*** $(-\infty\ ;\ -3) \cup (2\ ;\ \infty)$	✓✓ answer (2)
5.2.5(a)	$x < -1$ **OR/*OF*** $(-\infty\ ;\ -1)$	✓✓ answer (2)
5.2.5(b)		✓ shape of cubic with two turning points ✓ turning points at $x = 2$ and $x = -4$ ✓ point of inflection at $x = -1$ (3) **[25]**

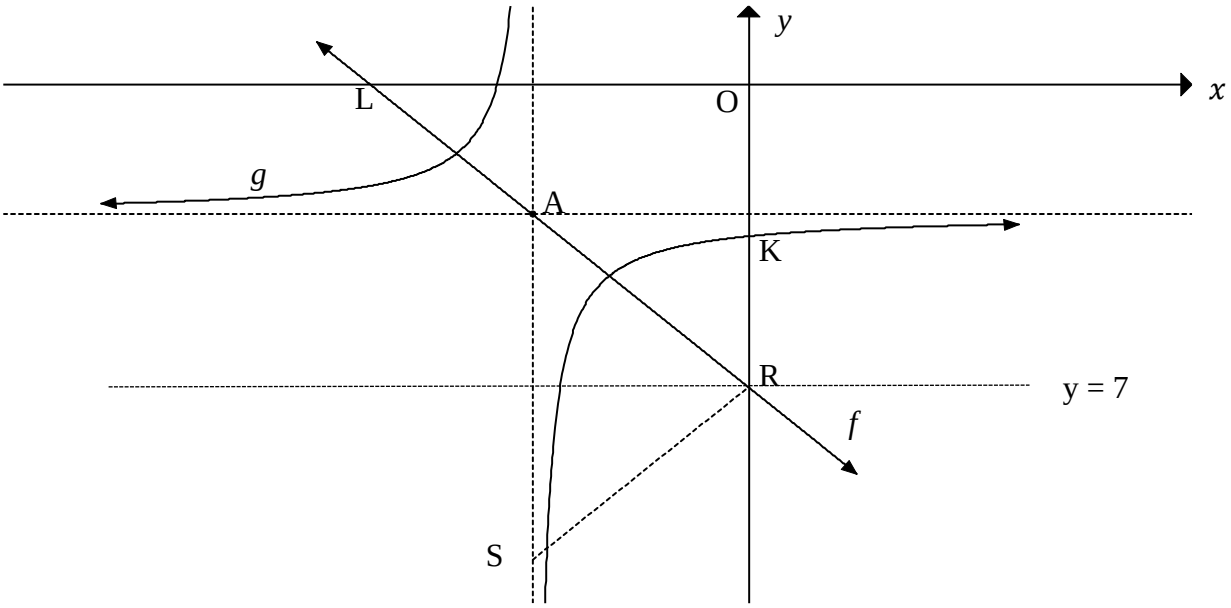
FREE STATE

QUESTION/*VRAAG* 4



4.1	$f(x) = \log_a x$ $2 = \log_a\left(\frac{25}{9}\right)$ $a^2 = \frac{25}{9}$ $a = \frac{5}{3}$ **OR/*OF*** $y = a^x$ $\frac{25}{9} = a^2$ $a = \frac{5}{3}$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2) ✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
4.2	$0 < x \leq 1$ **OR/*OF*** $x \in (0; 1]$	✓✓ answer/*antwoord* (2)
4.3	$x = \log_{\frac{5}{3}} y$ $y = \left(\frac{5}{3}\right)^x$	✓ swop/*ruil x* and/*en y* ✓ equation/*vergelyking* (2)
4.4	$B^{//}\left(-2\,;\ \frac{25}{9}\right)$	✓✓ answer/*antwoord* (2)
4.5	$x > 2$	✓✓ answer/*antwoord* (2)
		[10]

