LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE/*NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 12

MATHEMATICS P1/*WISKUNDE V1*

MARKING GUIDELINES/*NASIENRIGLYNE*

SEPTEMBER 2024

MARKS/*PUNTE*: 150

This marking guidelines consists of 17 pages/*Hierdie nasienriglyne bestaan uit 17 bladsye*

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NOTE/*NOTA*:

- If a candidate answers a question TWICE, only mark the FIRST attempt/ *As 'n kandidaat 'n vraag twee keer beantwoord, merk slegs die EERSTE poging.*
- Consistent Accuracy applies in all aspects of the marking guidelines/ *Konsekwente akkuraatheid is van toepassing in alle aspekte van die nasienriglyne*

QUESTION/*VRAAG* 1

1.1	1.1.1	$x^2-3x+2=0$ $(x-2)(x-1)=0$ $x=2$ or / *of* $x=1$	✓factorization/*faktore* ✓ $x=2$ ✓ $x=1$	(3)
	1.1.2	$3x^2=-2-6x$ $3x^2+6x+2=0$ $x=\frac{-(6)\pm\sqrt{(6)^2-4(3)(2)}}{2(3)}$ $\therefore x=-1,58$ or / *of* $x=-0,42$	✓standard form /*standard vorm* ✓subst into correct formula/*subst in korrekte formule* ✓ $x=-1,58$ ✓ $x=-0,42$	(4)
	1.1.3	$2x-1=\sqrt{1-x}$ $(2x-1)^2=\left(\sqrt{1-x}\right)^2$ $4x^2-4x+1=1-x$ $4x^2-3x=0$ $x(4x-3)=0$ $x=0$ or / *of* $x=\frac{3}{4}$ $x=\frac{3}{4}$	✓squaring both sides/ *kwadreer albei kante* ✓standard form /*standard vorm* ✓ $x=0$ or / *of* $x=\frac{3}{4}$ ✓ $x=\frac{3}{4}$	(4)
	1.1.4	$(x+3)(3-x)<0$ $(x+3)(x-3)>0$ CV : $x=-3$ or / *of* $x=3$  $x<-3$ or / *of* $x>3$	✓critical values/*kritieke waardes* ✓✓ answer/*antwoord*	(3)

1.2	$2x = y+2$ (1) $y-2 = x^2-3x$ (2) $y = 2x-2$ Subst in (2) $2x-2-2 = x^2-3x$ $2x-4 = x^2-3x$ $x^2-5x+4 = 0$ $(x-1)(x-4) = 0$ $x=1$ or / *of* $x=4$ $y=0$ or / *of* $y=6$ **OR/*OF*** $2x = y+2$ (1) $y-2 = x^2-3x$ (2) $x = \frac{y+2}{2}$ subst x in (2) $y-2 = \left(\frac{y+2}{2}\right)^2 - 3\left(\frac{y+2}{2}\right)$ $y-2 = \frac{y^2+4y+4}{4} - \frac{3y-6}{2}$ $4y-8 = y^2+4y+4-6y-12$ $y^2-6y = 0$ $y=0$ or / *of* $y=6$ $x=1$ or / *of* $x=4$	✓ $y = 2x-2$ ✓substitution / *substitusie* ✓simplification/*vereenvoudig* ✓standard form /*standard vorm* ✓ $x=1$ or / *of* $x=4$ ✓ $y=0$ or / *of* $y=6$ **OR/*OF*** ✓ $x = \frac{y+2}{2}$ ✓substitution / *substitusie* ✓simplification/*vereenvoudig* ✓standard form /*standard vorm* ✓ $y=0$ or / *of* $y=6$ ✓ $x=1$ or / *of* $x=4$	(6) (6)

1.3	$x=\frac{72}{t}$ $t=\frac{72}{x}$ (1) $t-0,2=\frac{72}{x+5}$ $t=\frac{72}{x+5}+0,2$ (2) equate (1) and (2) $\frac{72}{x}=\frac{72}{x+5}+0,2$ $72(x+5)=72x+0,2x(x+5)$ $72x+360=72x+0,2x^2+x$ $0,2x^2+x-360=0$ $x^2+5x-1800=0$ $(x-40)(x+45)=0$ $x=40$ or / *of* $x=-45$ $x=40\text{ km/h}$	✓ $t=\frac{72}{x}$ ✓ $t=\frac{72}{x+5}+0,2$ ✓substitution / *substitusie* ✓standard form /*standard vorm* ✓ $x=40$	(5)
			[25]

