



# basic education

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

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

**GRADE/*GRAAD* 11**

**MATHEMATICS P1/*WISKUNDE V1***

**NOVEMBER 2015**

**MEMORANDUM**

**MARKS/*PUNTE*: 150**

**This memorandum consists of 19 pages.  
*Hierdie memorandum bestaan uit 19 bladsye.***

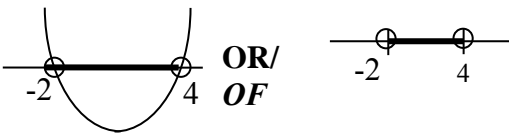
**NOTE:**

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- Assuming values/answers in order to solve a problem is unacceptable.

**LET WEL:**

- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde aan te neem om 'n probleem op te los.

**QUESTION/VRAAG 1**

1.1.1	$x^2 + x - 12 = 0$ $(x + 4)(x - 3) = 0$ $x = -4$ or $x = 3$	✓ factors/faktore ✓ answer/antwoord ✓ answer/antwoord (3)
1.1.2	$\sqrt{2x+1} = x-1$ $2x+1 = (x-1)^2$ $2x+1 = x^2 - 2x+1$ $x^2 - 4x = 0$ $x(x-4) = 0$ $x = 0$ or $x = 4$ $n/a$	✓ squaring both sides/ <i>kwadreer aan albei kante</i>  ✓ standard form/stand vorm ✓ factors/faktore ✓ answers/antwoord ✓ $x = 4$ (correct selection) <i>(korrekte keuse)</i> (5)
1.1.3	$2^{x\sqrt{x}} = 2^{27}$ $2^{x^{\frac{3}{2}}} = 2^{27}$ $x^{\frac{3}{2}} = 27$ $x = (27)^{\frac{2}{3}}$ $x = 9$	✓ $2^{x^{\frac{3}{2}}}$ ✓ $x^{\frac{3}{2}} = 27$ ✓ raise both sides to $\frac{2}{3}$ ✓ answer/antwoord (4)
1.1.4	$x^2 - 2x - 8 < 0$ $(x-4)(x+2) < 0$  <p style="text-align: center;"><b>OR/ OF</b></p> $-2 < x < 4$ <b>OR/ OF</b> $x \in (-2; 4)$	✓ $(x + 4)(x + 2) < 0$  ✓ critical values/krit wrdes ✓ inequalities/ongelykh (3)

<p>1.2.1</p>	$5x^2 + 6x - 7 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-6 \pm \sqrt{(6)^2 - 4(5)(-7)}}{2(5)}$ $= 0,73 \text{ or } -1,93$	<p>✓ formula/e</p> <p>✓ substitution</p> <p>✓✓ answers/antwoord (4)</p>
<p>1.2.2</p>	$5x^2 + 6x - d = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-6 \pm \sqrt{(6)^2 - 4(5)(-d)}}{2(5)}$ $36 + 20d = 0$ $d = -\frac{9}{5}$ <p><b>OR/OF</b> For equal roots/ vir gelyke wortels : <math>\Delta = 0</math></p> $\Delta = b^2 - 4ac$ $= (6)^2 - 4(5)(-d)$ $36 + 20d = 0$ $d = -\frac{9}{5}$ <p><b>OR/OF</b></p> $5x^2 + 6x - d = 0$ $x^2 + \frac{6x}{5} = \frac{d}{5}$ $\left(x + \frac{3}{5}\right)^2 = \frac{d}{5} + \frac{9}{25}$ $= \frac{5d + 9}{25}$ <p>For equal roots <math>\frac{5d + 9}{25} = 0</math></p> $\therefore 5d + 9 = 0$ $d = -\frac{9}{5}$	<p>✓ substitution</p> <p>✓ <math>36 + 20d = 0</math></p> <p>✓ answer/antwoord (3)</p> <p>✓ substitution</p> <p>✓ <math>36 + 20d = 0</math></p> <p>✓ answer/antwoord (3)</p> <p>✓ completing the square/ voltooi die kwadraat</p> <p>✓ <math>5d + 9 = 0</math></p> <p>✓ answer/antwoord (3)</p>

