



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

**NATIONAL SENIOR CERTIFICATE /
*NASIONALE SENIOR SERTIFIKAAT***

GRADE/*GRADE* 12

**MATHEMATICS P1/*WISKUNDE V1*
MARKING GUIDELINES/*NASIENRIGLYNE*
SEPTEMBER 2026**

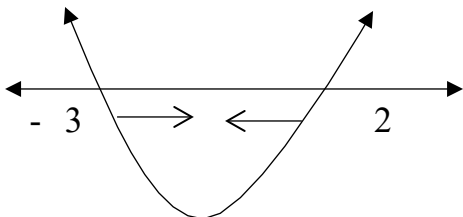
MARKS/*PUNTE*: 150

This marking guidelines consists of 18 pages/ *Hierdie nasienriglyne bestaan uit 18 bladsye*

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 1/VRAAG 1

1.1	1.1.1	$y + \frac{1}{y} = 2$ $y^2 - 2y + 1 = 0$ $(y-1)(y-1) = 0$ $y = 1$	↗ standard form/ <i>standaardvorm</i> ↗ answer/ <i>antwoord</i>	(2)
	1.1.2	$(2x^2 + 3x) + \frac{1}{(2x^2 + 3x)} = 2$ $2x^2 + 3x = 1$ $2x^2 + 3x - 1 = 0$ $x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-1)}}{2(2)}$ $x = -1,78 \quad \text{or / of} \quad x = 0,28$	↗ standard form/ <i>standaardvorm</i> ↗ substitution/ <i>vervanging</i> ↗ answer/ <i>antwoord</i> ↗ answer/ <i>antwoord</i>	(4)
1.2	1.2.1	$x^2 + x - 6 < 0$ $(x+3)(x-2) < 0$ CV $x = -3$ or / of $x = 2$  $-3 < x < 2$	↗ critical values/ <i>kritieke waardes</i> ↗ ↗ answer/ <i>antwoord</i>	(3)

	1.2.2	$5 + \sqrt{x+5} = \frac{14}{\sqrt{x+5}}$ $5\sqrt{x+5} + x + 5 = 14$ $5\sqrt{x+5} = 9 - x$ $25(x+5) = 81 - 18x + x^2$ $x^2 - 43x - 44 = 0$ $(x - 44)(x + 1) = 0$ $x \neq 44 \quad \text{or / of} \quad x = -1$	↪ cross multiply/<i>maal KGV</i> ↪ isolating surds/<i>isoleer wortel</i> ↪ squaring/<i>vierkant</i> ↪ standard form/<i>standaardvorm</i> ↪ answer with selection/<i>antwoord met seleksie</i>	(5)
	1.2.3	$9^{x+1} - 10 \cdot 3^x + 1 = 0$ $3^{2x} \cdot 9 - 10 \cdot 3^x + 1 = 0$ $(9 \cdot 3^x - 1)(3^x - 1) = 0$ $3^x = \frac{1}{9} \quad \text{or / of} \quad 3^x = 1$ $3^x = 3^{-2} \quad \text{or / of} \quad 3^x = 3^0$ $x = -2 \quad \text{or / of} \quad x = 0$	↪ factorisation/<i>faktorisering</i> ↪ both equations/<i>beide vgl</i> ↪ answer/<i>antwoord</i> ↪ answer/<i>Antwoord</i>	(4)
1.3	1.3.1	Surface Area / <i>Buite oppervlakte</i> $= 2lb + 2lh + 2bh$ $2x^2 + 2xy + 2xy = 288$ $2x^2 + 4xy = 288$ $x^2 + 2xy - 144 = 0$	↪ $2x^2 + 2xy + 2xy = 288$ ↪ $2x^2 + 4xy = 288$	(2)
	1.3.2	$x^2 + 2xy - 144 = 0$ $y = 21 - 2x$ $x^2 + 2x(21 - 2x) - 144 = 0$ $x^2 + 42x - 4x^2 - 144 = 0$ $-3x^2 + 42x - 144 = 0$ $x^2 - 14x + 48 = 0$ $(x - 6)(x - 8) = 0$ $x = 6 \quad \text{or / of} \quad x = 8$ $y = 9 \quad \text{or / of} \quad y = 5$ OR/OF	↪ substitution/<i>vervanging</i> ↪ standard form/<i>standaardvorm</i> ↪ x - values/<i>waardes</i> ↪ y - values/<i>waardes</i> OR/OF	(4)

