



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## NASIONALE SENIOR SERTIFIKAAT

**GRAAD 11**

**WISKUNDE V1**

**NOVEMBER 2014**

**MEMORANDUM**

**PUNTE: 150**

**Hierdie memorandum bestaan uit 14 bladsye.**

**VRAAG 1**

1.1.1	$x = -2$ of $x = \frac{7}{3}$	✓ $x = -2$ ✓ $x = \frac{7}{3}$ (2)
1.1.2	$x^2 - 5x - 2 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{5 \pm \sqrt{25 - 4(1)(-2)}}{2}$ $x = \frac{5 \pm \sqrt{33}}{2}$ $x = 5,37 \text{ or } x = -0,37$ <p><b>OF</b></p> $x^2 - 5x + \left(\frac{25}{4}\right) = 2 + \left(\frac{25}{4}\right)$ $\left(x - \frac{5}{2}\right)^2 = \frac{33}{4}$ $x - \frac{5}{2} = \pm \frac{\sqrt{33}}{2}$ $x = \frac{5 + \sqrt{33}}{2} \text{ or } x = \frac{5 - \sqrt{33}}{2}$ $x = 5,37 \quad x = -0,37$	✓ standaard vorm ✓ korrekte substitusie in korrekte formule ✓ $x = 5,37$ ✓ $x = -0,37$ (4)
1.1.3	$\sqrt{x-3} = 5 + 4$ $(\sqrt{x-3})^2 = (9)^2$ $x-3 = 81$ $x = 84$	✓ isoleer $\sqrt{ }$ ✓ kwadreer beide kante ✓ vereenvoudiging ✓ antwoord (4)
1.1.4	$2x^2 - 7x - 4 \geq 0$ $(2x+1)(x-4) \geq 0$ CV's : $-\frac{1}{2}; 4$  $x \leq -\frac{1}{2} \text{ or } x \geq 4$ <p><b>OF</b></p> $x \in (-\infty; -\frac{1}{2}] \cup [4; \infty)$	✓ faktore ✓ metode ✓ notasie ✓ kritieke waardes (4) ✓ notasie ✓ kritieke waardes

<p>1.2</p> $x = 2y + 1 \quad \dots\dots(1)$ $x^2 - 2y + 3xy = 6 \quad \dots\dots(2)$ $(2y + 1)^2 - 2y + 3y(2y + 1) = 6$ $4y^2 + 4y + 1 - 2y + 6y^2 + 3y - 6 = 0$ $10y^2 + 5y - 5 = 0$ $2y^2 + y - 1 = 0$ $(2y - 1)(y + 1) = 0$ $y = \frac{1}{2} \text{ or } y = -1$ $x = 2 \quad x = -1$ <b>OF</b> $y = \frac{x-1}{2}$ $x^2 - 2\left(\frac{x-1}{2}\right) + 3x\left(\frac{x-1}{2}\right) = 6$ $2x^2 - 2x + 2 + 3x^2 - 3x - 12 = 0$ $5x^2 - 5x - 10 = 0$ $x^2 - x - 2 = 0$ $(x+1)(x-2) = 0$ $x = -1 \quad \text{or} \quad x = 2$ $y = -1 \quad y = \frac{1}{2}$	<ul style="list-style-type: none"> <li>✓ substitusie van <math>x = 2y + 1</math></li> <li>✓ vereenvoudiging</li> <li>✓ standaard vorm</li> <li>✓ faktore</li> <li>✓ beide <math>y</math> waardes</li> <li>✓ beide <math>x</math> waardes (6)</li> </ul>
[20]	

**VRAAG 2**

2.1	$\begin{aligned} & \frac{3^x(3 - 3^{-1})}{2 \cdot 3^x} \\ &= \frac{3 - \frac{1}{3}}{2} \\ &= \frac{8}{3} \times \frac{1}{2} \\ &= \frac{4}{3} \end{aligned}$ <p><b>OF</b></p> $\begin{aligned} & \frac{3^{x-1}(3^2 - 1)}{2 \cdot 3^x} \\ &= \frac{3^x \cdot 3^{-1}(8)}{2 \cdot 3^x} \\ &= \frac{1}{3} \times 4 \\ &= \frac{4}{3} \end{aligned}$	✓ gemeen faktor $3^x$ ✓ $3 - 3^{-1}$ ✓ antwoord (3)
2.2	$\begin{aligned} (x - 2)^{-\frac{3}{2}} &= 64 \\ x - 2 &= [ (4^3) ]^{-\frac{2}{3}} \\ x - 2 &= 4^{-2} \\ x &= 2 + \frac{1}{16} \\ \therefore x &= 2 \frac{1}{16} \end{aligned}$ <p><b>OF</b></p> $\begin{aligned} \sqrt{(x-3)^{-3}} &= 64 \\ (x-3)^{-3} &= 4096 \\ (x-2)^3 &= \frac{1}{4096} \\ x-2 &= \frac{1}{16} \\ x &= 2 \frac{1}{16} \quad \underline{\underline{\frac{33}{16}}} \end{aligned}$	✓ toepassing van exp. wet ✓ $4^3$ ✓ vereenvoudiging ✓ antwoord (4)

