basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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

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MATHEMATICS P1/*WISKUNDE V1*

MAY/JUNE/*MEI/JUNIE* 2025

MARKING GUIDELINES/*NASIENRIGLYNE*

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MARKS/*PUNTE*: 150

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

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NOTE:
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking 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 ✓ $x=-2$ ✓ $x=5$ (3)
1.1.2	$3x^2+6x+1=0$ $x=\frac{-(6)\pm\sqrt{(6)^2-4(3)(1)}}{2(3)}$ $x=-1{,}82$ or $x=-0{,}18$	✓correct substitution into the formula ✓ $x=-1{,}82$ ✓ $x=-0{,}18$ (3)
1.1.3	$2^{x+4}+2^x=8\,704$ $2^x(16+1)=8\,704$ $2^x=512=2^9$ $x=9$ OR $x=\log_2 512$ $=9$	✓common factor ✓ simplification ✓ answer (3)
1.1.4	$(x-8)(x+2)\le 0$ CV: $x=8$ or $x=-2$ $\therefore -2\le x\le 8$	✓critical values ✓✓ $-2\le x\le 8$ (3)
1.1.5	$x+3\sqrt{x+2}=2$ $3\sqrt{x+2}=2-x$ $9(x+2)=4-4x+x^2$ $x^2-13x-14=0$ $(x-14)(x+1)=0$ $x\neq 14$ or $x=-1$	✓isolating the surd ✓squaring both sides ✓standard form ✓answer with selection (4)

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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 $x=13-11$ $x=6$ $x=2$	✓eq 1 ✓ eq 2 ✓substitution ✓standard form ✓x-values ✓y-values (6) ***OR/OF*** ✓eq 1 ✓ eq 2 ✓substitution ✓standard form ✓y-values ✓x-values (6)
1.3	$(1+x^m+x^{-n})^2-\left(1-x^m-x^{-n}\right)^2$ $=\left[1+x^m+x^{-n}-\left(1-x^m-x^{-n}\right)\right]\left[1+x^m+x^{-n}+\left(1-x^m-x^{-n}\right)\right]$ $=(2)\left(2x^m+2x^{-n}\right)$ $\therefore$ divisible by 2 for all integer values of m and n **OR/*OF*** $(1+x^m+x^{-n})^2=1+x^m+x^{-n}+x^m+x^{2m}+x^{m-n}+x^{-n}+x^{m-n}+x^{-2n}$ $=1+2x^m+2x^{-n}+2x^{m-n}+x^{2m}+x^{-2n}$ $(1-x^m-x^{-n})^2=1-2x^m-2x^{-n}+2x^{m-n}+x^{2m}+x^{-2n}$ $(1+x^m+x^{-n})^2-(1-x^m-x^{-n})^2=4x^m+4x^{-n}$ $=4(x^m+x^{-n})$ $=(2)\left(2x^m+2x^{-n}\right)$ $\therefore$ divisible by 2 for all integer values of m and n	✓ difference of squares ✓ simplification ✓ answer (3) **OR/*OF*** ✓ expansion ✓ expansion ✓ answer (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)

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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*** $8 + 32 + 128 +$ $S_{11} = \frac{8(4^{11}-1)}{4-1}$ $\therefore S_{11} = 11\ 184\ 808$	✓$\frac{8(2^{21}-1)}{2-1}$ ✓$\frac{16(4^{10}-1)}{4-1}$ ✓difference ✓answer (4) **OR/*OF*** ✓$n = 11$ ✓$r = 4$ ✓substitution ✓answer (4)
		[18]

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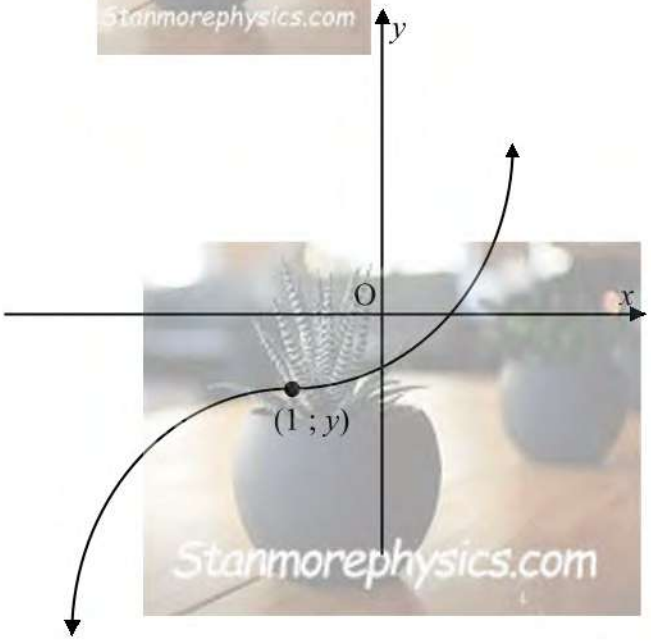
QUESTION/*VRAAG* 3

