



# basic education

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

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 10**

**MATHEMATICS P1**

**EXEMPLAR 2012**

**MEMORANDUM**

**MARKS: 100**

**This memorandum consists of 7 pages.**

## QUESTION 1

1.1.1	$(m - 2n)(m^2 - 6mn - n^2)$ $= m^3 - 6m^2n - mn^2 - 2m^2n + 12mn^2 + 2n^3$ $= m^3 - 8m^2n + 11mn^2 + 2n^3$	<ul style="list-style-type: none"> <li>✓ expansion</li> <li>✓ <math>m^3</math> ; <math>+2n^3</math></li> <li>✓ <math>-8m^2n + 11mn^2</math></li> </ul>	(3)
1.1.2	$\frac{x^3 + 1}{x^2 - x + 1} - \frac{4x^2 - 3x - 1}{4x + 1}$ $= \frac{(x+1)(x^2 - x + 1)}{x^2 - x + 1} - \frac{(4x+1)(x-1)}{4x+1}$ $= x+1 - (x-1)$ $= 2$	<ul style="list-style-type: none"> <li>✓✓ <math>(x+1)(x^2 - x + 1)</math></li> <li>✓ <math>(4x+1)(x-1)</math></li> <li>✓ <math>x+1 - (x-1)</math></li> <li>✓ answer</li> </ul>	(5)
1.2.1	$6x^2 - 7x - 20$ $= (3x + 4)(2x - 5)$	<ul style="list-style-type: none"> <li>✓ <math>(3x + 4)</math></li> <li>✓ <math>(2x - 5)</math></li> </ul>	(2)
1.2.2	$a^2 + a - 2ab - 2b$ $= a(a + 1) - 2b(a + 1)$ $= (a + 1)(a - 2b)$	<ul style="list-style-type: none"> <li>✓ grouping</li> <li>✓ <math>(1 + a)</math></li> <li>✓ <math>(a - 2b)</math></li> </ul>	(3)
1.3	<p>Since <math>7^2 = 49</math> and <math>8^2 = 64</math> and  <math>49 &lt; 51 &lt; 64</math>,  <math>7 &lt; \sqrt{51} &lt; 8</math>  i.e. <math>\sqrt{51}</math> lies between 7 and 8</p>	<ul style="list-style-type: none"> <li>✓ <math>49 &lt; 51 &lt; 64</math></li> <li>✓ answer</li> </ul>	(2)
1.4	<p>Let <math>x = 0,2\dot{4}5</math>  Then <math>1000x = 245,2\dot{4}5</math>  i.e. <math>999x = 245</math>  i.e. <math>x = \frac{245}{999}</math>  Therefore <math>x</math> is a rational number.</p>	<ul style="list-style-type: none"> <li>✓ introduce variable</li> <li>✓ <math>1000x = 245,2\dot{4}5</math></li> <li>✓ <math>999x = 245</math></li> <li>✓ <math>x = \frac{245}{999}</math></li> </ul>	(4) <b>[19]</b>

**QUESTION 2**

<p>2.1.1</p>	$x^2 - 4x = 21$ $x^2 - 4x - 21 = 0$ $(x + 3)(x - 7) = 0$ $x + 3 = 0 \quad \text{or} \quad x - 7 = 0$ $x = -3 \quad \quad \quad x = 7$	<p>✓ standard form ✓ factors</p> <p>✓ answers</p> <p>(3)</p>
<p>2.1.2</p>	$96 = 3x^{\frac{5}{4}}$ $32 = x^{\frac{5}{4}}$ $x = (32)^{\frac{4}{5}}$ $= (2^5)^{\frac{4}{5}}$ $= 2^4$ $= 16$	<p>✓ <math>32 = x^{\frac{5}{4}}</math> ✓ <math>x = (32)^{\frac{4}{5}}</math></p> <p>✓ answer</p> <p>(3)</p>
<p>2.1.3</p>	$R = \frac{2\sqrt{x}}{3S}$ $\frac{3RS}{2} = \sqrt{x}$ $x = \frac{9R^2S^2}{4}$	<p>✓ Multiply by 3S and divide by 2 ✓ Squaring both sides</p> <p>(2)</p>
<p>2.2</p>	<p><math>6q + 7p = 3</math>.....Equation 1 <math>2q + p = 5</math>.....Equation 2</p> <p><math>6q + 7p = 3</math>.....Equation 1 <math>14q + 7p = 35</math>.....multiply Equation 2 with 7 .....Equation 3</p> <p>Equation 3 – Equation 1:</p> <p><math>8q = 32</math> <math>q = 4</math></p> <p><math>2(4) + p = 5</math> <math>p = -3</math></p>	<p>✓ <math>14q + 7p = 35</math></p> <p>✓ <math>8q = 32</math> ✓ <math>q = 4</math></p> <p>✓ substitution ✓ <math>p = -3</math></p> <p>(5) <b>[13]</b></p>