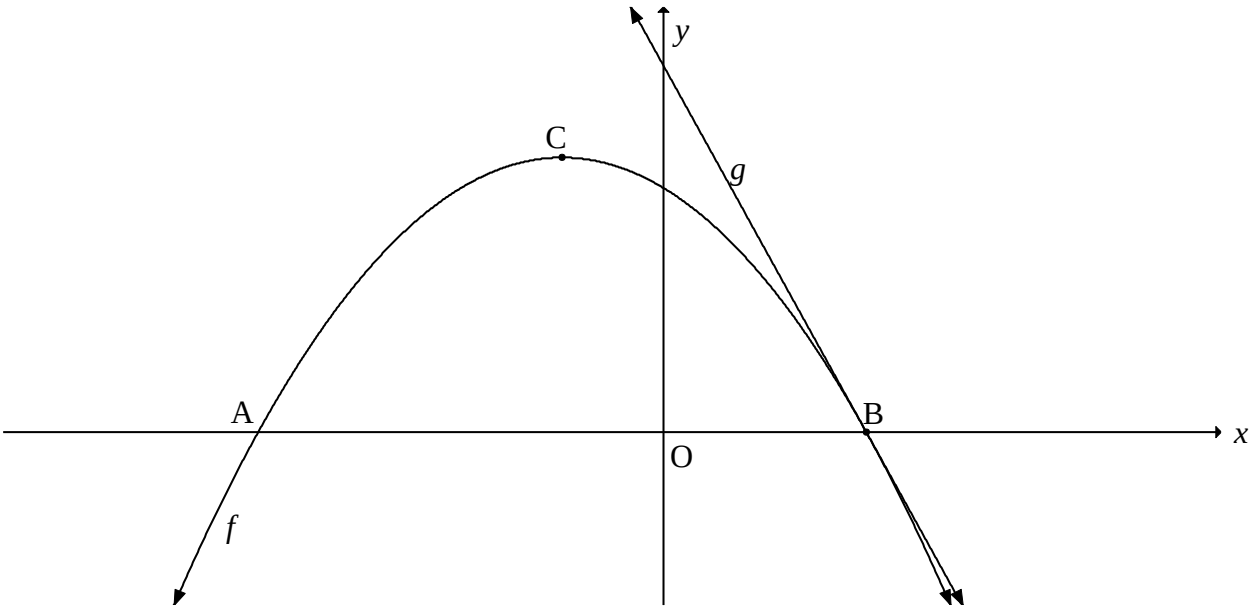
QUESTION/*VRAAG* 5



5.1	A(–4 ; –3) $y = -x + c$ $-3 = -(-4) + c$ $c = -7$ $y = -x - 7$ **OR/OF** A(–4 ; –3) $y - y_1 = m(x - x_1)$ $y - (-3) = -(x - (-4))$ $y = -x - 7$	✓ coordinates of A/*koördinate van A* ✓ subst *m* and A/*vervang m en A* ✓ equation/*vergelyking* (3) ✓ coordinates of A/*koördinate van A* ✓ subst *m* and A/*vervang m met A* ✓ equation/*vergelyking* (3)
5.2	$x = -2$ and/*en* $y = -2$	✓ $x = -2$ ✓ $y = -2$ (2)
5.3	$g(x) = \frac{-2}{x+4} - 3$ $y = \frac{-2}{0+4} - 3 = \frac{-7}{2} = -3\frac{1}{2}$ $K\left[0; \frac{-7}{2}\right]$	✓ K

