basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/
SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P1/*WISKUNDE V1*

MAY/JUNE/*MEI/JUNIE* 2025

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 15 pages.
Hierdie nasienriglyne bestaan uit 15 bladsye.

Please turn over/Blaai om asseblief

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.*

QUESTION 1/*VRAAG* 1

1.1.1	$x^2-3x-10=0$ $(x+2)(x-5)=0$ $x=-2$ or $x=5$	✓factors/formula ✓answer ✓answer (3)
1.1.2	$3x^2+6x+1=0$ $x=\dfrac{-(6)\pm\sqrt{(6)^2-4(3)(1)}}{2(3)}$ $x=-1{,}82$ or $x=-0{,}18$	✓correct substitution into correct formula ✓answer ✓answer (3)
1.1.3	$2^{x+4}+2^x=8\,704$ $2^x(16+1)=8\,704$ $2^x=512$ OR/OF $2^x=512$ $=2^9$ $x=9$ $x=\log_2 512=9$	✓factorisation ✓ simplify to exponential eq ✓ answer (3)
1.1.4	$(x-8)(x+2)\le 0$ CV: $x=8$ or $x=-2$ $\therefore -2\le x\le 8$ OR/OF $x\in[-2\,;8]$	✓critical values ✓✓ answer (3)
1.1.5	$x+3\sqrt{x+2}=2$ $3\sqrt{x+2}=2-x$ $9(x+2)=4-4x+x^2$ $x^2-13x-14=0$ $(x-14)(x+1)=0$ $x\ne 14$ or $x=-1$	✓isolating the surd ✓squaring both sides(method) ✓standard form ✓answer with selection (4)

1.2	$(y-3)(x+2)=32$ $yx+2y-3x-6=32$ ....(1) $2(y-3)+2(x+2)=24$ $y+x-1=12$ $y=13-x$ ....(2) $(13-x)x+2(13-x)-3x-6=32$ $13x-x^2+26-2x-3x-6-32=0$ $-x^2+8x-12=0$ $x^2-8x+12=0$ $(x-6)(x-2)=0$ $x=6$ or $x=2$ $y=13-6$ or $y=13-2$ $y=7$ $y=11$ **OR/*OF*** $(y-3)(x+2)=32$ $yx+2y-3x-6=32$ ....(1) $2(y-3)+2(x+2)=24$ $y+x-1=12$ $x=13-y$ ....(2) $y(13-y)+2y-3(13-y)-6=32$ $13y-y^2+2y-39+3y-6-32=0$ $-y^2+18y-77=0$ $y^2-18y+77=0$ $(y-7)(y-11)=0$ $y=7$ or $y=11$ $x=13-7$ or $x=13-11$ $x=6$ $x=2$	✓ setting up eq 1 (Area) ✓ setting up eq 2 (Perimeter) ✓substitution ✓standard form ✓x-values ✓y-values (6) **OR/*OF*** ✓setting up eq 1 (Area) ✓setting up eq 2 (Perimeter) ✓substitution ✓standard form ✓y-values ✓x-values (6)
1.3	$(1+x^m+x^{-n})^2-\left(1-x^m-x^{-n}\right)^2$ $=\left[1+x^m+x^{-n}-\left(1-x^m-x^{-n}\right)\right]\left[1+x^m+x^{-n}+\left(1-x^m-x^{-n}\right)\right]$ $=(2)\left(2x^m+2x^{-n}\right)$ **OR/*OF*** $(1+x^m+x^{-n})^2=1+x^m+x^{-n}+x^m+x^{2m}+x^{m-n}+x^{-n}+x^{m-n}+x^{-2n}$ $=1+2x^m+2x^{-n}+2x^{m-n}+x^{2m}+x^{-2n}$ $(1-x^m-x^{-n})^2=1-2x^m-2x^{-n}+2x^{m-n}+x^{2m}+x^{-2n}$ $(1+x^m+x^{-n})^2-(1-x^m-x^{-n})^2=4x^m+4x^{-n}$ $=4(x^m+x^{-n})$ $=(2)\left(2x^m+2x^{-n}\right)$	✓ factorisation ✓ 2 ✓ $\left(2x^m+2x^{-n}\right)$ (3) **OR/*OF*** ✓ expansion ✓ 4 ✓ (x^m+x^{-n}) (3)
		[25]