QUESTION*VRAAG* 2

2.1	2.1.1	$T_4: \quad a+3d=5$.....(1) $T_{14}: \quad a+13d=15$.....(2) $10d=10$ $d=1$	✓ $a+3d=5$. ✓ $a+13d=15$ ✓ $10d=10$ ✓ answer/*antwoord*	(4)
	2.1.2	$a=2$ $T_n=a+(n-1)d$ $=2+(n-1)1$ $=n+1$	✓ $a=2$ ✓ $T_n=n+1$	(2)
	2.1.3	$S_n=\frac{n}{2}\left[2a+(n-1)d\right]$ $S_{22}=\frac{22}{2}\left[2(2)+(22-1)(1)\right]$ $=11(25)$ $=275$	✓subst into correct formula/ *subst in korrekte formule* ✓ answer/*antwoord*	(2)
2.2		$x \quad 7 \quad 13 \quad 7x$ $7-x \quad 6 \quad 7x-13$ $x-1 \quad 7x-19$ $7x-13-6=6-(7-x)$ $7x-19=-1+x$ $6x=18$ $x=3$	✓1st difference/*1ste verskil* ✓2nd difference/*2de verskil* ✓equation/*vergelyking* ✓ answer/*antwoord*	(4)
				[12]

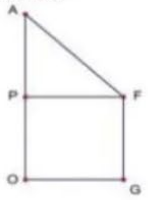
QUESTION/*VRAAG* 3

3.1	$S_\infty = \frac{a}{1-r}$ $= \frac{2}{1-\frac{1}{3}}$ $= 3$	✓ $r = \frac{1}{3}$ ✓subst into correct formula /*subst in korrekte formule* ✓ answer/*antwoord*	(3)
3.2	$S_n = \frac{a(1-r^n)}{1-r}$ $S_n = \frac{2\left[1-\left(\frac{1}{3}\right)^n\right]}{1-\frac{1}{3}}$ $= \frac{2\left[1-\left(\frac{1}{3}\right)^n\right]}{\frac{2}{3}}$ $= 3\left[1-\left(\frac{1}{3}\right)^n\right]$ $= 3-3\left(\frac{1}{3}\right)^n$	✓subst into correct formula /*subst in korrekte formule* ✓ $\frac{2\left[1-\left(\frac{1}{3}\right)^n\right]}{\frac{2}{3}}$ ✓ $3\left[1-\left(\frac{1}{3}\right)^n\right]$	(3)
3.3	$3-3\left(\frac{1}{3}\right)^n > 2,99$ $\left(\frac{1}{3}\right)^n < \frac{0,01}{3}$ $n\log\frac{1}{3} < \log\frac{0,01}{3}$ $n > \frac{\log\frac{0,01}{3}}{\log\frac{1}{3}}$ $n > 5,19$ Smallest value of/*Kleinste waarde van* n is 5	✓ $3-3\left(\frac{1}{3}\right)^n > 2,99$ ✓simplification/*vereenvoudig* ✓use of logs/*gebruik logs* ✓ $n > 5,19$ ✓reasoning/*redenasie*	(5)
			[11]