2.3	$\begin{aligned} & \frac{x^{\frac{1}{2}} \cdot x^{\frac{1}{4}} \cdot x^{\frac{1}{8}}}{\sqrt[8]{x^7}} \\ & = \frac{x^{\frac{7}{8}}}{x^{\frac{7}{8}}} \\ & = x \end{aligned}$	✓ toepassing van wortel wet ✓ toepassing van wortel wet ✓ vereenvoudiging ✓ antwoord (4)
[11]		

**VRAAG 3**

3	$\begin{aligned} AC \cdot (x-2) &= x^2 + 2x - 8 \\ AC \cdot (x-2) &= (x+4)(x-2) \\ AC &= (x+4) \text{ cm} \\ \therefore FD &= (x+4) \text{ cm} \\ \therefore ED &= x+4-(x-2) \\ ED &= 6 \text{ cm} \end{aligned}$	✓ stelling ✓ faktore ✓ $AC = (x+4) \text{ cm}$ ✓ metode ✓ antwoord (6)
[6]		

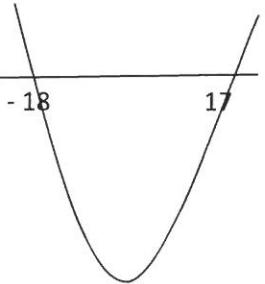
**VRAAG 4**

4.1	$\begin{array}{cccc} -7 & 0 & 9 & 20 \\ & 7 & 9 & 11 \\ & 2 & 2 & \end{array}$ <p> <math>2a = 2</math>  <math>a = 1</math>  <math>3(1) + b = 7</math>  <math>b = 4</math>  <math>(1) + (4) + c = -7</math>  <math>c = -12</math>  <math>\therefore T_n = n^2 + 4n - 12</math>  <b>OF</b>  <math>2a = 2</math>  <math>a = 1</math>  <math>T_2 = 2^2 + b(2) + c = 0</math>  <math>2b + c = -4 \quad (1) \quad 3(1) + b = 7</math>  <math>T_3 = 3^2 + b(3) + c = 9 \quad (2) \quad OF \begin{matrix} b = 4 \\ 1 + a + c = -7 \\ c = -12 \end{matrix}</math>  <math>(2) - (1) \quad b = 4</math>  <math>\therefore c = -4 - 2(4) = -12</math>  <math>T_n = n^2 + 4n - 12</math> </p>	✓ $2a = 2$ ✓ $a$ waarde ✓ $b$ waarde ✓ $c$ waarde (4) ✓ $2a = 2$ ✓ $a$ waarde ✓ $b$ waarde ✓ $c$ waarde (4)
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	<b>OF</b> $\begin{aligned} T_n &= T_1 + (n-1)d_1 + \frac{(n-1)(n-2)}{2} \cdot d_2 \\ &= -7 + (n-1) \cdot 7 + \frac{(n-1)(n-2)}{2} \cdot 2 \\ &= -7 + 7n - 7 + n^2 - 3n + 2 \\ &= n^2 + 4n - 12 \end{aligned}$	<input checked="" type="checkbox"/> formula <input checked="" type="checkbox"/> substitusie <input checked="" type="checkbox"/> vereenvoudiging (4)
4.2	$n^2 + 4n - 12 = 128$ $n^2 + 4n - 140 = 0$ $(n+14)(n-10) = 0$ $n \neq -14$ or $n = 10$ ongeldig $\therefore n = 10$	<input checked="" type="checkbox"/> vergelyking <input checked="" type="checkbox"/> faktore <input checked="" type="checkbox"/> antwoords vir $n$ <input checked="" type="checkbox"/> $n = 10$ (keuse) (4)
4.3	- 7 ; 0 ; 9 ; 20 ; ... eerste verskil 7 - 9 = 11 tweede verskil 2 - 2 $F_n = 2n + c$ $F_1 = 2(1) + c = 7$ $\therefore c = 5$ $F_n = 2n + 5$	<input checked="" type="checkbox"/> eerste verskil <div style="border: 1px solid black; padding: 5px;"><b>Slegs antwoord:</b> <b>Vol Punte</b></div> <input checked="" type="checkbox"/> $c = 5$ (3)
4.4	$F_n = 2n + 5 = 599$ $2n = 594$ $\therefore n = 297$ hierdie verskil sal tussen term 297 term 298 wees	<input checked="" type="checkbox"/> stel gelyk <input checked="" type="checkbox"/> 297 <input checked="" type="checkbox"/> 298(3) <b>[14]</b>