QUESTION/*VRAAG* 2

2.1.1	$T_n = 2n+3$	✓$2n$ ✓3 (2)
2.1.2	$93 = 2n+3$ $90 = 2n$ $45 = n$	✓equating ✓answer (2)
2.1.3	$50+70+90+...+930$ $S_{45} = \frac{45}{2}[2(50)+(45-1)(20)]$ $S_{45} = \text{R}22\,050$ Total raised = R22 050 **OR/*OF*** $50+70+90+...+930$ $S_{45} = \frac{45}{2}[50+930]$ $S_{45} = \text{R}22\,050$ Total raised = R22 050 **OR/*OF*** $5+7+9+...+93$ $S_{45} = \frac{45}{2}[2(5)+(45-1)(2)]$ $S_{45} = 2\ 205\text{km}$ $S_{45} = \text{R}22\,050$ Total raised = R22 050 **OR/*OF*** $5+7+9+...+93$ $S_{45} = \frac{45}{2}[5+93]$ $S_{45} = 2\ 205\text{km}$ $S_{45} = \text{R}22\,050$ Total raised = R22 050	✓convert to money ✓substitution ✓answer (3) **OR/*OF*** ✓convert to money ✓substitution ✓answer (3) **OR/*OF*** ✓substitution ✓answer ✓convert to money (3) **OR/*OF*** ✓substitution ✓answer ✓convert to money (3)
2.2.1 a)	$T_1 = (2)^{1+2}$ $T_1 = 8$	✓$a = 8$ (1)
2.2.1 b)	$r = 2$	✓$r = 2$ (1)
2.2.2	$T_{20} = (2)^{20+2}$ $T_{20} = 2^{22} = (2^2)^{11}$ $= 4^{11}$	✓substitution ✓answer (2)

2.2.3	$\frac{1}{8}+\frac{1}{16}+\frac{1}{32}+\ldots$ $S_\infty=\frac{a}{1-r}$ $=\frac{\frac{1}{8}}{1-\frac{1}{2}}$ $\therefore S_\infty=\frac{1}{4}$	✓series ✓substitution ✓answer (3)
2.2.4	$8+4^2+32+4^3+\ldots+4^{11}+\ldots$ $S_{21}-S_{10}=\frac{8(2^{21}-1)}{2-1}-\frac{16(4^{10}-1)}{4-1}$ $=16\ 777\ 208-5\ 592\ 400$ $=11\ 184\ 808$ **OR/*OF*** $8+32+128+$ $S_{11}=\frac{8(4^{11}-1)}{4-1}$ $\therefore S_{11}=11\ 184\ 808$	✓$\frac{8(2^{21}-1)}{2-1}$ ✓$n=10$ ✓$\frac{16(4^{10}-1)}{4-1}$ ✓11 184 808 (4) **OR/*OF*** ✓$n=11$ ✓$r=4$ ✓$\frac{8(4^{11}-1)}{4-1}$ ✓11 184 808 (4)
		[18]