		$x^2 + 2xy - 144 = 0$ $\frac{21-y}{2} = x$ $\left(\frac{21-y}{2}\right)^2 + 2y\left(\frac{21-y}{2}\right) - 144 = 0$ $\frac{441 - 42y + y^2}{4} + \frac{42y - 2y^2}{2} - 144 = 0$ $441 - 42y + y^2 + 84y - 4y^2 - 576 = 0$ $-3y^2 + 42y - 135 = 0$ $y^2 - 14y + 45 = 0$ $(y-5)(y-9) = 0$ $y = 5 \quad \text{or / of} \quad y = 9$ $x = 8 \quad \text{or / of} \quad x = 6$	↪ substitution/vervanging ↪ standard form/standaardvorm ↪ y - values/waardes ↪ x - values /waardes	(4)
				[24]

QUESTION 2/VRAAG 2

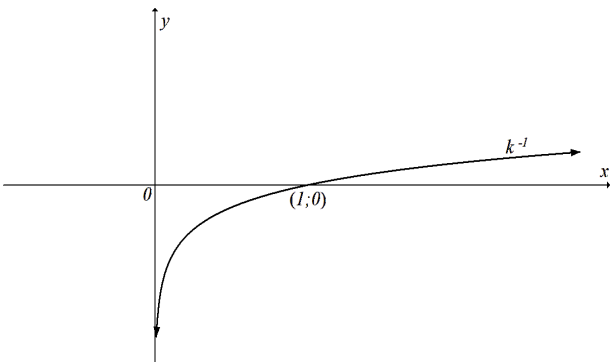
2.1	2.1.1	$r = \frac{T_2}{T_1} = \frac{(x-3)^2}{(x-3)}$ $r = (x-3)$ $-1 < (x-3) < 1$ $2 < x < 4$	☞ value of r /waarde van r ☞ condition/voorwaarde ☞ answer/Antwoord	(3)
	2.1.2	$S_{\infty} = \frac{x-3}{1-(x-3)}$ $= \frac{x-3}{4-x}$	☞ substitution/vervanging ☞ answer/Antwoord	(2)
	2.1.3	$S_{\infty} = \frac{2.5-3}{1-(2.5-3)}$ $= \frac{2.5-3}{4-2.5}$ $= -0.33$	☞ substitution/vervanging ☞ answer/Antwoord	(2)
2.2	2.2.1	$4 + 6 + 8 + \dots$ $a = 4$ $d = 2$ $\frac{n}{2}[8 + (n-1)2] = 990$ $\frac{n}{2}[2n + 6] = 990$ $n^2 + 3n - 990 = 0$ $(n-30)(n+33) = 0$ $n = 30 \quad \text{or / of} \quad n \neq -33$	☞ expansion/uitbrei ☞ substitution/vervanging ☞ standard form/standaardvorm ☞ answer with selection/antwoord met seleksie	(4)

	2.2.2	$T_n = a + (n-1)d$ $T_{30} = 30 + 29(2)$ $= 62$ $S_n - S_{n-1} = S_{30} - S_{29}$ $= 990 - \left[\frac{29}{2} [8 + 28(2)] \right]$ $= 990 - 928$ $= 62$ $\therefore T_{30} = S_{30} - S_{29}$	$\Rightarrow$ substitution/ <i>vervanging</i> $\Rightarrow$ answer/ <i>antwoord</i> $\Rightarrow$ substitution/ <i>vervanging</i> $\Rightarrow$ answer/ <i>antwoord</i>	(4)
				[15]

QUESTION 3/VRAAG 3

3.1	$-1 ; 1 ; 3 ; 5 ; \dots\dots\dots$ $a = -1$ $d = 2$ $T_{10} = -1 + 9(2)$ $= 17$	$\Rightarrow$ first difference/ <i>eerste verskil</i> $\Rightarrow$ substitution/ <i>vervanging</i> $\Rightarrow$ answer/ <i>antwoord</i>	(3)
3.2	$T_{30} = -1 + 29(2)$ $= 57$	$\Rightarrow$ substitution/ <i>vervanging</i> $\Rightarrow$ answer/ <i>antwoord</i>	(2)
3.3	$2a = 2$ $a = 1$ $3a + b = -1$ $3(1) + b = -1$ $b = -4$ $a + b + c = 3$ $1 - 4 + c = 3$ $c = 6$	$\Rightarrow 2a = 2$ $\Rightarrow 3(1) + b = -1$ $\Rightarrow 1 - 4 + c = 3$	(3)
3.4	The minimum value in the sequence is 2/ <i>Die minimum waarde in die reeks is 2</i>	$\Rightarrow$ answer/ <i>antwoord</i>	(1)
			[9]

