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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE 12/*GRAAD 12*

MATHEMATICS P1/*WISKUNDE V1*

NOVEMBER 2022

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 21 pages.
Hierdie nasienriglyne bestaan uit 21 bladsye.

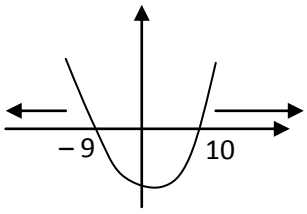
NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking guidelines.

LET WEL:

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

QUESTION1/*VRAAG* 1

1.1.1	$(3x-6)(x+2)=0$ $x=2$ or $x=-2$	✓ $x=2$ ✓ $x=-2$ (2)
1.1.2	$2x^2-6x+1=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{6\pm\sqrt{(-6)^2-4(2)(1)}}{2(2)}$ $x=2,82$ or $x=0,18$	✓ correct substitution into correct formula ✓ 2,82 ✓ 0,18 (3)
1.1.3	$x^2-90>x$ $x^2-x-90>0$ $(x+9)(x-10)>0$ CV: $x=-9$ or $x=10$  $x<-9$ or $x>10$ **OR/OF** $(-\infty;-9)$ or $(10;\infty)$	✓ standard form ✓ critical values ✓✓ $x<-9$ or $x>10$ (4)

1.1.4	$x-7\sqrt{x}=-12$ $x+12=7\sqrt{x}$ $(x+12)^2=\left(7\sqrt{x}\right)^2$ $x^2+24x+144=49x$ $x^2-25x+144=0$ $(x-16)(x-9)=0$ $x=16$ or $x=9$ **OR/*OF*** $x-7\sqrt{x}+12=0$ $\left(\sqrt{x}-3\right)\left(\sqrt{x}-4\right)=0$ or let $\sqrt{x}=k$ $\sqrt{x}=3$ or $\sqrt{x}=4$ $x=9$ or $x=16$	✓ isolating the root ✓ squaring both sides ✓ standard form ✓ both answers (4) **OR/*OF*** ✓ standard form ✓ factors ✓ answers ✓ both answers for x (4)
1.2	$2x-y=2$ $y=2x-2$ ……(1) $xy=4$ ……(2) (1) in (2): $x(2x-2)=4$ $2x^2-2x-4=0$ $x^2-x-2=0$ $(x-2)(x+1)=0$ $x=2$ or $x=-1$ $y=2$ $y=-4$	✓ eq 1 ✓ substitution ✓ standard form ✓ x-values ✓ y-values (5)

	OR/*OF*	**OR/*OF***
	$2x-y=2$	
	$x=\frac{1}{2}y+1$ .....(1)	✓ eq 1
	$xy=4$ .....(2)	
	(1) in (2):	
	$y\left(\frac{1}{2}y+1\right)=4$	✓ substitution
	$\frac{1}{2}y^2+y-4=0$	✓ standard form
	$y^2+2y-8=0$	
	$(y+4)(y-2)=0$	
	$y=-4$ or $y=2$	✓ *y*-values
	$x=-1$ $x=2$	✓ *x*-values (5)
	OR/OF	**OR/OF**
	$2x-y=2$ .....(1)	
	$y=\frac{4}{x}$ .....(2)	✓ eq 2
	(2) in (1):	
	$2x-\frac{4}{x}=2$	✓ substitution
	$2x^2-2x-4=0$ $x^2-x-2=0$	✓ standard form
	$(x-2)(x+1)=0$	
	$x=2$ or $x=-1$ $y=2$ $y=-4$	✓ *x*-values ✓ *y*-values (5)