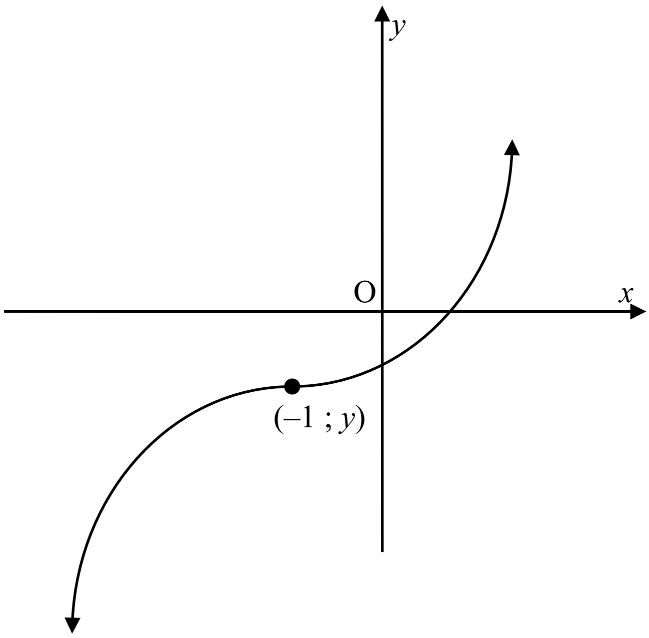
QUESTION/*VRAAG* 3

3.1	$14 \ ; \ 9 \ ; \ 6 \ ; \ 5 \ ; \ \ldots$ first differences: $-5 \quad -3 \quad -1$ second differences: $2 \quad 2$ $2a = 2 \qquad 3(1) + b = -5 \qquad 1 - 8 + c = 14$ $a = 1 \qquad b = -8 \qquad c = 21$ $\therefore T_n = n^2 - 8n + 21$	✓ $2a = 2$ ✓ $3(1) + b = -5$ ✓ $1 - 8 + c = 14$ (3)
3.2	$T_n = -5 + (n-1)(2)$ $T_n = 2n - 7$ $2n - 7 = 33$ $\therefore n = 20$ $\therefore T_{21} = (21)^2 - 8(21) + 21$ $T_{21} = 294$ **OR/*OF*** $\therefore T_{n+1} - T_n = (n+1)^2 - 8(n+1) + 21 - n^2 + 8n - 21$ $n^2 + 2n + 1 - 8n - 8 + 21 - n^2 + 8n - 21 = 33$ $2n - 7 = 33$ $\therefore n = 20$ $\therefore T_{21} = (21)^2 - 8(21) + 21$ $T_{21} = 294$	✓general term ✓equating to 33 ✓answer (3) **OR/*OF*** ✓ $T_{n+1} - T_n$ ✓equating to 33 ✓answer (3)
3.3	$T_7 = T_1 = 14$ $\therefore 14 + m \geq 0$ $m \geq -14$ And $T_6 = T_2$ $\therefore 9 + m < 0$ $m < -9$ $\therefore -14 \leq m < -9$	✓ -14 ✓ -9 ✓ $-14 \leq m < -9$ (3)
		[9]

QUESTION/*VRAAG* 4

4.1	M(3 ; 4)	✓ $x=3$ ✓ $y=4$ (2)
4.2	$f(x)=\frac{4}{x-3}+4$ $y=\frac{4}{0-3}+4=\frac{8}{3}$ $\therefore \text{D}\left(0\,;\frac{8}{3}\right)$	✓$x=0$ ✓y-value (2)
4.3	M (3 ; 4) $y=x+t$ **OR/*OF*** $y=(x+p)+q$ $4=3+t$ $y=x-3+4$ $t=1$ $y=x+1$ $\therefore t=1$	✓ substituting M ✓ value of t (2)
4.4	$\frac{4}{x-3}+4=0$ $-4(x-3)=4$ $x-3=-1$ $x=2$ C(2 ; 0) $\therefore 2\le x<3$	✓ $y=0$ ✓ $x=2$ ✓✓ answer (4)
4.5	$\frac{4}{x-3}+4=x+1$ $\frac{4}{x-3}=x-3$ $4=(x-3)^2$ $\pm 2=x-3$ $\therefore x=5$ or $x\neq 1$ $\therefore$ A (5 ; 6) **OR/*OF*** Point closest to the origin in $y=\frac{a}{x}$ is $(\sqrt{a}\,;\sqrt{a})$ By translation: $\text{A}(\sqrt{a}+3;\sqrt{a}+4)$ A(5 ; 6)	✓ x_A ✓ y_A (3) **OR/*OF*** ✓translation ✓ x_A ✓ y_A (3)
4.6	$h(x)=\frac{-4}{x+3}+4$ $=\frac{4}{-x-3}+4$ $\therefore$ Reflection in y – axis. $\text{A}^{/}(-5;6)$ $\text{AA}^{/}=10$	✓ coordinates ✓ distance (2)
		[15]

QUESTION/*VRAAG* 5

5.1	$y = a(x+1)^2 + 4$ $-4 = a(-3+1)^2 + 4$ $-8 = 4a$ $-2 = a$ $y = -2(x+1)^2 + 4$ $y = -2x^2 - 4x + 2$	✓ substitute (– 1 ; 4) ✓ substitute (– 3 ; – 4) ✓ $-8 = 4a$ (3)
5.2	$k < -4$	✓✓ $k < -4$ (2)
5.3		✓ point of inflection ✓ change of concavity at $x = -1$ ✓ y-intercept below x-axis ✓ increasing curve (4)
		[9]

