higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

8 April 2021 (X-paper)
09:00–12:00

This question paper consists of 6 pages, a formula sheet of 2 pages and 2 answer sheets.

088Q1A2108

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
MATHEMATICS N1
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. Round off answers to THREE decimals unless stated otherwise.
5. Start each question on a new page.
6. Use only a black or blue pen.
7. Write neatly and legibly.

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QUESTION 1

1.1 Simplify each of the exponents:

1.1.1 $4a^3b^3 \times 5a^4b^6$ (2)

1.1.2 $\sqrt[3]{27x^3} \times xy^3 \div x^2y^3$ (3)

1.1.3 $(4xy)^3 \div 8x^2y^2 \times (2xy)^0$ (3)

1.2 Simplify each of the logarithms:

1.2.1 log25 + log4 – log10 (3)

1.2.2 $\dfrac{\log_2 64 + lo_2 16}{\log_2 8 - lo_2 2}$ (4)

[15]

QUESTION 2

2.1 Add the following polynomials: 7a – 4b + 3 and –a + 6b –55 (3)

2.2 Subtract $-5x^2 - 3x - 2$ from $-3x^2 + 2x - 1$. (3)

2.3 Simplify $(4a - 3)^2$. (3)

[9]

QUESTION 3

3.1 Fully factorise each:

3.1.1 $2x^3 - 6x^2 + 10x$ (2)

3.1.2 $3x^2 - 3x - x + 1$ (4)

3.2 Simplify $4x(x-3)^2 + (2x+4)^2 - (x^2 - 3x + 2)$. (4)

3.3 Find the lowest common multiple (LCM) and the highest common factor (HCF) of the following:

$7xyz$

$5x^2y^3z^2$

$8x^5y^6z^5$

(7)

[17]

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QUESTION 4

4.1 Solve for x:

4.1.1 $5x + 3 = 24 - 2x$

4.1.2 $8(1 - 3x) = 5(4x + 6)$

(2 × 3) (6)

4.2 Six times the sum of eight and a certain number equals 60.

Determine the uncertain number. (5)

4.3 Given: $2px - 3 = 4y - 3p$

4.3.1 Make p the subject of the formula.

4.3.2 If $x = 5$ and $y = -2$ calculate p.

(2 × 2) (4)

[15]

QUESTION 5

5.1 The equation of a straight-line graph is given as: $y = -x - 3$

5.1.1 What is the gradient of the graph? (1)

5.1.2 Write down the constant number. (1)

5.1.3 Complete the table of the graph of $y = -x - 3$ on ANSWER SHEET 1 (attached).

x	-2	-1	0	1	2
y					

(2)

5.1.4 Sketch the graph of the table completed in QUESTION 5.1.3 on ANSWER SHEET 1 (attached). (3)

5.2 Given: $y = \frac{7}{x}$

5.2.1 Complete the following table on ANSWER SHEET 1 (attached).

x	-7	-1	1	7
y				

(2)

5.2.2 Draw the graph of $y = \frac{7}{x}$ on ANSWER SHEET 1 (attached). (3)

[12]

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QUESTION 6

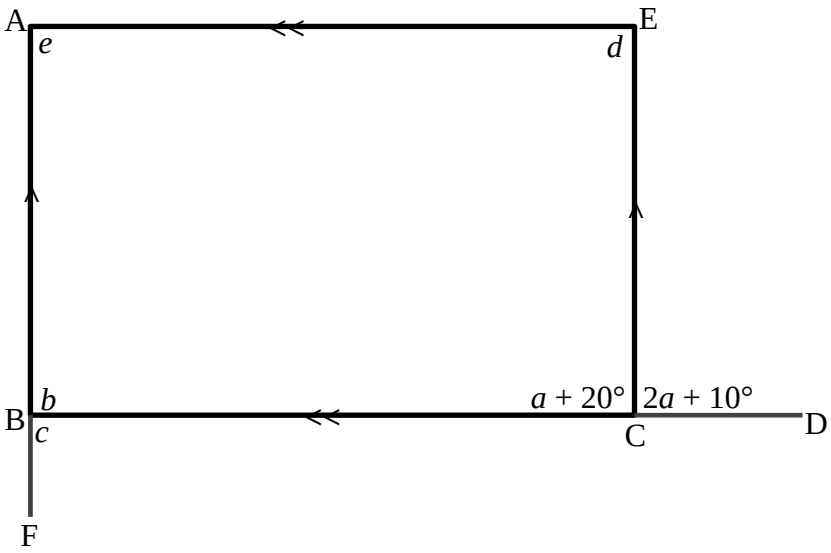
6.1 Complete the following sentences by writing only the missing word or words next to the question number (6.1.1–6.1.2) in the ANSWER BOOK.

