higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS

(First paper)

NQF LEVEL 2

(10501042)

14 February 2025 (Y-paper)
13:00–16:00

Scientific calculators may be used.

This question paper consists of 7 pages, 1 formula sheet and 2 addendums.

013Q1S2514

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
MATHEMATICS
(First paper)
NQF LEVEL 2
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 approximately accurately to THREE decimal places.
7. The list of formulas 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 $1{,}04$ (1)

1.1.2 $0,\dot{2}\dot{6}$ (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 $$\frac{(-9x^2y^2)^2 \times (3xy^{-2})^2 \times (x^2y)}{(6xy^3)^2(-3xy)^2}$$ (3)

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

1.3 Simplify the following by using surd laws:

$$\frac{\sqrt{20}+\sqrt{45}-\sqrt{80}+\sqrt{5}}{\sqrt{16}\times\sqrt{5}}$$ (3)

1.4 Simplify the following expression by rationalising the denominator:

$$\frac{\sqrt{4}}{\sqrt{2}-3}$$ (3)

1.5 The volume of a sphere is given by the formula: $V = \frac{4}{3}\pi r^3$

1.5.1 Make `$r$` the subject of the formula. (3)

1.5.2 If the volume of the sphere is $12\ m^3$, calculate the value of `$r$`. (2)

1.6 Determine the position of a term in an arithmetic sequence that has the value of 26, if the first term is 4 and the common difference is 5. (3)

1.7 Calculate the first three terms of an arithmetic sequence if the general term is $T_n = 2 + 4n$. (3)

1.8 The sum of the first 10 terms of an arithmetic progression is 180. The common difference is 2. Calculate the first term of the sequence. (3)

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QUESTION 2

2.1 Given the function of $f(x) = -3x + 9$

2.1.1 Copy and complete the following table by calculating the missing corresponding y-values, in your answer book for the function of $y = -3x + 9$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x) = -3x + 9$	i.	ii.	18	iii.	12	9	6	iv.	0	v.	-6

(5)

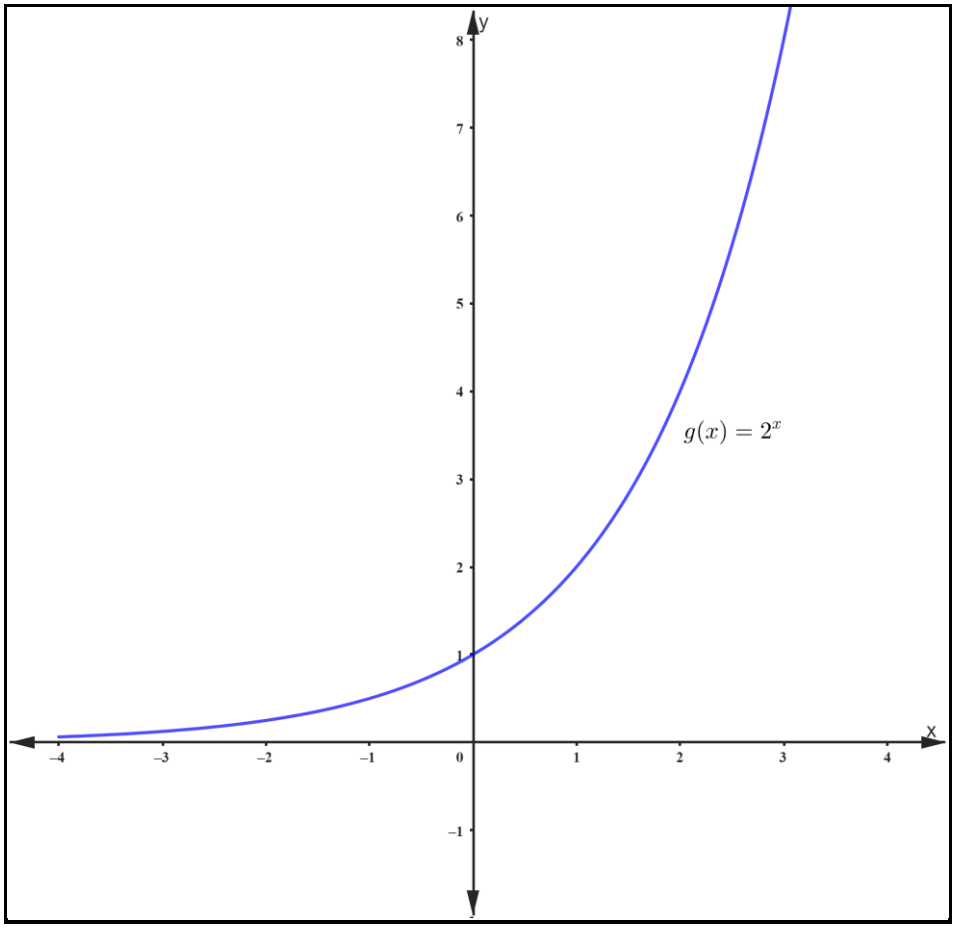
2.1.2 Sketch the graph and show all calculated points (i) to (v) on the attached ADDENDUM A. (5)