QUESTION 4/VRAAG 4

4.1	$B(0 ; -8)$ $3^x - 9 = 0$ $3^x = 9$ $3^x = 3^2$ $x = 2$ $A(2 ; 0)$	$\Rightarrow B(0 ; -8)$ $\Rightarrow$ equate to zero/stel gelyk 0 $\Rightarrow x$ – value/waarde	(3)
4.2	$g(x) = 3^x - 9$ $k(x) = g(x) + 9$ $k(x) = 3^{2x} - 9 + 9$ $k(x) = 9^x$	$\Rightarrow$ substitution/vervanging $\Rightarrow$ answer/antwoord	(2)
4.3	$y = 9^x$ $x = 9^y$ $y = \log_9 x$	$\Rightarrow$ interchange x and y /ruil x en y $\Rightarrow$ answer/antwoord	(2)
4.4		$\Rightarrow$ shape/vorm $\Rightarrow (1 ; 0)$	(2)
4.5	$x > 0$	$\Rightarrow$ domain/definisieversameling	(1)
4.6	$h(x) = -k^{-1}(x)$ $= -\log_9(x)$	$\Rightarrow h(x) = -k^{-1}(x)$ $\Rightarrow$ answer/antwoord	(2)
4.7	$\sum_{x=0}^2 9^x - \sum_{x=3}^4 g(x)$ $= [1 + 9 + 81] - [9 + 72]$ $= 91 - 81$ $= 10$	$\Rightarrow [1 + 9 + 72]$ $\Rightarrow [9 + 72]$ $\Rightarrow$ answer/antwoord	(3)
			[15]

QUESTION 5/VRAAG 5

5.1	$y = \frac{a}{x-1} + 2$ through / deur (0 ; 0) $0 = \frac{a}{-1} + 2$ $0 = -a + 2$ $a = 2$ $f(x) = \frac{2}{x-1} + 2$	↪ subst p and q /verv p en q ↪ subst (0 ; 0)/vervang (0 ; 0) ↪ value of a /waarde van a	(3)
5.2	$y = mx + c$ $y = mx + 0$ through / deur D (1 ; 2) $2 = m(1) + 0$ $m = 2$ $y = 2x$	↪ substitute c /vervang c ↪ gradient/gradiënt ↪ answer/antwoord	(3)
5.3	$\frac{2}{x-1} + 2 = 2x$ $\frac{2}{x-1} = 2x - 2$ $2 = (2x - 2)(x - 1)$ $2x^2 - 4x = 0$ $2x(x - 2) = 0$ $x \neq 0$ or / of $x = 2$ $y = 4$ C (2 ; 4)	↪ equating/gelykstel ↪ simplification/vereenvoudiging ↪ standard form/standaardvorm ↪ both values of x and y / beide waardes van x en y	(4)
5.4	$x < 0$ or / of $1 < x < 2$	↪ $x < 0$ ↪ $1 < x < 2$ OR/OF (1 ; 2)	(2)
5.5	$-\infty < x < 1$; $x \neq 0$	↪ $-\infty < x < 1$ ↪ $x \neq 0$	(2)
			[14]

QUESTION 6/VRAAG 6

6.1	$y = a(x + p)^2 + q$ $y = a(x - 1)^2 - 3$ subst / verv (0 ; -1) $-1 = a(0 - 1)^2 - 3$ $a = 2$ $y = 2(x - 1)^2 - 3$ $= 2(x^2 - 2x + 1) - 3$ $= 2x^2 - 4x - 1$ $b = -4$	$\Rightarrow$ substitution/vervanging $\Rightarrow$ subst (0 ; -1)/verv (0 ; -1) $\Rightarrow$ value of a /waarde van a $\Rightarrow$ value of b /waarde van b	(4)
6.2	$1 - k < 0$ $k > 1$	$\Rightarrow$ substitution/vervanging $\Rightarrow$ solution/oplossing	(2)
			[6]

