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 | $(m-2n)(m^2-6mn-n^2)$ <br><br> $= m^3 - 6m^2n - mn^2 - 2m^2n + 12mn^2 + 2n^3$ <br><br> $= m^3 - 8m^2n + 11mn^2 + 2n^3$ | ✓ expansion <br> ✓ $m^3$ ; $+2n^3$ <br> ✓ $-8m^2n + 11mn^2$ <br><br> (3) |
|---|---|---|
| 1.1.2 | $\dfrac{x^3+1}{x^2-x+1} - \dfrac{4x^2-3x-1}{4x+1}$ <br><br> $= \dfrac{(x+1)(x^2-x+1)}{x^2-x+1} - \dfrac{(4x+1)(x-1)}{4x+1}$ <br><br> $= x+1-(x-1)$ <br><br> $= 2$ | ✓✓ $(x+1)(x^2-x+1)$ <br> ✓ $(4x+1)(x-1)$ <br><br> ✓ $x+1-(x-1)$ <br><br> ✓ answer <br><br> (5) |
| 1.2.1 | $6x^2 - 7x - 20$ <br><br> $= (3x+4)(2x-5)$ | ✓ $(3x+4)$ <br> ✓ $(2x-5)$ <br><br> (2) |
| 1.2.2 | $a^2 + a - 2ab - 2b$ <br><br> $= a(a+1) - 2b(a+1)$ <br><br> $= (a+1)(a-2b)$ | ✓ grouping <br> ✓ $(1+a)$ <br> ✓ $(a-2b)$ <br><br> (3) |
| 1.3 | Since $7^2 = 49$ and $8^2 = 64$ and <br> $49 < 51 < 64$, <br> $7 < \sqrt{51} < 8$ <br> i.e. $\sqrt{51}$ lies between 7 and 8 | ✓ $49 < 51 < 64$ <br> ✓ answer <br><br> (2) |
| 1.4 | Let $\qquad x = 0,\dot{2}4\dot{5}$ <br> Then $1000x = 245,\dot{2}4\dot{5}$ <br> i.e. $\quad 999x = 245$ <br> i.e. $\qquad x = \dfrac{245}{999}$ <br> Therefore $x$ is a rational number. | ✓ introduce variable <br> ✓ $1000x = 245,\dot{2}4\dot{5}$ <br> ✓ $999x = 245$ <br> ✓ $x = \dfrac{245}{999}$ <br><br> (4) <br> **[19]** |

## QUESTION 2

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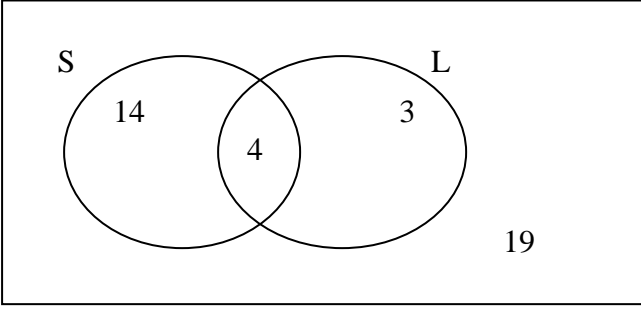
**QUESTION 3**

| 3.1.1 | 10 ; 6 ; 2 | ✓ 10 ✓ 6 ✓ 2 (3) |
|---|---|---|
| 3.1.2 | $d = -4$ $\quad$ $T_n = -4n + 14$ | ✓ $-4n$ ✓ 14 (2) |
| 3.1.3 | $-4n + 14 < -31$ $\quad -4n < -45$ $\quad n > 11{,}25$ $\quad n = 12$ | ✓ $-4n + 14 < -31$ ✓ $n > 11{,}25$ ✓ answer (3) |
| 3.2 | $T_n = 6n$ $\qquad\qquad\qquad$ $T_n = 3n$ $T_{13} = 6(13)$ $\quad$ **OR** $\quad$ $T_{26} = 3(26)$ $\quad = 78$ $\qquad\qquad\qquad = 78$ | ✓ $6n$ ✓ substitution of 13 ✓ answer (3) **OR** ✓ $3n$ ✓ substitution of 26 ✓ answer (3) **[11]** |
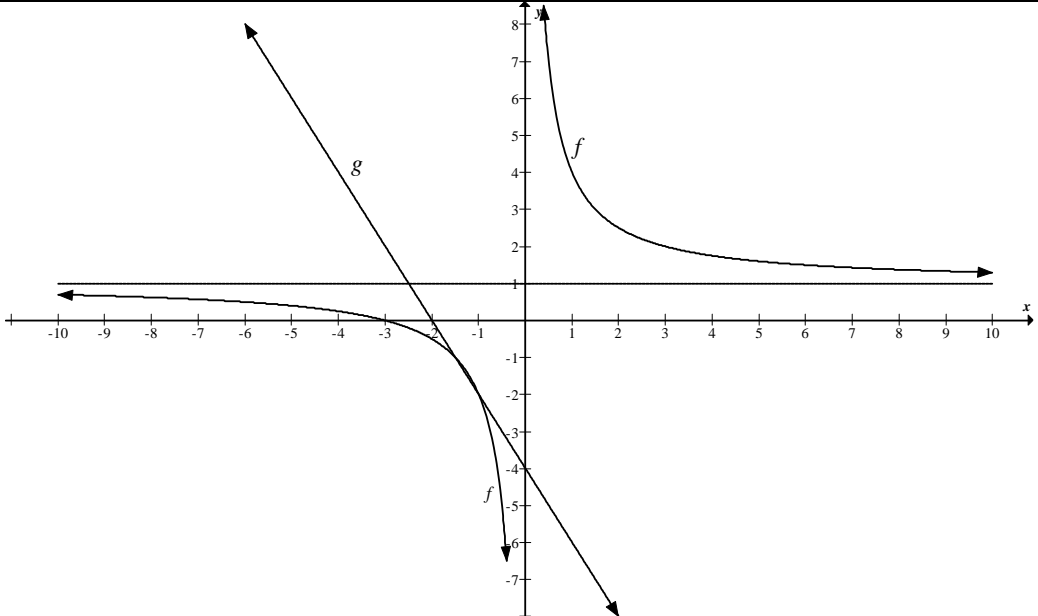
**QUESTION 4**