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

2.1.4 Is the gradient of this graph negative or positive? (1)

2.1.5 Write down the equation of a new function, g(x), if the graph moves one unit down. (2)

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



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

2.2.2 Write down the y-intercept. (1)

2.2.3 Is the graph continuous or discontinuous? (1)

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

2.3 Given is the function of $h(x) = x^2 + 4$

2.3.1 Set up a table for $-2 \leq x \leq 2$ in your answerbook and hence sketch the graph of $h(x) = x^2 + 4$ on the attached ADDENDUM B. (5)

2.3.2 What is the range for $h(x)\ if\ x \in R$? (1)

2.3.3 What type of function is represented in $h(x)$? (1)

[26]

QUESTION 3

3.1 Factorise the following:

3.1.1 $7k^2 - 63$

3.1.2 $2p^3 + p^2k - k^2(2p + k)$

(2 × 2) (4)

3.2 Simplify the following:

3.2.1 $(-2x - 3)(-x^2 - 4x + 1) - 2x^3$

3.2.2 $\dfrac{x^2 - y^2}{x + y} + y$

3.2.3 $\dfrac{2x}{3} + \dfrac{x}{2} - \dfrac{5x}{6}$

(3 × 3) (9)

3.3 Solve algebraically for x and y simultaneously in the following equations:

$5x - 3y = 4$

and

$y = -2x + 12$ (4)

3.4 Solve the following equations:

3.4.1 $3(x+1) = 3(-x-2) - 1$ (3)

3.4.2 $\frac{x}{3} + \frac{2x}{3} = \frac{1}{4}$ (3)

3.4.3 $8^x = 16$ (2)

[25]

QUESTION 4

4.1 William and Johanna, a newly married couple, bought a home jointly. They went to town and noticed a stunning 7-piece corner lounge suite at one of the stores. Their attention was drawn to the advert below. They realize they do not have the cash to buy this lounge set. They approached the salesperson, who detailed the different methods they could use to purchase the lounge suite.



4.1.1 If William and Johanna decide to pay a deposit of R100 and do a lay-by purchase, how much money will they pay back at the end of the term as shown, including the deposit? Refer to the advertisement. (2)

4.1.2 If they go to a local bank and borrow R19 999 at a rate of 17% simple interest per annum for a period of two years, how much money will they pay back the bank? (3)

4.1.3 If they decide to go with the in-store credit facility of 25,25% compound interest and pay a deposit of R2000(see advertisement), how much money will they pay back per month for the period of the term as shown? (4)

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4.1.4 If the salesperson makes available an option of a hire purchase with no deposit option and a payment of R850 per month over two years, how much will William and Johanna pay back over this period? (2)

4.1.5 What is the cash price for this lounge suite? (1)

4.1.6 Which payment option will cost William and Johanna the most for purchasing the lounge suite? (1)

4.2 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 (4.2.1–4.2.6) in the ANSWER BOOK.

