Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Departement van Onderwys
Porofensie Ya Kapa Botjhabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIORSERTIFIKAAT*

GRADE/*GRAAD 12*

SEPTEMBER 2024

MATHEMATICS P1/*WISKUNDE V1* MARKING GUIDELINE/*NASIENRIGLYN*

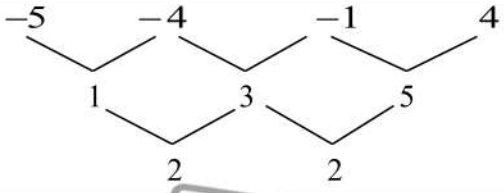
MARKS/*PUNTE*: 150

This marking guideline consists of 22 pages./
Hierdie nasienriglyn bestaan uit 22 bladsye.

1.2	$2x = 1 - y$.....(1) $xy - x^2 + y^2 = 5$.....(2) $y = 1 - 2x$.....(3) Subst/*Vervang* (3) into/*in* (2) $x(1-2x) - x^2 + (1-2x)^2 = 5$ $x - 2x^2 - x^2 + 1 - 4x + 4x^2 - 5 = 0$ $x^2 - 3x - 4 = 0$ $(x-4)(x+1) = 0$ $x = 4$ or/*of* $x = -1$ For/*Vir* $x = 4$: $y = 1 - 2(4)$ $y = -7$ For/*Vir* $x = -1$: $y = 1 - 2(-1)$ $y = 3$ **OR / *OF*** $y = 1 - 2x$.....(1) $xy - x^2 + y^2 = 5$.....(2) $x = \frac{1}{2} - \frac{y}{2}$.....(3) Subst/*Vervang* (3) into/*in* (2) $y\left(\frac{1}{2} - \frac{y}{2}\right) - \left(\frac{1}{2} - \frac{y}{2}\right)^2 + y^2 = 5$ $\frac{y}{2} - \frac{y^2}{2} - \left(\frac{1}{4} - \frac{y}{2} + \frac{y^2}{4}\right) + y^2 = 5$ $\frac{y}{2} - \frac{y^2}{2} - \frac{1}{4} + \frac{y}{2} - \frac{y^2}{4} + y^2 = 5$ $\frac{y^2}{4} + y - \frac{21}{4} = 0$ $y^2 + 4x - 21 = 0$ $(y+7)(y-3) = 0$ $y = -7$ or/*of* $y = 3$ For/*Vir* $y = -7$: $x = 4$ For/*Vir* $y = 3$: $x = -1$	✓ $y = 1 - 2x$ ✓ substitution / *vervanging* ✓ standard form / *standaardvorm* ✓ factors / *faktore* ✓ *x*-values / *x-waardes* ✓ *y*-values / *y-waardes* **OR/*OF*** ✓ $x = \frac{1}{2} - \frac{y}{2}$ ✓ substitution / *vervanging* ✓ standard form / *standaardvorm* ✓ factors / *faktore* ✓ *y*-values / *y-waardes* ✓ *x*-values / *x-waardes* (6)