<p>1.3</p>	<p> <math>x = 2y - 3 \quad \dots (1)</math>  <math>xy = 20 \quad \dots (2)</math>                      substitute (1) into (2) :  <math>(2y - 3)y = 20</math>  <math>2y^2 - 3y - 20 = 0</math>  <math>(2y + 5)(y - 4) = 0</math>  <math>y = -\frac{5}{2} \quad \text{or} \quad y = 4</math>  <math>x = -8 \quad \text{or} \quad x = 5</math>   <b>OR/OF</b>  <math>x + 3 = 2y</math>  <math>y = \frac{x + 3}{2} \quad \dots (1)</math>  <math>xy = 20 \quad \dots (2)</math>                      substitute (1) into (2) :  <math>x\left(\frac{x + 3}{2}\right) = 20</math>  <math>x^2 + 3x = 40</math>  <math>x^2 + 3x - 40 = 0</math>  <math>(x + 8)(x - 5) = 0</math>  <math>x = -8 \quad \text{or} \quad x = 5</math>  <math>y = -\frac{5}{2} \quad \text{or} \quad y = 4</math>   <b>OR/OF</b>  <math>x - 2y = -3 \quad \dots (1)</math>  <math>y = \frac{20}{x} \quad \dots (2)</math>                      substitute (2) into (1) :  <math>x - 2\left(\frac{20}{x}\right) = -3</math>  <math>x^2 - 40 = -3x</math>  <math>x^2 + 3x - 40 = 0</math>  <math>(x + 8)(x - 5) = 0</math>  <math>x = -8 \quad \text{or} \quad x = 5</math>  <math>y = -\frac{5}{2} \quad \text{or} \quad y = 4</math> </p>	<p>                     ✓ making <math>x</math> the subject/  <i>maak <math>x</math> die o/w</i>                       ✓ substitution                      ✓ standard form/<i>stand vorm</i>                      ✓ factors/<i>faktore</i>                       ✓ <math>y</math>-values/<i>wrdes</i>                       ✓ <math>x</math>-values/<i>wrdes</i> (6)                 </p> <p>                     ✓ making <math>y</math> the subject/  <i>maak <math>y</math> die o/w</i>                       ✓ subst                       ✓ standard form/<i>stand vorm</i>                      ✓ factors/<i>faktore</i>                      ✓ <math>x</math>-values/<i>wrdes</i>                       ✓ <math>y</math>-values/<i>wrdes</i> (6)                 </p> <p>                     ✓ making <math>y</math> the subject/  <i>maak <math>y</math> die o/w</i>                       ✓ substitution                       ✓ standard form/<i>stand vorm</i>                      ✓ factors/<i>faktore</i>                       ✓ <math>x</math> values/<i>wrdes</i>                       ✓ <math>y</math> values/<i>wrdes</i> (6)                 </p>
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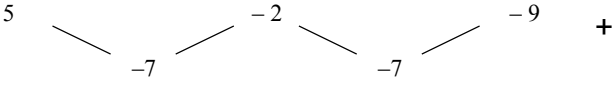
	$x - 2y = -3 \quad \dots (1)$ $x = \frac{20}{y} \quad \dots (2)$ <p>substitute (2) into (1):</p> $\frac{20}{y} - 2y = -3$ $20 - 2y^2 = -3y$ $0 = 2y^2 - 3y - 20$ $0 = (2y + 5)(y - 4)$ $y = -\frac{5}{2} \quad \text{or} \quad y = 4$ $x = -8 \quad \text{or} \quad x = 5$	<p>✓ making <math>x</math> the subject/ <i>maak <math>x</math> die o/w</i></p> <p>✓ subst</p> <p>✓ standard form/<i>stand vorm</i></p> <p>✓ factors/<i>faktore</i></p> <p>✓ <math>y</math> values/<i>wrdes</i> ✓ <math>x</math> values/<i>wrdes</i></p> <p style="text-align: right;">(6) [28]</p>
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**QUESTION/VRAAG 2**

<p>2.1.1</p>	$\frac{2^{n+2} \cdot 4^{n+1}}{8^{n-1}}$ $= \frac{2^{n+2} \cdot 2^{2n+2}}{2^{3n-3}}$ $= 2^{n+2+2n+2-(3n-3)}$ $= 2^7$ $= 128$ <p><b>OR/OF</b></p> $\frac{2^n \cdot 2^2 \cdot 4^n \cdot 4}{8^n \cdot 8^{-1}}$ $= \frac{8^n \cdot 2^2 \cdot 2^2}{8^n \cdot 2^{-3}}$ $= 2^7$ $= 128$	<p>✓ writing as prime bases/ <i>skryf as priembasisse</i></p> <p>✓ applying exponential laws/ <i>pas ekspon.wette toe</i></p> <p>✓ answer/antwoord (3)</p> <p>✓ writing as separate bases/ <i>skryf as aparte basisse</i></p> <p>✓ applying exponential laws/ <i>pas ekspon.wette toe</i></p> <p>✓ answer/antwoord (3)</p>
<p>2.1.2</p>	$\sqrt{x + \sqrt{2x-1}} \cdot \sqrt{x - \sqrt{2x-1}}$ $= \sqrt{(x + \sqrt{2x-1})(x - \sqrt{2x-1})}$ $= \sqrt{x^2 - 2x + 1}$ $= \sqrt{(x-1)^2}$ $= x - 1$ <p><b>OR/OF</b></p> <p>Let <math>\sqrt{2x-1} = k</math></p> $2x - 1 = k^2$ $\sqrt{x+k} \cdot \sqrt{x-k}$ $= \sqrt{(x^2 - k^2)}$ $= \sqrt{x^2 - 2x + 1}$ $= \sqrt{(x-1)^2}$ $= x - 1$	<p>✓ writing as one surd/ <i>skryf as een wortel</i></p> <p>✓ <math>\sqrt{x^2 - 2x + 1}</math></p> <p>✓ <math>\sqrt{(x-1)^2}</math></p> <p>✓ answer/antwoord (4)</p> <p>✓ writing as one surd/ <i>skryf as een wortel</i></p> <p>✓ <math>\sqrt{x^2 - 2x + 1}</math></p> <p>✓ <math>\sqrt{(x-1)^2}</math></p> <p>✓ answer/antwoord (4)</p>
<p>2.2.1</p>	<p>For P to be a real number, we cannot divide by 0 and <math>\frac{5}{x+2}</math> must be positive, i.e. we must have:</p> <p><i>Vir P om reël te wees, kan ons nie deur 0 deel nie en <math>\frac{5}{x+2}</math> moet positief wees, dus moet ons die vlg hê:</i></p> $x + 2 > 0$ $x > -2$	<p>✓ <math>x + 2 &gt; 0</math></p> <p>✓ answer/antwoord (2)</p>