QUESTION 7/VRAAG 7

7.1	$A = P(1+i)^n$ $A = 62\,000(1+0,05)^{20}$ $A = R164\,504,46$		<i>↻ i</i> <i>↻ substitution/vervangings</i> <i>↻ answer/antwoord</i>	(3)
7.2	7.2.1	$P_v = \frac{x[1-(1+i)^{-n}]}{i}$ $x = \frac{800\,000 \times \frac{0,11}{12}}{\left[1 - \left(1 + \frac{0,11}{12}\right)^{-240}\right]}$ $x = R8257,51$	<i>↻ i</i> <i>↻ n</i> <i>↻ substitution/vervangings</i>	(3)
	7.2.2	$\text{Balance / Balans} = \frac{8257,51 \left[1 - \left(1 + \frac{0,11}{12}\right)^{-60}\right]}{\frac{0,11}{12}}$ $= R379\,787,94$ OR/OF $\text{Balance / Balans} = A - F_v$ $\text{Balance / Balans} = P(1+i)^n - \frac{x[(1+i)^n - 1]}{i}$ $= 800\,000 \left(1 + \frac{0,11}{12}\right)^{180} - \frac{8257,51 \left[\left(1 + \frac{0,11}{12}\right)^{180} - 1\right]}{\frac{0,11}{12}}$ $\text{Balance / Balans} = R379\,786,50$	<i>↻ n = -60</i> <i>↻ i</i> <i>↻ substitution/vervangings</i> <i>↻ answer/antwoord</i> OR/OF <i>↻ n = 180</i> <i>↻ substitution A/verv A</i> <i>↻ substitution F_v/verv F_v</i> <i>↻ answer/antwoord</i>	(4)

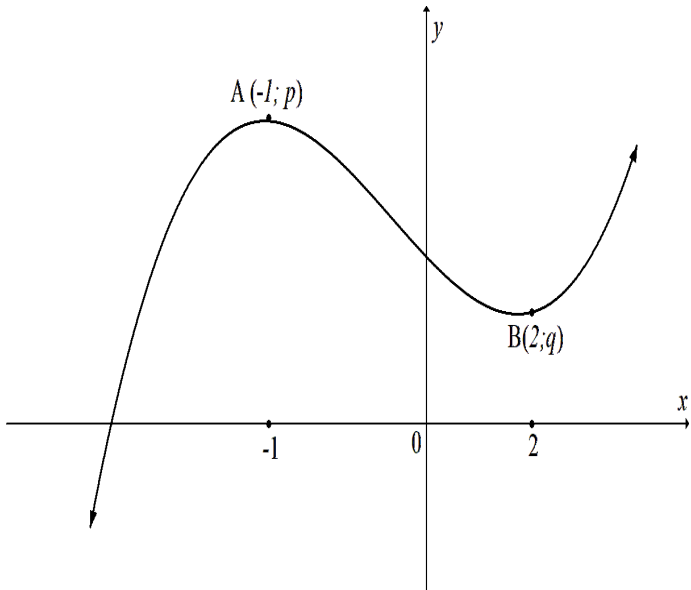
	7.2.3	$P_v = \frac{x[1-(1+i)^{-n}]}{i}$ $800\,000 = \frac{12\,000 \left[1 - \left(1 + \frac{0,11}{12} \right)^{-n} \right]}{\frac{0,11}{12}}$ $n = \frac{\log \left(1 - \frac{800\,000 \times \frac{0,11}{12}}{12\,000} \right)}{-\log \left(1 + \frac{0,11}{12} \right)}$ $n = 103,5$ Period / <i>Periode</i> = 104 months / <i>maande</i> In years / <i>In jare</i> = $\frac{104}{12} \approx 9$ years / <i>jare</i>	↪ substitution P_v/verv P_v ↪ substitution/vervanging ↪ correct use of logs/ <i>korrekte gebruik van logs</i> ↪ value of n/waarde van n ↪ answer/antwoord	(5)
				[15]