Copyright reserved/*Kopiereg voorbehou*

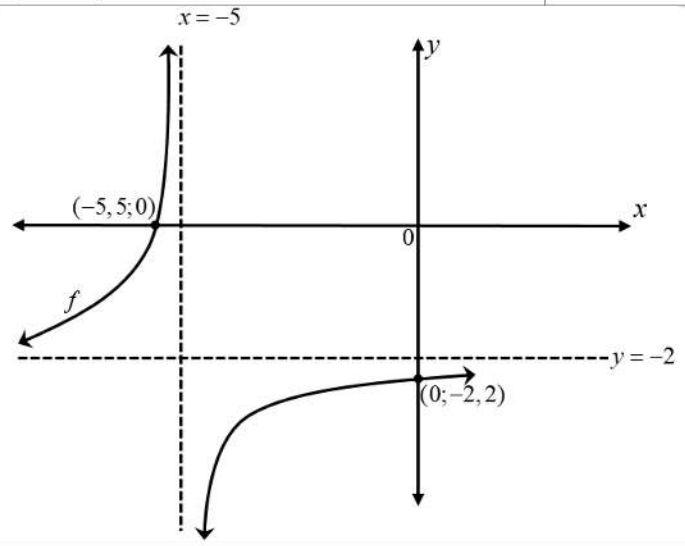
QUESTION 2/*VRAAG 2*

2.1		
2.1.1	$2a=2$ $\therefore a=1$ $3a+b=1$ $b=1-3(1)$ $\therefore b=-2$ $\therefore T_n=n^2-2n-4$ $a+b+c=-5$ $c=-5-1+2$ $\therefore c=-4$	✓ $a=1$ ✓ $b=-2$ ✓ $c=-4$ ✓ $T_n=n^2-2n-4$ (4)
2.1.2	$T_n=n^2-2n-4$ $T_{35}=(35)^2-2(35)-4$ $=1\ 151$	✓ answer / *antwoord* (1)
2.1.3	$T_n=1+(n-1)(2)$ $T_n=2n-1$ $T_{n+1}=2(n+1)-1$ $T_{n+1}=2n+1$ $T_n\times T_{n+1}=1155$ $(2n-1)(2n+1)=1155$ $4n^2-1=1155$ $4n^2=1156$ $n^2=289$ $n=\pm 17$ $\therefore n=17, n\in$ □ $\therefore T_{17}$ and/*en* T_{18} will give a product of 1155 *sal 'n produk van 1 155 gee* **OR/*OF*** $T_n=2n-1$ $T_{n-1}=2n-3$ $(2n-1)(2n-3)=1155$ $4n^2-8n-1152=0$ $n^2-2n-288=0$ $(n-18)(n+16)=0$ $n=18$ or/*of* $n\neq -16$, $n\in$ N $n=18$ and/*en* $n-1=17$ $\therefore T_{17}$ and/*en* T_{18} will give a product of 1155 *sal 'n produk van 1 155 gee*	✓ $T_n=2n-1$ ✓ $(2n-1)(2n+1)=1155$ ✓ standard form / *standaardvorm* ✓ $n=17$ and/*en* $n+1=18$ (4) **OR/*OF*** ✓ $T_n=2n-1$ ✓ $(2n-1)(2n-3)=1155$ ✓ standard form / *standaardvorm* ✓ $n=18$ and/*en* $n-1=17$ (4)

