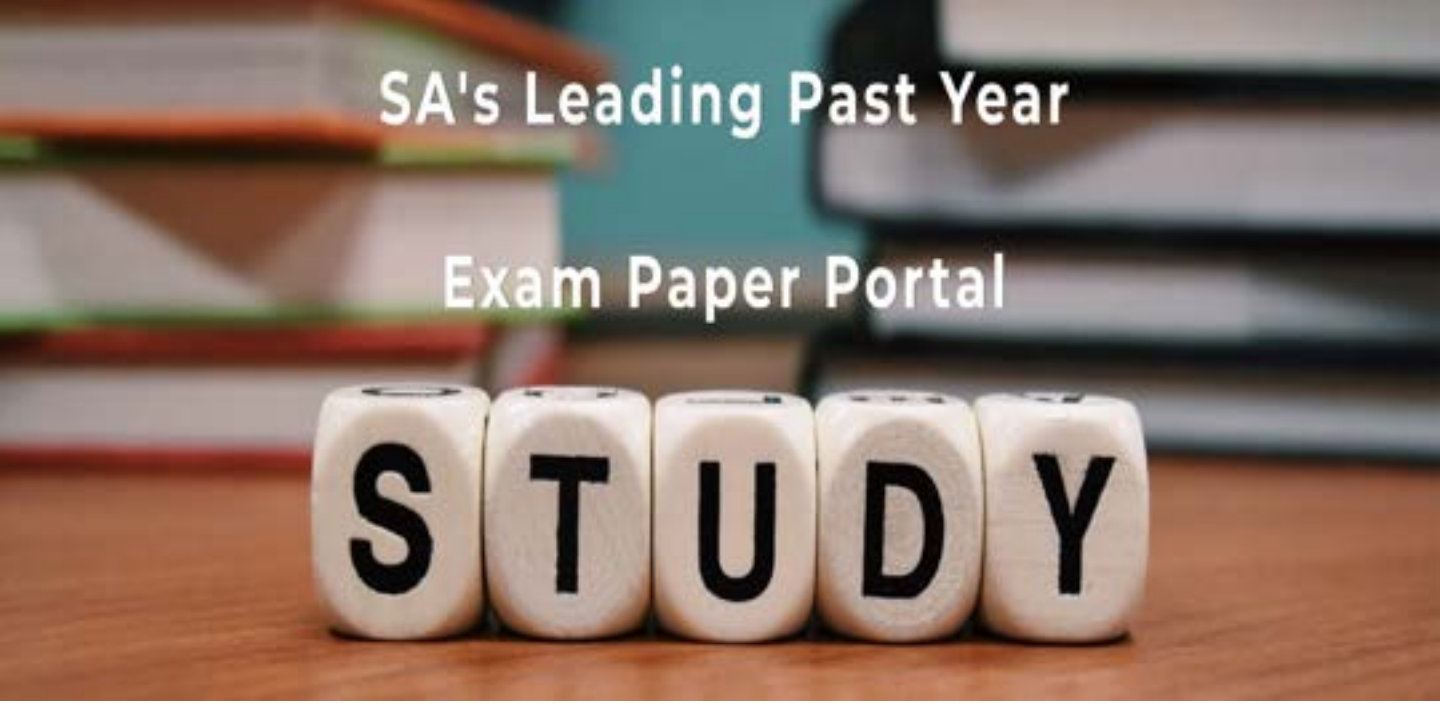


education

Department of Education
FREE STATE PROVINCE

VOORBEREIDENDE EKSAMEN

GRAAD 12

WISKUNDE V1

SEPTEMBER 2018

PUNTE: 150

NASIENRIGLYNE

Hierdie nasienriglyn bestaan uit 13 bladsye.