	COLUMN A		COLUMN B
4.2.1	The fixed amount of money you earn each month, which you plan as part of your income in the budget.	A	Interest
		B	Principal amount
4.2.2	Investments held for 1 to 5 years, where you expect a return in the near future, like unit trusts	C	Fixed deposit
		D	Medium-term investments
4.2.3	The initial amount of money invested or paid into the policy	E	Interest Rate
		F	Salary
4.2.4	The difference between the planned and actual amounts spent or earned in a budget	G	Long-Term Investments
		H	Variance
4.2.5	A long-term investment designed to provide income during retirement.	I	Retirement annuity
4.2.6	The money earned from an investment or savings account, or the extra money paid when borrowing		

(6 × 1) (6)

4.3 Why is the following statement false? Give a reason.

Compound interest is calculated on the principal amount and the interest earned. The final amount for compound interest grows much slower than for simple interest. (1)

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

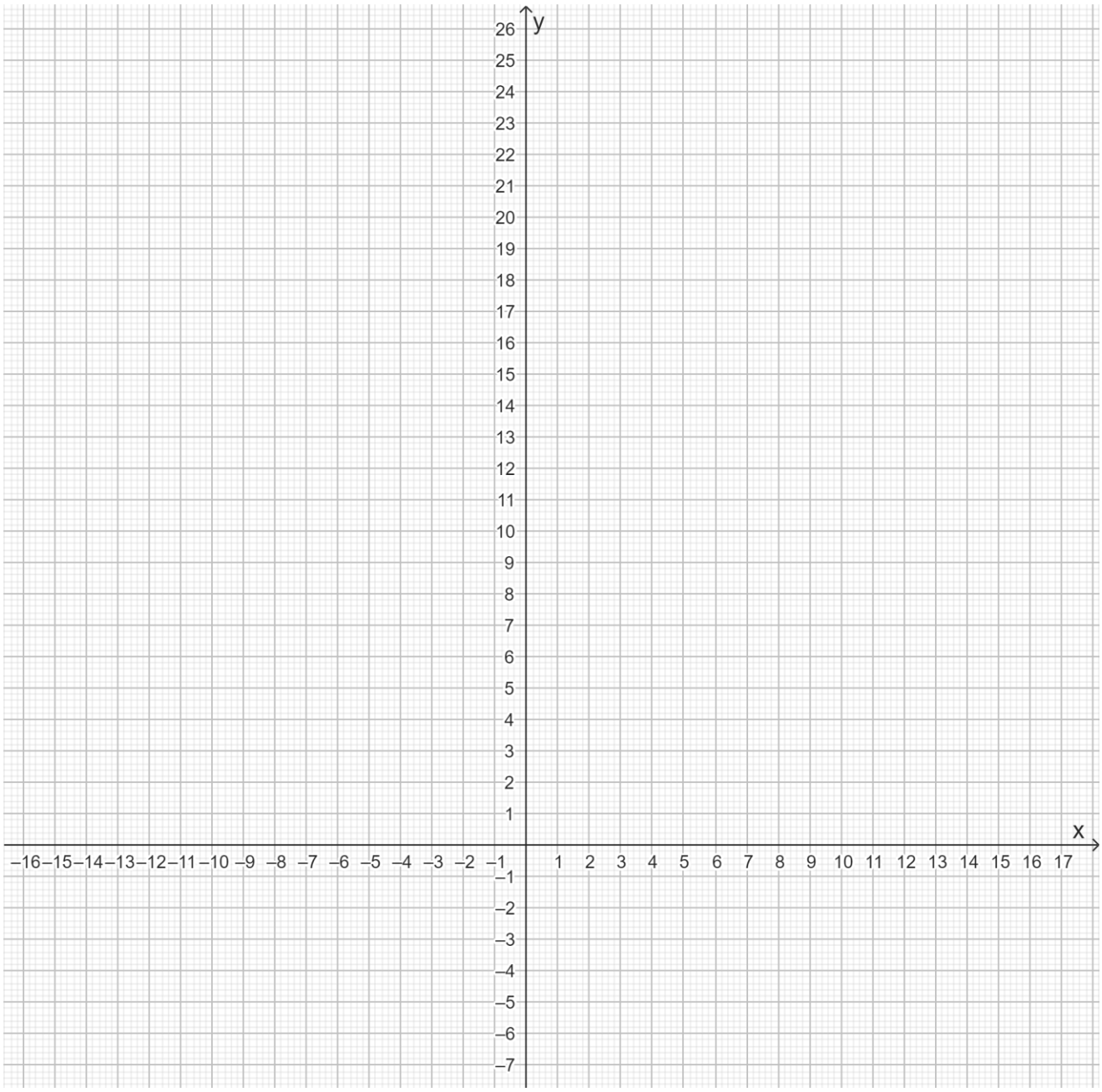
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ADDENDUM A

EXAMINATION NUMBER:

Enter your EXAMINATION NUMBER in the spaces provided above.
Detach the ADDENDUM and hand it in with the ANSWER BOOK.