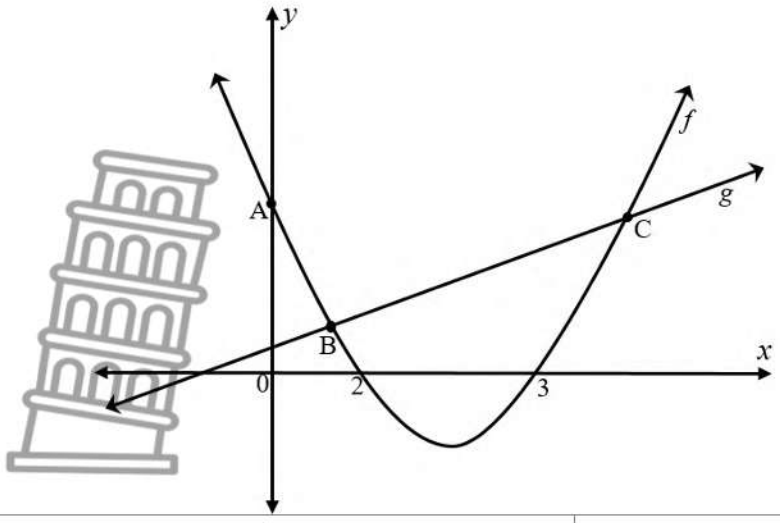
QUESTION 3/*VRAAG 3*

3.1.1	$\frac{2}{3}\ ;\ \frac{2}{9}$	✓ answer / *antwoord* (1)
3.1.2	$S_\infty = \frac{a}{1-r}$ $= \frac{2}{1-\frac{1}{3}}$ $= 3$	✓ substitution / *vervanging* ✓ answer / *antwoord* (2)
3.2	$\sum_{k=3}^{m} 8(2)^{k-1} = 131\,040$ $32 + 64 + 128 + \ldots$ $r = 2$ $s_n = \frac{a(1-r^n)}{1-r}$ $131\,040 = \frac{32(2^n - 1)}{2-1}$ $\therefore 2^n - 1 = 4\,095$ $2^n = 4\,096$ $2^n = 2^{12}$ **OR/*OF*** $n = \log_2(4\,096)$ $\Rightarrow n = 12$ $n = m - 3 + 1$ $12 = m - 2$ $m = 14$	✓ value of a / *waarde van a* ✓ substitution / *vervanging* ✓ simplification / *vereenvoudiging* ✓ value of n / *waarde van n* ✓ answer / *antwoord* (5)
		[8]

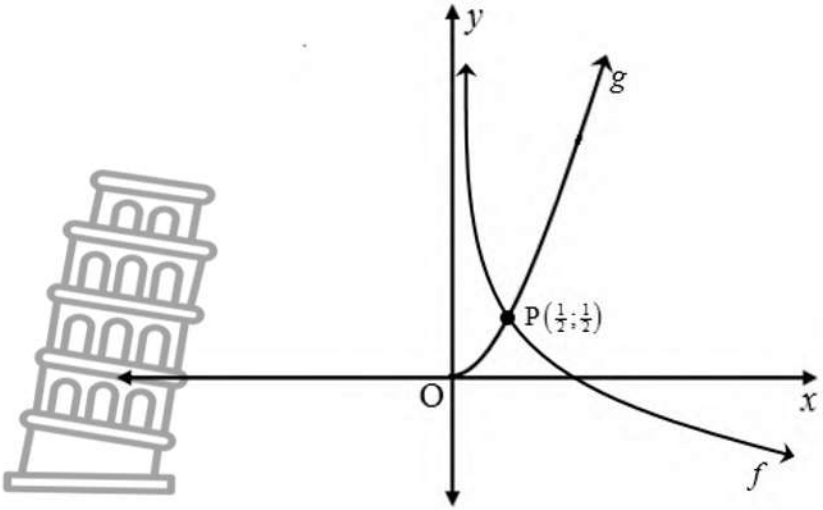
QUESTION 4/*VRAAG 4*

4.1	$x=-5$ $y=-2$	✓ equation of V.A / *vergelyking van V.A* ✓ equation of H.A / *vergelyking van H.A* (2)
4.2	$0=\frac{-1}{x+5}-2$ $2=\frac{-1}{x+5}$ $2(x+5)=-1$ $2x=-11$ $x=\frac{-11}{2}=-5,5$ $\therefore\left(-\frac{11}{2};0\right)$	✓ $y=0$ ✓ answer / *antwoord* (2)
4.3	$y=\frac{-1}{x+5}-2$ $y=\frac{-1}{0+5}-2$ $y=-\frac{11}{5}=-2,2$ $\therefore\left(0;-\frac{11}{5}\right)$	✓ $x=0$ ✓ answer / *antwoord* (2)
4.4		✓ both asymptotes / *beide asimptote* ✓ *x*-intercept / *x-afsnit and/of* *y*-intercept / *y-afsnit* ✓ shape / *vorm* (3)
4.5	$y=-(x+5)-2$ $y=-x-7$ **OR/*OF*** $y=-x+c$ Subst./*Vervang* $(-5;-2)$ $-2=-(-5)+c$ $-7=c$ $\therefore y=-x-7$	✓ method / *metode* ✓ answer / *antwoord* **Note: *Neem kennis*** ✓✓Answer only – Full marks *Slegs antwoord - Volpunte* (2)
		[11]