QUESTION 8/VRAAG 8

8.1	$f(x) = -x^2 + 3x$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-(x+h)^2 + 3(x+h) - (-x^2 + 3x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-x^2 - 2xh - h^2 + 3x + 3h + x^2 - 3x}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{h(-2x - h + 3)}{h}$ $f'(x) = \lim_{h \rightarrow 0} (-2x - h + 3)$ $f'(x) = -2x + 3$ OR $f(x) = -x^2 + 3x$ $f(x+h) = -(x+h)^2 + 3(x+h)$ $= -x^2 - 2xh - h^2 + 3x + 3h$ $f(x+h) - f(x) = -x^2 - 2xh - h^2 + 3x + 3h + x^2 - 3x$ $= -2xh - h^2 + 3h$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{h(-2x - h + 3)}{h}$ $f'(x) = \lim_{h \rightarrow 0} (-2x - h + 3)$ $f'(x) = -2x + 3$	$\Re f(x+h)$ $\Re$ substitution/ <i>vervang</i> $\Re$ simplification/ <i>vereenvoudiging</i> $\Re$ common factor/ <i>gemeensk factor</i> $\Re$ answer/ <i>antwoord</i>	(5)	
8.2	8.2.1	$g(x) = x^2 - 2\sqrt{x}$ $g(x) = x^2 - 2x^{\frac{1}{2}}$ $g'(x) = 2x - x^{-\frac{1}{2}}$	$\Re 2x^{\frac{1}{2}}$ $\Re 2x$ $\Re x^{-\frac{1}{2}}$	(3)

	8.2.2	$y = \left[\frac{x^3 - 2x^2 - x + 2}{x-1} \right]$ $y = \left[\frac{(x-1)(x^2 - x - 2)}{x-1} \right]$ $y = x^2 - x - 2$ $\frac{dy}{dx} = 2x - 1$	<i>↪ factors/faktore</i> <i>↪ 2x</i> <i>↪ -1</i>	(3)
				[11]

QUESTION 9/VRAAG 9

9.1		<i>↪ shape/vorm</i> <i>↪ A(-1 ; p)</i> <i>↪ B(2 ; q)</i>	(3)
9.2	One root/Een wortel	<i>↪ answer/antwoord</i>	(1)

9.3	$f'(x) = 3x^2 + 2xb + c$ $f'(x) = 0$ $3(-1)^2 + 2b(-1) + c = 0$ $3 - 2b + c = 0$ $c = 2b - 3 \dots\dots\dots(1)$ $f'(2) = 0$ $3(2)^2 + 2b(2) + c = 0$ $12 + 4b + c = 0$ $c = -4b - 12 \dots\dots\dots(2)$ $2b - 3 = -4b - 12$ $6b = -9$ $b = -\frac{3}{2}$ $c = -4\left(-\frac{3}{2}\right) - 12$ $\therefore c = -6$	$\Rightarrow 3x^2 + 2xb + c$ $\Rightarrow c = 2b - 3$ $\Rightarrow c = -4b - 12$ $\Rightarrow 2b - 3 = -4b - 12$ $\Rightarrow b = -\frac{3}{2}$ $\Rightarrow c = -6$	(6)
			[10]

