



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**MATHEMATICS**

**(First Paper)**

**NQF LEVEL 2**

**XX FEBRUARY 2020**

**This marking guideline consists of 10 pages.**

**INSTRUCTIONS AND INFORMATION**

1. Mathematics lends itself to various methods and alternative answers. Mark all mathematically correct answers.
  2. The answers in this marking guideline are not exhaustive. Marks are allocated for specific principles and markers must adhere to the mark allocation.
  3. Carry forward errors; in other words, in questions with more than one part, mark an answer to a later question part according to the answer given for the earlier part, even if it is wrong.
  4. Marks are allocated per step, but if a student omitted a step and there is evidence or reason that he/she can derive at the next step without calculation, then the mark must still be given to the student.
  5. Take note that marks have been allocated for simplification.
  6. Steps must be marked and not only the final answer. Ticks must correspond with the total. Put ticks and crosses neatly and legibly in a red pen only.
  7. If the answer does not look exactly the same as in the marking guideline, this could be an alternative method or a method not known to you. Please take a moment before you mark to verify the student's answer.
  8. Do not adjust marks of students to give them a pass mark.
-

✓ 1 mark    ✓ ½ mark

**QUESTION 1**

- 1.1      1.1.1      C  
           1.1.2      B  
           1.1.3      D  
           1.1.4      D  
           1.1.5      C

(5 × 1)      (5)

- 1.2      0,453̄  
           Let  $x = 0,453̄$   
            $1000x = 453,453̄$  ✓  
            $\therefore 1000x - x = 453$  ✓  
            $\therefore 999x = 453$  ✓  
            $\therefore x = \frac{453}{999}$  ✓  
                    $= \frac{151}{333}$  ✓

(3)

- 1.3       $\frac{6x^4\sqrt{2x^8} - 2\sqrt{8x^{16}}}{\sqrt{10x^{16}}}$   
            $= \frac{6x^4\sqrt{2}\sqrt{x^8} - 2\sqrt{2 \times 4}\sqrt{x^{16}}}{\sqrt{2 \times 5}\sqrt{x^{16}}}$  ✓  
            $= \frac{6x^4\sqrt{2}x^4 - 4\sqrt{2}x^8}{\sqrt{2}\sqrt{5}\sqrt{x^{16}}}$  ✓  
            $= \frac{6\sqrt{2}x^8 - 4\sqrt{2}x^8}{\sqrt{2}\sqrt{5}x^8}$  ✓  
            $= \frac{\sqrt{2}x^8(6-4)}{\sqrt{2}\sqrt{5}x^8}$  ✓  
            $= \frac{2}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$  ✓  
            $= \frac{2\sqrt{5}}{5}$  ✓

(5)

1.4      1.4.1       $2x^2y^3 \times 3x^5y^{-4}$   
 $= 6x^7y^{-1} \checkmark$   
 $= \frac{6x^7}{y} \checkmark$  (2)

1.4.2       $\frac{(-2x^{-2}y^0z^{-1})^2 \times (x^0y)^3}{(xy^{-4}z^3)^{-1}}$   
 $= \frac{(-2x^{-2}z^{-1})^2 \times y^3}{(xy^{-4}z^3)^{-1}} \checkmark$   
 $= \frac{4x^{-4}z^{-2} \times y^3}{x^{-1}y^4z^{-3}} \checkmark$   
 $= 4x^{-4-(-1)} \cdot z^{-2-(-3)} \cdot y^{3-4} \checkmark$   
 $= 4x^{-3}z y^{-1} \checkmark$   
 $= \frac{4z}{x^3y} \checkmark$  (3)

1.4.3       $\frac{18^x \times 8^{x-2}}{9^{x+1} \times 4^{2x-3}}$   
 $= \frac{(2 \times 3 \times 3)^x \times (2 \times 2 \times 2)^{x-2}}{(3 \times 3)^{x+1} \times (2 \times 2)^{2x-3}} \checkmark$   
 $= \frac{(2 \times 3^2)^x \times (2^3)^{x-2}}{(3^2)^{x+1} \times (2^2)^{2x-3}} \checkmark$   
 $= \frac{2^x \cdot 3^{2x} \times 2^{3x} 2^{-6}}{3^{2x} 3^2 \times 2^{4x} 2^{-6}} \checkmark$   
 $= \frac{2^{4x-6} \cdot 3^{2x}}{3^{2x+2} \times 2^{4x-6}} \checkmark$   
 $= 2^{4x-6-(4x-6)} \cdot 3^{2x-(2x+2)}$   
 $= 3^{-2} \checkmark$   
 $= \frac{1}{3^2}$   
 $= \frac{1}{9} \checkmark$  (3)