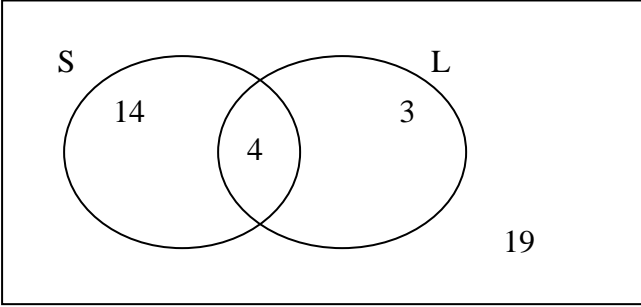
**QUESTION 3**

3.1.1	10 ; 6 ; 2	<ul style="list-style-type: none"> <li>✓ 10</li> <li>✓ 6</li> <li>✓ 2</li> </ul> <p style="text-align: right;">(3)</p>	
3.1.2	$d = -4$  $T_n = -4n + 14$	<ul style="list-style-type: none"> <li>✓ <math>-4n</math></li> <li>✓ 14</li> </ul> <p style="text-align: right;">(2)</p>	
3.1.3	$-4n + 14 < -31$ $-4n < -45$ $n > 11,25$ $n = 12$	<ul style="list-style-type: none"> <li>✓ <math>-4n + 14 &lt; -31</math></li> <li>✓ <math>n &gt; 11,25</math></li> <li>✓ answer</li> </ul> <p style="text-align: right;">(3)</p>	
3.2	$T_n = 6n$ $T_{13} = 6(13)$ $= 78$	<p style="text-align: center;"><b>OR</b></p> $T_n = 3n$ $T_{26} = 3(26)$ $= 78$	<ul style="list-style-type: none"> <li>✓ <math>6n</math></li> <li>✓ substitution of 13</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(3)</p> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>✓ <math>3n</math></li> <li>✓ substitution of 26</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(3)</p> <p style="text-align: right;"><b>[11]</b></p>

**QUESTION 4**

4.1	$A = P(1+i)^n$ $= 4500 \left(1 + \frac{4.25}{100}\right)^{2.5}$ $= R\ 4993.47$	<ul style="list-style-type: none"> <li>✓ <math>n = 2.5</math></li> <li>✓ substitution</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(3)</p>
4.2.1	Loan amount = R5 999 – R600 $= R5\ 399$  Total amount owed = $5\ 399[1+(0,08)(1,5)]$ $= R6\ 046,88$  Monthly instalment = $\frac{6046.88}{18}$ $= R335,94$	<ul style="list-style-type: none"> <li>✓ <math>y = 0</math></li> <li>✓ 5 399</li> <li>✓ <math>n = 1,5</math></li> <li>✓ Substitution</li> <li>✓ R6 046,88</li> <li>✓ <math>\div 18</math></li> <li>✓ R335,94</li> </ul> <p style="text-align: right;">(6)</p>
4.2.2	$R6\ 046,88 - R5\ 399$ $= R647,88$	<ul style="list-style-type: none"> <li>✓ answer</li> </ul> <p style="text-align: right;">(1)</p>
4.3	$1\ \text{kg} = 1\ 000\ \text{g}$ $\frac{1000}{28,35} = 35,27336861\dots$ ounces $35,27336861\dots \times 978,34 \times 8,79$ $= R303\ 337,16$	<ul style="list-style-type: none"> <li>✓ conversion</li> <li>✓ division</li> <li>✓ multiplication</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(4)</p> <p style="text-align: right;"><b>[14]</b></p>

