higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS

(First paper)

NQF LEVEL 2

(10501042)

5 November 2024 (Y-paper)
13:00–16:00

Scientific calculators may be used.

This question paper consists of 7 pages, 1 formula sheet and 1 addendum.

015Q1N2405

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
MATHEMATICS
NQF LEVEL 2
(First paper)
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Show all calculations and the intermediary steps. Simplify answers where possible.
5. Questions may be answered in any sequence. Subsections of questions may NOT be separated.
6. All final answers must be rounded off accurately to THREE decimal places.
7. The list of formulae on the formula sheet is NOT necessarily complete. Any other applicable formulae may be used.
8. Diagrams are NOT drawn to scale
9. Write neatly and legibly.

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QUESTION 1

1.1 Convert the following decimal fractions to the form $\frac{a}{b}$; where a; b ε Z and b ≠ 0. Express your answer in its simplest form.

1.1.1 $1{,}16$ (1)

1.1.2 $0{,}3\dot{7}$ (2)

1.2 Simplify the following by using the laws of exponents. (Leave answers with positive exponents and in surd form where applicable.)

1.2.1 $$\frac{(-8x^2y)^2 \times (4xy^3)^2 \times (xy)}{(2xy^2)^2 \times (2xy)^3}$$ (4)

1.2.2 $$\left(\frac{6a^5b^4}{12a^3b^{-2}}\right)^{-\frac{1}{3}}$$ (3)

1.3 Simplify the following by using surd laws:

1.3.1 $$\frac{\sqrt{27}+\sqrt{48}+\sqrt{75}}{\sqrt{3}\times\sqrt{9}}$$ (3)

1.3.2 $$\frac{\sqrt{24}+2\sqrt{6}+\sqrt{54}+\sqrt{150}}{\sqrt{96}-\sqrt{6}}$$ (3)

1.4 Simplify the following expression by rationalising the denominator:

$$\frac{\sqrt{3}-1}{1+\sqrt{3}}$$ (3)

1.5 The equation for the period of oscillation (T) of a simple pendulum is given by a technical formula: $T = 2\pi\left[\frac{l}{g}\right]^{\frac{1}{2}}$ with l as the length of this pendulum and g as the gravitational acceleration.

1.5.1 Show that: $l = \frac{gT^2}{4\pi^2}$ (3)

1.5.2 If T = 4 seconds and $= 9{,}8\ m/s^2$, determine the approximate value of l correctly to the nearest metre. (2)

1.6 Calculate the sum of the first 14 terms of the arithmetic sequence: 3, 7, 11, … (3)

1.7 Calculate the 13th term of an arithmetic sequence if the first term is 5 and the constant difference is 3. (4)

[31]