2.2.2	$P = \sqrt{\frac{5}{x+2}} + \frac{x}{3}$ $= \sqrt{\frac{5}{3+2}} + \frac{3}{3}$ $= 1 + 1$ $= 2$	<p>✓ substitution <math>x = 3</math></p> <p>✓ answer/antwoord (2)</p>
2.3	$2^{2015} \times 5^{2019}$ $= 2^{2015} \times 5^{2015} \cdot 5^4$ $= 625 \times (2 \cdot 5)^{2015}$ $= 625 \times 10^{2015}$ $= 625\,000\,000\dots 0$ <p>∴ Sum of digits will be/Som van die getalle</p> $6 + 2 + 5 + 0 + 0 + 0 \dots + 0$ $= 13$	<p>✓ <math>5^4 \times 2^{2015} \times 5^{2015}</math></p> <p>✓ <math>10^{2015}</math></p> <p>✓ 625 000...0</p> <p>✓ answer/antwoord (4)</p> <p><b>[15]</b></p>

**QUESTION/VRAAG 3**

<p>3.1.1</p>	 <p>First difference/<i>Eerste verskil</i> <math>d = -7</math></p>	<p>✓ answer/<i>antwoord</i> (1)</p>
<p>3.1.2</p>	<p><math>T_4 = -16</math></p>	<p>✓ answer/<i>antwoord</i> (1)</p>
<p>3.1.3</p>	<p><math>T_n = -7n + 12</math>  <math>-289 = -7n + 12</math>  <math>7n = 301</math>  <math>n = 43</math></p>	<p>✓ <math>T_n = -7n + 12</math>                  ✓ <math>T_n = -289</math>                  ✓ answer/<i>antwoord</i> (3)</p>
<p>3.2.1</p>	<p><math>T_{22} = 64 + 3 + 3</math>  <math>= 70</math></p>	<p>✓ answer/<i>antwoord</i> (1)</p>
<p>3.2.2</p>	<p><math>T_{20} = 3n + b</math>  <math>64 = 3(20) + b</math>  <math>b = 4</math>  <math>T_n = 3n + 4</math>  <math>3T_5 - 2 = 3[3(5) + 4] - 2</math>  <math>= 55</math>  <math>3n + 4 = 55</math>  <math>3n = 51</math>  <math>n = 17</math></p> <p><b>OR/OF</b></p> <p><math>T_{20} = 3n + b</math>  <math>64 = 3(20) + b</math>  <math>b = 4</math>  <math>T_5 = 64 - 15(3)</math>  <math>= 19</math>  <math>T_n = 3T_5 - 2</math>  <math>3n + 4 = 3(19) - 2</math>  <math>3n = 51</math>  <math>n = 17</math></p>	<p>✓ <math>64 = 3(20) + b</math>                  ✓ <math>3[3(5) + 4] - 2</math>                  ✓ <math>3n + 4 = 55</math>                  ✓ <math>n = 17</math> (4)</p> <p>✓ <math>64 = 3(20) + b</math>                  ✓ 19                  ✓ <math>3n + 4 = 3(19) - 2</math>                  ✓ <math>n = 17</math> (4)</p>