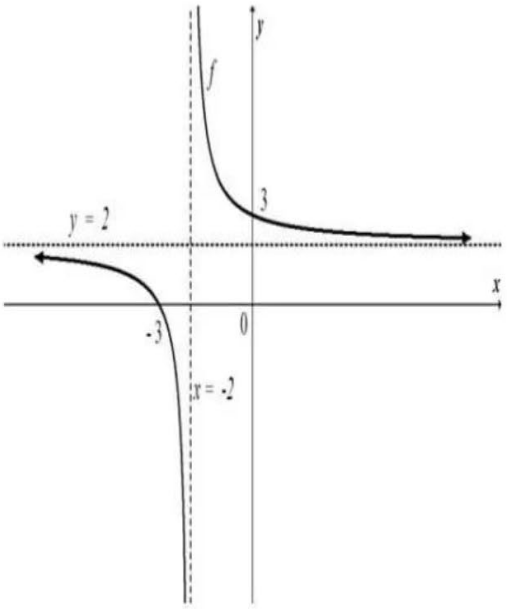
QUESTION/*VRAAG* 4

4.1	4.1.1	$f(x)=-x^2+x+12$ y – intercept/*afsnit* $(x=0)$ $y=12$ A $(0;12)$ $-x^2+x+12=0$ $x^2-x-12=0$ $(x-4)(x+3)=0$ $x=4$ or / *of* $x=-3$ B $(4;0)$	✓equate to 0/*gelykstel* 0 ✓ $x=4$ or / *of* $x=-3$	(2)
	4.1.2	$y=mx+k$ $y=mx+12$ Passing through/*Gaan deur* B $(4;0)$ $4m+12=0$ $m=-3$ $y=-3x+12$ **OR/*OF*** $m=\frac{12-0}{0-4}$ $=-3$ $y=mx+k$ B $(4;0)$ $0=-3(4)+k$ $\therefore k=12$ $y=-3x+12$	✓ $k=12$ ✓substitution / *substitusie* ✓ $m=-3$ **OR/*OF*** ✓ $m=-3$ ✓substitution / *substitusie* ✓ $k=12$	(3) (3)
	4.1.3	(a) EF = EG - FG $=(-x^2+x+12)-(-3x+12)$ $=[-(2)^2+(2)+12]-[-3(2)+12]$ EF = 4 units / *eenhede* **OR/*OF*** $EF=(-x^2+x+12)-(-3x+12)$ $=-x^2+4x$ $=-(2)^2+4(2)$ $\therefore$ EF = 4 units / *eenhede*	✓substitution / *substitusie* ✓ answer/*antwoord* **OR/*OF*** ✓substitution / *substitusie* ✓ answer/*antwoord*	(2) (2)

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		(b)	Area of / *Opv van* AOGF construct / *konstrueer* : PF / /OG = Area ΔAPF + Area OPFG $=\frac{1}{2}(2)(3)+(6\times 2)$ $=18$  **OR/*OF*** AOGF is a trapezium Area / *Opv* $=\frac{1}{2}(FG+AO)h$ $=\frac{1}{2}(6+12)2$ $=18$ **OR/*OF*** Area of / *opv van* AOGF = Area (ΔAOB – ΔGBF) $=\frac{1}{2}(4)(12)-\frac{1}{2}(2)(6$ $=18$	✓ $\frac{1}{2}(2)(3)$ ✓ (6×2) ✓ answer/*antwoord* **OR/*OF*** ✓ $(6+12)$ ✓ 2 ✓ answer/*antwoord* **OR/*OF*** ✓ $\frac{1}{2}(4)(12)$ ✓ $\frac{1}{2}(2)(6)$ ✓ answer/*antwoord*	(3) (3) (3)
	4.1.4		C(−3;0) $f'(x)=-2x+1$ $f'(-3)=-2(-3)+1$ $=7$ $y-0=7(x+3)$ $y=7x+21$ $7x+21=-3x+12$ $10x=-9$ $x=-0,9$ $y=14,7$	✓ $f'(x)=-2x+1$ ✓ $m=7$ ✓ $y=7x+21$ ✓ $7x+21=-3x+12$ ✓ $x=-0,9$ ✓ $y=14,7$	(6)
	4.1.5		$x<-3$ or $-\frac{1}{2}<x<4$	✓ $x<-3$ ✓✓ $-\frac{1}{2}<x<4$	(3)

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4.2	4.2.1		✓shape/*vorm* ✓aymptotes/*asimptote* ✓x – intercept/*afsnit* ✓y – intercept/*afsnit*	(4)
	4.2.2	$\frac{x}{x+2} \geq -2$ $\frac{x}{x+2} + 2 \geq 0$ $x \leq -3$ or / *of* $x > -2$	✓✓ $x \leq -3$ or / *of* $x > -1$	(2)
	4.2.3	$y - 2 = -x - 2$ $y = -x$ **OR/*OF*** $y = -(x + p) + q$ $y = -(x + 2) + 2$ $y = -x$ **OR/*OF*** $y = -x + c$ $2 = -(2) + c$ $c = 0$ $y = -x$	✓ $y - 2 = -x - 2$ ✓ $y = -x$ **OR/*OF*** ✓ $y = -(x + 2) + 2$ ✓ $y = -x$ **OR/*OF*** ✓ $2 = -(2) + c$ ✓ $y = -x$	(2) (2) (2)
				[27]