LET WEL:

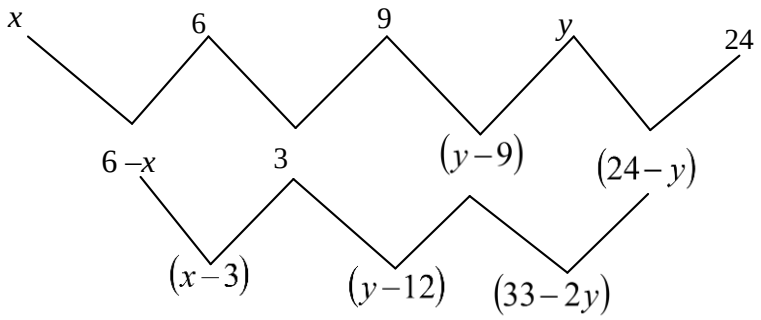
- **Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.**
- **Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die memorandum van toepassing.**

VRAAG 1

1.1				
	1.1.1	$-3x^2+2x+2=0$ $x=\frac{-2\pm\sqrt{(2)^2-4(-3)(2)}}{2(-3)}$ $x=-0{,}55 \quad of \quad x=1{,}22$	✓ vervang met korrekte formule ✓ $x=-0{,}55$ ✓ $x=1{,}22$	(3)
	1.1.2	$x^2+2x-3=5$ $x^2+2x-8=0$ $(x+4)(x-2)=0$ $x=-4 \quad of \quad x=2$	✓ standaard vorm ✓ faktore ✓ beide x waardes	(3)
	1.1.3	$x^2-2x-15\le 0$ $(x-5)(x+3)\le 0$ $CVs: -3\ en\ 5$ $Oplos\sin g: -3\le x\le 5$	✓ faktore ✓ kritiese waardes ✓ antwoord (notatsie)	(3)
	1.1.4	$-\sqrt{2x-1}=2-x$ $x-2=\sqrt{2x-1}$ $x^2-4x+4=2x-1$ $x^2-6x+5=0$ $(x-5)(x-1)=0$ $x=5 \ of \ x=1$ $\therefore \quad x=5 \ slegs$	✓ $x^2-4x+4=2x-1$ ✓ standaard vorm ✓ faktore ✓ $x=5 \ slegs$	(4)
	1.1.5	$7.3^x-3^{x+1}=36$ $7.3^x-3.3^x=36$ $3^x(7-3)=36$ $3^x(4)=36$ $3^x=9$ $3^x=3^2$ $\therefore x=2$	✓ $3^x(7-3)=36$ ✓ $3^x=9$ ✓ $x=2$	(3)

1.2	$2x-1=y$ en $x^2-xy=3x-3$ $x^2-x(2x-1)=3x-3$ $x^2-2x^2+x=3x-3$ $x^2+2x-3=0$ $(x+3)(x-1)=0$ $x=-3$ *of* $x=1$ $y=-7$ *of* $y=1$	✓ vervanging ✓ standaard vorm ✓ faktore ✓ beide *x*-waardes ✓ beide *y*-waardes	(5)
1.3	$\sqrt{5}.\sqrt{125}-\frac{5^x.5^{x+1}}{5^{2x}}$ $=\sqrt{5}.\sqrt{25.5}-\frac{5^{2x}.5}{5^{2x}}$ $=5\sqrt{5}.\sqrt{5}-5$ $=25-5$ $=20$	✓ $5.\sqrt{5}.\sqrt{5}$ ✓ 5 ✓ antwoord	(3)
			[24]

VRAAG 2

2.1	$3;-2;-7;-12;...$			
	2.1.1	$a=3$ en $d=-5$ $T_{21}=3+20(-5)$ $T_{21}=-97$	✓ korrekte vervanging ✓ antwoord	(2)
	2.1.2	$T_n=a+(n-1)d$ $-177=3+(n-1)(-5)$ $-177=3-5n+5$ $5n=185$ $\therefore n=37$	✓ vervanging ✓ $n=37$	(2)
2.2	$S_n=n^2-2n$			
	2.2.1	$S_{13}=(13)^2-2(13)$ $S_{13}=143$	✓ vervanging ✓ antwoord	(2)
	2.2.2	$S_{12}=(12)^2-2(12)$ $S_{12}=120$ $T_{13}=S_{13}-S_{12}$ $T_{13}=143-120=23$	✓ $S_{12}=120$ ✓ antwoord	(2)
2.3	 $(33-2y)=(y-12)$ $3y=45$ $\therefore\ y=15$ $\therefore x=6$ $x+y=21$	✓ Eerste differensie i.t.v. y ✓ Tweede differensie i.t.v. y ✓ gelykstelling van twee differensies ✓ $y=15$ ✓ $x+y=21$	(5)
				[13]