	OR/OF $2x-y=2$ ……(1) $x=\frac{4}{y}$ ……(2) (2)in (1): $2\left(\frac{4}{y}\right)-y=2$ $8-y^2-2y=0$ $y^2+2y-8=0$ $(y+4)(y-2)=0$ $y=-4$ or $y=2$ $x=-1$ $x=2$	**OR/OF** ✓ eq 2 ✓ substitution ✓ standard form ✓ *y*-values ✓ *x*-values (5)
1.3	$2.5^n-5^{n+1}+5^{n+2}=2.5^n-5^n.5^1+5^n.5^2$ $=5^n(2-5+25)$ $=5^n(22)$ $2\left(5^n(11)\right)$ **OR/OF** Any integer multiplied by an even number will be even	✓ exp law ✓common factor ✓answer/explanation (3)
1.4	$\frac{3^{y+1}}{32}=\sqrt{96^x}$ $\frac{3^{y+1}}{2^5}=(96)^{\frac{x}{2}}$ $3^{y+1}.2^{-5}=2^{\frac{5x}{2}}.3^{\frac{x}{2}}$ $-5=\frac{5x}{2}$ $\therefore x=-2$ $y+1=\frac{x}{2}$ $y+1=\frac{-2}{2}$ $\therefore y=-2$	✓ $\frac{3^{y+1}}{2^5}=(96)^{\frac{x}{2}}$ ✓ $3^{y+1}.2^{-5}=2^{\frac{5x}{2}}.3^{\frac{x}{2}}$ ✓ $x=-2$ ✓ $y=-2$ (4)

	OR/OF $\frac{3^{y+1}}{32} = \sqrt{96^x}$ $\left(\frac{3^{y+1}}{2^5}\right)^2 = \left(\sqrt{(96)^x}\right)^2$ $\frac{3^{2y+2}}{2^{10}} = 2^{5x}.3^x$ $3^{2y+2}.2^{-10} = 2^{5x}.3^x$ $-10 = 5x$ $\therefore x = -2$ $2y + 2 = -2$ $\therefore y = -2$	**OR/OF** ✓ $\left(\frac{3^{y+1}}{2^5}\right)^2 = \left(\sqrt{(96)^x}\right)^2$ ✓ $3^{2y+2}.2^{-10} = 2^{5x}.3^x$ ✓ $x = -2$ ✓ $y = -2$ (4)
		[25]

QUESTION 2/*VRAAG* 2

2.1.1	$a = 14$ $T_6 = 14r^5 = 448$ $r^5 = 32$ $\therefore r = 2$ Answer only: full marks	✓ $T_6 = 14r^5 = 448$ ✓ $r = 2$ (2)
2.1.2	$T_n = 14(2)^{n-1}$ $S_n = \frac{14(2^6 - 1)}{2 - 1}$ $S_6 = 882$ 114 674 – 882 = 113 792 $113\,792 = 896\left(2^n - 1\right)$ $128 = 2^n$ $n = 7$ **OR/OF** $S_n = \frac{a(r^n - 1)}{r - 1}$ $114\,674 = \frac{14(2^n - 1)}{2 - 1}$ $8\,191 = 2^n - 1$ $2^n = 8\,192$ $n = \log_2 8\,192$ $n = 13$ $\therefore$ 7 more terms must be added to the first 6 terms.	✓ substitution into correct formula ✓ $S_6 = 882$ ✓ $128 = 2^n$ ✓ 7 (4) **OR/OF** ✓ substitution into correct formula ✓ $2^n = 8\,192$ ✓ $n = 13$ ✓ 7 (4)
2.1.3	$r = \frac{1}{2}$ OR $448r^5 = 14$ $\therefore r = \frac{1}{2}$ $S_\infty = \frac{a}{1 - r}$ $S_\infty = \frac{448}{1 - \frac{1}{2}}$ $S_\infty = 896$	✓ $r = \frac{1}{2}$ ✓ substitution ✓ answer (3)