QUESTION 2.1.2



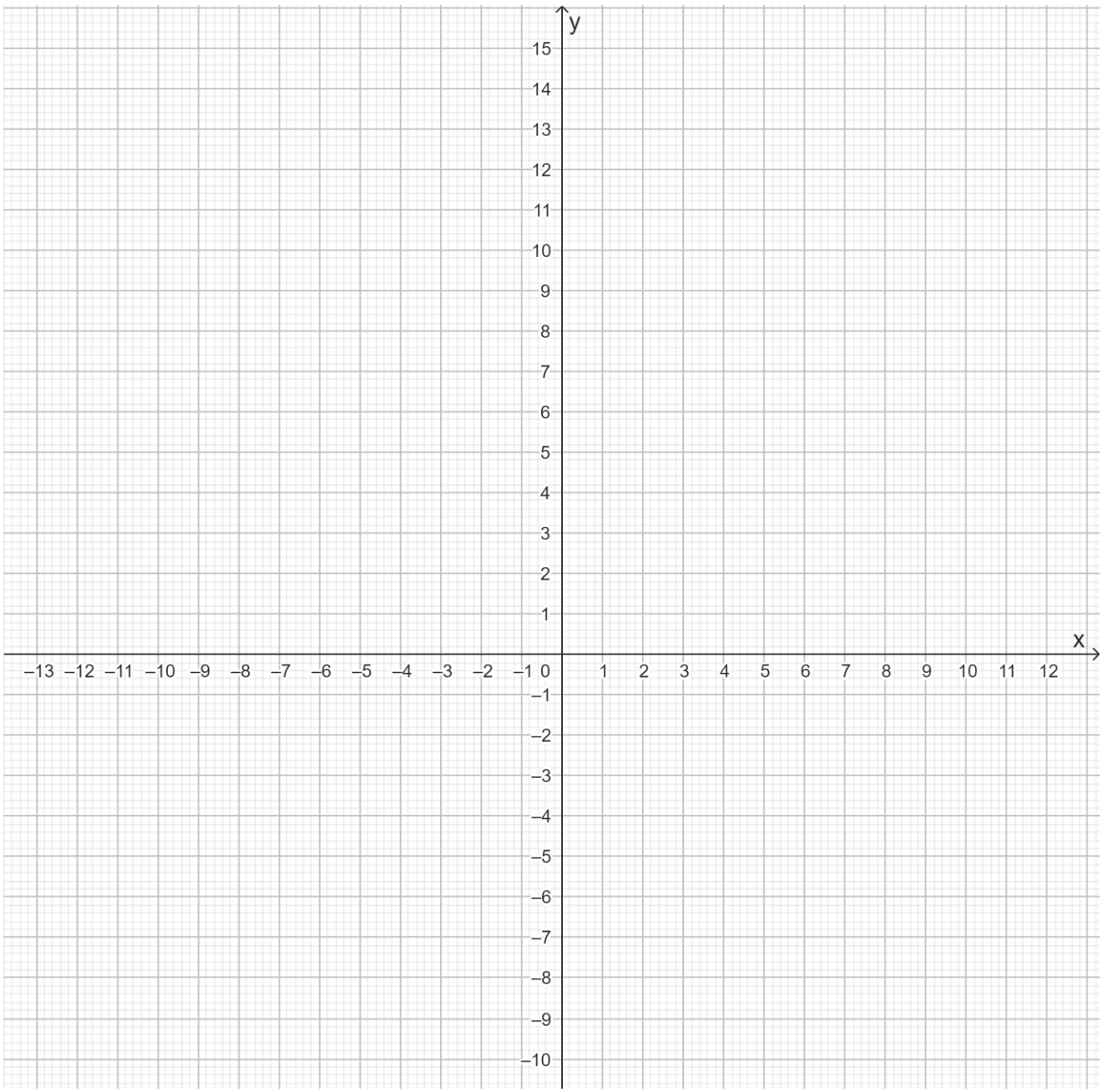
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ADDENDUM B

EXAMINATION NUMBER: | | | | | | | | | | | | | | |

Enter your EXAMINATION NUMBER in the spaces provided above.
Detach the ADDENDUM and hand it in with the ANSWER BOOK.

QUESTION 2.3.1



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