|     |       |   |             |
|-----|-------|---|-------------|
| 1.5 | 1.5.1 | $A_T = A_O + A_O \times \frac{r}{100} \times t$ $\therefore A_T = A_O \left( 1 + \frac{r}{100} \times t \right) \checkmark$ $\therefore A_O = \frac{A_T}{\left( 1 + \frac{r}{100} \times t \right)} \checkmark$ | (2)         |
|     | 1.5.2 | $A_O = \frac{3000}{\left( 1 + \frac{5}{100} \times 4 \right)} = 2500 \checkmark$  | (1)         |
| 1.6 | 1.6.1 | $T_4 = 17$  | (1)         |
|     | 1.6.2 | $T_n = a + (n-1)d$ $161 = 5 + (n-1)4 \checkmark$ $161 - 5 = 4n - 4 \checkmark$ $160 = 4n$ $\therefore n = 40 \checkmark$  | (3)         |
|     | 1.6.3 | $S_n = \frac{n}{2} [2a + (n-1)d]$ $S_{12} = \frac{12}{2} [2(5) + (12-1)4] \checkmark$ $S_{12} = 6 [2(5) + (11)4]$ $S_{12} = 6(54) = 324 \checkmark$   | (2)<br>[30] |

**QUESTION 2**

|     |       |   |
|-----|-------|---|
| 2.1 | 2.1.1 | A |
|     | 2.1.2 | D |
|     | 2.1.3 | A |
|     | 2.1.4 | C |
|     | 2.1.5 | C |
|     | 2.1.6 | D |

(6 × 1)      (6)

- 2.2      2.2.1      (a) False  
                          (b) True  
                          (c) False  
                          (d) False  
                          (e) False

(5 × 1)      (5)

2.2.2

$$y = \frac{a}{x} + q$$

$$q = 1 \checkmark$$

$$0 = \frac{a}{-3} + 1$$

$$\frac{a}{3} = 1$$

$$\therefore a = 3 \checkmark$$

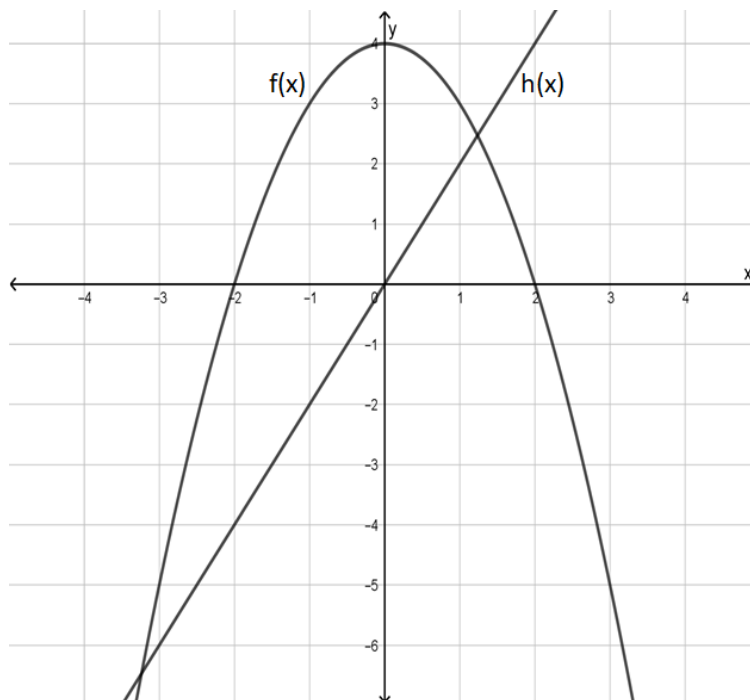
(2)

- 2.2.3      Horizontal asymptote:  $y = 1$      $\checkmark$   
                          Vertical asymptote:  $x = 0$      $\checkmark$

(2)

2.3

|                   |    |    |    |   |   |   |    |
|-------------------|----|----|----|---|---|---|----|
| $x$               | -3 | -2 | -1 | 0 | 1 | 2 | 3  |
| $f(x) = -x^2 + 4$ | -5 | 0  | 3  | 4 | 3 | 0 | -5 |
| $x$               | -2 | -1 | 0  | 1 | 2 |   |    |
| $h(x) = 2x$       | -4 | -2 | 0  | 2 | 4 |   |    |



Mark allocation:

$f(x)$ :