VRAAG 3

3.1		$S_n = a + ar + ar^2 + ... + ar^{n-2} + ar^{n-1}$ $rS_n = \quad ar + ar^2 + ar^3 .. + ar^{n-2} + ar^{n-1} + ar^n$ $S_n - rS_n = a - ar^n$ $S_n(1-r) = a(1-r^n)$ $\therefore \quad S_n = \dfrac{a(1-r^n)}{1-r}$	✓ S_n ✓ rS_n ✓ $S_n - rS_n = a - ar^n$ ✓ $S_n(1-r) = a(1-r^n)$	(4)
3.2				
	3.2.1	$4; \dfrac{4}{5}; \dfrac{4}{25}$	✓ antwoord	(1)
	3.2.2	$S_\infty = \dfrac{a}{1-r}$ $S_\infty = \dfrac{4}{1-\frac{1}{5}}$ $S_\infty = 5$	✓ $r = \dfrac{1}{5}$ ✓ vervanging met korrekte formule ✓ antwoord	(3)
	3.2.3	$S_\infty - S_n < 0.0001$ $5 - \dfrac{4\left[1-\left(\frac{1}{5}\right)^n\right]}{1-\frac{1}{5}} < 0.0001$ $4 - 4 + 4(0,2)^n < 0,00008$ $(0,2)^n < 0,00002$ $\therefore \quad n > \dfrac{\log 0,00002}{\log 0,2}$ $n > 6,722706232$ Kleinste $n = 7$	✓ opstelling van die ongelykheid ✓ vervang. $S_\infty; a$ en r ✓ $(0,2)^n = 0,00002$ ✓ korrekte gebruik van logaritmes ✓ $n = 7$	(5)
				[13]

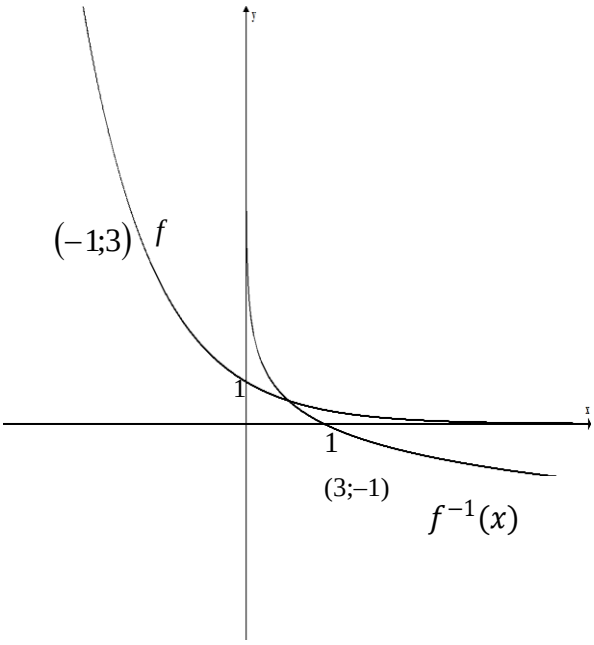
VRAAG 4

4.1	$0=4x+8$ $-4x=8$ $\therefore x=-2$ $A(-2;0)$	✓ $y=0$ ✓ $x=-2$	(2)
4.2	$B(10;0)$	✓ $x=10$ ✓ $y=0$	(2)
4.3	$h(x)=a(x-x_1)(x-x_2)$ $h(x)=a(x+2)(x-10)$ $32=a(6+2)(6-10)$ $32=-32a$ $a=-1$ $\therefore h(x)=-1(x+2)(x-10)$ $h(x)=-x^2+8x+20$	✓ vervang $x_1=-2$ en $x_2=10$ ✓ vervang $(6;32)$ ✓ $a=-1$ ✓ vergelyking van $h(x)$	(4)
4.4	$F(0;8)$ en $C(0;20)$ FC = 12 eenhede	✓ $F(0;8)$ en $C(0;20)$ ✓ antwoord	(2)
4.5	$h(4)=-(4)^2+8(4)+20=36$ Reeks: $y\in(-\infty;36]$ OF $y/y\in R;y\leq 36$	✓ $y=36$ ✓ antwoord	(2)
4.6	$x\in(10;\infty)$ OF $x/x\in R;x>10$	✓ kritiese waardes ✓ notasie	(2)
4.7	$4x+k=-x^2+8x+20$ $x^2-4x+k-20=0$ $\Delta=b^2-4ac$ $\Delta=(-4)^2-4(1)(k-20)$ $0=16-4k+80$ $4k=96$ $k=24$ **OF** $h'(x)=f'(x)$ $-2x+8=4$ $\therefore x=2$ $h(2)=-2^2+8(2)+20=32$ $\therefore (2;32)$ $32=4(2)+k$ $24=k$	✓ standard vorm ✓ vervang met Δ ✓ $\Delta=0$ ✓ antwoord ✓ $-2x+8=4$ ✓ $x=2$ ✓ $h(2)=32$ ✓ $k=24$	(4)
			[18]