**VRAAG 5**

5.1	Patroon	1	2	3	<input checked="" type="checkbox"/> ✓✓ antwoord(2)
	Wit vierkante	4	12	24	
	40				
5.2	$W_n = 2n^2 + 2n$ $W_{157} = 2(157)^2 + 2(157)$ $= 49612$	<input checked="" type="checkbox"/> $W_n$ <input checked="" type="checkbox"/> substitusie antwoord	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (3)	

5.3	$2n^2 + 2n + 1 < 613$ $2n^2 + 2n - 612 < 0$ $n^2 + n - 306 < 0$ $(n - 17)(n + 18) < 0$ <p></p> $\therefore n = 16$	✓ stel ongelykheid op ✓ faktore ✓ metode ✓ antwoord (4)
5.4	$P_n = 4n^2 + 4n + 1$ $= (2n)^2 + 2(2n) + 1$ $2n \text{ is ewe vir alle } n \in \mathbb{Z}$ $\therefore \text{Totale aantal vierkante in die } n^{\text{de}} \text{ patroon sal altyd onewe wees.}$ <p><b>OF</b></p> $P_n = 4n^2 + 4n + 1$ $= 2(2n^2 + 2n) + 1$ $2(2n^2 + 2n) \text{ is onewe vir alle } n \in \mathbb{Z}$ $2(2n^2 + 2n) + 1 \text{ is onewe vir alle } n \in \mathbb{Z}$ $\therefore \text{Totale aantal vierkante in die } n^{\text{de}} \text{ patroon sal altyd onewe wees.}$	✓ $P_n = 4n^2 + 4n + 1$ ✓ herskryf $P_n$ ✓ afleiding (3)  ✓ $P_n = 4n^2 + 4n + 1$ ✓ herskryf $P_n$ ✓ afleiding (3)  [12]

**VRAAG 6**

6.1	$x = 2$ $y = 3$	✓ $x = 2$ ✓ $y = 3$ (2)
6.2	$x.\text{int} : \frac{8}{x-2} + 3 = 0$ $8 + 3(x-2) = 0$ $3x + 2 = 0$ $\therefore x = -\frac{2}{3}$ $\therefore x - \text{int}\left(-\frac{2}{3}; 0\right)$ $y = \frac{8}{0-2} + 3$ $y = -1$ $y.\text{int} : (0; -1)$	✓ $\frac{8}{x-2} + 3 = 0$ ✓ $\left(-\frac{2}{3}; 0\right)$ ✓ $(0; -1)$ (3)

6.3		✓ asimptote ✓ afsnitte met asse ✓ vorm (3)
6.4	$3 = 2 + k$ $k = 1$ <b>OF</b> $y = (x - 2) + 3$ $y = x + 1$ $\therefore k = 1$	✓ substitusie ✓ antwoord (2)  ✓ $y = x + 1$ ✓ antwoord (2) <b>[10]</b>

**VRAAG 7**

7.1	$q = -6$	✓ antwoord (1)
7.2	$-5 \frac{1}{4} = a \cdot 2^{-1-1} - 6$ $\frac{3}{4} = \frac{1}{4} a$ $a = 3$	✓ vervang $x$ ✓ vervang $y$  ✓ vereenvoudiging ✓ antwoord (4)
7.3	$x\text{int}: 2^{x-1} = 2 \quad \therefore x = 2 \quad \therefore (2; 0)$ $y\text{int}: y = 3 \cdot 2^{-1} - 6 = -4 \frac{1}{2} \quad \therefore \left(0; -4 \frac{1}{2}\right)$ <b>Gemiddelde Gradient</b> $= \frac{0 + 4 \frac{1}{2}}{2 - 0}$ $= \frac{9}{4} \text{ of } 2 \frac{1}{4}$	✓ $2^{x-1} = 2$ ✓ $x = 2$ ✓ $y = -4 \frac{1}{2}$  ✓ subst. in gradient formule ✓ antwoord (5)
7.4	$y = 3 \cdot 2^{x-3} - 6$	✓✓ antwoord (2) <b>[12]</b>