QUESTION 5/*VRAAG 5*

		
5.1	$x = \frac{-b}{2a}$ $x = \frac{-(-5)}{2(1)}$ $x = \frac{5}{2} = 2,5$ **OR / *OF*** $f(x) = x^2 - 5x + 6$ $f'(x) = 2x - 5$ $2x - 5 = 0$ $2x = 5$ $\therefore x = \frac{5}{2} = 2,5$	✓ substitution / *vervanging* ✓ equation / *vergelyking* **OR / *OF*** ✓ $f'(x) = 0$ ✓ equation / *vergelyking* (2)
5.2	$f(x) = g(x)$ $x^2 - 5x + 6 = x + 1$ $x^2 - 6x + 5 = 0$ $(x-5)(x-1) = 0$ $x = 5$ or/ *of* $g(5) = 5 + 1 = 6$ $g(1) = 1 + 1 = 2$ B(1;2) and/*en* C(5;6)	✓ $f(x) = g(x)$ ✓ standard form / *standaardvorm* ✓ x-values / *x-waardes* ✓ y-values / *y-waardes* (4)

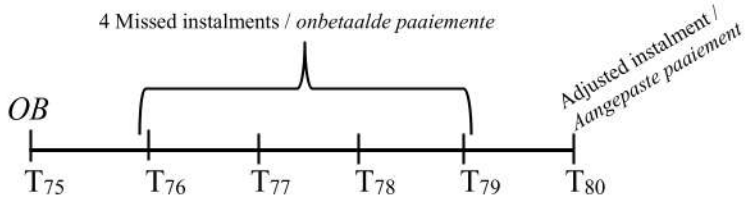
QUESTION 6/*VRAAG 6*

		
6.1	$f(x)=-\log_c x$ $\frac{1}{2}=-\log_c\left(\frac{1}{2}\right)$ $\sqrt{c}=2$ $c=4$ $g(x)=d\,x^2$ $\frac{1}{2}=d\left(\frac{1}{2}\right)^2$ $d=2$	✓ subst. of / *vervanging van* $\left(\frac{1}{2};\frac{1}{2}\right)$ ✓ value of c / *waarde van c* ✓ value of d / *waarde van d* (3)
6.2.1	$g: y=2x^2$ $g^{-1}: x=2y^2$ $g^{-1}: y^2=\frac{1}{2}x$ $g^{-1}: y=\pm\sqrt{\frac{1}{2}x}$ $\therefore y=\sqrt{\frac{1}{2}x}$	✓ swopping x and y *omruil van x en y* ✓ answer / *antwoord* (2)
6.2.2	$f(x)=-\log_4 x$ $h(x)=\log_4 x$ $h^{-1}(x): y=4^x$	✓ $h(x)=\log_4 x$ ✓ answer / *antwoord* (2)
6.2.3	$x\in\mathbb{R}$	✓ answer / *antwoord* (1)
		[8]