2.2	$\sum_{p=0}^{k}\left(\frac{1}{3}p+\frac{1}{6}\right)=20\frac{1}{6}$	
	$T_1=\frac{1}{6}\qquad T_2=\frac{1}{3}+\frac{1}{6}=\frac{3}{6}$	✓ $T_1=\frac{1}{6}$
	$d=\frac{3}{6}-\frac{1}{6}=\frac{1}{3}$	✓ d
	$\frac{121}{6}=\frac{n}{2}\left[2\left(\frac{1}{6}\right)+(n-1)\left(\frac{1}{3}\right)\right]$	✓ substitution
	$\frac{121}{3}=n\left[\frac{1}{3}+\frac{1}{3}n-\frac{1}{3}\right]$	
	$\frac{121}{3}=\frac{1}{3}n^2$ $121=n^2$	
	$n=11$ $\therefore k=10$	✓ value of n ✓ value of k (5)
	OR/*OF*	**OR/*OF***
	$\sum_{p=0}^{k}\left(\frac{1}{3}p+\frac{1}{6}\right)=20\frac{1}{6}$	
	$a=\frac{1}{6}$	✓ $a=\frac{1}{6}$
	$l=\frac{1}{3}k+\frac{1}{6}$	✓ l
	$n=k+1$	✓ $n=k+1$
	$S_n=\frac{n}{2}[a+l]$	
	$\frac{121}{6}=\frac{k+1}{2}\left[\frac{1}{6}+\frac{1}{3}k+\frac{1}{6}\right]$	
	$\frac{121}{6}=\frac{k+1}{2}\left[\frac{1}{3}k+\frac{1}{3}\right]$	
	$\frac{121}{6}=\frac{k+1}{2}\left[\frac{k+1}{3}\right]$	
	$\frac{121}{6}=\frac{(k+1)^2}{6}$	✓ $\frac{121}{6}=\frac{(k+1)^2}{6}$
	$k+1=\pm\sqrt{121}$ $k+1=11$ $k=10$	✓ value of k (5)
		[14]

QUESTION 3/*VRAAG* 3

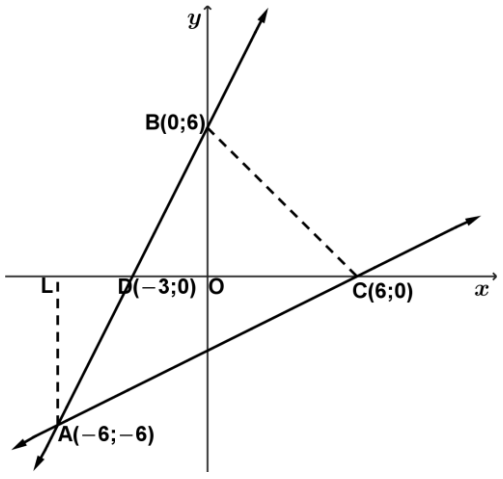
3.1	$3a+b=7$ $3+b=7$ $b=4$ **OR/OF** $T_2-T_1=7$ $4+2b+9-(1+b+9)=7$ $b=4$	✓ $3a+b=7$ ✓ $3+b=7$ (2) **OR/OF** ✓ $T_2-T_1=7$ ✓ substitution (2)
3.2	$T_n=n^2+4n+9$ $T_{60}=(60)^2+4(60)+9$ $=3849$ Answer only: full marks	✓ substitution ✓ answer (2)
3.3	14 ; 21 ; 30 ; 41; First difference: 7 ; 9 ; 11 ; … Common 2nd difference: 2 $T_p=2p+5$ Answer only: full marks **OR/*OF*** First difference: 7 ; 9 ; 11 ; … $T_n=a+(n-1)d$ $T_p=7+(p-1)(2)$ $T_p=2p+5$	✓first difference ✓ 2 ✓ $2p+5$ (3) **OR/*OF*** ✓first difference ✓ 2 ✓ $2p+5$ (3)
3.4	$157=2p+5$ $p=76$ ∴ Between T_{76} and T_{77} **OR/OF** $T_{n+1}-T_n=157$ $(n+1)^2+4(n+1)+9-(n^2+4n+9)=157$ $n^2+2n+1+4n+4+9-n^2-4n-9=157$ $2n=152$ $n=76$ ∴ Between T_{76} and T_{77}	✓$157=2p+5$ ✓ $p=76$ ✓ T_{76} and T_{77} (3) **OR/OF** ✓$T_{n+1}-T_n=157$ ✓ $n=76$ ✓ T_{76} and T_{77} (3)
		[10]