6.1.1 Lines that intersect at 90 are …

6.1.2 An angle that is formed outside a closed shape between the side of the shape and a side that has been extended is an …

(2 × 1) (2)

6.2 Find the values of *a*, *b*, *c* and *d*.



(8)
[10]

QUESTION 7

7.1 If $\tan\beta = \frac{6}{8}; \beta \in (0°;90°)$ determine the following:

7.1.1 $\sin\beta\cos\beta + \tan\beta$ (4)

7.1.2 $4 + \sin 90° + \sin^2\beta + \cos^2\beta$ (3)

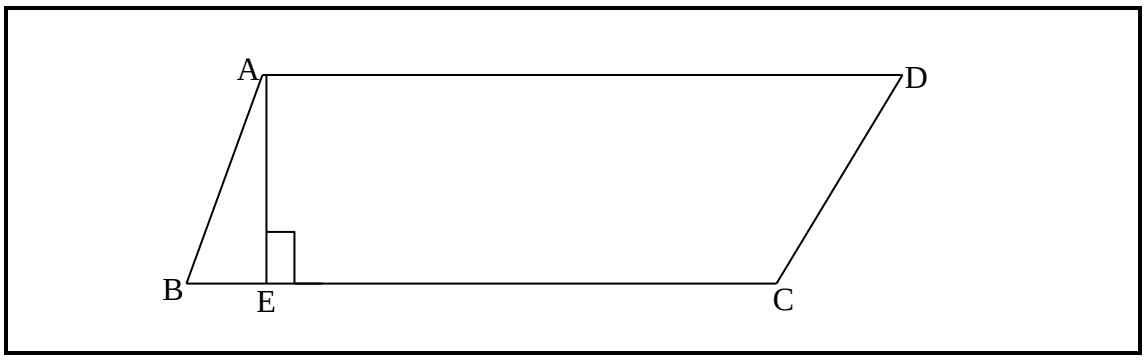
7.2 Sketch the graph of $f(x) = -\sin x + 2$ on ANSWER SHEET 2 (attached). (3)
[10]

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QUESTION 8

8.1 Calculate the radius of a circle with a circumference of 54 cm. (2)

8.2 Given parallelogram ABCD with BE = 3 cm, EC = 8 cm and DC = 5 cm.



8.2.1 Calculate AE. (4)

8.2.2 Calculate the area of the parallelogram. (3)

8.3 John and Marry are expected to share R2 000 000 in the ratio 2:3.

How much will each get? (3)

[12]

TOTAL: 100

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FORMULA SHEET

Rectangle: Perimeter = $2(l+b)$
Area = $l \times b$

Square: Perimeter = $4a$
Area = a^2

Triangle: Perimeter = $a+b+c$
Area = $\frac{1}{2}$ base $\times$ height

Rectangular prism: Volume = $l \times b \times h$
Surface area = $2(lb+lh+bh)$

Right triangular prism: Volume = $\frac{1}{2}b \times h \times l$

Cube: Volume = a^3

Right pyramid = $\frac{1}{3}$(base area $\times$ height)

Ellipse: Area = $\frac{\pi}{4}$(major axis $\times$ minor axis)