QUESTION 7/*VRAAG 7*

7.1	$A = P(1-i)^n$ $= 180000(1-0,13)^6$ $= R78\,052,72$	✓ $n = 6$ ✓ substitution / *vervanging* ✓ answer / *antwoord* (3)
7.2	$F_v = \frac{x[(1+i)^n - 1]}{i}$ $= \frac{900\left[\left(1+\frac{0,08}{12}\right)^{120} - 1\right]}{\frac{0,08}{12}} + \frac{1300\left[\left(1+\frac{0,08}{12}\right)^{60} - 1\right]}{\frac{0,08}{12}}$ $= 164\,651,4317 + 95\,519,91312$ $= R260171,34$	✓ $n = 120$ and/*en* $i = \frac{8\%}{12}$ or / *of* $\frac{8}{1200}$ ✓ $n = 60$ *in F* ✓ substitution into F_V / *vervanging in* F_v ✓ answer / *antwoord* (5)
7.3.1	$OB = P(1+i)^n - \frac{x\left[(1+i)^n - 1\right]}{i}$ $OB = 850000\left(1+\frac{0,13}{12}\right)^{75} - \frac{9958,39\left[\left(1+\frac{0,13}{12}\right)^{75} - 1\right]}{\frac{0,13}{12}}$ $= R\,763\,890,54$ **OR/*OF*** $OB = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $OB = \frac{9958,39\left[1-\left(1+\frac{0,13}{12}\right)^{-165}\right]}{\frac{0,13}{12}}$ $= R\,763\,889,86$	✓ correct substitution into **A** formula / *korrekte vervanging in **A** formule* ✓ correct substitution into **Fv** formula / *korrekte vervanging in **Fv** formule* ✓ answer / *antwoord* **OR/*OF*** ✓ $n = 165$ ✓ substitution into the correct formula / *vervanging in korrekte formule* ✓ answer / *antwoord* (3)

7.3.2



For Outstanding Balance / *Vir Uitstaande Balans*
$= R\,763\,890{,}54$:

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

$$A = 763890{,}54\left(1+\frac{0{,}13}{12}\right)^4$$

$A = R\,797\,534{,}2651$

✓ substitution into the correct **A** formula / *vervanging in korrekte **A** formule*

✓ accumulated amount / *opgeboude bedrag*

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

$$797534{,}2651 = \frac{x\left[1-\left(1+\frac{0{,}13}{12}\right)^{-161}\right]}{\frac{0{,}13}{12}}$$

✓ substitution into the correct formula / *vervanging in korrekte formule*

✓ $n = -161$

$$x = \frac{797534{,}2651\times\frac{0{,}13}{12}}{\left[1-\left(1+\frac{0{,}13}{12}\right)^{-161}\right]}$$

$x = R\,10\,490{,}96$

Adjusted instalment is R10 490,96

✓ answer / *antwoord*

(5)

OR / *OF*

For Outstanding Balance / *Vir Uitstaande Balans*
$= R\,763\,889{,}86$:

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

$$A = 763889{,}86\left(1+\frac{0{,}13}{12}\right)^4$$

$= R\,797\,533{,}5551$

✓ substitution into the correct **A** formula / *vervanging in korrekte **A** formule*

✓ accumulated amount/*opgeboude bedrag*

$$797533{,}56 = \frac{x\left[1-\left(1+\frac{0{,}13}{12}\right)^{-161}\right]}{\frac{0{,}13}{12}}$$

✓ substitution into the correct formula *vervanging in korrekte formule*

$$x = \frac{797533{,}56\times\frac{0{,}13}{12}}{\left[1-\left(1+\frac{0{,}13}{12}\right)^{-161}\right]}$$

✓ $n = -161$

$x = R\,10\,490{,}95$

✓ answer / *antwoord*

(5)

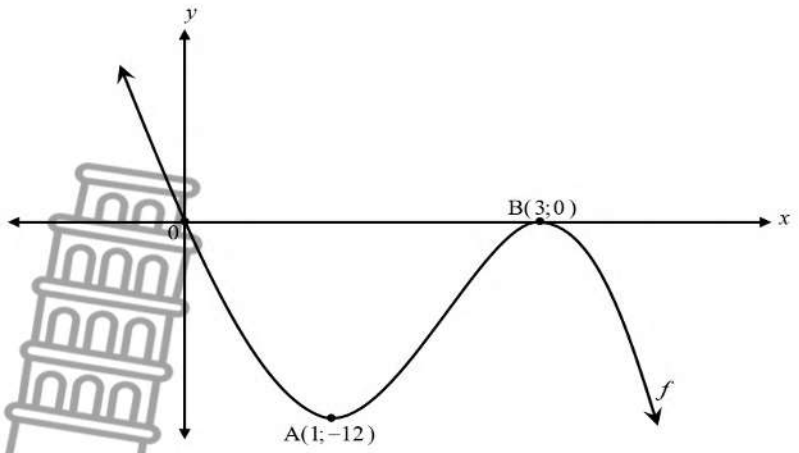
[16]