QUESTION 4/*VRAAG* 4

4.1.1	$p = -1$ and $q = 2$	✓ $p = -1$ ✓ $q = 2$ (2)
4.1.2	$\frac{1}{x-1} + 2 = 0$ $-2x + 2 = 1$ $x = \frac{1}{2}$ $\left(\frac{1}{2}; 0\right)$	✓ = 0 ✓ answer (2)
4.1.3	$x = \frac{1}{2} - 3$ $= \frac{-5}{2}$ Answer only: full marks	✓ –3 ✓ $x = \frac{-5}{2}$ (2)
4.1.4	$y = x + t$ $2 = 1 + t$ $t = 1$	✓subst (1 ; 2) ✓ $t = 1$ (2)
4.1.5	$-2 \le \frac{1}{x-1}$ Answer only: full marks $\frac{1}{x-1} + 2 \ge 0$ $\therefore x \le \frac{1}{2}$ or $x > 1$ **OR/*OF*** $x \in \left(-\infty; \frac{1}{2}\right]$ or $(1; \infty)$	 ✓ $\frac{1}{x-1} + 2 \ge 0$ ✓ $x \le \frac{1}{2}$ ✓ $x > 1$ (3)
4.2.1	$y = -5$	✓ answer (1)
4.2.2	$x = \frac{-b}{2a} = \frac{-(-4)}{2(1)} = 2$ $f(2) = 2^2 - 4(2) - 5 = -9$ $\therefore$ D(2 ; –9) **OR/*OF*** $f'(x) = 2x - 4$ $2x - 4 = 0$ $x = 2$ $f(2) = 2^2 - 4(2) - 5 = -9$ $\therefore$ D(2 ; –9)	✓ $x = 2$ ✓ $y = -9$ (2) **OR/*OF*** ✓ $x = 2$ ✓ $y = -9$ (2)

4.2.3	$q = -5$ $-9 = a(2)^2 - 5$ $-4 = 4a$ $a = -1$ $\therefore g(x) = -2^x - 5$	✓ $q = -5$ ✓ substitution of $(2\ ;-9)$ ✓ $a = -1$ (3)
4.2.4	$y \in (-\infty\ ;-5)$ OR $y < -5; y \in R$	✓answer (1)
4.2.5	$k < -9$	✓-9 ✓ $k < -9$ (2)
		[20]

QUESTION 5/*VRAAG* 5

5.1	$g(x) = 2x + 6$ $y = 6$	✓ $y = 6$ (1)
5.2	$y = 2x + 6$ $x = 2y + 6$ $y = \frac{1}{2}x - 3$ Answer only: Full marks	✓ swop x and y ✓ equation (2)
5.3	$\frac{1}{2}x - 3 = 2x + 6$ $x - 6 = 4x + 12$ $3x = -18$ $x = -6$ $A(-6;-6)$ **OR/*OF*** $2x + 6 = x$ $x = -6$ $y = -6$	✓equating ✓$x = -6$ ✓ $y = -6$ (3) **OR/*OF*** ✓equating ✓$x = -6$ ✓$y = -6$ (3)
5.4	$AB = \sqrt{(6)^2 + (12)^2}$ $= \sqrt{180} = 6\sqrt{5} = 13{,}42$	✓substitution ✓answer (2)
		