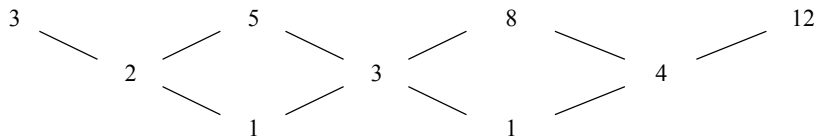


<p>3.3.1</p>		<p>✓ 93 ✓ 140 (2)</p>																		
<p>3.3.2</p>	<p> <math>T_n = 10n - 3</math>  <math>= (10n - 2) - 1</math>  <math>= 2(5n - 1) - 1</math> </p> <p>Since <math>10n - 2 = 2(5n - 1)</math>,  <math>10n - 2</math> is even for any value of <math>n</math>.              Thus <math>T_n</math> is always odd, since for any value of <math>n</math>, <math>T_n</math> is always one less than an even number</p> <p><i>Aangesien <math>10n - 2 = 2(5n - 1)</math>,              is <math>10n - 2</math> dus ewe vir enige waarde van <math>n</math>.              Dus <math>T_n</math> is altyd onewe, want vir enige waarde van <math>n</math>, is <math>T_n</math> altyd een minder as 'n ewe getal</i></p> <p><b>OR/OF</b></p> <p> <math>T_n = 10n - 3</math> </p> <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th><math>n</math></th> <th><math>10n</math></th> <th><math>T_n = 10n - 3</math></th> </tr> </thead> <tbody> <tr> <td>4</td> <td><math>10 \times 4 = 40</math></td> <td>37</td> </tr> <tr> <td>5</td> <td><math>10 \times 5 = 50</math></td> <td>47</td> </tr> <tr> <td>6</td> <td><math>10 \times 6 = 60</math></td> <td>57</td> </tr> <tr> <td>7</td> <td><math>10 \times 7 = 70</math></td> <td>67</td> </tr> <tr> <td>8</td> <td><math>10 \times 8 = 80</math></td> <td>77</td> </tr> </tbody> </table> <p style="display: inline-block; vertical-align: middle; margin-left: 10px;">or  <math>T_n = 10n - 3</math>  <math>7; 17; 27; 37; 47; 57; \dots</math></p> <p>                 The sequence of first differences, for all values of <math>n</math>, will always end in a 7, since they are all multiples of 10 (<math>10n</math>) less three.                  Any number ending in 7 is odd.                  Therefore all the terms in the sequence of first differences will be odd numbers.             </p> <p><b>OR/OF</b></p>	$n$	$10n$	$T_n = 10n - 3$	4	$10 \times 4 = 40$	37	5	$10 \times 5 = 50$	47	6	$10 \times 6 = 60$	57	7	$10 \times 7 = 70$	67	8	$10 \times 8 = 80$	77	<p>                     ✓ <math>T_n = 10n - 3</math>                      ✓ <math>10n - 2 = 2(5n - 1)</math> </p> <p>✓ explanation/verduidlkng (3)</p> <p>✓ <math>T_n = 10n - 3</math></p> <p>                     ✓ all answers end in 7/                      alle antwoord eindig in 7                      ✓ explanation/verduidlkng (any logical explanation/ enige logiese verduidlkng) (3)                 </p>
$n$	$10n$	$T_n = 10n - 3$																		
4	$10 \times 4 = 40$	37																		
5	$10 \times 5 = 50$	47																		
6	$10 \times 6 = 60$	57																		
7	$10 \times 7 = 70$	67																		
8	$10 \times 8 = 80$	77																		

	<p>Term 1 is odd and if the first difference of 10(even number) is added to an odd number, the answer remains odd.</p> <p><i>Die ry van eerste verskille, vir alle waardes van <math>n</math>, sal altyd in 7 eindig want hulle is almal veelvoude van 10 (<math>10n</math>) min drie.</i></p> <p><i>Enige getal wat in 7 eindig, is onewe.</i></p> <p><i>Daarom sal alle getalle in die ry van eerste verskille onewe getalle wees.</i></p> <p><b>OF</b></p> <p><i>Term 1 is 'n onewe getal en as die eerste verskil van 10(ewe getal) by 'n onewe getal getel word, bly die antwoordoord 'n onewe getal.</i></p>	<b>[15]</b>
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**QUESTION/VRAAG 4**

4.1



$$2a = 1$$

$$a = \frac{1}{2}$$

$$3\left(\frac{1}{2}\right) + b = 2$$

$$b = \frac{1}{2}$$

$$a + b + c = 3$$

$$\frac{1}{2} + \frac{1}{2} + c = 3$$

$$c = 2$$

$$T_n = \frac{n^2}{2} + \frac{n}{2} + 2$$

$$T_{26} = \frac{26^2}{2} + \frac{26}{2} + 2$$

$$= 353$$

**OR/OF**

$$T_n = T_1 + (n-1)d_1 + \frac{(n-1)(n-2)d_2}{2}$$

$$= 3 + (n-1)(2) + \frac{(n-1)(n-2)(1)}{2}$$

$$= 3 + 2n - 2 + \frac{n^2 - 3n + 2}{2}$$

$$= 2n + 1 + \frac{1}{2}n^2 - \frac{3}{2}n + 1$$

$$= \frac{1}{2}n^2 + \frac{1}{2}n + 2$$

$$T_n = \frac{n^2}{2} + \frac{n}{2} + 2$$

$$T_{26} = \frac{26^2}{2} + \frac{26}{2} + 2$$

$$= 353$$

$$\checkmark a = \frac{1}{2}$$

$$\checkmark b = \frac{1}{2}$$

$$\checkmark c = 2$$

$$\checkmark T_n = \frac{n^2}{2} + \frac{n}{2} + 2$$

✓ subst  $n = 26$

✓ answer/antwoord (6)

✓ formula/e

✓ substitution

✓ simplifying/vereenv

$$\checkmark T_n = \frac{n^2}{2} + \frac{n}{2} + 2$$

✓ substitution  $n = 26$

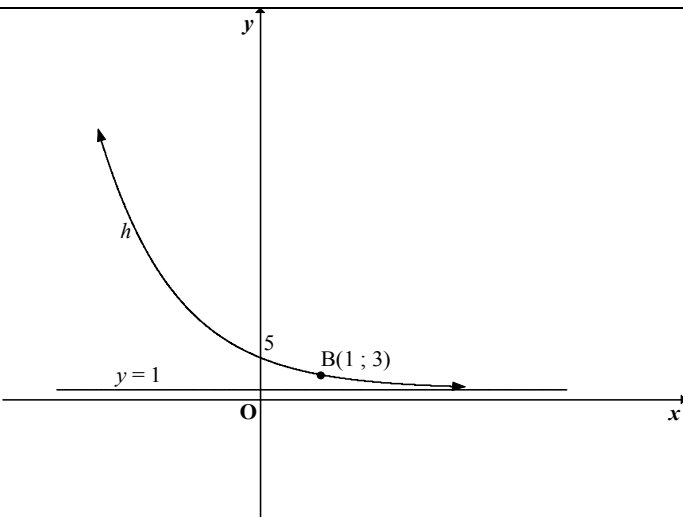
✓ answer/antwoord (6)