QUESTION/*VRAAG* 6

6.1	$(0\,;-3)$ $\quad -3 = p^0 + q$ OR $y = p^x - 4$ $q = -4$ $(3\,;4)$ $\quad 4 = p^3 - 4$ $p^3 = 8$ $p = 2$ $\therefore f(x) = 2^x - 4$	✓substitute $(0\,;-3)$ ✓ answer for q ✓ substitute $(3\,;4)$ ✓ answer for p (4)
6.2	$y > -4$ **OR/*OF*** $y \in (-4\,;\infty)$	✓ answer (1)
6.3	$g(x) = mx + c$ E $(-3\,;0)$ $m = \dfrac{4-0}{3-(-3)} = \dfrac{2}{3}$ $y = \dfrac{2}{3}x + c$ $0 = \dfrac{2}{3}(-3) + c$ OR $y - 0 = \dfrac{2}{3}(x+3)$ $\therefore c = 2$ $y = \dfrac{2}{3}x + 2$ $\qquad y = \dfrac{2}{3}x + 2$ **OR/*OF*** For g^{-1}: $y = mx - 3$ $3 = m(4) - 3$ $m = \dfrac{3}{2}$ $\therefore g^{-1}(x) = \dfrac{3}{2}x - 3$ For g: $2x + 6 = 3y$ $\dfrac{2}{3}x + 2 = y$ $\therefore y = \dfrac{2}{3}x + 2$	✓E$(-3\,;0)$ ✓ m_{AE} ✓ substitution ✓ equation (4) **OR/*OF*** ✓ substitution of $(4\,;3)$ ✓ m of inverse ✓ equation of g^{-1} ✓ equation of g (4)
6.4	$g(x) = \dfrac{2}{3}x + 2$ $x = \dfrac{2}{3}y + 2$ $g^{-1}(x) = \dfrac{3}{2}x - 3$	✓ swop x and y ✓ equation (2)
		[11]

QUESTION/*VRAAG* 7

7.1	$(1+i)=\left(1+\frac{15}{1200}\right)^{12}$ $i=16{,}08\%$	✓substitution into correct formula ✓answer (2)
7.2	$P=\frac{x\left[1-(1+i)^{-n}\right]}{i}$ $500\ 000=\frac{11\ 250\left[1-\left(1+\frac{0{,}06}{4}\right)^{-n}\right]}{\frac{0{,}06}{4}}$ $\frac{2}{3}=1-\left(1+\frac{0{,}06}{4}\right)^{-n}$ $(1{,}015)^{-n}=\frac{1}{3}$ $-n=\log_{1{,}015}\left(\frac{1}{3}\right)$ $n=73{,}788\ldots$ $\therefore n=73$ withdrawals	✓ $i=\frac{0{,}06}{4}$ ✓ substitution into correct formula ✓correct use of logs ✓answer for n ✓final answer (5)
7.3	$A=P(1+i)^n$ $=12\ 000\left(1+\frac{0{,}095}{12}\right)^{12\times 4}$ $=$ R 17 521,17895… $F=\frac{x[(1+i)^n-1]}{i}$ $F=\frac{500\left[\left(1+\frac{0{,}095}{12}\right)^{24}-1\right]}{\frac{0{,}095}{12}}$ $=$ R 13 158,64744… Total = 17 521,17895… + 13 158,64744… = R30 679,83	✓ $i=\frac{0{,}095}{12}$ ✓ $n=48$ in A ✓ substitution into correct formula ✓ $n=24$ in F ✓ substitution into correct formula ✓ adding compound and future values (6)
		[13]