	R(0 ; –7) $\therefore \text{K} = \frac{-7}{0} - (-7) = \frac{7}{2} = 3\frac{1}{2}$ units /*eenhede*	✓ R ✓ answer/*antwoord* (3)
5.4	A(–4 ; –3) and/*en* S(–4 ; –11) $m_{SR} = \frac{-11-(-7)}{-4-0}$ $m_{SR} \times m_{AR} = -1$ $SR = \sqrt{[(0)-(4)]^2 + [(-7)-(11)]^2} = 4\sqrt{2}$ $AR = \sqrt{[(-4)-(0)]^2 + [(-3)-(7)]^2} = 4\sqrt{2}$ $Area\ of\ /\ Oppvl\ van\ \Delta\text{ARS} = \frac{1}{2}(4\sqrt{2})(4\sqrt{2})$ $= 16 units^2 / eenhede^2$	✓ coordinates of S/*koördinate van S* ✓ Gradient of SR/*Gradiënt van SR* base/*basis* = $4\sqrt{2}$ and/*en* ✓ $\perp$h = $4\sqrt{2}$ ✓ answer/*antwoord* (4)
		[12]

QUESTION/*VRAAG* 6

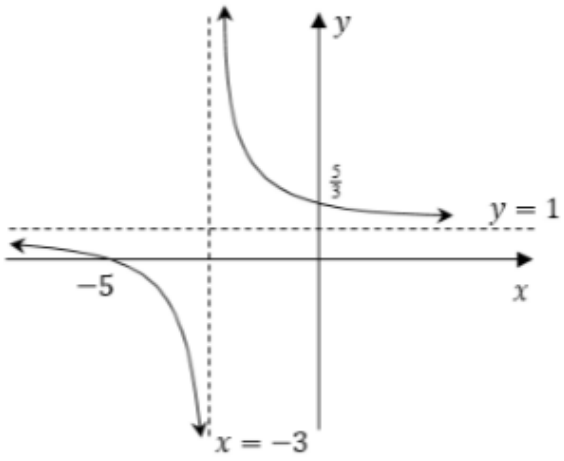


6.1	$g(x) = 2x - 4$ $0 = 2x - 4$ B(2; 0)	✓ $0 = 2x - 4$ ✓ answer/*antwoord* (2)

6.2	$f(x) = ax^2 + bx + 16$ $f'(x) = 2ax + b$ $-12 = 2a(2) + b$ $-12 = 4a + b$ .....(1) B(2;0): $0 = a(2)^2 + b(2) + 16$ $-16 = 4a + 2b$ .....(2) (2) – (1): $b = -4$ $\therefore -12 = 4a - 4$ $\therefore a = -2$	✓ derivative/*afgeleide* ✓ $f'(2) = -12$ ✓ $f(2) = 0$ ✓equations/*vergelykings* (1) & (2) ✓ $b = -4$ ✓ $a = -2$ (6)
6.3.1	$f(x) = -2x^2 - 4x + 16$ $f'(x) = -4x - 4$ $0 = -4x - 4$ $x = -1$ $y = -2(-1)^2 - 4(-1) + 16$ $y = 18$ C(–1 ; 18) $\therefore \quad y \in (-\infty ; 18]$ **OR/*OF*** $f(x) = -2x^2 - 4x + 16$ $x = \frac{-b}{2a} = \frac{-(-4)}{2(-2)}$ $x = -1$ $y = -2(-1)^2 - 4(-1) + 16$ $y = 18$ $\therefore \quad y \in (-\infty ; 18]$	✓ derivative/*afgeleide* ✓ *x*- value/*x* - *waarde* ✓ substitution/*vervanging* ✓ y value/*y*- *waarde* ✓ answer/*antwoord* (5) ✓ substitution into formula/*vervang in formule* ✓ *x*- value/*x*- *waarde* ✓ substitution/*vervanging* ✓ *y* value/*y waarde* ✓ answer/*antwoord* (5)
6.3.2	$-4 < x < -1$ or/*of* $x < 2$	✓ $-4 < x < -1$ ✓ $x < 2$ (2)
		[15]