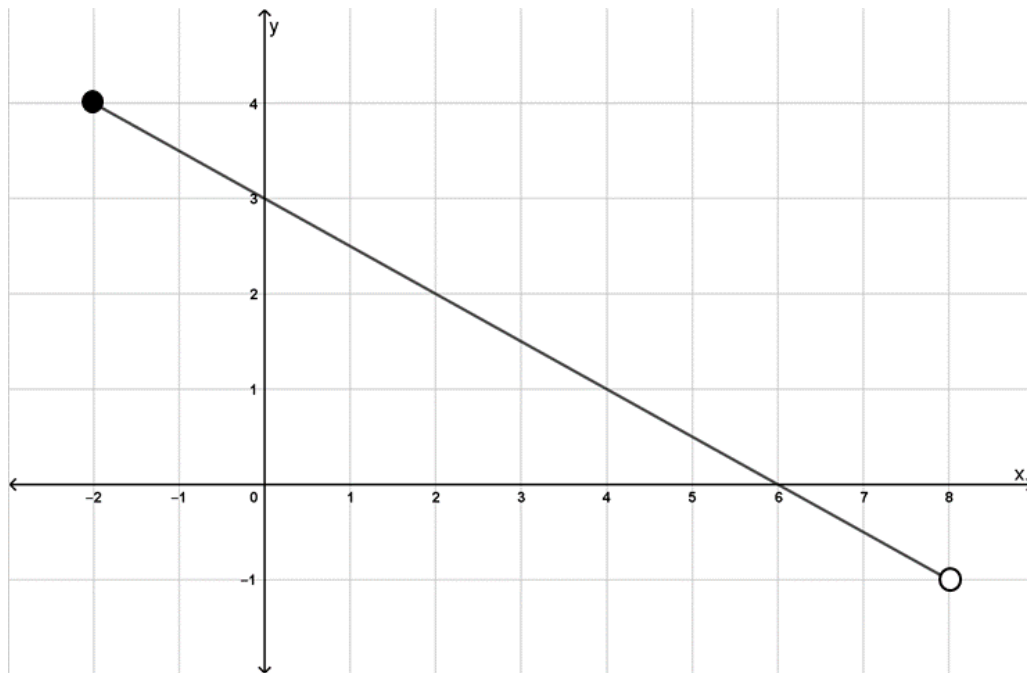
Turning point 1; Shape 1;  $x$ -intercepts 1

$h(x)$ :

Passing through origin 1; Correct points and shape 1

(5)

2.4 2.4.1



½ mark  $x$ -intercept; ½ mark  $y$ -intercept  
 ½ mark each for end points correctly placed  
 ½ mark open point; ½ mark closed point

(3)

2.4.2 Range  $y \in (-1\checkmark; 4]\checkmark$  where  $y \in R$ 

(2)

**[25]****QUESTION 3**

3.1 3.1.1  $(a+b)^2 = a^2 + 2ab + b^2$  (1)

3.1.2  $(x-3y)(x^2+3xy+9y^2)$   
 $= x^3 + 3x^2y - 3x^2y + 9xy^2 - 9xy^2 - 27y^3 \checkmark \checkmark \checkmark$  (½ mark for 2 correct  
 $= x^3 - 27y^3$   
 terms)  $\checkmark$  (2)

3.2 3.2.1  $9x^3 - 16xy^2$   
 $= x(9x^2 - 16y^2) \checkmark$   
 $= x(3x - 4y)(3x + 4y) \checkmark$  (2)

3.2.2  $6x - 9 + 6xy - 9y$   
 $= 6x + 6xy + (-9 - 9y) \checkmark$   
 $= 6x(1+y) - 9(1+y) \checkmark$   
 $= (1+y)(6x-9) \checkmark$   
 $= 3(1+y)(2x-3) \checkmark$  (2)

$$\begin{aligned}
 3.2.3 \quad & 4a^2 - 4a + 1 \\
 & = (2a - 1)(2a - 1) \quad \checkmark \quad \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 3.3 \quad & \frac{63x^2y - 7x^2y^3}{7x^2y} \\
 & = \frac{7x^2y(9 - y^2)}{7x^2y} \quad \checkmark \quad \checkmark \quad (\frac{1}{2} \text{ mark for each factor in numerator}) \\
 & = 9 - y^2 \quad \checkmark \\
 & = (3 - y)(3 + y)
 \end{aligned}$$

