Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIORSERTIFIKAAT*

GRADE/*GRAAD 12*

SEPTEMBER 2024

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

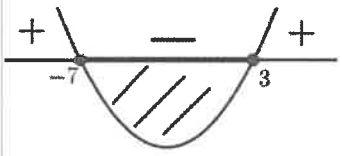
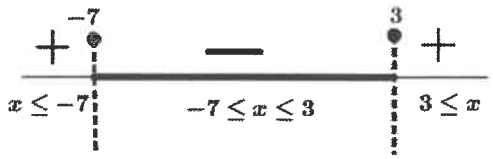
MARKS/*PUNTE*: 150

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

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 toegeken vir substitusie in die korrekte formule.*

QUESTION 1/*VRAAG 1*

1.1.1	$(2x-4)(x-1)=0$ $x=2$ or/*of* $x=1$	✓ $x=2$ ✓ $x=1$ (2)
1.1.2	$2x^2-3(x+2)=4$ $2x^2-3x-6-4=0$ $2x^2-3x-10=0$ $x=\dfrac{-(-3)\pm\sqrt{(-3)^2-4(2)(-10)}}{2(2)}$ $x=3,11$ **OR/*OF*** $x=-1,61$	✓ standard form / *standaardvorm* ✓ substitution / *vervanging* ✓ $x=3,11$ or/*of* ✓ $x=-1,61$ (4)
1.1.3	$x^2+4x-21\le 0$ $(x+7)(x-3)\le 0$ $c.v's: x\in\{-7;3\}$  **OR / *OF***  $\therefore -7\le x\le 3$	✓ factors / *faktore* ✓✓ answer / *antwoord* (Accuracy / *Akkuraatheid*) (3)

1.1.4	$-\sqrt{x-1}=3-2x$ $2x-3=\sqrt{x-1}$ $(2x-3)^2=x-1$ $4x^2-12x+9=x-1$ $4x^2-13x+10=0$ $(4x-5)(x-2)=0$ $x\neq\frac{5}{4}$ or/*of* $x=2$ $\therefore x=2$	✓ squaring both sides/ *kwadreer beide kante* ✓ standard form / *standaardvorm* ✓ factors / formula *faktore / formule* ✓ answers with selection *antwoorde met keuse* (4)

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* $x=-1$: $y=1-2(-1)$ $y=3$	✓ $y=1-2x$ ✓ substitution / *vervanging* ✓ standard form / *standaardvorm* ✓ factors / *faktore* ✓ x-values / *x-waardes* ✓ y-values / *y-waardes*
	OR / *OF*	**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* $y=3$: $x=-1$	✓ $x=\frac{1}{2}-\frac{y}{2}$ ✓ substitution / *vervanging* ✓ standard form / *standaardvorm* ✓ factors / *faktore* ✓ y-values / *y-waardes* ✓ x-values / *x-waardes* (6)

1.3	$f(x)=x^2+3x$ $\therefore f(-x)=x^2-3x$ $2x=[t(x)]^{\frac{1}{2}}$ $t(x)=4x^2$ $\therefore t(2k)=4(2k)^2$ $f(-x)+\frac{t(2k)}{4}=0$ $x^2-3x+\frac{4(2k)^2}{4}=0$ $x^2-3x+4k^2=0$ For equal roots / *Vir gelyke wortels*, $\Delta=0$ $b^2-4ac=0$ $(-3)^2-4(1)(4k^2)=0$ $9-16k^2=0$ $(3-4k)(3+4k)=0$ $k=\frac{3}{4}$ or/*of* $k=-\frac{3}{4}$	✓ $f(-x)$ & $t(2k)$ ✓ simplification / *vereenvoudiging* ✓ subst. in / *vervang in*: $\Delta=0$ ✓ method of solving for k *metode vir oplos van k* ✓ k-values / *k-waardes* (5)
		[24]