5.5	$BC = \sqrt{6^2 + 6^2} = \sqrt{72} = 6\sqrt{2}$ AB = AC = $\sqrt{180}$ symmetry of g and g^{-1} $\perp h = (\sqrt{180})^2 - \left(\frac{\sqrt{72}}{2}\right)^2$ $= \sqrt{162} = 9\sqrt{2}$ area of $\Delta ABC = \frac{1}{2} BC \times h$ $= \frac{1}{2} \times \sqrt{72} \times \sqrt{162} = 54 \text{ units}^2$ **OR/*OF*** $\tan B\hat{D}C = 2$ $\therefore B\hat{D}C = 63{,}43°$ $\tan D\hat{C}A = \frac{1}{2}$ $\therefore D\hat{C}A = 26{,}57°$ $\therefore D\hat{A}C = 36{,}86°$ (ext angle triangle) Area of $\Delta ABC = \frac{1}{2}\left(\sqrt{180}\right)\left(\sqrt{180}\right)\sin 36{,}86°$ $= 53{,}99 \text{ units}^2$ **OR/OF** Area of ΔABC = Area of ΔBDC + Area of ΔADC $= \frac{1}{2} DC.BO + \frac{1}{2} DC.height$ $= \frac{1}{2}(9)(6) + \frac{1}{2}(9)(6)$ $= 54 \text{ units}^2$	✓ BC ✓ AB = AC /midpoint (3 ; 3) ✓ $\perp h$ (A) ✓ substitution ✓ answer (A) (5) **OR/*OF*** ✓ $B\hat{D}C = 63{,}43°$ ✓ $D\hat{A}C = 36{,}86°$ ✓ AC = $\sqrt{180}$ ✓ substitution into the correct formula ✓ answer (A) (5) **OR/OF** ✓ Areas ($\Delta BDC + \Delta ADC$) ✓ $\frac{1}{2} DC.BO$ ✓ $\frac{1}{2} DC.height$ ✓ substitution ✓ answer (A) (5)
		[13]

QUESTION 6/*VRAAG* 6

6.1	$A = P(1+i)^n$ $13\,459 = 12\,000\left(1+\frac{m}{400}\right)^8$ $\left(1+\frac{m}{400}\right)^8 = 1{,}121...$ $1+\frac{m}{400} = \sqrt[8]{1{,}121..}$ $\frac{m}{400} = 0{,}0144...$ $\therefore m = 5{,}78\%$	✓ 8 ✓ subst into correct formula ✓ $1+\frac{m}{400} = \sqrt[8]{1{,}121..}$ ✓ 5,78 % (4)
6.2	$F = \frac{x\left[(1+i)^n - 1\right]}{i}$ $F = \frac{1\,000\left[\left(1+\frac{0{,}075}{12}\right)^{12} - 1\right]}{\frac{0{,}075}{12}}$ = R12 421,22 He won't be able to buy the computer because R13 000 – R12 421,22 = R578,78 **OR/OF** He won't be able to buy the computer because R12 421,22 < R13 000	✓ $\frac{0{,}075}{12}$ ✓ 12 ✓ answer ✓ conclusion (4)
6.3.1	Loan amount = 85% × R250 000 = R212 500 **OR/OF** Loan amount = R250 000 – (15% × R250 000) = R212 500	✓ answer (1) **OR/OF** ✓ answer (1)
6.3.2	$A = 212\,500\left(1+\frac{0{,}13}{12}\right)^5$ A = 224 262,53 $P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $224\,262{,}53 = \frac{x\left[1-\left(1+\frac{0{,}13}{12}\right)^{-67}\right]}{\frac{0{,}13}{12}}$ $\therefore x = R4\,724{,}96$	✓ $A = 212\,500\left(1+\frac{0{,}13}{12}\right)^5$ ✓answer ✓ substitution into correct formula ✓ – 67 ✓ answer (5)
		[14]

QUESTION 7/*VRAAG* 7

7.1	$f(x)=x^2+x$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{(x+h)^2+(x+h)-(x^2+x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{x^2+2xh+h^2+x+h-x^2-x}{h}$ $=\lim\limits_{h\to 0}\dfrac{2xh+h^2+h}{h}$ $=\lim\limits_{h\to 0}\dfrac{h(2x+h+1)}{h}$ $\therefore f'(x)=2x+1$ **OR/*OF*** $f(x)=x^2+x$ $f(x+h)=(x+h)^2+(x+h)=x^2+2xh+h^2+x+h$ $f(x+h)-f(x)=x^2+2xh+h^2+x+h-x^2-x$ $=2xh+h^2+h$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to 0}\dfrac{2xh+h^2+h}{h}$ $=\lim\limits_{h\to 0}\dfrac{h(2x+h+1)}{h}$ $\therefore f'(x)=2x+1$	✓substitution into the formula ✓ $x^2+2xh+h^2+x+h$ ✓ $2xh+h^2+h$ ✓common factor ✓answer (5) **OR/*OF*** ✓ $x^2+2xh+h^2+x+h$ ✓ $2xh+h^2+h$ ✓substitution into the formula ✓common factor ✓answer (5)
7.2	$f(x)=2x^5-3x^4+8x$ $f'(x)=10x^4-12x^3+8$	✓$10x^4$ ✓$-12x^3$ ✓8 (3)
7.3	$g(x)=ax^3+3x^2+bx+c$ $g'(x)=3ax^2+6x+b$ $g''(x)=6ax+6$ $g''(-1)=6a(-1)+6=0$ $\therefore a=1$ For concave up $g''(x)>0$ $6x+6>0$ $x>-1$	✓ $g'(x)=3ax^2+6x+b$ ✓ $g''(-1)=6a(-1)+6=0$ ✓ $a=1$ ✓ $x>-1$ (4)