Note: No mark allocation if candidate factorises. The instruction does not say “factorise”.) (2)

$$\begin{aligned}
 3.4 \quad 3.4.1 \quad & x - (x - 2) + 2(3 - x) = 0 \\
 & x - x + 2 + 6 - 2x = 0 \quad \checkmark \\
 & 8 = 2x \quad \checkmark \\
 & x = 4 \quad \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 3.4.2 \quad & \left( \frac{x+2}{5} - 5 = -\frac{1-3x}{3} \right) \times LCM \\
 & \therefore \frac{(15)(x+2)}{5} - 5(15) = -\left( \frac{1-3x}{3} \right) \times 15 \quad \checkmark \\
 & \therefore \frac{3(x+2)}{1} - 75 = \frac{-1+3x}{1} \times 5 \quad \checkmark \\
 & \therefore 3x + 6 - 75 = -5 + 15x \quad \checkmark \\
 & \therefore -12x = 64 \quad \checkmark \\
 & \therefore x = \frac{-16}{3} \quad \checkmark
 \end{aligned}
 \tag{3}$$

|       |  |   |
|-------|--|---|
| 3.4.3 | $  \begin{aligned}  (2^{x+1})^2 &= (2^2)^3 \\  2^{2x+2} &= 2^6 \quad \checkmark \\  2x + 2 &= 6 \quad \checkmark \\  2x &= 4 \quad \checkmark \\  \therefore x &= 2 \quad \checkmark  \end{aligned}  $ | <p>Alternative:</p> $  \begin{aligned}  (2^{x+1})^2 &= (2^2)^3 \\  \therefore 2^{2x+2} &= 2^6 \quad \checkmark \\  \therefore 2^{2x} 2^2 &= 2^6 \\  \therefore 2^{2x} &= \frac{2^6}{2^2} \quad \checkmark \\  2^{2x} &= 2^4 \quad \checkmark \\  2x &= 4 \\  \therefore x &= 2 \quad \checkmark  \end{aligned}  $ |
|-------|--|---|

(2)

$$\begin{aligned}
 3.5 \quad 3.5.1 \quad & 4 \geq 3 - 8x > -11 \\
 & 1 \geq -8x > -14 \quad \checkmark \\
 & \frac{1}{-8} \leq \frac{-8x}{-8} < \frac{-14}{-8} \quad \checkmark \\
 & -0,25 \leq x < 1,75 \quad \checkmark
 \end{aligned}$$

Note: Answer can also be given in fractions in their simplest form. (3)



3.5.2  $x \in [-0,25;1,75)$  for  $x \in R$  ( $\frac{1}{2}$  mark for each correct bracket)  
 Note: answer can also be given in fractions in their simplest form. (1)

3.6  $2x = 3y - 4$  eq 1  
 $y = x - 3$  eq 2  
 Substitute eq 2 into eq 1  
 $2x = 3(x - 3) - 4 \checkmark$   
 $2x = 3x - 9 - 4$   
 $-x = -13 \checkmark$   
 $\therefore x = 13 \checkmark$   
 Substitute  $x$  in eq 2  
 $y = 13 - 3 = 10 \checkmark$  (3)  
**[25]**

#### QUESTION 4

- 4.1      4.1.1      G  
             4.1.2      E  
             4.1.3      D  
             4.1.4      C  
             4.1.5      B  
(5 × 1)      (5)
- 4.2      4.2.1      The R300 variance in expenses under *Books and Stationery* shows that he spent less than what he planned✓ which is favourable. (1)
- 4.2.2      unfavourable✓ – A negative in the income column shows that the income is less than expected.✓ (2)
- 4.2.3      Adriaan will have a surplus✓ of R385✓ at the end of the month. (2)
- 4.2.4      The variance is zero. (1)
- 4.3      4.3.1       $\frac{10}{100} \times R5600 = R560 \checkmark$   
 $R5600 - R560 = R5040 \checkmark$  (2)

4.3.2 CA from 4.3.1

$$A_t = A_o \left(1 + \frac{rt}{100}\right)$$

$$A_t = 5040 \left(1 + \frac{15(2)}{100}\right) \checkmark$$

$$A_t = R6552,00 \checkmark$$

$$\text{Monthly installments is } \frac{R6552,00}{24\text{months}} = R273,00 \checkmark \quad (3)$$

4.3.3

$$A_t = A_o \left(1 + \frac{r}{100}\right)^n$$

$$5600 \checkmark = A_o \left(1 + \frac{7}{100}\right)^2 \checkmark$$

$$A_o = \frac{5600 \checkmark}{1.1449} = R4891,26 \checkmark$$

(4)  
[20]

**TOTAL: 100**