QUESTION/*VRAAG* 8

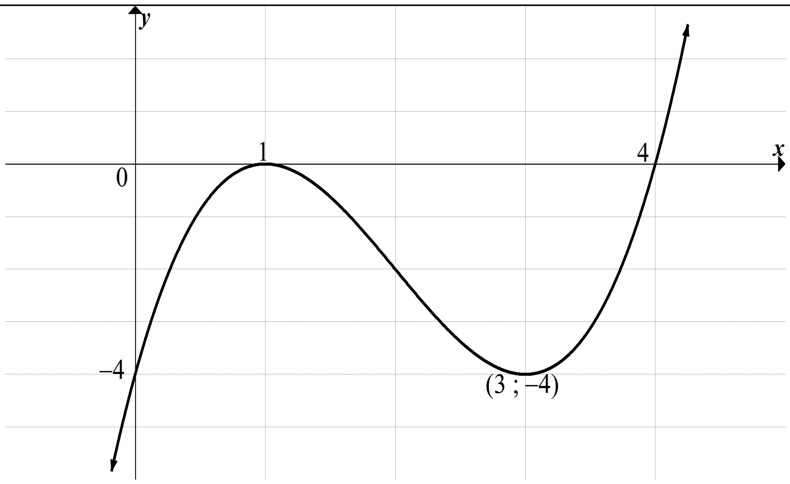
8.1	$f(x)=x^2-2$ $f^{/}(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f^{/}(x)=\lim_{h\to 0}\frac{x^2+2xh+h^2-2-(x^2-2)}{h}$ $f^{/}(x)=\lim_{h\to 0}\frac{2xh+h^2}{h}$ $f^{/}(x)=\lim_{h\to 0}\frac{h(2x+h)}{h}$ $f^{/}(x)=\lim_{h\to 0}(2x+h)$ $\therefore f^{/}(x)=2x$ **OR/*OF*** $f(x)=x^2-2$ $f(x+h)=(x+h)^2-2=x^2+2xh+h^2-2$ $f(x+h)-f(x)=2xh+h^2$ $f^{/}(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f^{/}(x)=\lim_{h\to 0}\frac{2xh+h^2}{h}$ $f^{/}(x)=\lim_{h\to 0}\frac{h(2x+h)}{h}$ $f^{/}(x)=\lim_{h\to 0}(2x+h)$ $\therefore f^{/}(x)=2x$	✓ $f(x+h)$ ✓ substitution ✓ simplification ✓ factorisation ✓ answer (5) **OR/*OF*** ✓ $f(x+h)$ ✓ simplification ✓ substitution ✓ factorisation ✓ answer (5)
8.2.1	$\frac{d}{dx}\left[3x^2-4x\right]$ $=6x-4$	✓$6x$ ✓ -4 (2)
8.2.2	$g(x)=-2\sqrt{x}(x-1)^2$ $g(x)=-2x^{\frac{1}{2}}(x^2-2x+1)$ $g(x)=-2x^{\frac{5}{2}}+4x^{\frac{3}{2}}-2x^{\frac{1}{2}}$ $g^{/}(x)=-5x^{\frac{3}{2}}+6x^{\frac{1}{2}}-x^{\frac{-1}{2}}$	✓ $x^{\frac{1}{2}}$ ✓ expansion ✓ $-5x^{\frac{3}{2}}+6x^{\frac{1}{2}}$ ✓ $-x^{\frac{-1}{2}}$ (4)

8.3	$y=4x-14$ tangent $\therefore 4x-4=4$ $4x=8$ $x=2$ $\therefore y=4(2)-14$ at point $(2\ ;-6)$ $g(2)=a(2)^2+b(2)-18=-6$ $4a+2b=12 \quad ...(1)$ $g^{/}(2)=2a(2)+b=4$ $4a+b=4 \quad ...(2)$ $(1)-(2)$ $b=8$ $4a+b=4$ $4a+8=4$ $4a=-4$ $a=-1$ **OR/OF** $2x^2-4x-6=4x-14$ $2x^2-8x+8=0$ $x^2-4x+4=0$ $(x-2)^2=0$ $\therefore x=2$ $\therefore y=4(2)-14$ at point $(2\ ;-6)$ $g(2)=a(2)^2+b(2)-18=-6$ $4a+2b=12 \quad ...(1)$ $g^{/}(2)=2a(2)+b=4$ $4a+b=4 \quad ...(2)$ $(1)-(2)$ $b=8$ $4a+b=4$ $4a+8=4$ $4a=-4$ $a=-1$	✓ $4x-4$ ✓ $=4$ ✓ y-value ✓ $g(2)=y-$value ✓ $g^{/}(2)=4$ ✓ a and b (6) **OR/OF** ✓equating ✓ y-value ✓ $g(2)=y-$value ✓ $g^{/}(x)$ ✓ $g^{/}(2)=4$ ✓ a and b (6)
		[17]