OR/OF

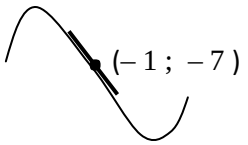
Min gradient at $(-1\ ;-7)$ implies:

at $x = -1$ - point of inflection
and g will be positive cubic
hence $a > 0$

Since g is concave up

$x > -1$

OR/OF



Since g is concave up
$x > -1$

$(-1\ ;\ y)$

Since g is concave up
$x > -1$

Answer only: $\frac{1}{4}$

OR/OF

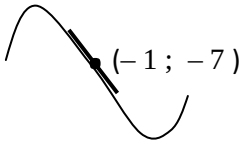
Min gradient at $(-1\ ;-7)$ implies:

at $x = -1$ - point of inflection
and g will be positive cubic
hence $a > 0$

Since g is concave up

$x > -1$

OR/OF

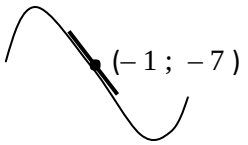


Since g is concave up
$x > -1$

$(-1\ ;\ y)$

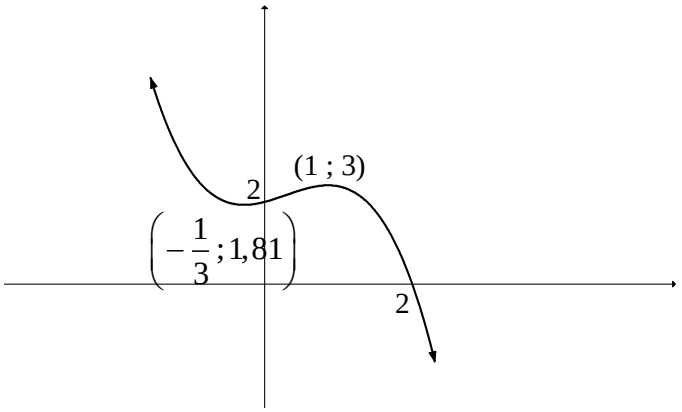
Since g is concave up
$x > -1$

Answer only: $\frac{1}{4}$

	OR/OF Min gradient at (– 1 ; – 7) implies: at $x = -1$ - point of inflection and g will be positive cubic hence $a > 0$ Since g is concave up $x > -1$ **OR/OF**  Since g is concave up $x > -1$  (– 1 ; y) Since g is concave up $x > -1$ Answer only: $\frac{1}{4}$	**OR/OF** ✓ point of inflection ✓✓ $a > 0$ ✓ $x > -1$ (4) **OR/OF** ✓✓pos graph ✓point of inflection ✓ $x > -1$ (4)
		[12]