QUESTION/*VRAAG* 5

5.1	$h(x) = \log_a x$ Passing though/*gaan deur* $(16;4)$ $4 = \log_a 16$ $a^4 = 16$ $a = 2$	✓substitution / *substitusie* ✓change to exponents/ *vernader na eksponente* ✓ answer/*antwoord*	(3)
5.2	$y = \log_2 x$ $2^y = x$ $x = 2^0$ $x = 1$ B$(1;0)$	✓ B$(1;0)$	(1)
5.3	$y = \log_2 x$ $x = \log_2 y$ $y = 2^x$ $\therefore h^{-1}(x) = 2^x$	✓interchanging/*ruil x & y* ✓ $h^{-1}(x) = 2^x$	(2)
5.4	Range / *waardeversameling*: $y > 0$ **OR/*OF*** $y \in (0\ ;\ \infty)$	✓ $y > 0$ **OR/*OF*** $y \in (0\ ;\ \infty)$	(1) (1)
			[7]

6.1	$1+i_{eff}=\left(1+\frac{0,115}{4}\right)^4$ $1+i_{eff}=1,120055$ $i_{eff}=0,1200$ $\therefore$ rate / *koers* $=12\%$	✓subst in correct formula */subst in korrekte formule* ✓ $\frac{0,115}{4}$ ✓ answer/*antwoord*	(3)
6.2	$A=200\ 000\left(1+\frac{11,5}{400}\right)^{40}$ $=R621\ 475,37$	✓ $n=40$ ✓ answer/*antwoord*	(2)
6.3	Loan amount/*Lening bedrag* $=1\ 850\ 000-621\ 475,37$ $=R1\ 228\ 524,63$	✓Loan/*lening* ✓ answer/*antwoord*	(2)
6.4	$P=\frac{x[1-(1+i)^{-n}]}{i}$ $1\ 228\ 524,63=\frac{x\left[1-\left(1+\frac{12}{1200}\right)^{-300}\right]}{\frac{12}{1200}}$ $1\ 228\ 524,63=94,94655125x$ $x=12\ 939,12$	✓ $n=-300$ ✓subst in correct formula */subst in korrekte formule* ✓ $\frac{12}{1200}$ ✓ answer/*antwoord*	(4)
6.5	Balance / *Balans* $=\frac{x[1-(1+i)^{-n}]}{i}$ $=\frac{12\ 939,12\left[1-\left(1+\frac{12}{1200}\right)^{-120}\right]}{3}$ $=R901\ 863,28$ **OR/*OF***	✓ $n=-120$ ✓subst in correct formula */subst in korrekte formule* ✓ answer/*antwoord* **OR/*OF***	(3)

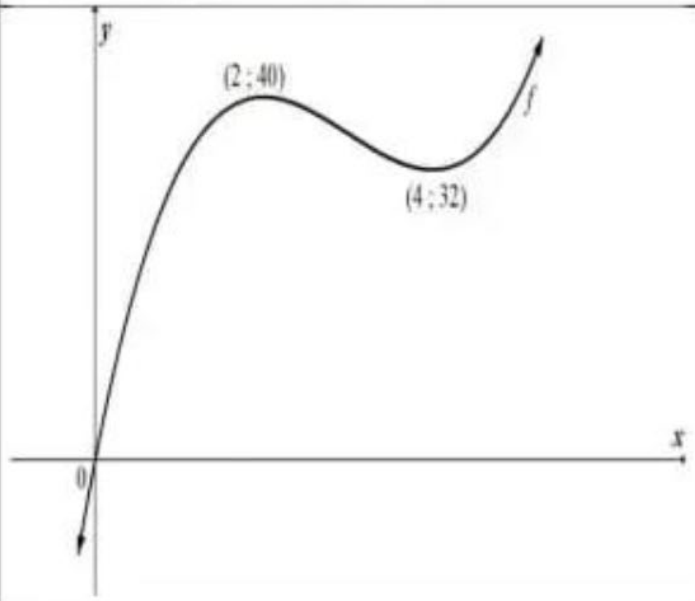
	Balance / *Balans* = A – F $=1\ 228\ 524,63\left(1+\frac{12}{1200}\right)^{300}-\frac{12\ 939,12\left[\left(1+\frac{12}{1200}\right)^{300}-1\right]}{\frac{12}{1200}}$ $=901\ 863,28$	✓ subst in compound formula/*vervang in saamgestelde formule* ✓ subst in Future value/ *vervang in toekomstige formule* ✓ answer/*antwoord*	(3)
6.6	Interest/*Rente* $=12\ 939,12\times300-1\ 228\ 524,63$ $=R2\ 653\ 210,76$	✓calculation/*bewerking* ✓ answer/*antwoord*	(2)
			[16]

