higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS
(First paper)
NQF LEVEL 2

(10501042)

9 November 2023 (Y-paper)
13:00–16:00

Scientific calculators may be used.

This question paper consists of 7 pages, a formula sheet and an answer sheet.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
MATHEMATICS
NQF LEVEL 2
PAPER 1
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 accurate to TWO decimals.
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. Use only a black or a blue pen.
10. Write neatly and legibly.
11. Answer QUESTION 2.2.2 on the attached ANSWER SHEET.

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QUESTION 1

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

1.1.1 0,58 (1)

1.1.2 $0,\dot{4}8\dot{6}$ (2)

1.2 Simplify the following using the laws of exponents (leave your answer with positive exponents and in surd form where applicable):

1.2.1 $$\frac{27r^{-3}s^{-2}}{3^{-(-2)}r^2 \times 3s^{-3}}$$ (3)

1.2.2 $$5s^2(r^0s^0)^8 \times 3 \times \sqrt[3]{\frac{64\,r^9}{729\,r^3s^6}}$$ (4)

1.3 Simplify the following using surd laws. Show ALL working.

$$\frac{\sqrt{125} + \sqrt{45} - \sqrt{20}}{2\sqrt{80}}$$ (3)

1.4 Simplify the following expression by rationalising the denominator:

$$\frac{\sqrt{36a^2}}{\sqrt{5} - \sqrt{6}}$$ (4)

1.5 Given: $Z = \frac{2pq}{r+2}$

1.5.1 For the given equation, make q the subject of the formula. (2)

1.5.2 Find the value of q if: Z = 20, p = 10 and r = 4. (2)

1.6 The sum of the first 16 terms of an arithmetic progression is 166. The common difference is 3.

Calculate the first term of the sequence. (4)

1.7 Given the sequence: 7; 4; 1; …; -26.

1.7.1 Write down the fourth term of the sequence. (1)

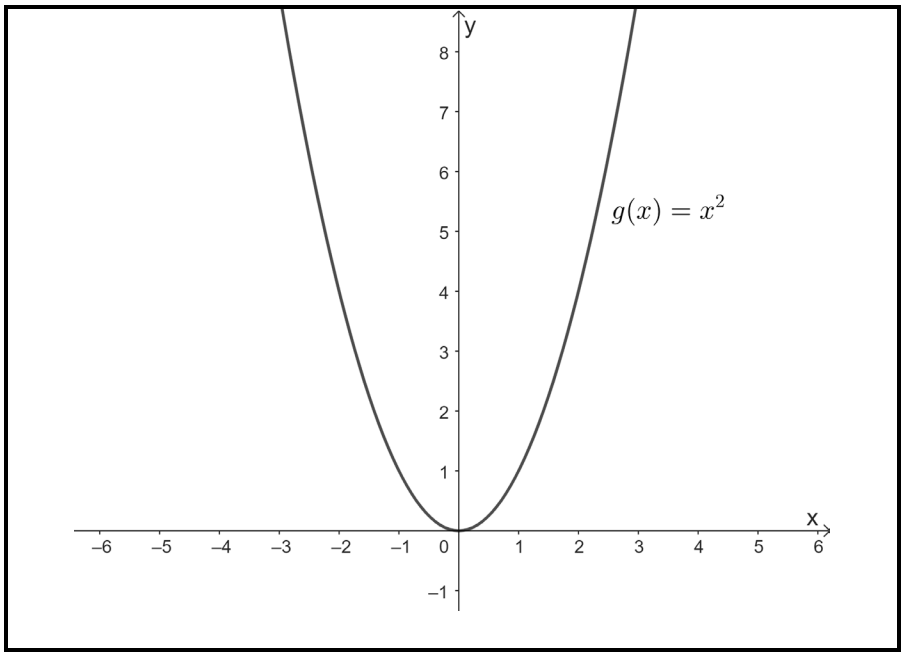
1.7.2 Make use of the relevant formula to determine the number of terms in the arithmetic sequence. (4)

[30]