4.2	<p style="margin-top: 20px;"> <math>10 - (18 - p) = 4p - 28 - 10</math>  <math>10 - 18 + p = 4p - 28 - 10</math>  <math>3p = 30</math>  <math>p = 10</math> </p>	<p>✓ <math>T_3 = 28</math></p> <p>✓ <math>T_4 = 4p</math></p> <p>✓ <math>10 - (18 - p)</math></p> <p>✓ <math>4p - 28 - 10</math></p> <p>✓ equating</p> <p>✓ answer/antwoord (6)</p> <p style="text-align: right;"><b>[12]</b></p>
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**QUESTION/VRAAG 5**

5.1.1	$(1; -2)$	<p>✓ for/vir 1</p> <p>✓ for/vir - 2</p> <p style="text-align: right;">(2)</p>
5.1.2	<p>For <math>x</math>-intercept/Vir <math>x</math>-afsnit:</p> $0 = \frac{-9}{x-1} - 2$ $2 = \frac{-9}{x-1}$ $2(x-1) = -9$ $2x = -7$ $x = -\frac{7}{2} \quad \left(-\frac{7}{2}; 0\right)$ <p>For <math>y</math>-intercept/Vir <math>y</math>-afsnit:</p> $y = \frac{-9}{0-1} - 2$ $= 9 - 2$ $= 7 \quad (0; 7)$	<p>✓ <math>y = 0</math></p> <p>✓ simplification/vereenv</p> <p>✓ answer/antwoord</p> <p>✓ <math>x = 0</math></p> <p>✓ answer/antwoord (5)</p>
5.1.3	$y = -x - 1$	<p>✓ <math>-x</math></p> <p>✓ <math>-1</math></p> <p style="text-align: right;">(2)</p>