QUESTION/*VRAAG* 9

9.1	$f(x)=(x-4)(x^2-2x+1)$ $f(x)=(x-4)(x-1)^2$ $\therefore k=1$ **OR/*OF*** $f(1)=1-6+9-4=0$ $(x-1)$ is a factor $\therefore k=1$ **OR/*OF*** $-4k^2=-4$ $k^2=1$ $\therefore k=1$	✓ (x^2-2x+1) ✓ $(x-1)^2$ (2) **OR/*OF*** ✓ $f(1)$ ✓ $f(1)=0$ (2) **OR/*OF*** ✓ $-4k^2=-4$ ✓ $k^2=1$ (2)
9.2	$3x^2-12x+9=0$ $x^2-4x+3=0$ $(x-3)(x-1)=0$ $x=3$ or $x=1$ TP's: $(3\ ;-4)$ and $(1\ ;0)$	✓ $f^{/}(x)$ ✓ values of x ✓✓turning points (4)

9.3	$f^{//}(x)=6x-12$
	$f^{//}(-3)=-30$
	$f^{//}(x)<0$, therefore concave down
		✓substitution $x=-3$ into $f^{//}(x)$
		✓ concave down (2)

9.4	 	✓ turning points ✓ x-intercepts ✓ y-intercept ✓ shape (4)
9.5	Distance $=(-6x^2+24x-18)-(x^3-6x^2+9x-4)$ $=-6x^2+24x-18-x^3+6x^2-9x+4$ $=-x^3+15x-14$ Max distance : $-3x^2+15=0$ $3x^2=15$ $x^2=5$ $x=\pm\sqrt{5}$, but $1<x<3$ $\therefore x=\sqrt{5}$ $d(\sqrt{5})=8{,}36$ max distance = 8,36	✓ $h(x)=-2f^{/}(x)$ ✓ simplification ✓ first derivative ✓= 0 ✓ x-value ✓ answer (6)
		[18]

QUESTION/*VRAAG* 10

10.1	P(A or B) = P(A) + P(B) P(B) = P(A or B) – P(A) = 0,79 – 0,42 = 0,37	✓ substitution ✓ answer (2)
10.2	People pay: R2 600 $0{,}7 \times \text{R}2\ 600 = \text{R}1\ 820$ Total value of pay-outs = R2 600 – R1 820 = R780 P(someone to win) = $\frac{16}{52} \times \frac{1}{2}$ $= \frac{2}{13}$ Total number of people winning = $\frac{2}{13} \times 260$ $= 40$ $\therefore$ Pay-out = $\frac{\text{R}780}{40}$ = R19,50 per person winning	✓R1 820 ✓ amount willing to pay-out ✓ $\frac{16}{52}$ ✓ $\frac{2}{13}$ ✓ winners ✓ pay-out (6)
	OR/*OF* People pay: R2 600 Total value of pay-outs $= 0{,}3 \times \text{R}2\ 600$ $= \text{R}780$ P(someone to win) = $\frac{16}{52} \times \frac{1}{2}$ $= \frac{2}{13}$ Total number of people winning = $\frac{2}{13} \times 260$ $= 40$ $\therefore$ Pay-out = $\frac{\text{R}780}{40}$ = R19,50 per person winning	**OR/*OF*** ✓ $0{,}3 \times \text{R}2\ 600$ ✓ amount willing to pay-out ✓ $\frac{16}{52}$ ✓ $\frac{2}{13}$ ✓ winners ✓ pay-out (6)
		[8]

QUESTION/*VRAAG* 11

11.1	$\underline{1} \times \underline{9} \times \underline{9} = 81$ 5 500 cannot be included ∴ 80 possibilities $\underline{4} \times \underline{1} \times \underline{9} = 36$ 5 $\underline{4} \times \underline{9} \times \underline{1} = 36$ 5 Total possibilities = 80 + 36 + 36 = 152 **OR** 501 to 599: 99 – 10 – 9 = 80 possibilities 601 to 699: 9 + 9 = 18 possibilities of having a 5 in the 10's digit or units digit. Thus 601 to 699 = 4 ×18 Total possibilities = 4 × 18 + 80 = 152	✓ 1 × 9 × 9 ✓ 4 × 1 × 9 ✓ 4 × 9 × 1 ✓152 (4) ✓ 80 ✓ 18 ✓ 4 × 18 ✓152 (4)
11.2	P(not having such a number) $= 1 - \frac{152}{499}$ $= \frac{347}{499}$ $= 0{,}70$	✓ n(S) = 499 ✓1 – P(having number) ✓ numerator (3)
		[7]

TOTAL/TOTAAL: 150