EASTERN CAPE

QUESTION 4/*VRAAG 4*

4.1	$x=-3$ $y=1$	✓ $x=-3$ ✓ $y=1$ (2)
4.2	$1+\frac{2}{x+3}=0$ $\frac{2}{x+3}=-1$ $2=-x-3$ $x=-5$ $y=1+\frac{2}{0+3}$ $=\frac{5}{3}$	✓ substitution/*vervanging* ✓ x-intercept/x-*afsnit* ✓ y-intercept/y-*afsnit* (3)
4.3		✓ asymptotes / *asimptote* ✓ x-intercept / x-*afsnit* ✓ y-intercept / y-*afsnit* ✓ shape / *vorm* (4)
4.4	$h(x)=\frac{-2}{x+3}-1$ point of intersection of asymptotes/ *snypunt van asimptote* $(-3;-1)$ or / *of* $y=-(-x-p)+q$ $y=(x-(-3))-1$ *or / of* $y=-(-x-3)-1$ $y=x+2$	✓ $h(x)=\frac{-2}{x+3}-1$ ✓ substitute point of intersection of asymptotes / *vervang die snypunt van asimptote* ✓✓ answer/*antwoord* (4)

4.4	**OR/*OF*** $h(x)=\frac{-2}{x+3}-1$ point of intersection of asymptotes/ *snypunt van asimptote* $(-3;-1)$ $y=x+k$ $-1=-3+k$ $k=2$ $\therefore y=x+2$	✓ $h(x)=\frac{-2}{x+3}-1$ ✓ substitute point of intersection of asymptotes / *vervang die snypunt van asimptote* ✓✓ answer/*antwoord* (4) **[13]**

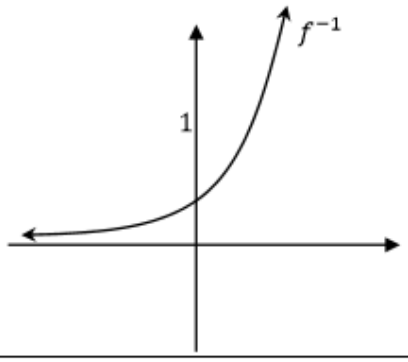
QUESTION 5/*VRAAG 5*

5.1	$(0;-8)$	✓ answer / *antwoord* (1)
5.2	$y=mx+c$ $y=mx-8$ $10=9m-8$ $m=2$ $\therefore y=2x-8$ **OR/OF** $m_{TQ}=\frac{10-(-8)}{9-0}$ $m=2$ $\therefore y=2x-8$	✓ $c=-8$ ✓ substituting T(9;10) into equation of line / *vervanging van* T(9;10) *in vergelyking van lyn* ✓ equation / *vergelyking* ✓ substituting T and Q into m_{TQ} *vervanging van* T *en* Q *in* m_{TQ} ✓ m=2 ✓ equation (3)
5.3	$y=x^2-7x-8$ $=x^2-7x+(-\frac{7}{2})^2-8-(-\frac{7}{2})^2$ $=(x-\frac{7}{2})^2-\frac{81}{4}$	✓ completing the square / *vierkantsvoltooiing* ✓ equation / *vergelyking* (2)
5.4	$(\frac{7}{2};-\frac{81}{4})$	✓ x- coordinate/*koördinaat* ✓ y- coordinate/*koördinaat* (2)

5.5	Ave gradient/Gem. gradiënt $\frac{y-10}{x-9}=1$ $y-10=x-9$ $y=x+1$ $f(x)=x^2-7x-8$ $x+1=x^2-7x-8$ $0=x^2-8x-9$ $0=(x-9)(x+1)$ $\therefore x=9$ or / *of* -1 $y=10$ or / *of* 0 $\therefore$ W$(-1\,;0)$ **OR/*OF*** $\frac{x^2-7x-8-(10)}{x-(9)}=1$ $x^2-7x-18=x-9$ $x^2-8x-9=0$ $(x-9)(x+1)=0$ $x=9$ *or / of* $x=-1$ $y=10$ *or / of* $y=0$ $\therefore$ W$(-1\,;0)$	✓ method/*metode* ✓ making y the subject *maak y die onderwerp* ✓ equating 2 equations *gelykstel van 2 vergelykings* ✓ factors/*faktore* ✓ specifying coordinates for W / *spesifiseer W se koördinate* ✓ $\frac{x^2-7x-8-(10)}{x-(9)}$ ✓ equating to 1 / *gelykstel aan* 1 ✓ standard form/*standaardvorm* ✓ factors/*faktore* ✓ specifying coordinates for W. *spesifiseer W se koördinate*
	OR/*OF* $f'(x)=2x-7$ $f'(9)=2(9)-7$ $=11$ $\frac{f'(9)+f'(x)}{2}=1$ $\frac{11+2x-7}{2}=1$ $\frac{2x+4}{2}=1$ $x+1=1$ $x=-1$ $y=0$ $\therefore W(-1;0)$	✓ $f'(x)=2x-7$ ✓ $f'(9)=11$ ✓ average gradient = 1 *gemiddelde gradiënt = 1* ✓ substitution/*vervanging* ✓ coordinates of W / *koördinate van W* (5)