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QUESTION 2

2.1 Given below is the graph of $g(x) = x^2$.



2.1.1 What type of function is represented in $g(x)$? (1)

2.1.2 Is the graph of g(x) continuous or discontinuous? (1)

2.1.3 What is the equation of the axis of symmetry for the graph of $g(x)$? (1)

2.1.4 Is the graph of g(x) a function or a non-function? Give a reason for your answer. (2)

2.1.5 Write down the domain and range for g(x). (2)

2.1.6 Write down the y-intercept. (1)

2.1.7 Write down the equation of $g(x)$ if the graph moves one unit down. (2)

2.2 Given: $f(x) = \frac{4}{x} + 2$

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

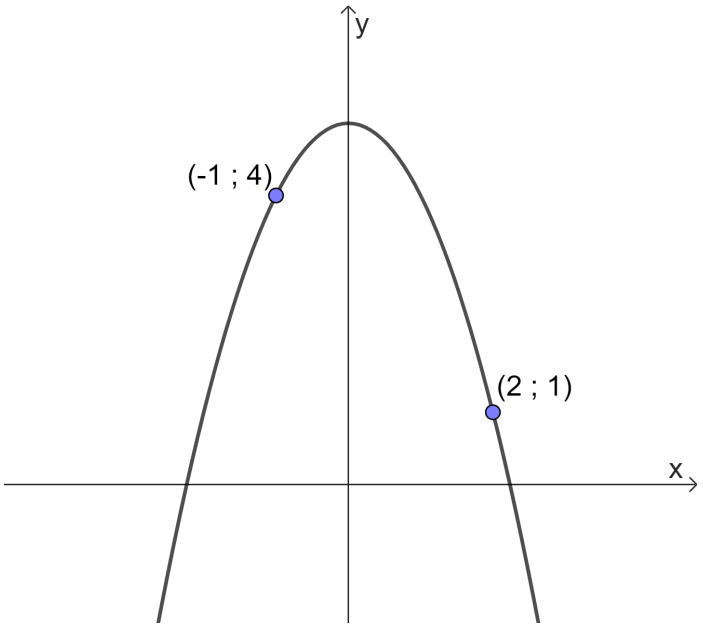
2.2.2 Use the ANSWER SHEET to sketch the graph of $f(x)$. (4)

2.2.3 Write down the range of $f(x)$. (1)

2.2.4 Is the graph continuous or discontinuous? (1)

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2.3 Find the equation of the parabola passing through points (-1; 4) and (2; 1).



(8)
[25]

QUESTION 3

3.1 Simplify the following:

3.1.1 $(r + s - 1)(r + s)$ (2)

3.1.2 $(p^3 - 1)^2 - 3p^3(p^3 + 2) - 6p^6$ (3)

3.1.3 $(a^3)^2 \times a^4$ (2)

3.2 Factorise the following:

3.2.1 $2 - 32p^2$ (2)

3.2.2 $6(p - q) + 9p(q - p)$ (4)

3.3 Solve for x in the following equations:

3.3.1 $p^{3x-6} = 1$ (2)

3.3.2 $\frac{x + 4}{2} = \frac{2x + 7}{3}$ (3)

3.4 Solve the following inequality and represent the solution on a number line.

$$2(3x - 1) > 4x + 5$$ (3)

3.5 Solve algebraically for x and y in the following simultaneous linear equations:

$$4x - y = 1$$

and

$$x + y = 1$$

(4)
[25]

QUESTION 4

4.1 Choose an item or word from COLUMN B that matches a description in COLUMN A. Write only the letter (A–I) next to the question number (4.1.1–4.1.6) in the ANSWER BOOK.

COLUMN A		COLUMN B	
4.1.1	A card that is used to get goods or services before they are paid for. It is based on the guarantee that payment will be made later	A	income
4.1.2	The difference between the budgeted amount and actual amount	B	debit card
4.1.3	The initial amount of money that is put into an investment or is borrowed	C	interest rate
4.1.4	A plan of your monthly income and expenditures in order to manage your finances	D	credit card
4.1.5	All the money you can earn or receive	E	variance
4.1.6	A percentage that regulates the interest you will receive on your savings or will have to pay on hire-purchase amounts and overdrafts	F	principal amount
		G	budget
		H	variable
		I	payment

(6 × 1) (6)

4.2 Sarah is a university student. Her parents give her a monthly allowance of R3 500 to cover her expenses, which consist of the following:

- Monthly cell phone payments, which add up to 9,5% of her allowance
- A total monthly instalment of R300,00 for two clothing stores, Zap and Azania Fashion
- Daily cost of R45,00 for food
- R110,00 per weekend for entertainment
- Transport costs

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The table below shows Sarah's budget for April (April has 30 days with 4 weekends):

April 2018 budget	
Monthly cell phone payments	A
Zap account	R195,00
Azania Fashion Account	B
Food for the month	C
Weekend entertainment	D
Transport	E
Total	R3 500,00

Calculate and write down the missing amounts A – E in your answer book. (5)