QUESTION/VRAAG 7

7.1	$f(x)=3x^2$ $f(x+h)=3(x+h)^2=3x^2+6xh+3h^2$	✓ $3x^2+6xh+3h^2$	
	$f'(x)=\lim\limits_{h\to0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to0}\dfrac{3x^2+6xh+3h-3x^2}{h}$ $=\lim\limits_{h\to0}\dfrac{6xh+3h^2}{h}$ $=\lim\limits_{h\to0}\dfrac{h(6x+3h)}{h}$ $=\lim\limits_{h\to0}\dfrac{6x+3h}{h}$ $=6x$	✓ $3x^2+6xh+3h^2$ ✓substitution / *substitusie* ✓ $\lim\limits_{h\to0}\dfrac{6xh+3h^2}{h}$ ✓ $\lim\limits_{h\to0}\dfrac{h(6x+3h)}{h}$ ✓ $\lim\limits_{h\to0}(6x+3h)$ ✓ answer/*antwoord*	(5)
	OR/*OF*	**OR/*OF***	
	$f(x)=3x^2$ $f'(x)=\lim\limits_{h\to0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to0}\dfrac{3(x+h)^2-3x^2}{h}$ $=\lim\limits_{h\to0}\dfrac{3x^2+6xh+3h^2-3x^2}{h}$ $=\lim\limits_{h\to0}\dfrac{6xh+3h^2}{h}$ $=\lim\limits_{h\to0}\dfrac{h(6x+3h)}{h}$ $=\lim\limits_{h\to0}(6x+3h)$ $=6x$	✓substitution / *substitusie* ✓ $3x^2+6xh+3h^2$ ✓ $\lim\limits_{h\to0}\dfrac{6xh+3h^2}{h}$ ✓ $\lim\limits_{h\to0}\dfrac{h(6x+3h)}{h}$ ✓ $\lim\limits_{h\to0}(6x+3h)$ ✓ answer/*antwoord*	(5)
	7.2.1 $f(x)=(x-1)(x^6+x^5+x^4+x^3+x^2+x+1)$ $=x^7+x^6+x^5+x^4+x^3+x^2+x$ $-x^6-x^5-x^4-x^3-x^2-x-1$ $=x^7-1$ $f'(x)=7x^6$	✓products/*produkte* ✓ x^7-1 ✓ $7x^6$	(3)

	7.2.2	$D_x\left[\frac{x^3+2x^2+x}{x+1}\right]$ $=D_x\left[\frac{x(x+1)(x+1)}{x+1}\right]$ $=D_x\left[x^2+x\right]$ $=2x+1$	✓simplification/*vereenvoudig* ✓x^2+x ✓$2x$ ✓1	(4)
	7.2.3	$y=\sqrt[3]{x}-\frac{1}{3x}$ $=x^{\frac{1}{3}}-\frac{1}{3}x^{-1}$ $\frac{dy}{dx}=\frac{1}{3}x^{\frac{-2}{3}}+\frac{1}{3}x^{-2}$	✓$x^{\frac{1}{3}}$ ✓$-\frac{1}{3}x^{-1}$ ✓$\frac{1}{3}x^{\frac{-2}{3}}$ ✓$\frac{1}{3}x^{-2}$	(4)
				[16]