VRAAG 5

5.1	$f(x)=\frac{2+x}{x-1}$ $f(x)=\frac{x-1+3}{x-1}$ $f(x)=\frac{x-1}{x-1}+\frac{3}{x-1}$ $f(x)=\frac{3}{x-1}+1$	✓ $\frac{x-1+3}{x-1}$ ✓ $\frac{x-1}{x-1}+\frac{3}{x-1}$ ✓ $f(x)=\frac{3}{x-1}+1$	(3)
5.2	$x=1$ $y=1$	$x=1$ $y=1$	(2)
5.3	$0=\frac{2+x}{x-1}$ $0=2+x$ $x=-2$ $A(-2;0)$	✓ $y=0$ ✓ $x=-2$	(2)
5.4	$x=3$	✓ antwoord	(1)
			[8]

VRAAG 6

6.1	$f(x)=\left(\frac{1}{3}\right)^x$		
	6.1.1 $x=\left(\frac{1}{3}\right)^y$ $f^{-1}(x)=\log_{\frac{1}{3}} x$ OF $f^{-1}(x)=-\log_3 x$ Slegs Antwoord:Volpunte	✓ $x=\left(\frac{1}{3}\right)^y$ ✓✓antwoord	(2)
	6.1.2 	$f(x)=\left(\frac{1}{3}\right)^x$: ✓ vorm ✓ y-afsnit $f^{-1}(x)=\log_{\frac{1}{3}} x$: ✓ vorm ✓ x-afsnit	(4)
6.2	$p(-3)=10$ en $p'(x)=-2$ $p(x)=-2x+c$ $10=-2(-3)+c$ $\therefore\ c=16$ $p(x)=y=-2x+16$ $x=-2y+16$ $p^{-1}(x)=-\frac{1}{2}x+8$	✓ $m=-2$ ✓ $c=16$ ✓ omruil van x en y $(x=-2y+16)$ ✓ antwoord	(4)
			[10]