<p>5.1.4</p>	<p>Closest point is a point of intersection between the axis of symmetry and the hyperbola/<i>Naaste punt is 'n snypunt tussen die simmetrie-as en die hiperbool:</i></p> $-x-1 = \frac{-9}{x-1} - 2$ $-x+1 = \frac{-9}{x-1}$ $x-1 = \frac{9}{x-1}$ $(x-1)^2 = 9$ $x-1 = 3 \quad \text{or} \quad x-1 = -3$ $x = 4 \quad \quad \quad x = -2$ <p>in the fourth quadrant, <math>x &gt; 0</math>, hence <math>x = 4</math> only</p> $y = -4 - 1$ $y = -5$ <p>Point/<i>Punt</i> is <math>(4; -5)</math></p> <p><b>OR/OF</b></p> <p>Closest point is a point of intersection between the axis of symmetry and the hyperbola/<i>Naaste punt is 'n snypunt tussen die simmetrie-as en die hiperbool:</i></p> $-x-1 = \frac{-9}{x-1} - 2$ $(-x-1)(x-1) = -9 - 2(x-1)$ $-x^2 + 1 = -9 - 2x + 2$ $0 = x^2 - 2x - 8$ $0 = (x-4)(x+2)$ $x = 4 \quad \quad \quad x = -2$ <p>in the fourth quadrant, <math>x &gt; 0</math>, hence <math>x = 4</math> only</p> $y = -4 - 1$ $y = -5 \quad \quad \quad \text{Point is } (4; -5)$ <p><b>OR/OF</b></p> $y = \frac{-9}{x} \quad \xrightarrow{\text{translate 1 right and 2 down}} \quad f(x) = \frac{-9}{x-1} - 2$ <p>Under translation 1 right and 2 down, points in the fourth quadrant will stay in the fourth quadrant.          Since the origin becomes A under the translation 1 right and 2 down and the point in the fourth quadrant which is the closest point on <math>y = \frac{-9}{x}</math> to the origin is <math>(3; -3)</math>,          The closest point on <math>f</math> to A is <math>(3+1; -3-2)</math> i.e. <math>(4; -5)</math></p>	<p>✓ equating/vgl</p> <p>✓ <math>(x-1)^2 = 9</math></p> <p>✓ answers for/<i>antwoord vir</i> <math>x</math>              ✓ selects <math>x = 4</math> only/  <i>kies slegs</i> <math>x = 4</math></p> <p>✓ answer for/<i>antwoord vir</i> <math>y</math> (5)</p> <p>✓ equating/vgl</p> <p>✓ <math>0 = x^2 - 2x - 8</math></p> <p>✓ answers for/<i>antwoord vir</i> <math>x</math>              ✓ selects <math>x = 4</math> only/  <i>kies slegs</i> <math>x = 4</math>              ✓ answer for/<i>antwoord vir</i> <math>y</math> (5)</p> <p>✓ points in 4<sup>th</sup> quad stay in 4<sup>th</sup> quad              ✓ origin becomes A              ✓ closest point to origin on parent function is <math>(3; -3)</math>              ✓✓ answer/<i>antwoord</i> (5)</p>
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	<p>Onder die translasie 1 regs en 2 na onder, sal punte in die vierde kwadrant steeds in die vierde kwadrant wees. Die oorsprong word A onder die translasie 1 regs en 2 na onder, en die punt in die vierde kwadrant wat die naaste punt aan <math>y = \frac{-9}{x}</math> tot die oorsprong is, is <math>(3; -3)</math>. Die naaste punt op f aan A is <math>(3 + 1; -3 - 2)</math> d.i. <math>(4; -5)</math></p>	<p>✓ punte in 4<sup>de</sup> kwad bly in 4<sup>de</sup> kwad ✓ oorsprong word A ✓ naaste punt aan oorsprong op moederfunksie is <math>(3; -3)</math> ✓✓ answer/antwoord (5)</p>
5.1.5	$y = \frac{9}{x-1} + 2$	<p>✓ <math>\frac{9}{x-1}</math> ✓ +2 (2)</p>
5.2.1	<p>For y-intercept/Vir y-afsnit substitution <math>x = 0</math>: <math>y = 4.2^0 + 1</math> <math>= 5</math> H(0 ; 5)</p>	<p>✓ <math>x = 0</math> substitution into the equation/in die vgl ✓ <math>y = 5</math> (2)</p>
5.2.2	<p>For x-intercept/Vir y-afsnit <math>y = 0</math> i.e./d.i. <math>4.2^{-x} + 1 = 0</math> <math>4.2^{-x} = -1</math> <math>2^{-x} = -\frac{1}{4}</math>, which is impossible, since <math>2^{-x} &gt; 0</math> for <math>x \in R</math> , wat onmoontlik is omdat <math>2^{-x} &gt; 0</math> vir <math>x \in R</math> Therefore/Dus: no solution/geen oplossing, which means there will be no x-intercept/wat beteken daar sal geen x-afsnit wees nie.</p> <p><b>OR/OF</b></p> <p>The graph lies above its asymptote <math>y = 1</math> because the coefficient of <math>2^{-x}</math> is 4/Die grafiek lê bokant sy asimptoot <math>y = 1</math> want die koëffisiënt van <math>2^{-x}</math> is 4.</p> <p><b>OR/OF</b></p> <p>The range is <math>(1 ; \infty)</math> or <math>y &gt; 1</math> Die waardeversameling is <math>(1 ; \infty)</math> of <math>y &gt; 1</math></p>	<p>✓ <math>4.2^{-x} + 1 = 0</math> ✓ <math>2^{-x} = -\frac{1}{4}</math> and explanation/en verduideliking (2)</p> <p>✓ above/bokant ✓ <math>y = 1</math> (2)</p> <p>✓✓ correct range/korrekte waardeversameling (2)</p>
5.2.3		<p>✓ shape/vorm ✓ y-intercept and other point/y-afsnit en ander punt ✓ asymptote/asimptoot (3)</p>

5.2.4	$g(x) = 4(2^{-x} + 2)$ $= 4 \cdot 2^{-x} + 8$ <p>The graph of <math>h</math> is translated 7 units upwards to form <math>g</math>/ Die grafiek van <math>h</math> word 7 eenhede na bo getransleer om <math>g</math> te vorm.</p>	✓ 7 units/eenhede ✓ upwards/opwaarts (2) <b>[25]</b>
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**QUESTION/VRAAG 6**

6.1	$y = a(x - 2)^2 + 9$ <p>Substitution (0; 5):</p> $5 = a(0 - 2)^2 + 9$ $5 = 4a + 9$ $a = -1$ $y = -1(x - 2)^2 + 9$ $= -(x^2 - 4x + 4) + 9$ $= -x^2 + 4x + 5$	✓ substitution coordinates of TP ✓ substitution of/van (0; 5) ✓ value of/waarde van $a$ ✓ simplification/vereenv (4)
6.2	<p>Average Gradient = <math>\frac{9-5}{2-0}</math> or <math>\frac{5-9}{0-2}</math></p> $= 2$	✓ $\frac{9-5}{2-0}$ or $\frac{5-9}{0-2}$ ✓ answer/antwoord (2)
6.3	<p><math>x</math>-intercepts of/<math>x</math>-afsnitte van <math>f</math>:</p> $\frac{1}{2}x^2 - 8 = 0$ $x^2 = 16$ $x = 4 \text{ or } -4$ <p>At/By B: <math>x = -4</math></p> <p><math>x</math>-intercepts of/<math>x</math>-afsnitte van <math>g</math>:</p> $-x^2 + 4x + 5 = 0$ $x^2 - 4x - 5 = 0$ $(x - 5)(x + 1) = 0$ $x = -1 \text{ or } 5$ <p>At/By D: <math>x = 5</math></p> <p>Length of/Lengte van BD: <math>4 + 5 = 9</math></p>	✓ $\frac{1}{2}x^2 - 8 = 0$ ✓ $-4$ ✓ factors/faktore ✓ 5 ✓ answer/antwoord (5)
6.4.1	$x \leq -4 \text{ or } x \geq 4$	✓ $x \leq -4$ ✓ $x \geq 4$ (2)
6.4.2	$0 < x < 2$	✓ endpoints/eindpunte ✓ notation/notasie (2) <b>[15]</b>