**VRAAG 8**

8.1	$C(-1 ; 0)$	✓ $C(-1 ; 0)$ (1)
8.2	$y = (x - 3)(x + 1)$ $y = x^2 - 2x - 3$	✓ $(x - 3)$ ✓ $(x + 1)$ ✓ $y = x^2 - 2x - 3$ (3)
8.3	TP : $y = (1)^2 - 2(1) - 3$ $y = -4$ R: $y \in [-4; \infty)$ <b>OF</b> $y \geq -4$	✓ $y = -4$ ✓ $[-4; \infty)$ (2)  ✓ $y \geq -4$ (2)
8.4	$m = \frac{0 + 4}{3 - 1} = 2$ $y - 0 = 2(x - 3)$ $y = 2x - 6$	✓ substitusie in gradient formule ✓ $m = 2$ ✓ vergelyking (3)
8.5.1	$x \leq -1$ of $x \geq 3$ <b>OF</b> $x \in (-\infty; -1] \cup [3; \infty)$	✓ $x \leq -1$ ✓ $x \geq 3$ (2)  ✓ $(-\infty; -1]$ ✓ $[3; \infty)$ (2)
8.5.2	$-1 < x < 3$ of $x > 3$ <b>OF</b> $x > -1$ ; $x \neq 3$ <b>OF</b> $(-1; 3) \cup (3; \infty)$	✓ kritieke waardes ✓ notasie (2)  ✓ $x > -1$ ✓ $x \neq 3$ (2)  ✓ $(-1; 3)$ ✓ $(3; \infty)$ (2)
8.5.3	$-1 < x < 0$ of $x > 3$ <b>OF</b> $(-1; 0) \cup (3; \infty)$	✓ kritieke waardes ✓ notasie (2)  ✓ $(-1; 0)$ ✓ $(3; \infty)$ (2)

8.6	$x^2 - 2x - p = 0$ $\Delta = (-2)^2 - 4(1)(-p)$ $= 4 + 4p$ <p>vir nie-rieele wortels <math>\Delta &lt; 0</math></p> $4 + 4p < 0$ $4p < -4$ $\therefore p < -1$ <p><b>OF</b></p> $A(1; -4)$ $x^2 - 2x - 3 = 0$ $x^2 - 2x - p = 0$ $-p > 1$ $\therefore p < -1$	$\checkmark 4 + 4p < 0$ $\checkmark p < -1 \text{ (2)}$
8.7	$PM = (2x - 6) - (x^2 - 2x - 3)$ $= -x^2 + 4x - 3$ $x = -\frac{b}{2a}$ $= -\frac{4}{2(-1)} = 2$ $\text{Max. } PM = -(2)^2 + 4(2) - 3 = 1 \text{ eenheid}$ <p><b>OF</b></p> $PM = (2x - 6) - (x^2 - 2x - 3)$ $= -x^2 + 4x - 3$ $= -(x^2 - 4x + 4 - 4 + 3)$ $= -[(x - 2)^2 - 1]$ $= -(x - 2)^2 + 1$ $\text{Max. } PM = 1 \text{ eenheid}$	$\checkmark$ aftrekking $\checkmark$ kwadratiese uitdrukking $\checkmark$ metode  $\checkmark$ maks waarde (4)  $\checkmark$ aftrekking $\checkmark$ kwadratiese uitdrukking $\checkmark$ metode  $\checkmark$ maks waarde (4) <b>[21]</b>