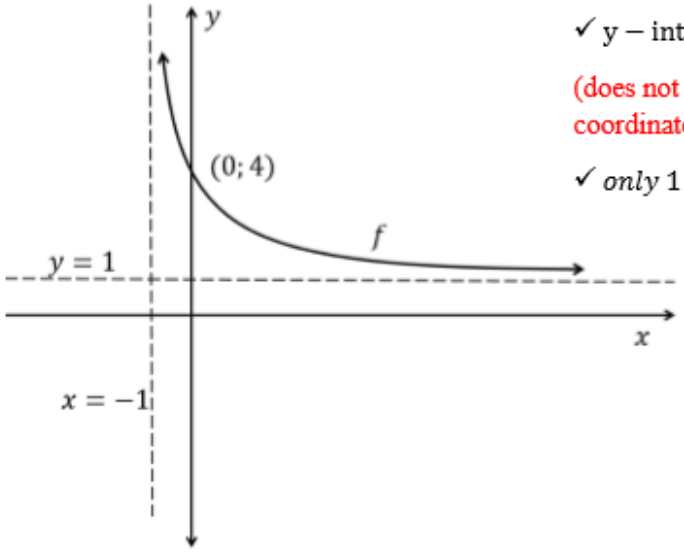
5.6	$x^2 - 7x - 8 = 0$ $(x-8)(x+1) = 0$ $\therefore \text{P}(-1;0) \text{ and / } en \text{ R}(8;0)$ $y = 2x - 8$ $0 = 2x - 8$ $\therefore \text{V}(4;0)$ $\therefore x < -1 \quad \text{or / } of \quad 4 < x < 8$ OR / *OF* $x \in (-\infty;-1) \cup (4;8)$	✓ x intercepts of f *x-afsnitte van f* ✓ x intercept of g *x-afsnit van g* ✓ $x < -1$ accuracy/*akkuraatheid* ✓ $4 < x < 8$ accuracy/ *akkuraatheid* (4) **[17]**

QUESTION 6/*VRAAG 6*

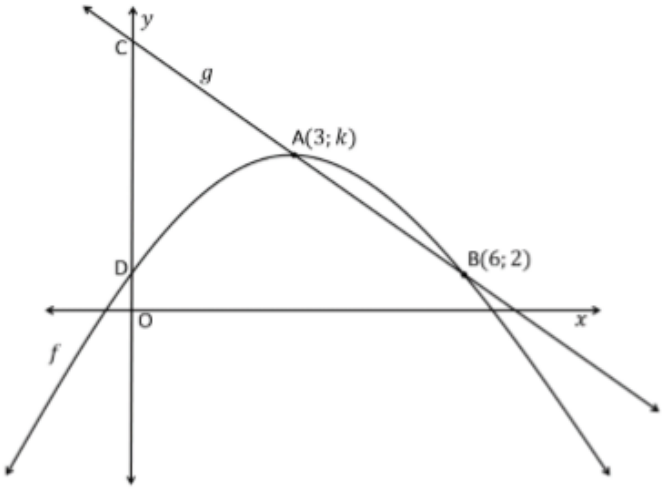
6.1	$f(x) = \log_m x$ $3 = \log_m 64$ $m^3 = 64$ $m^3 = 4^3$ $\therefore m = 4$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
6.2	$f(x) = \log_4 x$ $\therefore f^{-1} : x = \log_4 y$ $y = 4^x$	✓ interchanging x and y *omruiling van x en y* ✓ answer / *antwoord* (2)
6.3		✓ y-intercept/*y-afsnit* ✓ shape and asymptote *vorm en asimptoot* (2)
6.4	$y > -2$ **OR/*OF*** $y \in (-2;\infty)$	✓ answer/*antwoord* **OR/*OF*** ✓ answer/*antwoord* (1) **[7]**