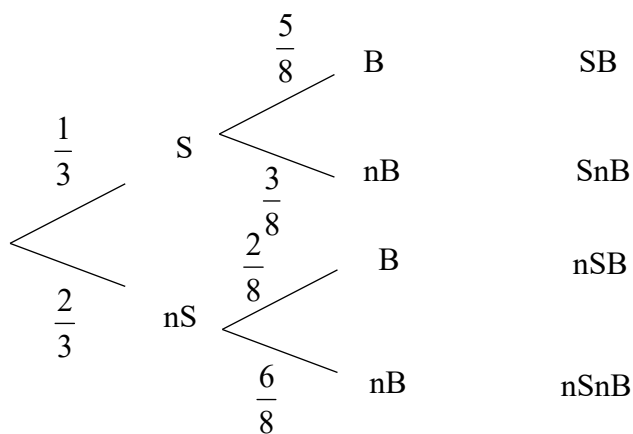
QUESTION 10/VRAAG 10

10.1	10.1.1	$p\left(x ; \sqrt{-x^3+8}\right)$ $OP^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$ $= (x)^2 + \left(\sqrt{-x^3+8}\right)^2$ $= -x^3 + x^2 + 8$ $OP = \sqrt{-x^3 + x^2 + 8}$	➤ substitution/vervanging ➤ answer/antwoord	(2)
	10.1.2	For max / min values $f'(x) = 0$ <i>Vir min / maks waardes $f'(x) = 0$</i> $-3x^2 + 2x = 0$ $x(-3x + 2) = 0$ $x = 0$ or / of $x = \frac{2}{3}$ subst / verv $x = 0$ $y = 8$ subst / verv $x = \frac{2}{3}$ $y = -\left(\frac{2}{3}\right)^3 + \left(\frac{2}{3}\right)$ $= 8,15$ The maximum of OP^2 is 8,15 / <i>Die maksimum van OP^2 is 8,15</i>	➤ $f'(x) = 0$ ➤ both values of x/beide waardes van x ➤ value of y when $x = 0$ / waarde van y as $x = 0$ ➤ value of y when $x = \frac{2}{3}$ / waarde van x as $x = \frac{2}{3}$ ➤ max value/maks waarde	(5)
	10.1.3	The y – intercept of the graph is $2\sqrt{2}$ and the x – intercept is 2. The minimum value is (2 ; 0) / <i>Die y – afsnit van die grafiek is $2\sqrt{2}$ en die x – afsnit is 2. Die minimum waarde is (2 ; 0).</i> $OP^2 = -x^3 + x^2 + 8$ $= -(2)^3 + (2)^2 + 8$ $= 4$ $OP = \sqrt{4} = 2$	➤ substitution/vervanging ➤ answer/antwoord	(2)

10.2	10.2.1	$A = \frac{1}{2}(PQ + RS)(QR)$ $A(x) = \frac{1}{2}(2x - 3 + 4x + 3)(5 - x)$ $= \frac{1}{2}(6x)(5 - x)$ $= 15x - 3x^2$	↳ substitution/ <i>vervanging</i> ↳ simplification/ <i>vereenvoudig</i>	(2)
	10.2.2	$A'(x) = 0$ $15 - 6x = 0$ $6x = 15$ $x = 2.5 \text{ m}$	↳ derivative = 0/ <i>afgeleide = 0</i> ↳ answer/ <i>antwoord</i>	(2)
	10.2.3	Maximum Area / <i>Maksimum Opv</i> $= 15(2.5) - 3(2.5)^2$ $= 18.75 \text{ m}^2$	↳ substitution/ <i>vervanging</i> ↳ answer/ <i>antwoord</i>	(2)
				[15]

QUESTION 11/VRAAG 11

11.1	11.1.1	$a = 720$ $b = 120$ $c = 180$ $d = 540$ $e = 180$ $f = 240$	$\Rightarrow$ any two/enige twee $\Rightarrow$ any two/enige twee $\Rightarrow$ any two/enige twee	(3)
	11.1.2	$P(\text{Good Eng}) \times P(\text{Good Maths})$ $= \frac{480}{720} \times \frac{540}{720}$ $= 0,5$ $P(\text{Good English and Good Maths})$ $= \frac{360}{720}$ $= 0,5$ So it seems that the good English is independent of maths ability / <i>Dit lyk dat goeie Engels onafhanklik is van wiskundige vaardigheid</i>	$\frac{480}{720} \times \frac{540}{720}$ $\Rightarrow$ answer/antwoord $\frac{360}{720}$ $\Rightarrow$ answer/antwoord	(4)
11.2	$B \rightarrow \text{Beach/strand}$ $S \rightarrow \text{Sunny/sonnig}$			



		$P(SB) + P(nSB)$ $= \left(\frac{1}{3} \times \frac{5}{8}\right) + \left(\frac{2}{3} \times \frac{2}{8}\right)$ $= \frac{5}{24} + \frac{4}{24}$ $= \frac{9}{24}$	$\Rightarrow \left(\frac{1}{3} \times \frac{5}{8}\right)$ $\Rightarrow \left(\frac{2}{3} \times \frac{2}{8}\right)$ $\Rightarrow \text{answer/antwoord}$	(3)
11.3	11.3.1	$P = \frac{4 \times 3 \times 2 \times 24}{5040}$ $= \frac{576}{5040} = \frac{4}{35}$	$\Rightarrow 7! = 5040$ $\Rightarrow 4 \times 3 \times 2 \times 24 = 576$ $\Rightarrow \text{answer/antwoord}$	(3)
	11.3.2	$P = \frac{6 \times 4 \times 24}{5040}$ $= \frac{576}{5040} = \frac{4}{35}$ Both events have the same probability/Beide gebeurtenisse het dieselfde waarskynlikheid	$\Rightarrow 6 \times 4 \times 24 = 576$ $\Rightarrow \text{answer/antwoord}$ $\Rightarrow \text{conclusion/gevolgtrekking}$	(3)
				[16]

TOTAL/ TOTAAL: 150