**VRAAG 9**

9.1	$A = P(1 - i)^n$ $11090,41 = 120000(1 - i)^{12}$ $\therefore i = 1 - \sqrt[12]{\frac{11090,41}{120000}}$ <p>Dus <math>i = 0,179999\dots</math></p> <p>Depresiasie-koers = 18%</p>	$\checkmark$ substitusie $\checkmark$ maak $i$ onderwerp $\checkmark$ $i$ waarde as desimaal $\checkmark$ antwoord (4)
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9.2	$\begin{aligned} i_{\text{eff}} &= \left(1 + \frac{i}{m}\right)^m - 1 \\ &= \left(1 + \frac{0,098}{12}\right)^{12} - 1 \\ &= 0,10252..... \\ \text{koers} &= 10,25\% \end{aligned}$	✓ formula ✓ substitusie in formule ✓ 10,25% (3)								
9.3	$\begin{aligned} A &= P(1+i_1)^{n_1}(1+i_2)^{n_2} \\ &= 80000\left(1 + \frac{0,075}{4}\right)^{16}\left(1 + \frac{0,092}{12}\right)^{36} \\ &= R141768,60 \end{aligned}$ <p><b>OF</b></p> $\begin{aligned} A_1 &= 80000\left(1 + \frac{0,075}{4}\right)^{16} \\ &= 107689,1465.. \\ A_2 &= 107689,1465\left(1 + \frac{0,092}{12}\right)^{36} \\ &= R141768,60 \end{aligned}$	✓ $\left(1 + \frac{0,075}{4}\right)^{16}$ ✓ $\left(1 + \frac{0,092}{12}\right)^{36}$ ✓ vermenigvuldiging ✓ antwoord (4)  ✓ $\left(1 + \frac{0,075}{4}\right)^{16}$ ✓ $A_1$ ✓ $\left(1 + \frac{0,092}{12}\right)^{36}$ ✓ antwoord (4)								
9.4.1	<p>Belegging : einde van derde jaar :</p> $\begin{aligned} A &= P(1+i)^n \\ &= 30000\left(1 + \frac{0,065}{12}\right)^{96} \\ &= R50390,07 \end{aligned}$	✓ $\frac{0,065}{12}$ ✓ subst. in korrekte formule ✓ antwoord (3)								
9.4.2	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;"><math>T_0</math></th> <th style="width: 25%;"><math>T_3</math></th> <th style="width: 25%;"><math>T_5</math></th> <th style="width: 25%;"><math>T_8</math></th> </tr> <tr> <td style="text-align: center;">30000</td> <td style="text-align: center;">- 10000</td> <td style="text-align: center;">+ 10000</td> <td></td> </tr> </table> $\begin{aligned} A &= 30000\left(1 + \frac{0,65}{12}\right)^{96} - 10000\left(1 + \frac{0,65}{12}\right)^{60} + 10000\left(1 + \frac{0,65}{12}\right)^{36} \\ A &= R48708,61 \\ \therefore \text{verskil} &= 48708,61 - 50390,07 \\ &= -R1681,46 \end{aligned}$	$T_0$	$T_3$	$T_5$	$T_8$	30000	- 10000	+ 10000		✓ $30000\left(1 + \frac{0,65}{12}\right)^{96}$ ✓ $-10000\left(1 + \frac{0,65}{12}\right)^{60}$ ✓ $10000\left(1 + \frac{0,65}{12}\right)^{36}$ ✓ R48708,61 ✓ aftrek ✓ antwoord (7)
$T_0$	$T_3$	$T_5$	$T_8$							
30000	- 10000	+ 10000								

	<p>Belegging : einde van derde jaar :</p> $A = P(1 + i)^n$ $= 30\ 000 \left(1 + \frac{0,065}{12}\right)^{36}$ $= R\ 36\ 440,14881$ <p>Bedrag(nuut) : <math>R\ 36\ 440,14881 - R\ 10\ 000,00 = R\ 26\ 440,14881</math></p> <p>Belegging : einde van vyfde jaar :</p> $A = P(1 + i)^n$ $= 26\ 440,14881 \left(1 + \frac{0,065}{12}\right)^{24}$ $= R\ 30\ 100,2304$ <p>Bedrag (Nuut) : <math>R\ 30\ 100,2304 + R\ 10\ 000,00 = R\ 40\ 100,2304</math></p> <p>Belegging : einde van agste jaar :</p> $A = P(1 + i)^n$ $= 40\ 100,2304 \left(1 + \frac{0,065}{12}\right)^{24}$ $= R\ 48\ 708,61$ <p style="color: red; margin-left: 200px;"><math>50390,07 - 48708,61</math></p> <p>Tashil hed 'n verskil van R1681,46 gehad</p>	<p>✓ subst. in formule ✓ antwoord</p> <p>✓ subst. in formule ✓ antwoord</p> <p>✓ subst. in formule ✓ antwoord ✓ afleiding (7) [21]</p>
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**VRAAG10**