WESTERN CAPE (Practice paper)

QUESTION/ VRAAG 4

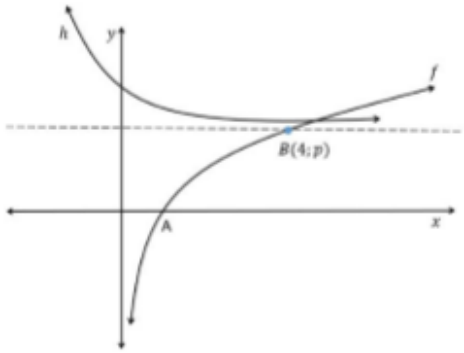
	$f(x) = \frac{3}{x+1} + 1$		
4.1	$x = -1$ *and* $y = 1$	✓ $x = -1$ **A** ✓ $y = 1$ **A**	(2) K
4.2	$f(0) = \frac{3}{0+1} + 1$ $= 4$	✓ $x = 0$ ✓ $y = 4$	(2) R
4.3		✓✓ 1 for each asymptote ✓ y – intercept (does not have to be in coordinate form.) ✓ *only* 1 *arm*	(4) R
4.4	$-1 < x \leq 0$	✓ critical values **CA from 4.1** ✓ inequalities/ *ongelykhede*	(2) P
			[10]

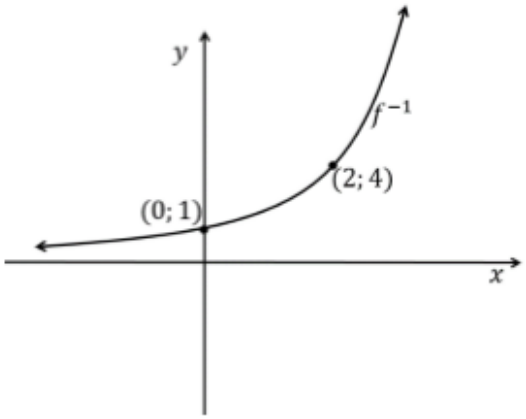
QUESTION/ VRAAG 5



5.1	$g(x) = -3x + 20$ $g(3) = -3(3) + 20 = 11$ $\therefore k = 11$	✓ subst. $x = 3$ ✓ 11	(2) R
5.2	$y \geq -11$	✓✓ answer/ *antwoord* **CA from 5.1** Only 1 mark if $y > -11$	(2) K
5.3	$y = a(x-3)^2 + 11$ *subst.* $(6; 2)$ $2 = a(6-3)^2 + 11$ $-9 = 9a$ $-1 = a$ $y = -1(x-3)^2 + 11$ $y = -(x^2 - 6x + 9) + 11$ $y = -x^2 + 6x + 2$ $\therefore a = -1\,; b = 6\ and\ /en\ \ c = 2$	✓ $y = a(x-3)^2 + 11$ **CA from 5.1** ✓ subst. $(6; 2)$ ✓ $a = -1$ ✓ $(x^2 - 6x + 9)$ ✓ $y = -x^2 + 6x + 2$ ✓ answer/ *antwoord* **CA**	(6) C
5.4	$3 < x < 6$	✓ critical values / *kritieke waardes* ✓ inequalities/ *ongelykhede*	(2) K
5.5	• Real *Reëel* • Rational *Rasionaal* • Equal *Gelyk*	✓ Real and rational / *Reëel en rass* ✓ Equal / *gelyk*	(2) C
5.6	$x > 3$	✓✓ answer/ *antwoord*	(2) P
			[16]