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QUESTION 2

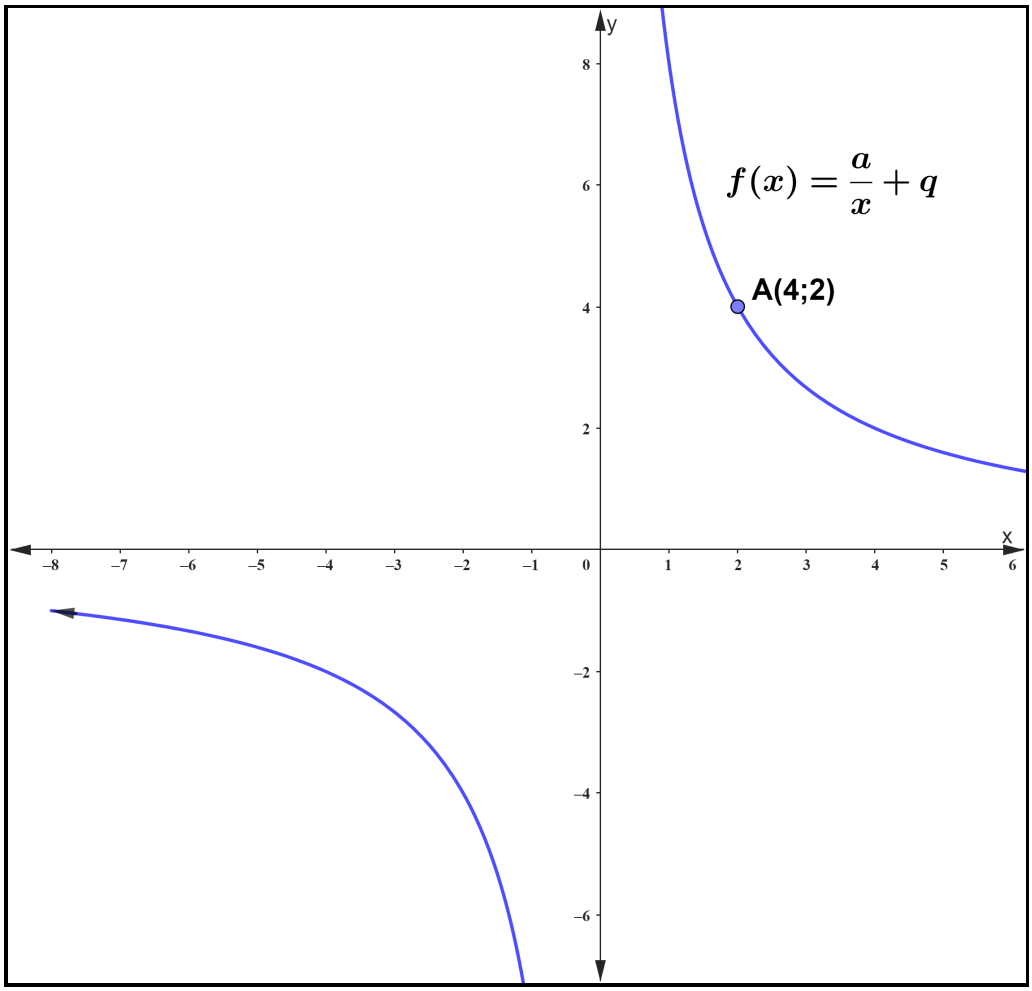
2.1 Given the function of $y = 3^x$

2.1.1 Tabulate values of x for $-2 \leq x \leq 2$, x an integer, and calculate the corresponding $y-$values, if $y = 3^x$. (5)

2.1.2 Use the values in QUESTION 2.1.1 and sketch the graph of $y = 3^x$ on ADDENDUM A (attached). (3)

2.1.3 Is the graph drawn in QUESTION 2.1.2 continuous or discontinuous? (1)

2.2 The following diagram represents the graph of $f(x) = \frac{a}{x} + q$. A$(4; 2)$ is a point on the graph.

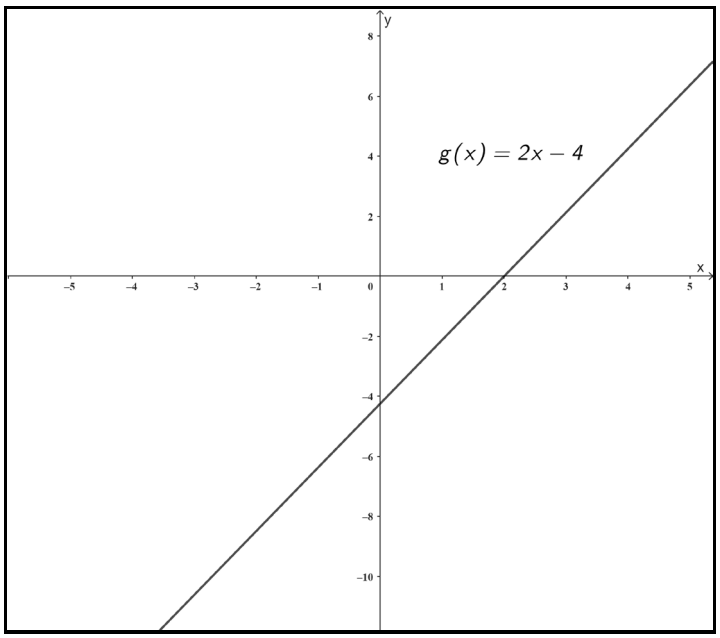


2.2.1 What is the mathematical name for the graph of (x)? (1)

2.2.2 Determine the equation of the graph. (3)

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2.3 The diagram below represents the graphs of $g(x) = 2x - 4$:



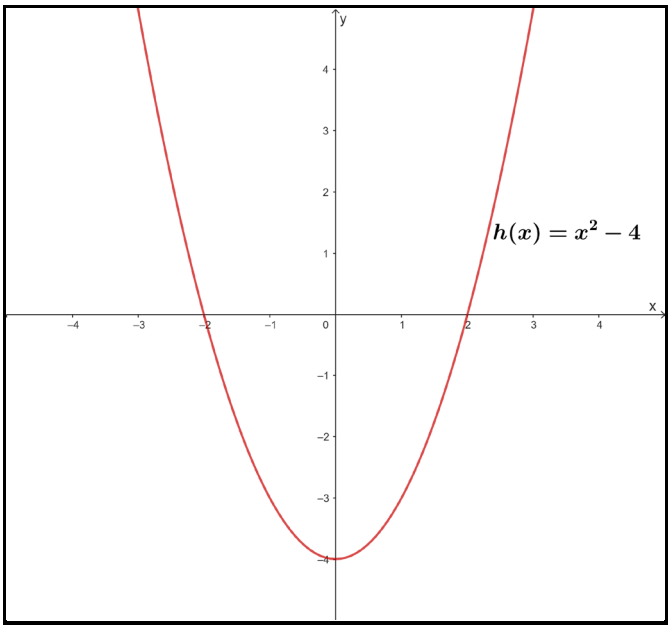
2.3.1 What is the mathematical name for the graph of g(x)?

2.3.2 Is the gradient of the graph negative or positive?

2.3.3 Is the graph continuous or discontinuous?

(3 × 1) (3)

2.4 Given below is the graph of: $h(x) = x^2 - 4$



2.4.1 Write down the co-ordinates of the turning point of the graph. (2)

2.4.2 What are the x intercepts of the graph? (2)

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2.4.3 What is the axis of symmetry for this graph? (1)

2.4.4 Is the graph continuous or discontinuous? (1)

2.4.5 Is this graph a function or relation? (1)

2.4.6 What is the mathematical name for the graph of $h(x)$? (1)

[24]

QUESTION 3

3.1 Factorise the following:

3.1.1 $3pqx + pqy - 12x - 4y$ (3)

3.1.2 $-64k^2 + 100$ (3)

3.2 Simplify the following:

3.2.1 $(x^2 - 1)^2 - 1$ (3)

3.2.2 $(-x^2 - 2x)(-x + 3)$ (2)

3.2.3 $\big((2x + 1)(-x)\big)^2$ (3)

3.3 Solve for x:

3.3.1 $(32)^{x-1} = (64)^{2x+1}$ (4)

3.3.2 $-2x - 2 = -3(-2x - 1)$ (3)

3.4 Solve algebraically for x and y simultaneously given the following equations:

$2x - y = 3$

and

$3x - 2y = 1$ (4)

[25]

QUESTION 4

4.1 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–H) next to the question number (4.1.1–4.1.6) in the ANSWER BOOK.

COLUMN A		COLUMN B	
4.1.1	A bank card used to regulate transactions from bank accounts with money to spend; offers an overdraft for unexpected, urgent expenses	A	variance
4.1.2	Money invested in a bank for a specific period of time at a fixed rate of interest	B	balance sheet
4.1.3	Money paid to students in order to complete a course of study at an institution of learning.	C	audit
4.1.4	A formal examination of an organization`s financial statements and controls	D	fixed deposit
4.1.5	Difference between budgeted and actual amounts	E	debit card
4.1.6	A summary of a assets and liabilities as at a specific date	F	interest
		G	credit card
		H	bursary

(6 × 1) (6)

4.2 William received an expression of appreciation from his dad in the amount of R5 000 for passing NCV level 2 with four distinctions. William deposited this money into a savings account. Calculate the final amount that will be available after five years if the interest is calculated at 6% simple interest annually. (5)

4.3 William finished his NCV level 4 and secured a learnership at a well-known company that gives him a monthly stipend of R6 500. William plans to give his father a surprise gift for his birthday. He buys a refrigerator for R10 500 through a hire-purchase agreement. The initial amount due to be paid off is R10 500 compounded annually at a rate of 11% for three years.
Determine mathematically:

4.3.1 The amount William will pay for the fridge (5)

4.3.2 The monthly repayments (2)

4.3.3 The total interest paid (2)

[20]

TOTAL: 100

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FORMULA SHEET

1) $a^m \times a^n = a^{m+n}$

2) $a^m \div a^n = a^{m-n}$

3) $(a^m)^n = a^{m\times n}$

4) $(a^m b^n)^p = a^{mp}.b^{np}$

5) $\left(\frac{a^m}{b^n}\right)^p = \frac{a^{mp}}{b^{np}}$

6) $a^{-n} = \frac{1}{a^n}$

7) $a^{\,0} = 1$

8) $\sqrt[n]{a^m} = a^{\frac{m}{n}}$

9) $T_n = a + (n-1)d$

10) $S_n = \frac{n}{2}[2a + (n-1)d]$

11) $S_n = \frac{n}{2}(a + l)$

12) $I = \frac{Prt}{100}$ $\quad or \quad$ $A_t = P(1 + in)$

13) $A_t = Ao(1 + \frac{r}{100\times m})^{tm}$ $\quad or \quad$ $A_t = P(1 + i)^n$