**QUESTION/VRAAG 7**

7.1	$CD = 2x + 3 - (-2x^2 + 14x + k)$ $= 2x + 3 + 2x^2 - 14x - k$ $= 2x^2 - 12x + 3 - k$	$\checkmark\checkmark f(x) - g(x)$  $\checkmark$ answer/antwoord (3)
7.2	<p>Minimum value occurs at/<i>Minimum waarde vind plaas by</i></p> $x = \frac{-b}{2a}$ $= \frac{12}{2(2)}$ $= 3$ <p>Minimum value/<i>Minimum waarde</i></p> $5 = 2(3)^2 - 12(3) + 3 - k$ $5 = 18 - 36 + 3 - k$ $k = -20$ <p><b>OR/OF</b></p> $CD = 2x^2 - 12x + 3 - k$ $= 2(x^2 - 6x) + 3 - k$ $= 2[(x - 3)^2 - 9] + 3 - k$ $= 2(x - 3)^2 - 18 + 3 - k$ $= 2(x - 3)^2 - 15 - k$ <p>Hence the minimum value of CD is <math>-15 - k</math>  The minimum value of CD is given to be 5  <i>Vervolgens is die minimum waarde van CD <math>-15 - k</math></i>  <i>Die minimum waarde van CD is gegee as 5</i></p> $5 = -15 - k$ $k = -20$	$\checkmark x = \frac{-b}{2a}$  $\checkmark$ x-value for minimum <i>x-waarde vir minimum</i> $\checkmark$ subst 5  $\checkmark$ answer/antwoord (4)   $\checkmark 2(x - 3)^2$  $\checkmark CD = 2(x - 3)^2 - 15 - k$   $\checkmark 5 = -15 - k$ $\checkmark$ answer/antwoord (4) <b>[7]</b>

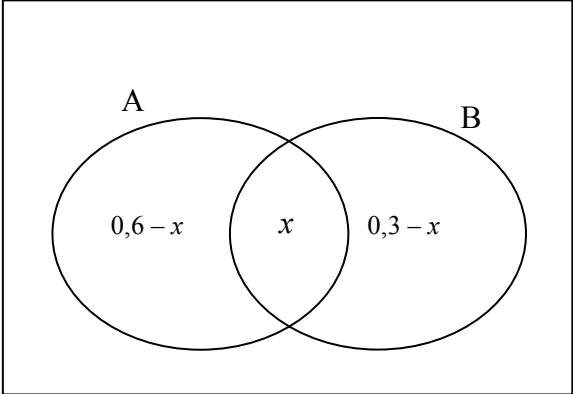


**QUESTION/VRAAG 8**

8.1	$A = P(1+i)^n$ $= 140\,000(1+0,061)^4$ $= R177\,414,69$	✓ 140 000 ✓ $(1 + 0,061)^4$ ✓ answer/antwoord (3)
8.2	$1 + i_{eff} = \left(1 + \frac{0,07}{2}\right)^2$ $1 + i_{eff} = (1 + 0,035)^2$ $i_{eff} = (1 + 0,035)^2 - 1$ $= 0,071225$ <p>The effective interest rate/Die effektiewe rentekoers is 7,12% p.a.</p>	✓ $\frac{0,07}{2}$ ✓ $1 + i_{eff} = (1 + 0,035)^2$ ✓ answer/antwoord (3)
8.3	$A = 24000\left(1 + \frac{0,105}{12}\right)^{48} - 7000\left(1 + \frac{0,105}{12}\right)^{30}$ $= R27\,369,56$ <p><b>OR/OF</b></p> $A = \left[24000\left(1 + \frac{0,105}{12}\right)^{18} - 7000\right]\left(1 + \frac{0,105}{12}\right)^{30}$ $= R27\,369,56$ <p><b>OR/OF</b></p> $A_{\text{after 18 months}} = 24000\left(1 + \frac{0,105}{12}\right)^{18}$ $= R28\,074,70$ $R28\,074,70 - R7000 = R21\,074,70$ $A_{\text{after 4 years}} = 21\,074,70\left(1 + \frac{0,105}{12}\right)^{30}$ $= R27\,369,56$	✓ $\frac{0,105}{12}$ ✓ $n=48$ ✓ $n=30$ ✓ correct substitution into correct formula/korr subst in korr formule ✓ answer/antwoord (5) ✓ $\frac{0,105}{12}$ ✓ $n=18$ ✓ $n=30$ ✓ correct substitution into correct formula/korr subst in korr formule ✓ answer/antwoord (5) ✓ $\frac{0,105}{12}$ ✓ $n=18$ ✓ 21 074,70 ✓ $n=30$ ✓ answer/antwoord (5)
8.4	$102\,755,34 = 198\,000\left(1 - \frac{r}{100}\right)^3$ $\sqrt[3]{\frac{102\,755,34}{198\,000}} = 1 - \frac{r}{100}$ $1 - \frac{r}{100} = 0,8036119818$ $-\frac{r}{100} = -0,1963880182$ $r = 19,64\%$	✓ formula ✓ correct substitution into correct formula/korr subst in korr formule ✓ $n = 3$ ✓ $\sqrt[3]{\frac{102\,755,34}{198\,000}} = 1 - \frac{r}{100}$ ✓ answer/antwoord (5)