1.3 $f(x) = x^2 + 3x$

$f(-x) = (-x)^2 + 3(-x)$

$= x^2 - 3x$

$2x - [t(x)]^{\frac{1}{2}} = 0$

$(2x)^2 = ([t(x)]^{\frac{1}{2}})^2$

$4x^2 = t(x)$

both ✓

$4(2k)^2 = t(2k)$

$4 \cdot 4k^2 = t(2k)$

$16k^2 = t(2k)$

$f(-x) + \frac{t(2k)}{4} = 0$

$x^2 - 3x + \frac{16k^2}{4} = 0$

$x^2 - 3x + 4k^2 = 0$ ✓

$\Delta = (-3)^2 - 4(1)(4k^2)$

$= 9 - 16k^2$

Equal roots

$\Delta = 0$

$9 - 16k^2 = 0$ ✓

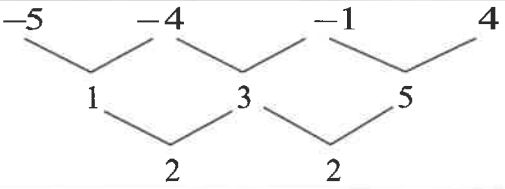
$k^2 = \frac{9}{16}$

$k = \pm\sqrt{\frac{9}{16}}$ ✓ method

$= \pm\frac{3}{4}$ ✓ both

5

QUESTION 2/*VRAAG 2*

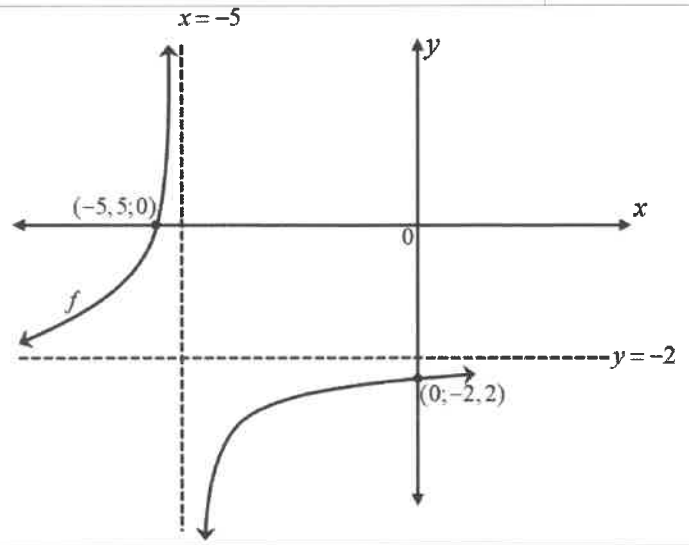
2.1		
2.1.1	$2a=2$ $\therefore a=1$ $\quad a+b+c=-5$ $3a+b=1$ $\quad c=-5-1+2$ $b=1-3(1)$ $\quad \therefore c=-4$ $\therefore b=-2$ $\therefore T_n=n^2-2n-4$	✓ $a=1$ ✓ $b=-2$ ✓ $c=-4$ ✓ $T_n=n^2-2n-4$ (4)
2.1.2	$T_n=n^2-2n-4$ $T_{35}=(35)^2-2(35)-4$ $=1\,151$	✓ answer / *antwoord* (1)
2.1.3	$T_n=1+(n-1)(2)$ $T_n=2n-1$ $T_{n+1}=2(n+1)-1$ $T_{n+1}=2n+1$ $T_n\times T_{n+1}=1155$ $(2n-1)(2n+1)=1155$ $4n^2-1=1155$ $4n^2=1156$ $n^2=289$ $n=\pm 17$ $\therefore n=17$ $\therefore T_{17}$ 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* $n\neq -16$ $n=18$ 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)