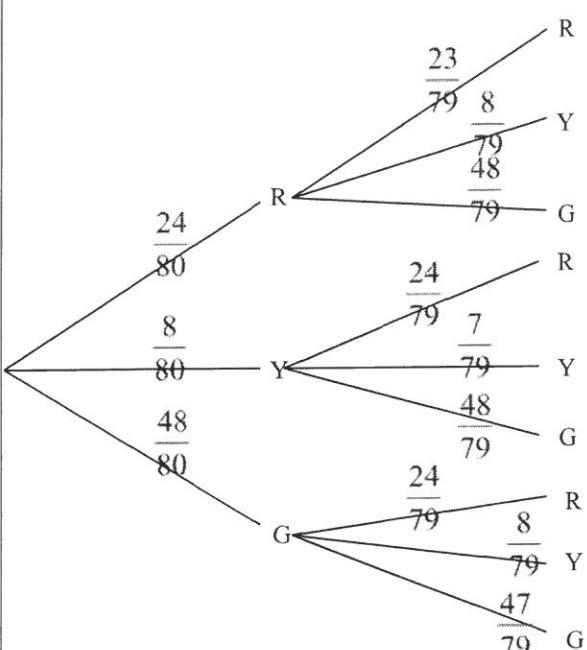
10.1	5 klante	✓ antwoord (1)
10.2	$P(C \text{ en } B) \neq 0$ Dus gebeure B en C is nie onderling uitsluitend nie	✓ $P(C \text{ and } B) \neq 0$ ✓ afleiding (2)
10.3.1	$P(\text{slegs } V) = \frac{58}{240} = \frac{29}{120}$	✓ antwoord (1)
10.3.2	$P(C \text{ en } B) = \frac{29}{240}$	✓ antwoord (1)
10.3.3	$P(\text{nie } C) = 1 - P(C)$ $= 1 - \frac{122}{240} = \frac{59}{120}$ <b>OF</b> $P(\text{nie } C) = \frac{52 + 3 + 58 + 5}{240}$ $= \frac{118}{240} = \frac{59}{120}$	✓ formule ✓ substitusie ✓ antwoord (3)  ✓ ✓ noemer en teller ✓ antwoord (3)

10.3.4	$\begin{aligned} P(B \text{ of } V) &= P(B) + P(V) - P(B \text{ en } V) \\ &= \frac{84}{240} + \frac{82}{240} - \frac{15}{240} \\ &= \frac{151}{240} \\ \text{OF} \\ P(B \text{ of } V) &= \frac{17 + 52 + 12 + 3 + 9 + 58}{240} \\ &= \frac{151}{240} \end{aligned}$	<input checked="" type="checkbox"/> $\frac{84}{240}$ <input checked="" type="checkbox"/> $\frac{82}{240}$ <input checked="" type="checkbox"/> $\frac{15}{240}$ <input checked="" type="checkbox"/> $\frac{151}{240}$ (4)  <input checked="" type="checkbox"/> teller en noemer <input checked="" type="checkbox"/> antwoord (4) [12]
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**VRAAG 11**

	$\begin{aligned} P(A \text{ of } B) &= P(A) + P(B) - P(A \cap B) \\ 0,428 &= 0,12 + 0,35 - P(A \cap B) \\ P(A \cap B) &= 0,042 \\ P(A) \times P(B) &= 0,12 \times 0,35 = 0,042 \\ \therefore P(A \cap B) &= P(A) \times P(B) \\ \text{Dus is A en B onafhanklike gebeure} \end{aligned}$	<input checked="" type="checkbox"/> substitusie <input checked="" type="checkbox"/> waarde van $P(A \cap B)$ <input checked="" type="checkbox"/> waarde van $P(A) \times P(B)$ <input checked="" type="checkbox"/> afleiding (4) [4]
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**VRAAG 12**

12.1	Daar is $100\% - 60\% - 10\% = 30\%$ rooi albasters $\therefore \frac{30}{100} \times 80 = 24$ rooi albasters	✓ 30% ✓ 24 (2)
12.2	 <p>Uitkoms R,R R,Y R,G Y,R Y,Y Y,G G,R G,Y</p>	✓ eerste tak ✓ tweede tak ✓ waardes op diagram (3)
12.3	$P(G \text{ en } Y) = P(G, Y) + P(Y, G)$ $= \frac{48}{80} \times \frac{8}{79} + \frac{8}{80} \times \frac{48}{79}$ $= \frac{48}{395}$	✓ vermenigvuldig reel ✓ optel ✓ antwoord (3) [8]
		<b>TOTAAL: 150</b>