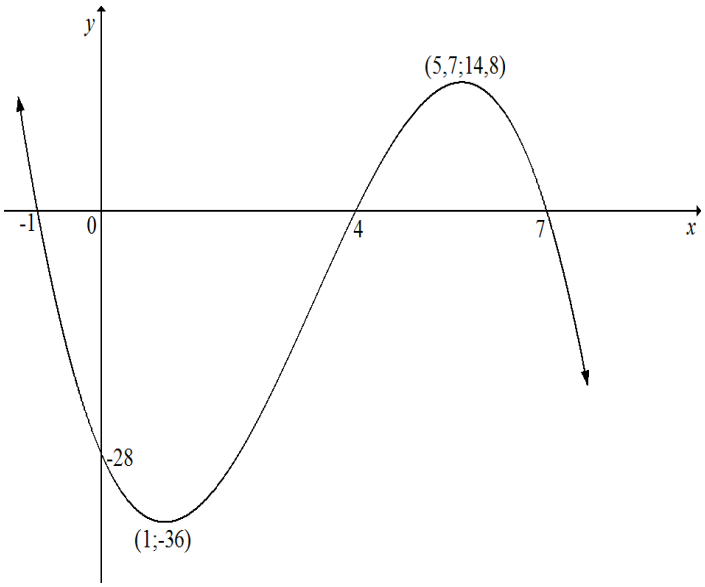
VRAAG 7

7.1	$1+i_{eff}=\left(1+\frac{i_{nom}}{n}\right)^n$ $1+i_{eff}=\left(1+\frac{0,096}{12}\right)^{12}$ $\therefore i_{eff}=0,100338694$ $\therefore r_{eff}=10,03\%$	✓ $i=\frac{0,096}{12}$ ✓ vervang met korrekte formule ✓ antwoord (i of r)	(3)
7.2	$A=P(1-i)^n$ $60\,000=150\,000\left(1-\frac{0,88}{4}\right)^n$ $0,4=(0,978)^n$ $\therefore n=\frac{log0,4}{log0,978}$ $n=41,1897\ldots\ kwarte=10,3\ jare$	✓ $i=\frac{0,88}{4}$ ✓ vervang met korrekte formule ✓ Korrekte gebruik van logaritmes ✓ antwoord	(3)
7.3			
7.3.1	$P=\frac{x[1-(1+i)^{-n}]}{i}$ $R250\,000=\frac{x\left[1-\left(1+\frac{0,1}{12}\right)^{-120}\right]}{\frac{0,1}{12}}$ $\therefore\ x=R3\,303,77$	✓ $i=\frac{0.1}{12}$ ✓ $n=120$ ✓ vervang met korrekte formule ✓ antwoord	(4)
7.3.2	Uitstaande balans (B): $B=\frac{R3\,303,77\left[1-\left(1+\frac{0,1}{12}\right)^{-84}\right]}{\frac{0,1}{12}}$ $B=R199\,008,09$ **OF** Uitstaande Balans (B): $B=250\,000\left(1+\frac{0,1}{12}\right)^{36}-\frac{3\,303,77[\left(1+\frac{0,1}{12}\right)^{36}-1]}{\frac{0,1}{12}}$ $B=R199\,007,93$	✓ opstel van formule ✓ $n=84$ ✓ vervang met korrekte formule ✓ antwoord **OF** ✓ opstel van formule ✓ $n=36$ ✓ vervang met korrekte formule ✓ antwoord	(4) (4)
			[14]

VRAAG 8

8.1	$f(x)=-3x^2$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{-3(x+h)^2-(-3x^2)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{-3x^2-6xh-3h^2+3x^2}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{-6xh-3h^2}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{h(-6x-3h)}{h}$ $f'(x)=-6x$	✓ vervang met korrekte formule ✓ $-6xh-3h^2$ ✓ $\dfrac{h(-6x-3h)}{h}$ ✓ antwoord	(4)
8.2	$y=7x^4-5\sqrt{x}-\dfrac{3}{x}$ $y=7x^4-5x^{\frac{1}{2}}-3x^{-1}$ $\dfrac{dy}{dx}=28x^3-\dfrac{5}{2}x^{-\frac{1}{2}}+3x^{-2}$	✓ $y=7x^4-5x^{\frac{1}{2}}-3x^{-1}$ ✓ $28x^3$ ✓ $-\dfrac{5}{2}x^{-\frac{1}{2}}$ ✓ $+3x^{-2}$	(4)
8.3	$g(x)=ax^3-24x+b$ $g'(x)=3ax^2-24$ $0=3a(-2)^2-24$ $24=12a$ $a=2$ $17=2(-2)^3-24(-2)+b$ $17=-16+48+b$ $b=-15$	✓ $g'(x)=3ax^2-24$ ✓ vervanging $x=-2$ $g'(x)=0$ ✓ waarde van a ✓ vervanging $(-2;17)$ in $g(x)$ ✓ $b=-15$	(5)
			[13]