2.2	$T_P = 430$ $d = 5$ $T_P = a + (p-1)d$ $430 = 60 + (p-1)(5)$ $430 = 60 + 5p - 5$ $5p = 375$ $p = 75$ $\therefore T_{75} = 430$	✓ equating / *gelyk stel* ✓ simplification / *vereenvoudiging* ✓ answer / *antwoord* (3)
2.3	$a + (a+d) + (a+2d) = 30$ $3a + 3d = 30$ $a + d = 10$ $\therefore a = 10 - d$.....(1) $a(a+d)(a+2d) = 510$.....(2) Subst./*Vervang* (1) into/*in* (2) $(10-d)(10-d+d)(10-d+2d) = 510$ $10(10-d)(10+d) = 510$ $(10-d)(10+d) = 51$ $100 - d^2 - 51 = 0$ $49 - d^2 = 0$ $d^2 = 49$ $d = \pm 7$ reject $d = -7$. increasing A.S $\therefore d = 7$ $\therefore a = 10 - 7 = 3$	✓eq(1) and / *en* eq (2) ✓ substitution / *vervanging* ✓ simplification / *vereenvoudiging* ✓ value of d / *waarde van d* ✓ value of a / *waarde van a* (5)
		[17]

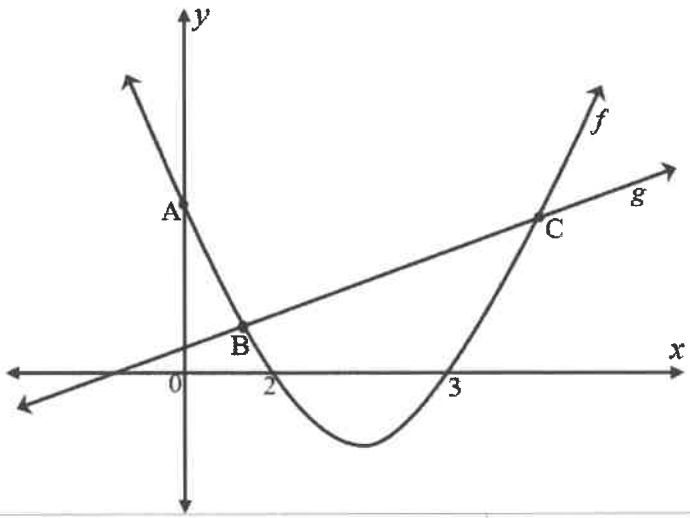
QUESTION 3/*VRAAG 3*

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* $x=1$ $g(5)=5+1=6$ $g(1)=1+1=2$ B(1;2) and/*en* C(5;6)	✓ $f(x)=g(x)$ ✓ standard form / *standaardvorm* ✓ x-values / *x-waardes* ✓ y-values / *y-waardes* (4)

5.3	$h = x+1-(x^2-5x+6)$ $h(x) = x+1-x^2+5x-6$ $= -x^2+6x-5$ $x = \frac{-6}{2(-1)}$ $= 3$ **OR/*OF*** $h'(x) = -2x+6$ $0 = -2x+6$ $\therefore x = 3$ $h(3) = -(3)^2+6(3)-5 = 4$ $\therefore$ Max. height is 4 units. *Maks hoogte is* 4 *eenhede.*	✓ $g(x)-f(x)$ ✓ $h(x)$ ✓ $x = 3$ ✓ Max. height / *Maks. hoogte* (4)
5.4	Min. of f : $f\left(\frac{5}{2}\right) = \left(\frac{5}{2}\right)^2 - 5\left(\frac{5}{2}\right)+6 = -\frac{1}{4}$ Min. of/*van* $t(x) = -\frac{1}{4}-2 = -\frac{9}{4}$ $\therefore y \in \left[-\frac{9}{4};\infty\right)$ **OR / *OF*** $\therefore y \geq -\frac{9}{4}$	✓✓ Range of $t(x)$ / *Terrein van t(x)* (2)
5.5	$2 < x < 3$	✓✓ $2 < x < 3$ (accuracy / *akkuraatheid*) (2)
		[14]