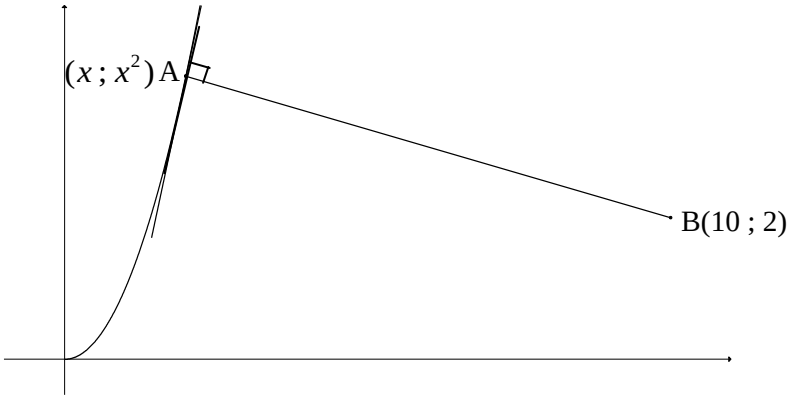
QUESTION 8/*VRAAG* 8

8.1	$f'(x)=mx^2+nx+k$ $f'(x)=m\left(x+\frac{1}{3}\right)(x-1)$ $1=m\left(0+\frac{1}{3}\right)(0-1)$ $1=-\frac{1}{3}m$ $\therefore m=-3$ $f'(x)=-3\left(x+\frac{1}{3}\right)(x-1)$ $f'(x)=-3\left(x^2-\frac{2}{3}x-\frac{1}{3}\right)$ $f'(x)=-3x^2+2x+1$ $\therefore n=2$ $\therefore k=1$ **OR/OF** $k=1$ $0=m+n+1$ and $\frac{1}{9}m-\frac{1}{3}n+1=0$ $m+n=-1$ (1) $m-3n=-9$ (2) (1) – (2) $4n=8$ $\therefore n=2$ $m+2=-1$ $\therefore m=-3$	✓ substitution of $\left(-\frac{1}{3};0\right)$ and (1 ; 0) ✓ substitution of (0 ; 1) ✓ $m=-3$ ✓ $f'(x)=-3\left(x^2-\frac{2}{3}x-\frac{1}{3}\right)$ ✓ $n=2$ ✓ $k=1$ (6) **OR/OF** ✓ $k=1$ ✓ $m+n=-1$ ✓ $m-3n=-9$ ✓ $4n=8$ ✓ $n=2$ ✓ $m=-3$ (6)
8.2.1	$f(x)=-x^3+x^2+x+2$ $f\left(-\frac{1}{3}\right)=\frac{49}{27}=1{,}81$ $\text{T.P}\left(-\frac{1}{3};\frac{49}{27}\right)$ $f(1)=3$ $\text{T.P}(1;3)$	✓ x-coordinates of the TP ✓ $\text{T.P}\left(-\frac{1}{3};\frac{49}{27}\right)$ ✓ $\text{T.P}(1;3)$ (3)

8.2.2	$f(x)=-x^3+x^2+x+2$ $-x^3+x^2+x+2=0$ $(x-2)(-x^2-x-1)=0$ $x=2$ or no solution  	✓ $x=2$ ✓one x-intercept ✓ two turning points ✓y-intercept ✓ shape: neg cubic (5)
8.3.1	$a=\frac{-\frac{1}{3}+1}{2}$ $=\frac{1}{3}$ **OR/OF** $f'(x)=-3x^2+2x+1$ $f''(x)=-6x+2$ $f''(a)=-6a+2=0$ $-6a=-2$ $a=\frac{1}{3}$	✓ answer (1) **OR/OF** ✓ answer (1)
8.3.2	$b<\frac{4}{3}$ units	✓$\frac{4}{3}$ ✓ $b<\frac{4}{3}$ (2)
		[17]