14) $i = \frac{r}{100}$

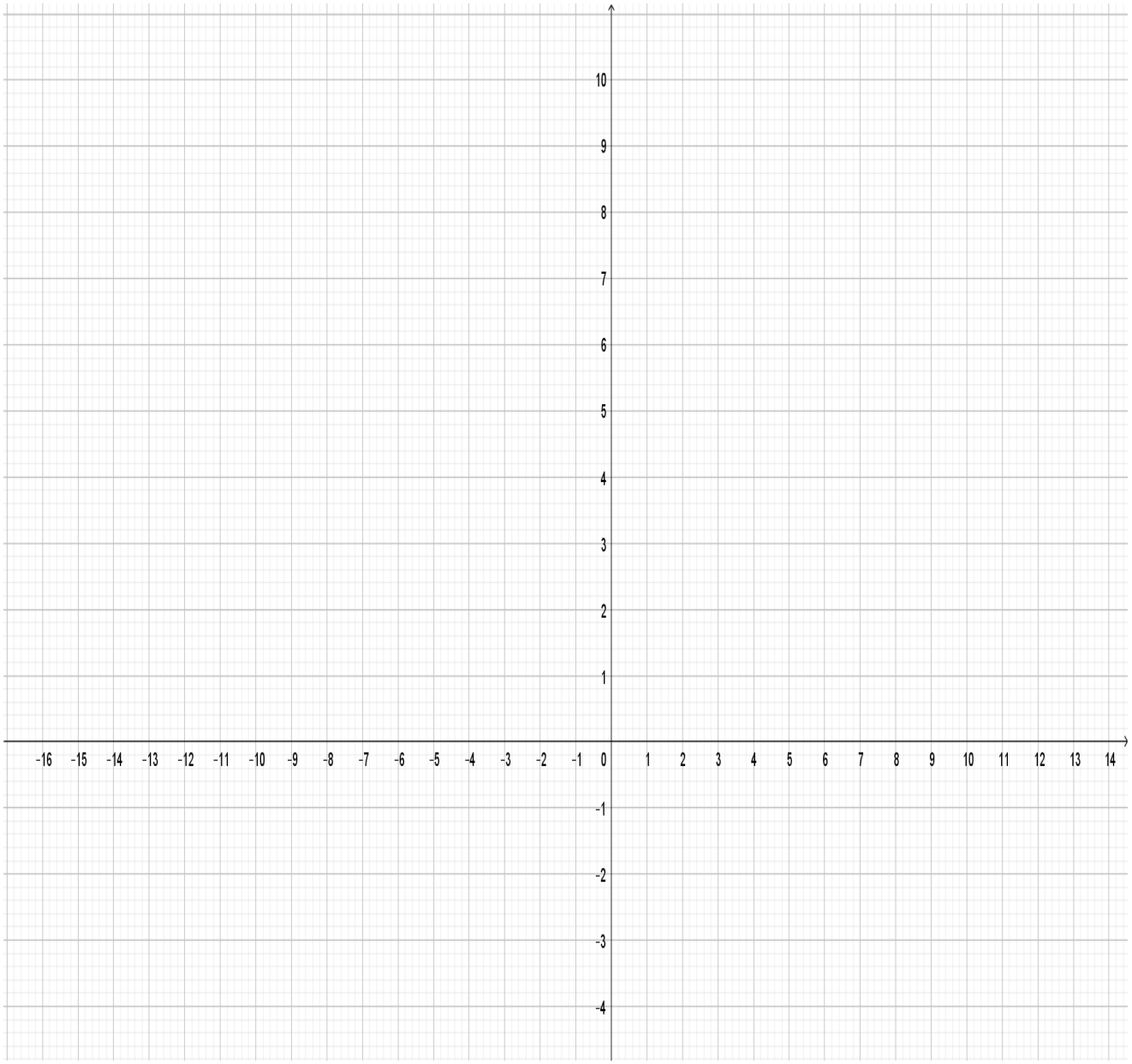
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EXAMINATION NUMBER:

Detach the ADDENDUM and hand it in with the ANSWER BOOK

ADDENDUM A

Q2.1.2



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