6. $f: y = -\log_c x$ $\quad g: y = dx^2 \quad (x \geq 0)$

6.1. $y = -\log_c x$
sub $P(\frac{1}{2}; \frac{1}{2})$
$\frac{1}{2} = -\log_c \frac{1}{2}$ ✓
$-\frac{1}{2} = \log_c \frac{1}{2}$
$c^{-\frac{1}{2}} = \frac{1}{2}$
$(c^{-\frac{1}{2}})^{-2} = (\frac{1}{2})^{-2}$
$c = 4$ ✓

$y = dx^2$
sub $P(\frac{1}{2}; \frac{1}{2})$
$\frac{1}{2} = d(\frac{1}{2})^2$
$\frac{1}{2} = \frac{1}{4}d$
$2 = d$ ✓

(3)

6.2.1. $g: y = 2x^2 \quad (x \geq 0)$
$g^{-1}: x = 2y^2 \quad (y \geq 0)$ ✓
$\frac{1}{2}x = y^2 \quad (y \geq 0)$
$\pm\sqrt{\frac{1}{2}x} = y \quad (y \geq 0)$
$\therefore \sqrt{\frac{1}{2}x} = y$ ✓

$y = dx^2$
$y = \sqrt{\frac{1}{d}x}$

(2)

6.2.2. $f: y = -\log_4 x$
refl x: $-y = -\log_4 x$
$h: y = \log_4 x$ ✓
$h^{-1}: x = \log_4 y$
$4^x = y$ ✓

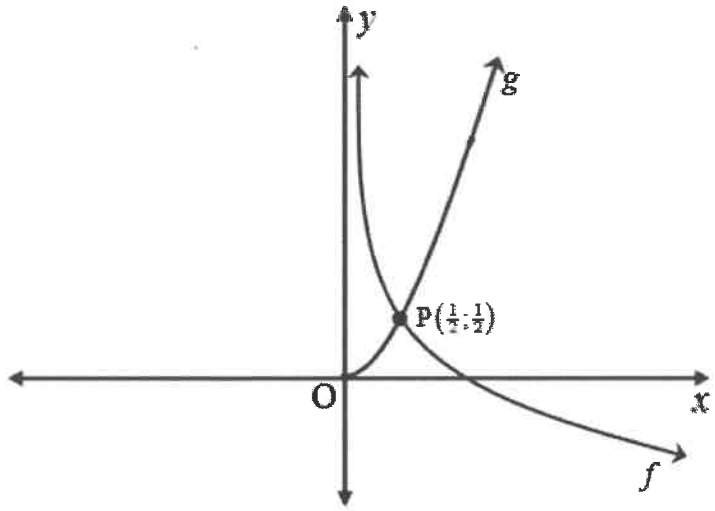
$y = -\log_c x$
$y = \log_c x$
$y = c^x$

(2)

6.2.3. $h^{-1}(x) > 0$
$4^x > 0$
$x \in \mathbb{R}$ ✓

(1)

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	$g: y=2x^2$ $(x\geq 0)$ $g^{-1}: x=2y^2$ $(y\geq 0)$ $g^{-1}: y^2=\frac{1}{2}x$ $g^{-1}: y=\pm\sqrt{\frac{1}{2}x}$ $(y\geq 0)$ $\therefore y=\sqrt{\frac{1}{2}x}$	✓ 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	$F_v = \frac{x[(1+i)^n - 1]}{i}$ $= \frac{900\left[\left(1+\frac{0,08}{12}\right)^{120} - 1\right]}{\frac{0,08}{12}} + \frac{1300\left[\left(1+\frac{0,08}{12}\right)^{60} - 1\right]}{\frac{0,08}{12}}$ $= 164651,4317 + 95519,91312$ $= R260171,34$ See pg 13.1.	✓ $n = 120$ 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)

7.2.