QUESTION 8/*VRAAG 8*

8.1	$f(x)=x^2-3$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{(x+h)^2-3-(x^2-3)}{h}$ $=\lim_{h\to 0}\frac{x^2+2xh-h^2-3-(x^2-3)}{h}$ $=\lim_{h\to 0}\frac{x^2+2xh-h^2-3-x^2+3}{h}$ $=\lim_{h\to 0}\frac{2xh-h^2}{h}$ $=\lim_{h\to 0}\frac{h(2x-h)}{h}$ $=\lim_{h\to 0}2x-h$ $f'(x)=2x$	✓ substitution into the formula *vervanging in die formule* ✓ simplification / *vereenvoudiging* ✓ factorisation / *faktorisering* ✓ answer / *antwoord* (4)
8.2.1	$\frac{dy}{dx}=-6x+7$	✓ $-6x$ ✓ 7 (2)
8.2.2	$D_x\left[\frac{x^3-5x^2}{x^3}-\sqrt{x}\right]$ $=D_x\left[\frac{x^3}{x^3}-\frac{5x^2}{x^3}-x^{\frac{1}{2}}\right]$ $=D_x\left[1-5x^{-1}-x^{\frac{1}{2}}\right]$ $=0+5x^{-2}-\frac{1}{2}x^{-\frac{1}{2}}$ $=\frac{5}{x^2}-\frac{1}{2\sqrt{x}}$	✓ $x^{\frac{1}{2}}$ ✓ $1-5x^{-1}$ ✓ 0 & $5x^{-2}$ (zero does not have to be seen) (*hoef nie nul te sien nie*) ✓ $-\frac{1}{2}x^{-\frac{1}{2}}$ (4)

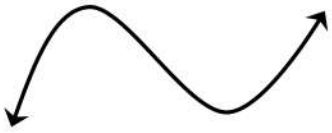
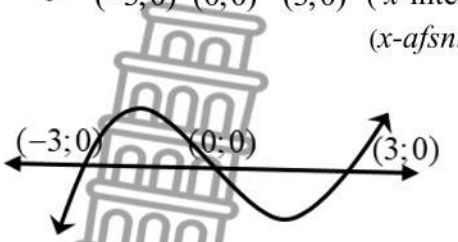
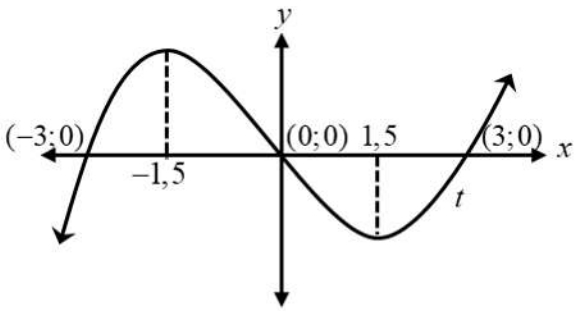
8.3	$h(x) = -x^3 - 3x^2 + 1$ $g(x) = h'(x)$ $g(x) = -3x^2 - 6x$ Max of $g(x)$ will occur at $g'(x) = 0$ *Maks van $g(x)$ sal wees by* $g'(x) = 0$ $g'(x) = -6x - 6 = 0$ $\therefore\ x = -1$ $g(-1) = -3(-1)^2 - 6(-1)$ $g(-1) = -3 + 6 = 3$ largest value $\Rightarrow$ maximum $= 3$ *grootste waarde* $\Rightarrow$ *maksimum* $= 3$	✓ $g(x) = -3x^2 - 6x$ ✓ $x = -1$ ✓ answer / *antwoord* (3)
		[13]