3.1	14 ; 9 ; 6 ; 5 ; …. -5 -3 -1 2 2 $2a = 2$ $3(1) + b = -5$ $1 - 8 + c = 14$ $a = 1$ $b = -8$ $c = 21$ $\therefore T_n = n^2 - 8n + 21$	✓ $2a = 2$ ✓ $3(1) + b = -5$ ✓ $1 - 8 + c = 14$ (3)
3.2	$T_n = -5 + (n-1)(2) = 2n - 7$ $2n - 7 = 33$ $\therefore n = 20$ $\therefore T_{21} = (21)^2 - 8(21) + 21 = 294$ **OR/*OF*** $\therefore T_{n+1} - T_n = (n+1)^2 - 8(n+1) + 21 - n^2 + 8n - 21$ $n^2 + 2n + 1 - 8n - 8 + 21 - n^2 + 8n - 21 = 33$ $2n - 7 = 33$ $\therefore n = 20$ $\therefore T_{21} = (21)^2 - 8(21) + 21 = 294$	✓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 –value ✓ y- value (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(3 ; 4) ✓ 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: A$(\sqrt{a}+3;\sqrt{a}+4)$ A(5 ; 6)	✓equating ✓✓A (3) **OR/*OF*** ✓translation ✓✓A (3)
4.6	$h(x)=\frac{-4}{x+3}+4=\frac{4}{-x-3}+4$ $\therefore$ Reflection in $y-$ axis. A$'$(–5;6) AA$'$ = 10	✓ coordinate ✓ 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 $(-3\ ;\ -4)$ ✓ $-2 = a$ (3)
5.2	$k < -4$	✓✓ $k < -4$ (2)
5.3	$g'(x) = -(-2x^2 - 4x + 2) + 8$ $= 2x^2 + 4x + 6$ $g''(x) = 4x + 4 = 0$ $x = -1$ and $g'(x) \neq 0$  	✓ Stationary point at $x = -1$ ✓ y-intercept below x-axis ✓✓ shape (4)
		[9]

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QUESTION/*VRAAG* 6

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

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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 ✓ substitution into correct formula ✓correct use of logs ✓answer for n ✓final answer (5)
7.3	$A=P(1+i)^n$ $=12\,000\left(1+\frac{0{,}095}{12}\right)^{12\times4}$ $=\text{R } 17\,521{,}17895\ldots$ $F=\frac{x[(1+i)^n-1]}{i}$ $F=\frac{500\left[\left(1+\frac{0{,}095}{12}\right)^{24}-1\right]}{\frac{0{,}095}{12}}$ $=\text{R } 13\,158{,}64744\ldots$ Total = 17 521,17895… + 13 158,64744… = R30 679,83	✓ i ✓ n ✓substitution into the correct formula ✓ n ✓ substitution into correct formula ✓ final amount (6)
		[13]

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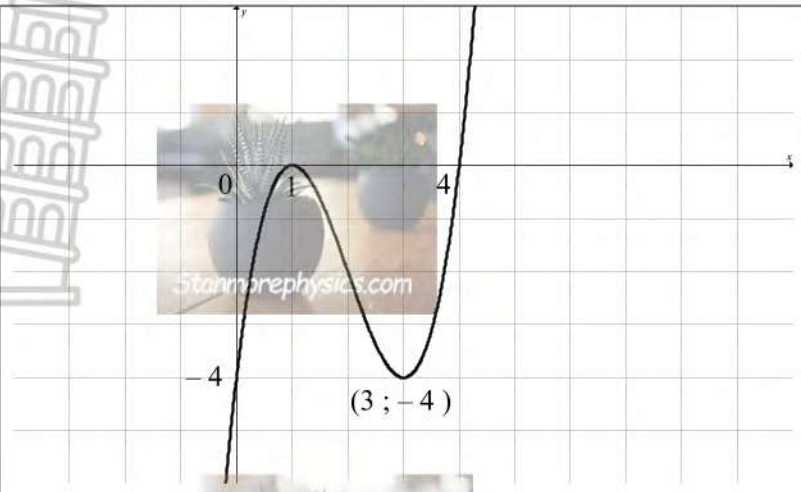
QUESTION/*VRAAG* 8

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

8.3	$y = 4x - 14$ tangent $\therefore 4x - 4 = 4$ $4x = 8$ $x = 2$ $\therefore y = 4(2) - 14$ at point $(2\ ;-6)$ $g(2) = a(2)^2 + b(2) - 18 = -6$ $4a + 2b = 12 \quad ...(1)$ $g'(2) = 2a(2) + b = 4$ $4a + b = 4 \quad ...(2)$ $(1) - (2)$ $b = 8$ $4a + b = 4$ $4a + 8 = 4$ $4a = -4$ $a = -1$	✓tangent ✓ coordinates ✓ equation 1 ✓equation 2 ✓ b ✓ a (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 $\therefore k = 1$	✓$(x^2 - 2x + 1)$ ✓$(x-1)^2$ (2) ✓ $f(1) = 0$ ✓ $(x-1)$ is a factor (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 $(1\ ;0)$	✓ $f'(x) = 0$ ✓ 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		✓ tp's ✓ 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	✓ subtraction ✓ simplification ✓✓ first derivative = 0 ✓ x-values ✓ 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 × R2 600 = R1 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 = $\frac{R780}{40}$ = R19,50 per person winning	✓✓ amount willing to pay-out ✓✓P(winning) ✓ winners ✓ pay-out (6)
		[8]

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QUESTION/*VRAAG* 11

11.1	$\frac{1}{5} \times \frac{9}{\ } \times \frac{9}{\ } = 81$ 500 cannot be included ∴ 80 possibilities $\frac{4}{\ } \times \frac{1}{5} \times \frac{9}{\ } = 36$ $\frac{4}{\ } \times \frac{9}{\ } \times \frac{1}{5} = 36$ Total number = 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. Total possibilities = 4 × 18 + 80 = 152	✓ 5 in hundredth ✓ 5 in tenth ✓ 5 in units ✓answer (4) ✓ 80 ✓ 18 ✓ 4 × 18 ✓answer (4)
11.2	P(not having such a number) $= 1 - \frac{152}{499}$ $= \frac{347}{499}$ $= 0,70$	✓1 – P(having number) ✓ denominator ✓ answer (3)
		[7]

TOTAL/TOTAAL: 150

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