QUESTION/VRAAG 8

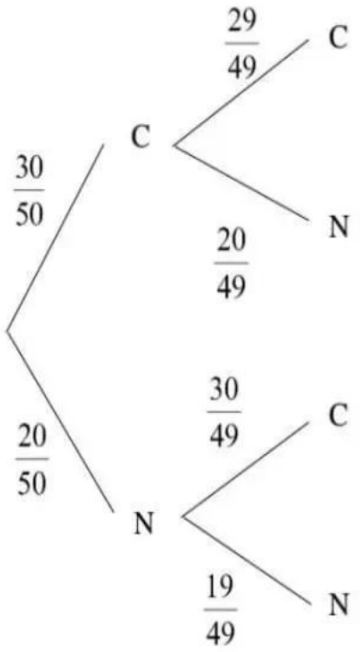
8.1	$f(3) = 2(3)[(3)^2 - 9(3) + 24]$ $= 36$	✓ substitution / *substitusie* ✓ answer/*antwoord*	(2)
8.2	$f(x) = 2x^3 - 18x^2 + 48x$ $f'(x) = 6x^2 - 36x + 48$ $x^2 - 6x + 8 = 0$ $(x-4)(x-2) = 0$ $x = 4$ or / *of* $x = 2$ $y = 32$ or / *of* $y = 40$	✓ derivative/*afgeleide* /*standard vorm* ✓ x – values/*waardes* ✓ y – values/*waardes*	(4)
8.3		✓ shape/*vorm* ✓ turning points/ *draaipunte* ✓ origin/*oorsprong*	(3)
8.4	$32 < k < 40$	✓✓ answer/*antwoord*	(2)
8.5	Maximum/*Maksimum* is 40	✓ max/*maks* 40	(1)
			[12]

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QUESTION/*VRAAG* 9

9.1	$A = \pi R^2 + \pi r^2$ .....(1) $R + r = 200$ $r = 200 - R$.....(2) Subst (2) in (1) $A = \pi R^2 + \pi(200 - R)^2$ $= \pi R^2 + \pi(40000 - 400R + R^2)$ $= \pi R^2 + 40000\pi - 400\pi R + \pi R^2$ $= 2\pi R^2 - 400\pi R + 40000\pi$	✓Equation of A/ *Vergelyking A* ✓r subject of formula/ r *onderwerp formule* ✓substitution / *substitusie*	(3)
9.2	At minimum $\frac{dA}{dR} = 0$ $4\pi R - 400\pi = 0$ $R = \frac{400\pi}{4\pi}$	✓$\frac{dA}{dR} = 0$ ✓$4\pi R - 400\pi$ ✓$R = 100$	
9.3	$R = r = 100$, will not get the desired shape because a shape with **two equal circles touch externally**/ *sal nie die gewenste vorm kry nie, want 'n vorm met* ***twee gelyke sirkels raak ekstern***	✓✓ valid explanation/ *geldige verduideliking*	(2)
			[9]

QUESTION/*VRAAG* 10

10.1		$P(A \text{ or / } of \ B) = P(A) + P(B)$ $= 0,45 + 0,25$ $= 0,7$	✓ $0,45 + 0,25$ ✓ answer/*antwoord*	(2)
10.2	10.2.1		✓ $\frac{20}{50}$ and / *en* $\frac{30}{50}$ ✓ $\frac{29}{49}$ and / *en* $\frac{20}{49}$ ✓ $\frac{30}{49}$ and / *en* $\frac{19}{49}$	(3)
	10.2.2	$P(\text{NC}) = \left(\frac{30}{50} \times \frac{20}{49}\right) + \left(\frac{20}{50} \times \frac{30}{49}\right)$ $= 0,41$	✓ $\left(\frac{30}{50} \times \frac{20}{49}\right)$ ✓ $\left(\frac{20}{50} \times \frac{30}{49}\right)$ ✓ answer/*antwoord*	(3)
	10.2.3	$P(\text{CC}) = \frac{30}{50} \times \frac{29}{49}$ $= 0,36$	✓ $\frac{30}{50} \times \frac{29}{49}$ ✓ answer/*antwoord*	(2)
10.3	10.3.1	$10^3 \times 5^2$ $= 25000$	✓ $10^3 \times 5^2$ ✓ answer/*antwoord*	(2)
	10.3.2	$9 \times 9 \times 8 \times 4 \times 1$ $= 12960$	✓ $9 \times 9 \times 8$ ✓ 4×1 ✓ answer/*antwoord*	(3)
				[15]

TOTAL/*TOTAAL*: 150