QUESTION 9/*VRAAG 9*



9.1.1	$f(x) = -3x^3 + mx^2 + nx$ $f'(x) = -9x^2 + 2mx + n$ $0 = -9(1)^2 + 2m(1) + n$ $0 = -9 + 2m + n$ $n = 9 - 2m$.....(1) $f'(x) = -9x^2 + 2mx + n$ $0 = -9(3)^2 + 2m(3) + n$ $81 = 6m + n$ $81 - 6m = n$.....(2) $81 - 6m = 9 - 2m$ $81 - 9 = 6m - 2m$ $72 = 4m$ $\therefore m = 18$ $n = 9 - 2(18)$ $\therefore n = -27$ $\therefore f(x) = -3x^3 + 18x^2 - 27x$	✓ equation 1 / *vergelyking* 1 ✓ equation 2 / *vergelyking* 2 ✓ equating (method) / *gelykstel (metode)* ✓ solve for m / *oplos vir* m ✓ substituting value of m / *vervanging van waarde van* m (5)
9.1.2	$f(a)$ – corresponding y-value when $x = a$, while $f'(a)$ – gradient/derivative/rate of change of when $x = a$ $f(a)$ – *is die ooreenstemmende y-waarde wanneer* $x = a$, *terwyl* $f'(a)$ – *stel voor die gradiënt/afgeleide/ veranderingskoers van* f *wanneer* $x = a$	explanation of/*verduideliking van* ✓ $f(a)$ ✓ $f'(a)$ (2)

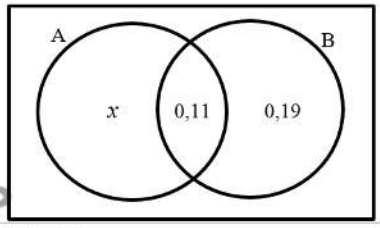
9.1.3	Point of inflection/*Buigpunt/infleksiepunt* $x = \frac{x_A + x_B}{2}$ $x = \frac{1+3}{2} = 2$ **OR / *OF*** $f'(x) = -9x^2 + 36x - 27$ $f''(x) = -18x + 36$ $f''(x) = 0$ $-18x + 36 = 0$ $18x = 36$ $\therefore x = 2$ $\therefore f(2) = -3(2)^3 + 18(2)^2 - 27(2) = -6$ $\therefore (2;-6)$ Gradient of / *Gradiënt van* $g(x)$: $f'(2) = -9(2)^2 + 36(2) - 27 = 9$ Gradient of / *Gradiënt van* $h(x)$: $m_g \times m_h = -1$ $\therefore m_h = -\frac{1}{9}$ $\therefore h(x) = -\frac{1}{9}x$	✓ method / *metode* ✓ ✓ $f(2)$ ✓ $f'(2)$ ✓ $h(x) = -\frac{1}{9}x$ (5)
9.1.4	$f''(x) > 0$ when $f(x)$ is concave up $x-$ value for point of inflection is 2 $\therefore x < 2$ $f''(x) > 0$ *wanneer* $f(x)$ *konkaaf op is* *x-waarde vir buigpunt/infleksiepunt is* 2 $\therefore x < 2$	✓✓ answer / *antwoord* (2)

9.2	• $a = 2 > 0$ 	✓ shape / *vorm*
	• (−3;0) (0;0) (3;0) (x-intercepts) (x-*afsnitte*)  	✓ intercepts on the graph/ *afsnitte op die grafiek*
	• x-values of stationary points: *x-waardes van stasionêre punte*  	✓ x- values for stationary points *x-waardes vir stasionêre punte* (3)
		[17]