R 900 pm | R 1300 pm

$T_0 - T_{10}$

$$F = \frac{900\left[\left(1+\frac{8}{1200}\right)^{10\times 12}-1\right]}{\frac{8}{1200}}$$

$= 164\,651,43\ldots$

i, n ✓ ✓sub F

$T_{10} - T_{15}$

$A = 164\,651,43\ldots\left(1+\frac{8}{1200}\right)^{5\times 12}$ ✓

$= 245\,305,22\ldots \rightarrow A$

$$F = \frac{1300\left[\left(1+\frac{8}{1200}\right)^{5\times 12}-1\right]}{\frac{8}{1200}}$$ ✓

$= 95\,519,91\ldots$

$\therefore$ Savings $= 245\,305,22\ldots + 95\,519,91\ldots$

$= \underline{R\ 340\,825,14}$ ✓

5

7.3.1. $P = \dfrac{9958,39\left(1-\left(1+\frac{13}{1200}\right)^{-165}\right)}{\frac{13}{1200}}$ ✓ ✓

$20 \times 12 - 75 = 165$

$= R\ 763\ 889,86$ ✓

(3)

OR

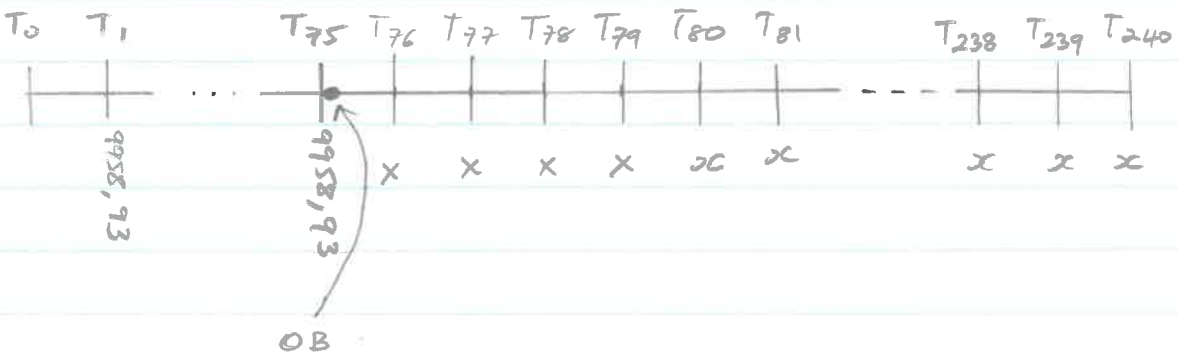
$OB = 850\,000\left(1+\frac{13}{1200}\right)^{75} - \dfrac{9958,39\left(\left(1+\frac{13}{1200}\right)^{75}-1\right)}{\frac{13}{1200}}$ ✓ ✓

$= 1\ 907\ 153,00\ldots - 1\ 143\ 262,47\ldots$

$\rightarrow A$

$= R\ 763\ 890,54$ ✓

2.



$T_{75} - T_{79}$

$A = 763\,889,86\left(1+\frac{13}{1200}\right)^{4}$ ✓

$= 797\,533,55\ldots$ ✓

$T_{80} - T_{240}$

$797\,533,55\ldots = \dfrac{x\left(1-\left(1+\frac{13}{1200}\right)^{-161}\right)}{\frac{13}{1200}}$ ✓ ✓

$x = R\ 10\ 490,95$ ✓

(5)