QUESTION/ VRAAG 6



6.1	$A(1;0)$	✓ answer/ *antwoord*	(1) K
6.2	$x \in R$; $x > 0$ or $x \in (0;\infty)$	✓ $x > 0$ *or* $x \in (0;\infty)$	(1) K
6.3	$x = \log_2 y$ $y = 2^x$	✓ $x = \log_2 y$ ✓ answer/ *antwoord* OR ✓✓ *answer only*	(2) K
6.4		✓ shape and asymptote ✓ y – intercept (does not have to be in coordinate form.) ✓ coordinates of any other point	(3) R
6.5	$p = \log_2 4 = 2$ $\therefore y = 2$	✓ subst/ *vervang* ✓ answer/ *antwoord* OR ✓✓ answer only	(2) C
6.6	Reflection in the y –axis and translate 2 units down/ *Refleksie in die y-as en translasie 2 eenh af.*	✓ reflect in the y – axis ✓Translate 2 units down	(2) C
			[11]

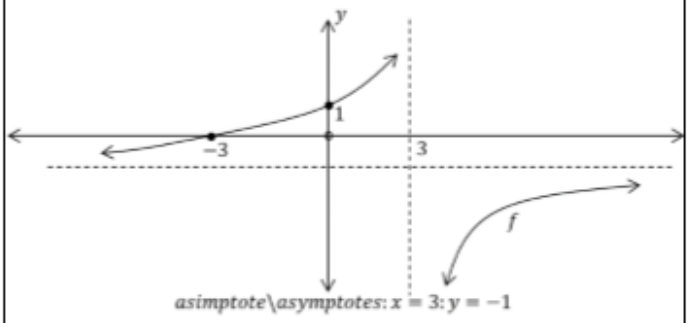
LIMPOPO

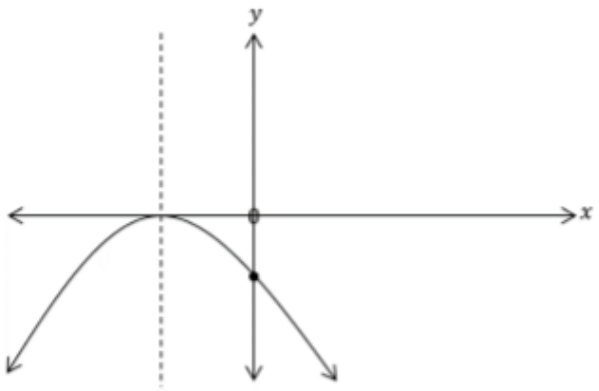
QUESTION 4/VRAAG 4

4.1.1	$S_n = \frac{n}{2}(5n+9)$ $\therefore S_{23} = \frac{23}{2}(5\times 23+9)$ $= \frac{23}{2}(124)$ $= 1426$	✓correct substitution in correct formula/ *korrekte vervanging in korrekte formule* ✓simplification/*vereenvoudiging* $\frac{23}{2}(124)$ ✓answer/*antwoord* (3)
4.1.2	$T_{23} = S_{23} - S_{22}$ $= 1426 - 1309$ $= 117$	✓ $T_{23} = S_{23} - S_{22}$ ✓ answer/*antwoord* (2)
4.2	For geometric sequence/ *vir meetkundige ry*: $\frac{T_2}{T_1} = \frac{T_3}{2}$ $\frac{x+1}{1} = \frac{x-3}{x+1}$ $\therefore x^2 + 2x + 1 = x - 3$ $\therefore x^2 + x + 4 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-1 \pm \sqrt{1-4(1)(4)}}{2(1)}$ $x = \frac{-1 \pm \sqrt{1-16}}{2}$ $x = \frac{-1 \pm \sqrt{-15}}{2}$ $\therefore$ no real solution/*geen reële oplossing* Not geometric sequence/*nie meetkundige ry nie*	✓ equation /*vergelyking* $\frac{x+1}{1} = \frac{x-3}{x+1}$ ✓ standard form/*standaardvorm* = 0 ✓correct substitution in correct formula/*korrekte vervanging in korrekte formule* ✓answer and explanation/ *antwoord en verduideliking*
		(4)