Circle: Circumference = πD *or* $2\pi r$
Area = $\frac{\pi D^2}{4}$ **OR** πr^2

Cylinder: Volume = $\frac{\pi D^2}{4}$ **OR** πr^2 h
Surface area = $2\pi r(r+h)$

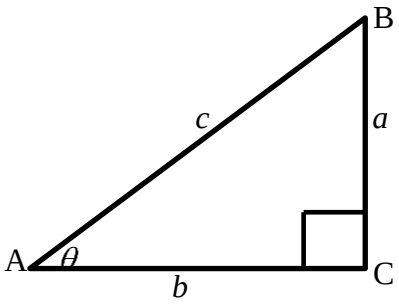
Cone: volume= $\frac{\pi D^2}{4} \times \frac{h}{3}$ **OR** $\frac{\pi r^2 h}{3}$

Sphere: V = $\frac{4}{3}\pi r^3$

Annulus: A = $\pi(R^2 - r^2)$

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Right-angled triangle:



Theorem of Pythagoras: $c^2 = a^2 + b^2$

Ratios of angle θ:

$\sin\theta = \frac{a}{c}$ $\cos\theta = \frac{b}{c}$ $\tan\theta = \frac{a}{b}$

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ANSWER SHEET 1 **EXAMINATION NUMBER:**

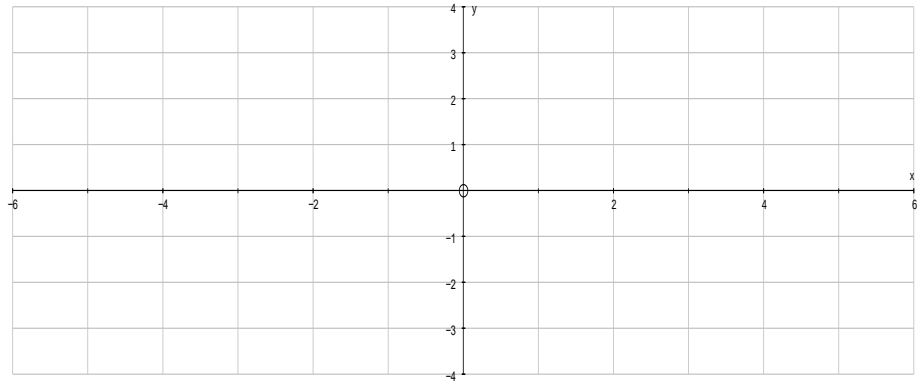
QUESTION 5

5.1 5.1.3 Complete the table of the graph of $y = -x - 3$

x	-2	-1	0	1	2
y					

(2)

5.1.4



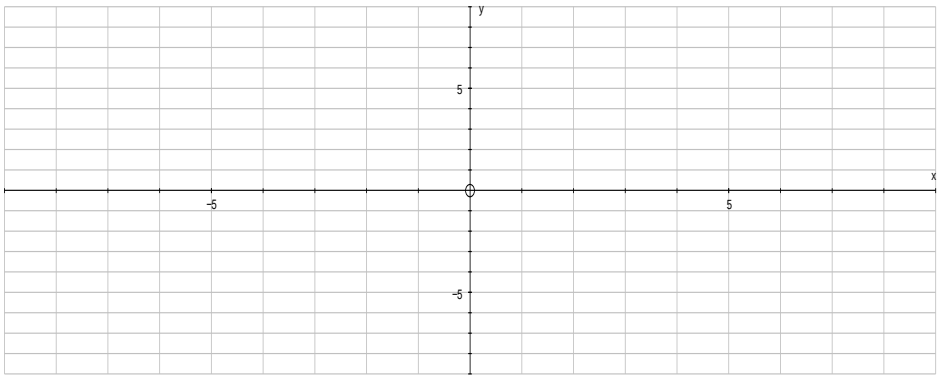
(3)

5.2 5.2.1 Complete the table.

x	-7	-1	1	7
y				

(2)

5.2.2



(3)

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ANSWER SHEET 2 **EXAMINATION NUMBER:**

QUESTION 7

7.2



(3)

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