OR

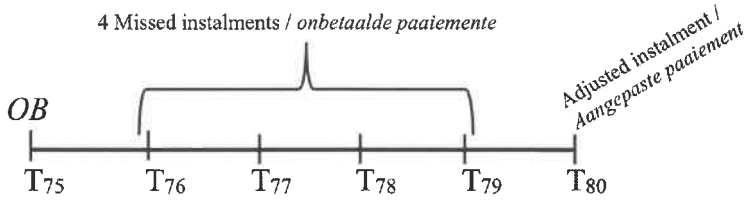
$A = \ldots$

$= 797\,534,26\ldots$

$\ldots = \ldots$

$x = R\ 10\ 490,96$

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*

✓ $n = -161$

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

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

✓ answer / *antwoord*

∴ Adjusted instalment is R10 490,96 (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	$f(x)=x^2-3$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to 0}\dfrac{(x+h)^2-3-(x^2-3)}{h}$ $=\lim\limits_{h\to 0}\dfrac{x^2+2xh+h^2-3-(x^2-3)}{h}$ $=\lim\limits_{h\to 0}\dfrac{x^2+2xh+h^2-3-x^2+3}{h}$ $=\lim\limits_{h\to 0}\dfrac{2xh+h^2}{h}$ $=\lim\limits_{h\to 0}\dfrac{h(2x+h)}{h}$ $=\lim\limits_{h\to 0}(2x+h)$ $f'(x)=2x$	✓ substitution into the formula *vervanging in die formule* ✓ simplification / *vereenvoudiging* ✓ factorisation / *faktorisering* ✓ answer / *antwoord* (4)
8.2.1	$\dfrac{dy}{dx}=-6x+7$	✓ $-6x$ ✓ 7 (2)
8.2.2	$D_x\left[\dfrac{x^3-5x^2}{x^3}-\sqrt{x}\right]$ $=D_x\left[\dfrac{x^3}{x^3}-\dfrac{5x^2}{x^3}-x^{\frac{1}{2}}\right]$ $=D_x\left[1-5x^{-1}-x^{\frac{1}{2}}\right]$ $=0+5x^{-2}-\dfrac{1}{2}x^{-\frac{1}{2}}$	✓ $x^{\frac{1}{2}}$ ✓ $1-5x^{-1}$ ✓ 0 & $5x^{-2}$ (zero does not have to be seen) (*hoef nie nul te sien nie*) ✓ $-\dfrac{1}{2}x^{-\frac{1}{2}}$ (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* $g'(x) = 0$ $g'(x) = -6x - 6 = 0$ $\therefore\ x = -1$ $g(-1) = -3(-1)^2 - 6(-1)$ $g(-1) = -3 + 6 = 3$ $\therefore$ largest value $\Rightarrow$ maximum $= 3$ *grootste waarde* $\Rightarrow$ *maksimum* $= 3$	✓ $g(x) = -3x^2 - 6x$ ✓ $x = -1$ ✓ answer / *antwoord* (3)
		[13]

OR

pg 16.1.

8.3. $h(x) = -x^3 - 3x^2 + 1$

$g(x) = h'(x)$ rate of change of h

$= -3x^2 - 6x$ ✓

Largest value of g:

$g' = 0$

$(h')' = 0$

$-6x - 6 = 0$

$x = -1$ ✓

$\therefore \quad g(-1) = -3(-1)^2 - 6(-1)$

$= 3$ ✓ (3)