**QUESTION 5**

5.1.1	$A \cap B$ <b>OR</b> A and B	✓ answer (1)
5.1.2	$A'$ <b>OR</b> not A	✓ answer (1)
5.2	B	✓ answer (1)
5.3.1	19 learners are right-handed and do not play soccer.	✓ answer (1)
5.3.2		✓ 15 ✓ 4 ✓ 2 ✓ 19 (4)
5.3.3 (a)	$P(L \text{ OR } S) = \frac{14+4+3}{40}$ $= \frac{21}{40}$	✓ $15 + 4 + 2$ ✓ 40 ✓ answer (3)
5.3.3 (b)	$P(R \text{ AND } S) = \frac{14}{40}$ $= \frac{7}{20}$	✓ $\frac{15}{40}$ ✓ answer (2) <b>[13]</b>

**QUESTION 6**

<p>6.1</p>		<ul style="list-style-type: none"> <li>✓ shape of <math>f</math></li> <li>✓ <math>x</math>-int of <math>f</math></li> <li>✓ <math>x</math>-intercept of <math>g</math></li> <li>✓ <math>y</math>-intercept of <math>g</math></li> </ul> <p style="text-align: right;">(4)</p>
<p>6.2</p>	<p><math>x = 0</math> and <math>y = 1</math></p>	<ul style="list-style-type: none"> <li>✓ answer</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(2)</p>
<p>6.3</p>	<p><math>(-\infty ; 0) \cup (0 ; \infty)</math></p>	<ul style="list-style-type: none"> <li>✓ values</li> <li>✓ notation</li> </ul> <p style="text-align: right;">(2)</p>
<p>6.4</p>	$\frac{3}{x} + 1 = -2x - 4$ $\frac{3}{x} = -2x - 5$ $3 = -2x^2 - 5x$ $2x^2 + 5x + 3 = 0$ $(2x + 3)(x + 1) = 0$ $x = -\frac{3}{2} \text{ or } x = -1$	<ul style="list-style-type: none"> <li>✓ <math>\frac{3}{x} + 1 = -2x - 4</math></li> <li>✓ standard form</li> <li>✓ factors</li> <li>✓✓ answers</li> </ul> <p style="text-align: right;">(5)</p>
<p>6.5</p>	$-1 \leq -2x - 4 < 3$ $3 \leq -2x < 7$ $-1,5 \geq x > -3,5$ $-3,5 < x \leq -1,5$ <p style="text-align: center;">OR <math>x \in (-3,5 ; -1,5]</math></p>	<ul style="list-style-type: none"> <li>✓</li> <li><math>-1 \leq -2x - 4 &lt; 3</math></li> <li>✓ <math>3 \leq -2x &lt; 7</math></li> <li>✓ answer</li> </ul> <p style="text-align: right;">(3)</p>
<p>6.6</p>	$k(x) = 2(-2x - 4)$ $= -4x - 8$ <p><math>y</math>-intercept: <math>(0 ; -8)</math></p>	<ul style="list-style-type: none"> <li>✓ equation of <math>k(x)</math></li> <li>✓ answer</li> </ul> <p style="text-align: right;">(2)</p>
<p>6.7</p>	<p><math>x</math>-intercept: <math>(2 ; 0)</math> <math>y</math>-intercept: <math>(0 ; -4)</math></p>	<ul style="list-style-type: none"> <li>✓ <math>x</math>-intercept</li> <li>✓ <math>y</math>-intercept</li> </ul> <p style="text-align: right;">(2) <b>[20]</b></p>

**QUESTION 7**

7.1	$C(-2; 0)$	✓ answer (1)
7.2	$f(x) = ax^2 + q$ $f(x) = a(x^2 - 4)$ $2,5 = a((-3)^2 - 4)$ $2,5 = 5a$ $a = \frac{1}{2}$ $f(x) = \frac{1}{2}(x^2 - 4)$	✓ $f(x) = a(x^2 - 16)$ ✓ substitution of $(-5; 2,25)$ ✓ answer (3)
7.3	Range of $f$ : $[-2; \infty)$	✓ answer (1)
7.4	Range of $h$ : $(-\infty; 0]$	✓ notation ✓ critical values (2)
7.5	$g(x) = b^x - 4$ $0 = b^2 - 4$ $4 = b^2$ $b = 2$ $g(x) = 2^x - 4$	✓ $g(x) = b^x - 4$ ✓ substitution  ✓ answer (3) <b>[10]</b>

**TOTAL: 100**