4.3 Bongani purchases a HD Television set that is priced at R 19000 on a hire purchase agreement. The store agrees that he could pay the television off over a period of 3 years but he will be charge at an interest rate of 12% per annum over the payment period. The store also offers an insurance on the television set and he is obligated to take the insurance that is charged at R 35 per month over the 3 years. In order to take possession of the television set, Bongani will have to pay a 10% cash deposit. Determine the total amount that he actually pays for the television set at the end of 3 years. (5)

4.4 An amount of R1 300 has accumulated interest to reach R1 466 after three years. Find the interest rate if the investment was paid using compound interest. (4)

[20]

TOTAL: 100

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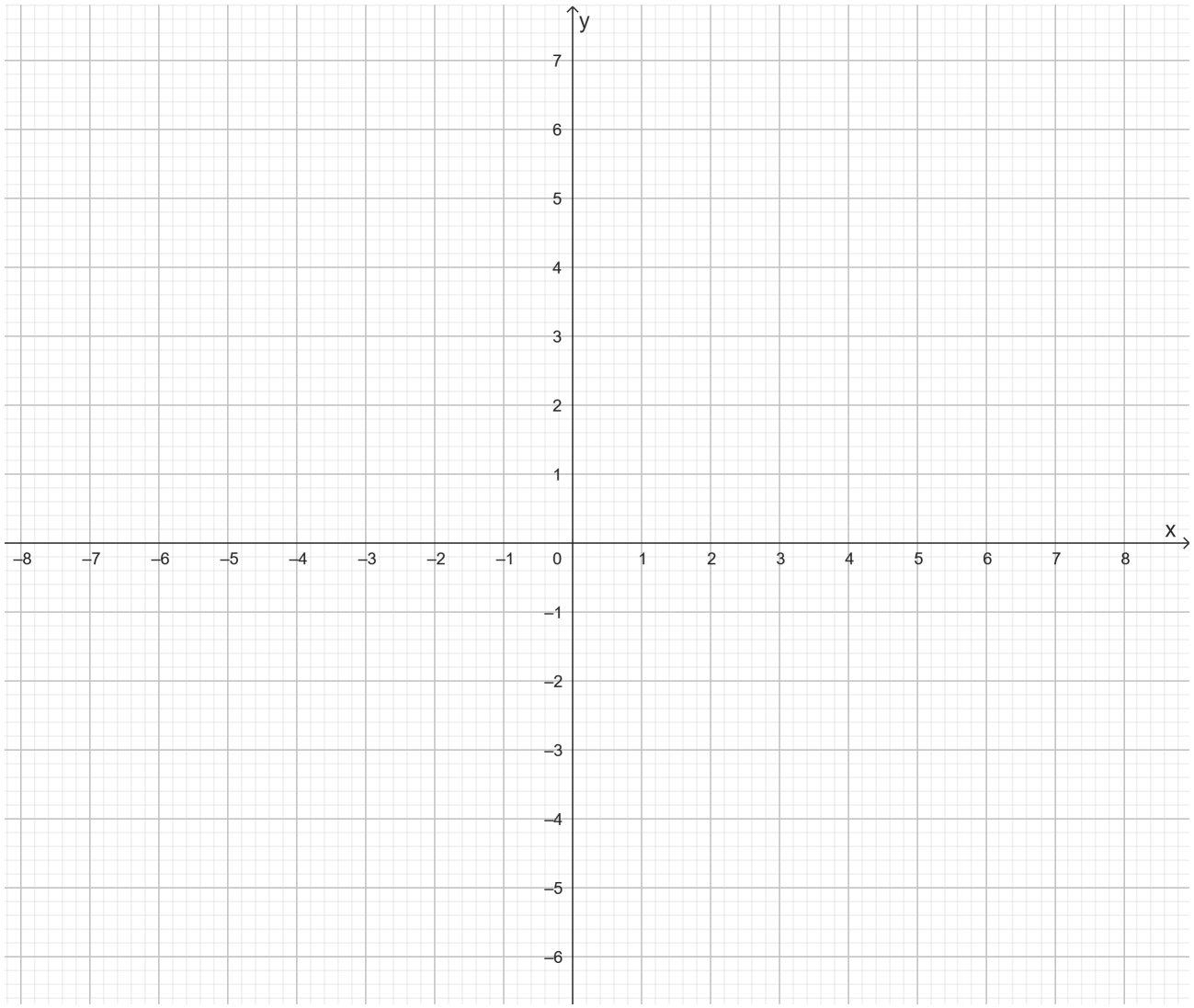
FORMULA SHEET

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



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