9.1.1. $y = -3x^3 + mx^2 + nx$ $\qquad y = a(x-0)(x-3)(x-3)$

$a = -3$

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

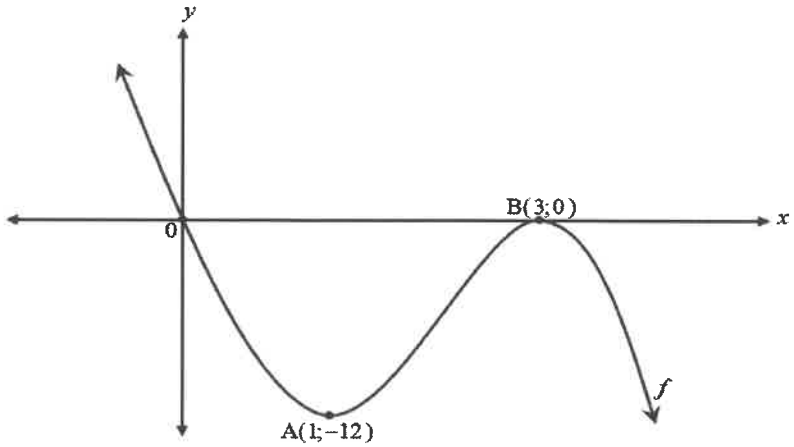
$= -3x(x^2 - 6x + 9)$

$= -3x^3 + 18x^2 - 27x$

$m = 18 \quad n = -27$

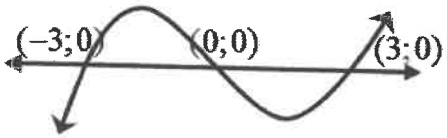
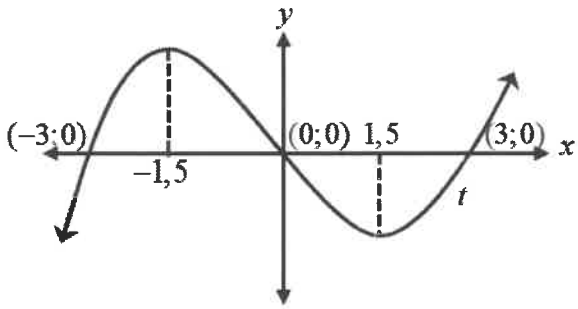
5

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 f 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)

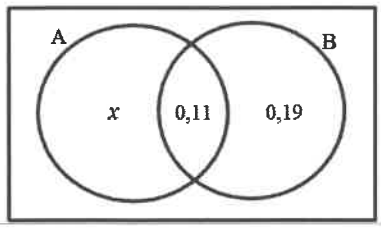
9.1.3	Point of inflection/*Buigpunt/infleksiepunt* $x=\frac{x_A+x_B}{2}$ $x=\frac{1+3}{2}=2$ **OR / *OF*** $f'(x)=-9x^2+36x-27$ $f''(x)=-18x+36$ $f''(x)=0$ $-18x+36=0$ $18x=36$ $\therefore x=2$ $\therefore f(2)=-3(2)^3+18(2)^2-27(2)=-6$ $\therefore (2;-6)$ Gradient of / *Gradiënt van* $g(x)$: $f'(2)=-9(2)^2+36(2)-27=9$ 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* ✓ $x=2$ ✓ $f(2)$ ✓ $f'(2)$ ✓ $h(x)=-\frac{1}{9}x$ (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	$x = 1-(0,11+0,19+0,41)$ $x = 0,29$ $\therefore P(A) = 0,29+0,11 = 0,4$	✓ 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]

12. C B 1 2 F D $0-9 = 10$, $26-5 = 21$

12.1. $21 \times 20 \times 10 \times 9 \times 19 \times 18 = 12\ 927\ 600$ ✓ ✓ (2)

12.2.

B		4			
C		6	1		
D		8	2		
F		9	4		
4	20	4	3	19	18

- Composite > 2 factors ie prime

- 0 1 2 3 (4) 5 (6) 7 (8) (9) = 4
- 1 2 4 = 3

but we don't want ... 4 4 ...
1 1

$\therefore 4 \times 20 \times 4 \times 3 \times 19 \times 18 - 4 \times 20 \times 1 \times 1 \times 19 \times 18$ ✓

$= 328\ 320 - 27\ 360$

$= 300\ 960$

$\therefore P = \frac{300\ 960}{12\ 927\ 600}$ ✓

$= \frac{22}{945}$ ✓ (4)

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* :

$n(A)=(4\times20\times4\times2\times19\times18)+(4\times20\times3\times1\times19\times18)$
$=218\ 880+82\ 080$
$=300\ 960$

✓ 4 *in* $n(A)$
✓ 4×2 and/*en* 3×1 in $n(A)$

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

$=\dfrac{300960}{12927600}$

✓ dividing by / *deel deur* 12927600

$=\dfrac{22}{945}$

$\approx 0,02$

✓ answer / *antwoord*

OR

(4)

[6]

see pg 22.1.

TOTAL/*TOTAAL:* 150