QUESTION 10/*VRAAG 10*

10.1	$S(t) = -3t^2 + 30t$ $S(3) = -3(3)^2 + 30(3)$ $= 63$ scripts / *skrifte*	✓ substitution / *vervanging* ✓ answer / *antwoord* (2)
10.2	$S'(t) = -6t + 30$ For maximum number of scripts, $S'(t) = 0$ / *Vir maksimum aantal skrifte*, $S'(t) = 0$ $-6t + 30 = 0$ $6t = 30$ $t = 5$ (Day 5 / *Dag* 5)	✓ $S'(t)$ ✓ $S'(t) = 0$ ✓ $t = 5$ (3)
10.3	No / *Nee* D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 27 | 48 | 63 | 72 | 75 | 72 | 63 | 48 | 27 | 0 Sum/*Som* = 495 scripts/*skrifte*	✓ No / Nee ✓ explanation / *verduideliking* (2)
		[7]

QUESTION 11/*VRAAG 11*

		
11.1.1	$x = 1-(0,11+0,19+0,41)$ $x = 0,29$ $P(A) = 0,29+0,11 = 0,4$	✓ value of x / *waarde van x* ✓ answer / *antwoord* (2)
11.1.2	P (A or/*of* not/*nie* B) $= 0,29+0,11+0,41 = 0,81$	✓✓ answer / *antwoord* (2)
11.2.1	$a = 4$	✓ answer / *antwoord* (1)
11.2.2	$\frac{14}{30} = \frac{7}{15}$	✓ *answer / antwoord* (1)
11.2.3	P (winning a game) $= \frac{7}{30}$ P (playing at home) $= \frac{15}{30} = \frac{1}{2}$ P (winning a game) × P (playing at home) $= \frac{7}{30} \times \frac{1}{2}$ $= \frac{7}{60} = 0,12$ P (winning a game and playing at home) $= \frac{3}{30} = 0,10$ events are not independent, since P (winning a game and playing at home) ≠ P (winning a game) × P (playing at home)	✓ P (winning a game) × P(playing at home) ✓ P(winning a game and playing at home) ✓ conclusion
	P (*wen 'n wedstryd*) $= \frac{7}{30}$ P (*speel tuiswedstryd*) $= \frac{15}{30} = \frac{1}{2}$ P (*wen wedstryd*) × P (*speel tuiswedstryd*) $= \frac{7}{30} \times \frac{1}{2}$ $= \frac{7}{60} = 0,12$ P (*wen wedstryd en tuis wedstryd*) $= \frac{3}{30} = 0,10$ *gebeurtenisse is nie onafhanklik nie, omdat* P *(wen wedstryd en speel tuiswedstryd)* ≠ P (*wen wedstryd*) × P (*speel tuiswedstryd*)	✓ *P (wen wedstryd) × P(speel tuiswedstryd)* ✓ *P(wen wedstryd en speel tuiswedstryd)* ✓ *Gevolgtrekking* (3)
		[9]

QUESTION 12/*VRAAG 12*

12.1	$21\times20\times10\times9\times19\times18$ =12 927 600 codes/*kodes*	✓✓ answer / *antwoord* *(2)*
12.2	**DIGITS / *SYFERS*:** 4 2 or/*of* 3 1 4 1 4 1 6 2 6 2 8 4 8 4 9 9 **LETTERS BEFORE G / *LETTERS VOOR* G:** A; B; C; D; E and/*en* F Out of 6 letters remove A and E (vowels) $=4$ letters *Van die 6 letters verwyder A en E (klinkers) = 4 letters* **COMBINED / *KOMBINASIE* :** $n(A)=(4\times20\times4\times2\times19\times18)+(4\times20\times3\times1\times19\times18)$ $= 218\,880 + 82\,080$ $= 300\,960$ $P(A)=\frac{n(A)}{n(S)}$ $=\frac{300960}{12927600}$ $=\frac{22}{945}$ $\approx 0,02$	✓ 4 *in* $n(A)$ ✓ 4×2 and/*en* 3×1 in $n(A)$ ✓ dividing by / *deel deur* 12927600 ✓ answer / *antwoord* (4)
		[6]

TOTAL/*TOTAAL:* 150