**[16]**

**QUESTION/VRAAG 9**

<p>9.1</p>	<p>Given/Gegee: <math>P(A) = 0,6</math>  <math>P(B) = 0,3</math>  <math>P(A \text{ or } B) = 0,8</math></p> <p><math>P(A \text{ and/en } B) = 0,6 + 0,3 - 0,8 = 0,1 \neq 0</math>  Therefore A and B are not mutually exclusive.  <i>Dus is A en B nie onderling uitsluitend nie</i></p> <p><b>OR/OF</b></p>  <p><math>0,6 - x + x + 0,3 - x = 0,8</math>  <math>0,9 - x = 0,8</math>  <math>x = 0,1</math></p> <p>There is an intersection between A and B/<i>Daar is snyding tussen A en B</i>  Therefore A and B are not mutually exclusive/<i>Dus is A en B nie onderling uitsluitend nie.</i></p>	<p>✓✓ <math>P(A \text{ and/en } B) = 0,1</math>  ✓ justification/regv  ✓ Not mutually exclusive/<i>Nie onderling uitsluitend</i>  (4)</p> <p>✓ Venn diagram</p> <p>✓ <math>x = 0,1</math></p> <p>✓ justification/regv  ✓ Not mutually exclusive/<i>Nie onderling uitsluitend</i>  (4)</p>
<p>9.2.1a</p>	<p><math>\frac{1832}{2646} = 69,24\%</math></p>	<p>✓ 1832  ✓ 2646  (2)</p>
<p>9.2.1b</p>	<p><math>\frac{460}{2646} = \frac{230}{1323} = 17,38\%</math></p>	<p>✓ answer/antwoord  (1)</p>
<p>9.2.1c</p>	<p><math>\frac{340 + 14}{2646} = \frac{59}{441} = 13,38\%</math></p>	<p>✓✓ answer/antwoord  (2)</p>

9.2.2	<p>Let the event of a randomly selected person living in Area 1 be A. Let the event of a randomly selected person earning less than R3 200 be B. <i>Laat die gebeurtenis van 'n persoon wat willekeurig gekies is wat in Gebied 1 woon, A wees.</i> <i>Laat die gebeurtenis van 'n persoon wat willekeurig gekies is wat minder as R3 200 verdien, B wees.</i></p> $P(A \text{ and } B) = \frac{500}{2646} = 18,90\%$ $P(A) \times P(B) = \frac{1832}{2646} \times \frac{960}{2646} = 25,12\%$ <p>Clearly/Duidelik, <math>P(A \text{ and } B) \neq P(A) \times P(B)</math> Hence A and B are not independent/<i>Vervolgens is A en B nie onafhanklik nie.</i></p> <p><b>OR/OF</b></p> <p>Let the event of a randomly selected person living in Area 2 be C. Let the event of a randomly selected person earning less than R3200 be D. <i>Laat die gebeurtenis van 'n persoon wat willekeurig gekies is wat in Gebied 2 woon, C wees.</i> <i>Laat die gebeurtenis van 'n persoon wat willekeurig gekies is wat minder as R3 200 verdien, D wees.</i></p> $P(C \text{ and } D) = \frac{460}{2646} = 17,38\%$ $P(C) \times P(D) = \frac{814}{2646} \times \frac{960}{2646} = 11,16\%$ <p>Clearly, <math>P(C \text{ and } D) \neq P(C) \times P(D)</math> Hence C and D are not independent/<i>Vervolgens is C en D nie onafhanklik nie.</i></p>	<p>✓ P(A and B) ✓ P(A) ✓ P(B) ✓ P(A) × P(B)</p> <p>✓ conclusion with justification/<i>gevolgtrekking met motivering</i> (5)</p> <p>✓ P(C and D) ✓ P(C) ✓ P(D) ✓ P(C) × P(D)</p> <p>✓ conclusion with justification/<i>gevolgtrekking met motivering</i> (5)</p>
9.2.3	$P(\text{Area 1 person earns less than R3200}) = \frac{500}{1832} = 27,29\%$ $P(\text{Area 2 person earns less than R3200}) = \frac{460}{814} = 56,51\%$ <p>A person from Area 2 is more likely to earn less than R3200</p> $P(\text{Gebied 1 persoon verdien minder as R3200}) = \frac{500}{1832} = 27,29\%$ $P(\text{Gebied 2 persoon verdien minder as R3200}) = \frac{460}{814} = 56,51\%$ <p><i>Dis meer waarskynlik dat 'n persoon uit Gebied 2 minder as R3 200 sal verdien.</i></p>	<p>✓ 27,29% ✓ 56,51%</p> <p>✓ conclusion/vgl (3)</p>

[17]

**TOTAL/TOTAAL: 150**