| 4.1 | $A = P(1+i)^n$ $\quad = 4500\left(1 + \dfrac{4.25}{100}\right)^{2.5}$ $\quad = R\,4993.47$ | ✓ $n = 2.5$ ✓ substitution ✓ answer (3) |
|---|---|---|
| 4.2.1 | Loan amount = R5 999 – R600 $\qquad\qquad$ = R5 399 Total amount owed = 5 399[1+(0,08)(1,5)] $\qquad\qquad\qquad$ = R6 046,88 Monthly instalment $= \dfrac{6046.88}{18}$ $\qquad\qquad\qquad = R335{,}94$ | ✓ $y = 0$ ✓ 5 399 ✓ $n = 1,5$ ✓ Substitution ✓ R6 046,88 ✓ ÷ 18 ✓ R335,94 (6) |
| 4.2.2 | R6 046,88 - R5 399 = R647,88 | ✓ answer (1) |
| 4.3 | 1 kg = 1 000 g $\dfrac{1000}{28{,}35} = 35{,}27336861\ldots$ ounces $35{,}27336861\ldots$ x 978,34 x 8,79 = R303 337,16 | ✓ conversion ✓ division ✓ multiplication ✓ answer (4) **[14]** |

**QUESTION 5**

| 5.1.1 | $A \cap B$ **OR** A and B | ✓ answer (1) |
|---|---|---|
| 5.1.2 | $A^{/}$ **OR** 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<br>✓ 4<br>✓ 2<br>✓ 19<br><br>(4) |
| 5.3.3 (a) | $P(L \text{ OR } S) = \dfrac{14 + 4 + 3}{40}$<br><br>$= \dfrac{21}{40}$ | ✓ 15 + 4 + 2<br>✓ 40<br>✓ answer<br><br>(3) |
| 5.3.3 (b) | $P(R \text{ AND } S) = \dfrac{14}{40}$<br><br>$= \dfrac{7}{20}$ | ✓ $\dfrac{15}{40}$<br>✓ answer<br><br>(2)<br>**[13]** |

**QUESTION 6**

| 6.1 |  | ✓ shape of $f$ <br><br> ✓ $x$-int of $f$ <br><br> ✓ $x$-intercept of $g$ <br><br> ✓ $y$-intercept of $g$ <br><br><br><br><br> (4) |
|---|---|---|
| 6.2 | $x = 0$ and <br> $y = 1$ | ✓ answer <br> ✓ answer <br> (2) |
| 6.3 | $(-\infty\,;0) \cup (0\,;\infty)$ | ✓ values <br> ✓ notation <br> (2) |
| 6.4 | $\dfrac{3}{x} + 1 = -2x - 4$ <br><br> $\dfrac{3}{x} = -2x - 5$ <br><br> $3 = -2x^2 - 5x$ <br><br> $2x^2 + 5x + 3 = 0$ <br><br> $(2x + 3)(x + 1) = 0$ <br><br> $x = -\dfrac{3}{2}$ or $x = -1$ | ✓ $\dfrac{3}{x} + 1 = -2x - 4$ <br><br><br><br> ✓ standard form <br> ✓ factors <br><br> ✓✓ answers <br> (5) |
| 6.5 | $-1 \le -2x - 4 < 3$ <br> $3 \le -2x < 7$ <br> $-1{,}5 \ge x > -3{,}5$ <br> $-3{,}5 < x \le -1{,}5$ <br>   OR   $x \in (-3{,}5\,;-1{,}5]$ | ✓ <br> $-1 \le -2x - 4 < 3$ <br> ✓ $3 \le -2x < 7$ <br><br> ✓ answer <br> (3) |
| 6.6 | $k(x) = 2(-2x - 4)$ <br>       $= -4x - 8$ <br> $y$-intercept: $(0\,;-8)$ | ✓ equation of $k(x)$ <br> ✓ answer <br> (2) |
| 6.7 | $x$-intercept:    $(2\,;0)$ <br> $y$-intercept:    $(0\,;-4)$ | ✓ $x$-intercept <br> ✓ $y$-intercept <br> (2) <br> **[20]** |

**QUESTION 7**

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

**TOTAL: 100**