



# basic education

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

**NASIONALE  
SENIOR SERTIFIKAAT**

**GRAAD 11**

**WISKUNDE V1**

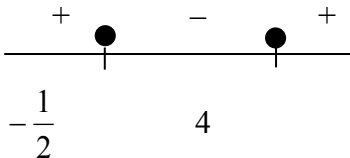
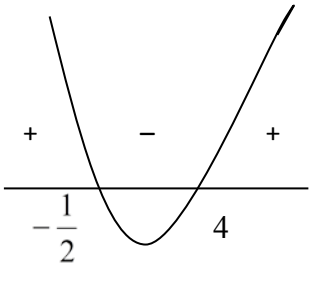
**NOVEMBER 2014**

**MEMORANDUM**

**PUNTE: 150**

**Hierdie memorandum bestaan uit 14 bladsye.**

**VRAAG 1**

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

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

<p>2.1</p>	$\frac{3^x(3-3^{-1})}{2 \cdot 3^x}$ $= \frac{3 - \frac{1}{3}}{2}$ $= \frac{8}{3} \times \frac{1}{2}$ $= \frac{4}{3}$ <p><b>OF</b></p> $\frac{3^{x-1}(3^2 - 1)}{2 \cdot 3^x}$ $= \frac{3^x \cdot 3^{-1} (8)}{2 \cdot 3^x}$ $= \frac{1}{3} \times 4$ $= \frac{4}{3}$	<p>✓ gemeen faktor <math>3^x</math></p> <p>✓ <math>3 - 3^{-1}</math></p> <p>✓ antwoord (3)</p> <p>✓ gemeen faktor <math>3^{x-1}</math></p> <p>✓ vereenvoudiging</p> <p>✓ antwoord (3)</p>
<p>2.2</p>	$(x - 2)^{-\frac{3}{2}} = 64$ $x - 2 = \left[ (4^3) \right]^{-\frac{2}{3}}$ $x - 2 = 4^{-2}$ $x = 2 + \frac{1}{16}$ $\therefore x = 2 \frac{1}{16}$ <p><b>OF</b></p> $\sqrt{(x - 3)^{-3}} = 64$ $(x - 3)^{-3} = 4096$ $(x - 2)^3 = \frac{1}{4096}$ $x - 2 = \frac{1}{16}$ $x = 2 \frac{1}{16}$	<p>✓ toepassing van exp. wet</p> <p>✓ <math>4^3</math></p> <p>✓ vereenvoudiging</p> <p>✓ antwoord (4)</p> <p>✓ kwadrering</p> <p>✓ toepassing van eksp. wet</p> <p>✓ vereenvoudiging</p> <p>✓ antwoord (4)</p>

2.3	$\frac{x \cdot x^{\frac{1}{2}} \cdot x^{\frac{1}{4}} \cdot x^{\frac{1}{8}}}{\sqrt[8]{x^7}}$ $= \frac{x^{\frac{7}{8}}}{x^{\frac{7}{8}}}$ $= x$	✓ toepassing van wortel wet ✓ toepassing van wortel wet  ✓ vereenvoudiging  ✓ antwoord (4)
<b>[11]</b>		

**VRAAG 3**

3	$AC \cdot (x-2) = x^2 + 2x - 8$ $AC \cdot (x-2) = (x+4)(x-2)$ $AC = (x+4) \text{ cm}$ $\therefore FD = (x+4) \text{ cm}$ $\therefore ED = x+4 - (x-2)$ $ED = 6 \text{ cm}$	✓ stelling ✓ faktore ✓ $AC = (x+4) \text{ cm}$  ✓ metode ✓ antwoord (6)
<b>[6]</b>		

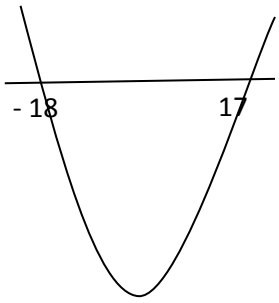
**VRAAG 4**

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

**VRAAG 5**

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

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

**VRAAG 6**

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

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

**VRAAG 7**

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

**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)  ✓ $y \geq -4$
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)