[9]

QUESTION 5

5.1.1	$y-\text{intercept}: \ x=0$ $\therefore f(0)=\frac{-6}{0-3}-1=2-1=1$ $\therefore \times(x-3): \ 0=-6-(x-3)$ $x=-3$	✓ substitute $x=0$ *vervang* ✓ $x=-3$ (2)
5.1.2	$x-\text{intercept}: \ y=0$ $0=\frac{-6}{x-3}-1$ $\therefore \times(x-3): \ 0=-6-(x-3)$ $x=-3$	✓ $y=0$ ✓simplification/ *vereenvoudiging* $0=-6-(x-3)$ ✓ $x=-3$ (3)
5.1.3		✓asymptote /*asimptote* $x=3; y=-1$ ✓ $x-\text{intercept:}$*afsnit* $x=-3$ $y-\text{intersept}$ /*afsnit:* $y=1$ ✓✓form of graph/ *vorm* (4)
5.1.4	$x\in(-3;3)$	✓✓ $x\in(-3;3)$ (2)
5.1.5	verge gradient/gemiddelde gradient: $m=\frac{y_2-y_1}{x_2-x_1}$ $m=\frac{f(-2)-f(0)}{-2-0}$ $f(-2)=\frac{1}{5}$ $f(0)=1$	✓ $f(-2)=\frac{1}{5}$ ✓ $f(0)=1$ ✓substitution in correct formula/*subst in korrekte formule*

	$= \dfrac{\frac{1}{5}-1}{-2-0}$ $= \dfrac{\frac{-4}{5}}{-2} = \dfrac{2}{5}$	✓answer /*antwoord* (4)
5.2		✓negative form of the graph/*negatiewe vorm* ✓negative symmetry *negatiewe simmetrie* ✓negative $y-$intercept *negatiewe $y-$afsnit* ✓only one root *een wortel* (4)

QUESTION 6/VRAAG 6

6.1	$x = 2^y$ $\therefore y = \log_2 x$	✓ inverse form/*inverse vorm* ✓ $\therefore y = \log_2 x$ (2)
6.2	$y_A = 3 = y_B$ $f(x) = 2^x$ $3 = 2^x$ $\therefore x = \log_2 3 = \dfrac{\log 3}{\log 2} = 1{,}584\ldots$ $\therefore x = 1{,}6$ $f^{-1}(x) = \log_2 x$ $3 = \log_2 x$ $\therefore x = 2^3 = 8$ $\therefore x_B = 8$ $\text{AB} = x_B - x_A$ $= 8 - 1{,}6$	✓substitution in exponent formula *vervanging in eksponent vorm* ✓correct using of logs /*korrekte gebruik van logs* ✓value of /*waarde van* x ✓determine value of *bepaal waarde van* $x_B = 8$ ✓answer /*antwoord*

	= 6,4 units/eenhede	AB= 6,4 units (5)
6.3	$x_B = x_C = 8$ $\therefore y_C = 2^8 = 256$ $\therefore C_B = y_C - y_B$ $= 256 - 3$ $= 253$	✓ substitute/*vervang* $x = 8$ ✓ $C_B = 256 - 3$ ✓answer /*antwoord* (3)
6.4	$x > 0; x \in R$ ALTERNATIVE $x \in (0; \infty)$	✓answer/*antwoord* (1)

[11]