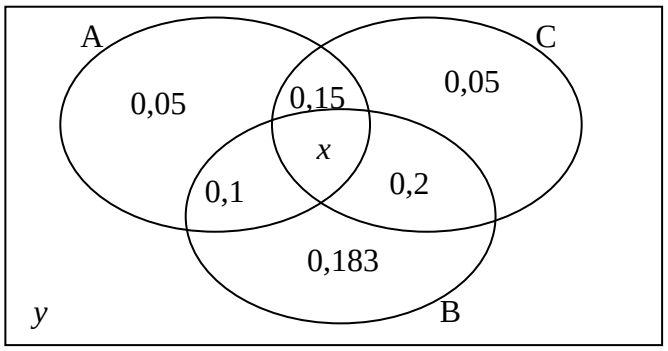
QUESTION9/*VRAAG* 9

9.1	Any point on f : $(x\,;x^2)$ $\text{distance} = \sqrt{(x-10)^2+(x^2-2)^2}$ $= \sqrt{x^2-20x+100+x^4-4x^2+4}$ $= \sqrt{x^4-3x^2-20x+104}$ For min distance $\frac{d}{dx}\left(x^4-3x^2-20x+104\right)=0$ $4x^3-6x-20=0$ $(x-2)(4x^2+8x+10)=0$ $\Delta = 8^2-4(4)(10) = -96 \quad \therefore$ no roots $\therefore x = 2$ $d = \sqrt{2^4-3(2)^2-20(2)+104} = 2\sqrt{17} = 8{,}25$	✓$(x\,;x^2)$ ✓ substitution ✓ simplification ✓ answer ✓$4x^3-6x-20$ ✓ derivative = 0 ✓$x = 2$ ✓answer (A) (8)



9.2	$m_{AB} = \frac{y_2-y_1}{x_2-x_1} = \frac{x^2-2}{x-10}$ $\therefore m_{\tan g} = -\frac{x-10}{x^2-2}$ $f'(x) = 2x$ $\therefore 2x = -\frac{x-10}{x^2-2}$ $-2x^3+4x = x-10$ $2x^3-3x-10=0$ $x = 2$ $y = (2)^2 = 4$ $\therefore AB = \sqrt{(2-10)^2+(4-2)^2}$ $= 2\sqrt{17} = 8,25$	✓ m_{AB} ✓ $m_{\tan g} = -\frac{x-10}{x^2-2}$ ✓ $f'(x) = 2x$ ✓ equating ✓ standard form ✓$x = 2$ ✓substitute into distance ✓answer (A) (8)
		[8]

QUESTION 10/*VRAAG* 10



10.1.1(a)	$y = 1 - 0,893 = 0,107$ (0,11)	✓ $y = 1 - 0,893$ (1)
10.1.1(b)	$x = 0,893 - 0,733$ $= 0,16$	✓ $x = 0,893 - 0,733$ (1)
10.1.2	P(at least 2 events) = 0,1 + 0,15 + 0,16 + 0,2 = 0,61 Answer only: Full Marks	✓ values ✓ answer (2)
10.1.3	P(B) = 0,643 P(C) = 0,56 P(B and C) = 0,36 P(B) × P(C) = 0,643 × 0,56 = 0,36 ∴ P(B and C) = P(B) × P(C) ∴ B and C are independent	✓ P(B) = 0,643 ✓ P(C) = 0,56 ✓ P(B and C) = 0,36 ✓ P(B) × P(C) = 0,36 ✓ independent because P(B and C) = P(B) × P(C) (5)
10.2.1	$7 \times 6 \times 5 \times 4 = 840$	✓ 4✓ 7 ✓ $7 \times 6 \times 5 \times 4 = 840$ (3)
10.2.2	start with 5, 7, 9 or start with 6 or start with 8 $(3 \times 5 \times 1 \times 3) + (1 \times 5 \times 1 \times 2) + (1 \times 5 \times 1 \times 2)$ $= 45 + 10 + 10$ $= 65$ $P = \frac{65}{840} = \frac{13}{168} = 0,08$ **OR/*OF*** ends in 4 or ends in 6 or ends in 8 $(5 \times 5 \times 1 \times 1) + (4 \times 5 \times 1 \times 1) + (4 \times 5 \times 1 \times 1)$ $= 25 + 20 + 20$ $= 65$ $P = \frac{65}{840} = \frac{13}{168} = 0,08$	✓ $(3 \times 5 \times 1 \times 3) = 45$ ✓ $(1 \times 5 \times 1 \times 2) = 10$ ✓ $(1 \times 5 \times 1 \times 2) = 10$ ✓65 ✓ answer (5) **OR/*OF*** ✓ $(5 \times 5 \times 1 \times 1) = 25$ ✓ $(4 \times 5 \times 1 \times 1) = 20$ ✓ $(4 \times 5 \times 1 \times 1) = 20$ ✓65 ✓ answer (5)
		[17]

TOTAL/*TOTAAL*: 150