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

**VRAAG 9**

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

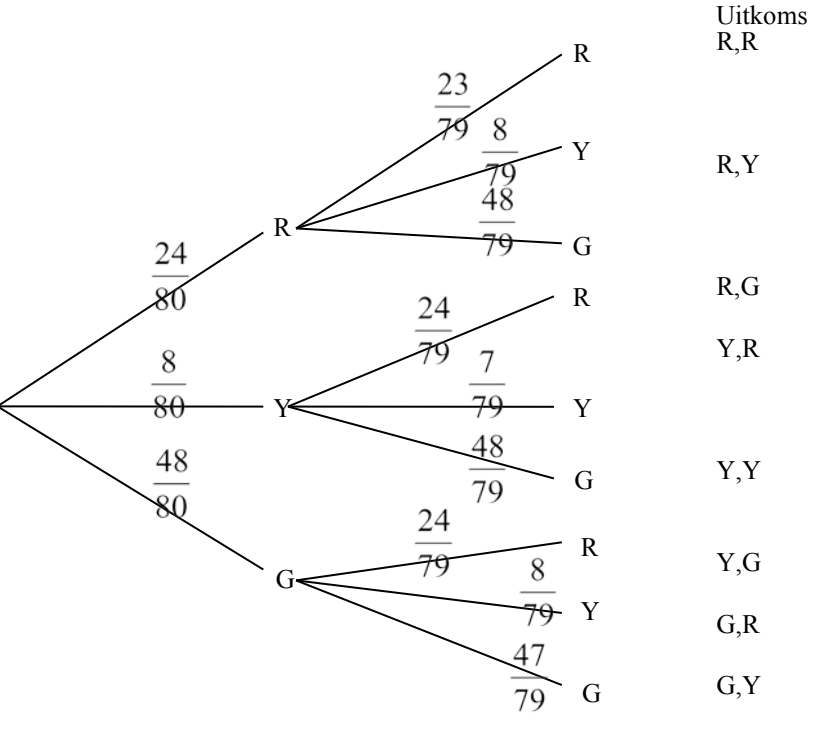


10.3.4	$P(\text{B of V}) = P(\text{B}) + P(\text{V}) - P(\text{B en V})$ $= \frac{84}{240} + \frac{82}{240} - \frac{15}{240}$ $= \frac{151}{240}$ <p><b>OF</b></p> $P(\text{B of V}) = \frac{17 + 52 + 12 + 3 + 9 + 58}{240}$ $= \frac{151}{240}$	$\checkmark \frac{84}{240}$ $\checkmark \frac{82}{240}$ $\checkmark \frac{15}{240}$ $\checkmark \frac{151}{240} (4)$  $\checkmark \checkmark$ teller en noemer $\checkmark \checkmark$ antwoord (4) <b>[12]</b>
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**VRAAG 11**

	$P(A \text{ of } B) = P(A) + P(B) - P(A \cap B)$ $0,428 = 0,12 + 0,35 - P(A \cap B)$ $P(A \cap B) = 0,042$ $P(A) \times P(B) = 0,12 \times 0,35 = 0,042$ $\therefore P(A \cap B) = P(A) \times P(B)$ <p>Dus is A en B onafhanklike gebeure</p>	$\checkmark$ substitusie $\checkmark$ waarde van $P(A \cap B)$ $\checkmark$ waarde van $P(A) \times P(B)$ $\checkmark$ afleiding (4) <b>[4]</b>
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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	$\checkmark 30\%$  $\checkmark 24$ (2)
12.2		Uitkoms R,R  R,Y  R,G Y,R  Y,Y  Y,G G,R G,Y  $\checkmark$ eerste tak $\checkmark$ tweede tak $\checkmark$ waardes op diagram (3)
12.3	$P(\text{G en Y}) = P(\text{G, Y}) + P(\text{Y, G})$ $= \frac{48}{80} \times \frac{8}{79} + \frac{8}{80} \times \frac{48}{79}$ $= \frac{48}{395}$	$\checkmark$ vermenigvuldig reel $\checkmark$ optel $\checkmark$ antwoord (3) <b>[8]</b>
		<b>TOTAAL: 150</b>