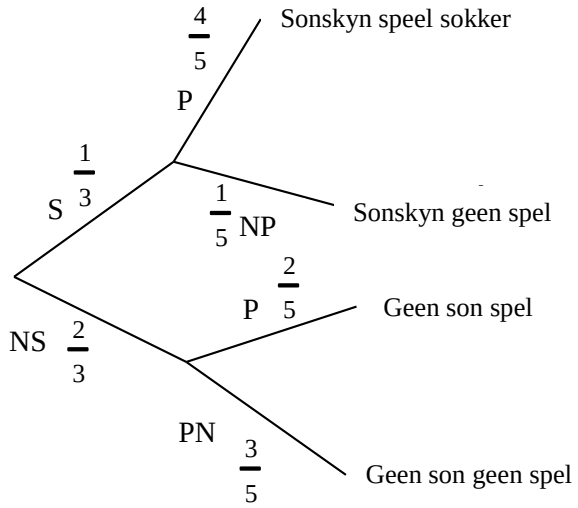
VRAAG 9

9.1	$f(x)=-x^3+10x^2-17x-28$ y-afsnit: $(0;-28)$ x-afsnit: $(x+1)(x^2-11x-28)=0$ $(x+1)(x-7)(x-4)=0$ $x=-1$ of $x=7$ of $x=4$ $(-1\,;\,0);\ (7\,;0);\ (4\,;0)$	✓ $(0;-28)$ ✓✓ $(x+1)(x^2-11x-28)=0$ ✓ $(x+1)(x-7)(x-4)=0$ ✓ x-waardes	(5)
9.2	$f(x)=-x^3+10x^2-17x-28$ $0=-3x^2+20x-17$ $0=3x^2-20x+17$ $0=(3x-17)(x-1)$ $\therefore x=\frac{17}{3}$ *or* $x=1$ Draaipunte: $\left(\frac{17}{3};14{,}8\right)$ en $(1;-36)$	✓ $0=-3x^2+20x-17$ ✓ faktore ✓ beide x-waardes ✓ $\left(\frac{17}{3};14{,}8\right)$ ✓ $(1;-36)$	(5)
9.3		✓ vorm ✓ draaipunt ✓ x- en y-afsnitte	(3)
9.4	$k-3>14{,}8$ or $k-3<-36$ $k>17{,}8$ or $k<-33$	✓ $k>17{,}8$ ✓ $k<-33$	(2)
			[15]

VRAAG 10

10.1	$\tan 60° = \frac{DE}{x}$ $\therefore \quad DE = x\sqrt{3}$ $EF = y - 2x$ Oppvl van reghoek = basis $\times$ hoogte $= (y-2x)x\sqrt{3}$ $= \sqrt{3}xy - 2\sqrt{3}x^2$	✓ $\tan 60° = \frac{DE}{x}$ ✓ $DE = x\sqrt{3}$ ✓ $EF = y - 2x$ ✓ $(y-2x)x\sqrt{3}$	(4)
10.2	$A = \sqrt{3}xy - 2\sqrt{3}x^2$ $\frac{dA}{dx} = \sqrt{3}y - 4\sqrt{3}x = 0$ $\therefore \quad x = \frac{y}{4}$ $MaksOppvl = \sqrt{3}\left(\frac{y}{4}\right)y - 2\sqrt{3}\left(\frac{y}{4}\right)^2$ $= \frac{\sqrt{3}y^2}{4} - \frac{2\sqrt{3}y^2}{16}$ $= \frac{\sqrt{3}}{8}y^2$	✓ $\frac{dA}{dx} = \sqrt{3}y - 4\sqrt{3}x$ ✓ $\frac{dA}{dx} = 0$ ✓ $x = \frac{y}{4}$ ✓ Vervanging $x = \frac{y}{4}$ ✓ antwoord	(5)
			[9]

VRAAG 11

11.1	11.1.1	$\therefore P(A) = 0{,}45$ $P(A\ of\ B) = P(A) + P(B)$ $= 0{,}45 + 0{,}29$ $= 0{,}74$	✓ vervanging ✓ antwoord	(2)
	11.1.2	$P(A) \times P(B) = 0{,}45 \times 0{,}29$ $= 0{,}1305 \approx 0{,}13$ $P(A\ of\ B) = P(A) + P(B) - P(A\ en\ B)$ $= 0{,}45 + 0{,}29 - 0{,}1276$ $= 0{,}0695 \approx 0{,}61$	✓ $0{,}45 \times 0{,}29$ ✓ $0{,}1267$ or $\frac{319}{2500}$ ✓ vervanging ✓ antwoord	(4)
11.2	 P(speel nie sokker nie) = $\frac{1}{3} \times \frac{1}{5} + \frac{2}{3} \times \frac{3}{5} = \frac{7}{15}$	✓ $\frac{1}{3} \times \frac{1}{5}$ ✓✓ $\frac{2}{3} \times \frac{3}{5}$ ✓ $\frac{7}{15}$	(4)
11.3	Aantal verskillende kodes $= 26 \times 9 \times 8 \times 7 = 13104$	✓ 26 ✓ $9 \times 8 \times 7$ ✓ antwoord	(3)
			[13]

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