higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

30 March 2020 (X-paper)
09:00–12:00

REQUIREMENTS: Graph paper

Nonprogrammable calculators may be used.

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

003Q1A2030

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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. Questions may be answered in any order, but subsections of questions must be kept together.
5. QUESTION 5.1.3 and QUESTION 5.2 must be answered on graph paper.
6. Use only a black or blue pen.
7. Round off final answers to THREE decimal places unless indicated otherwise.
8. Write neatly and legibly.

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QUESTION 1

1.1 Simplify the following using exponents without using a calculator:

1.1.1 $a^3 \times a^2 \times 2a^0$ (2)

1.1.2 $\dfrac{3x^2y^3 \times (4xy)^2 \times (5xy)^0}{4x^4y^3}$ (4)

1.1.3 $\sqrt[4]{16x^4y^8} \times \dfrac{1}{3}\sqrt{81x^2y^6}$ (3)

1.2 Simplify the following logarithms without using a calculator:

1.2.1 $\dfrac{\log 5 + \log 2}{\log 20 + \log 5}$ (4)

1.2.2 $7 \log 10 - \dfrac{1}{2}\log_2 64$ (3)

[16]

QUESTION 2

2.1 Determine: $4b^3 - 12b^2 + 5b + 6 \quad \div \quad 2b - 3$ (6)

2.2 From $3a^2 - 7b - 3$ subtract $5b - 4a^2 + 5$ (3)

[9]

QUESTION 3

3.1 Fully factorise the following expressions:

3.1.1 $2x^2 - 50x$ (3)

3.1.2 $2x^2 + 6x - x - 3$ (4)

3.2 Simplify:

$$\frac{2a-4}{a+2} \div \frac{a-2}{4a+8}$$ (4)

3.3 Determine the lowest common multiple (LCM) and the highest common factor (HCF) of the following algebraic terms by using prime factors:

$9r^4x^2y^3$; $6r^3x^3y^2$; $42r^2x^5y^7$ (5)

[16]

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QUESTION 4

4.1 Solve for x:

4.1.1 $2x(x-1)-2x^2+5=-7$ (3)

4.1.2 $\frac{5x}{3}-1=x+5$ (4)

4.2 Half of a certain number, subtracted from thirteen, equals five.

Determine the number. (3)

4.3 Given: $S=\frac{n}{2}(a+l)$

Change the subject of the given formula to a. (3)
[13]

QUESTION 5

5.1 5.1.1 Given: The gradient $=3$ and y-intercept $=1$ of a straight line.

Determine the equation of the straight line by using the given values. (2)

5.1.2 Given: The y-intercept $=-1$ of a straight line and a coordinate on the line $(-2;1)$.

Determine the equation of the straight line by using the given values. (3)

5.1.3 Draw the graph of $y-3x=1$ on graph paper. (4)

5.2 Given: $xy-3=0$

Use the table method to draw the graph on graph paper for the domain $x\{-3;\ -1;\ 1;\ 3\}$. (5)
[14]

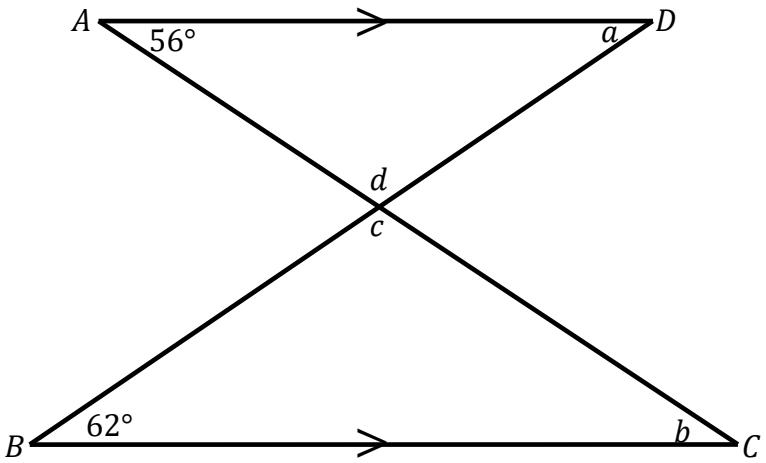
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QUESTION 6

6.1 Complete the following sentence by writing only answer next to the question number (6.1) in the ANSWER BOOK.

$\hat{A}$ and $\hat{B}$ are complementary angles. If $\hat{A} = 50°$ then $\hat{B} = \ldots.$ (1)

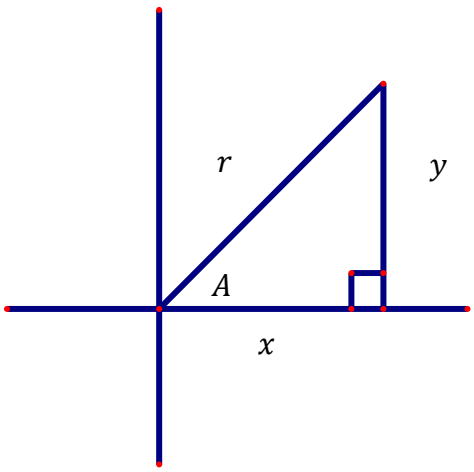
6.2 Determine the values of a, b, c and d on the diagram below and give a reason for each answer.



(8)
[9]

QUESTION 7

7.1 Given: $\sin \hat{A} = \frac{3}{5}$ and $0° \leq \hat{A} \leq 90°$



7.1.1 Calculate the value of x. (3)

7.1.2 Determine without the use of a calculator the value of $\cos \hat{A}$. (1)

7.1.3 Determine without the use of a calculator the value of the expression and simplify the answer:

$1 \div \tan \hat{A}$ (2)

7.2 Simplify the expression by making use of special angles (without the use of a calculator):

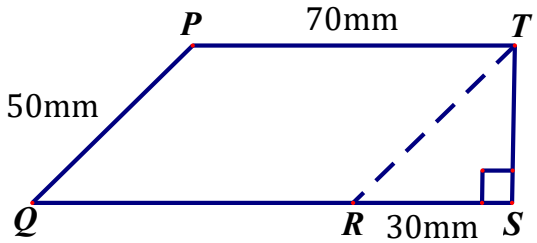
$6 \sin 30° - 4 \cos 60°$ (3)

[9]

QUESTION 8

8.1 Given: Quadrilateral $PQST$ and parallelogram $PQRT$.

$PT = 70\ mm$, $PQ = 50\ mm$ and $RS = 30\ mm$



8.1.1 Determine the length of RT. (1)

8.1.2 Calculate the length of ST. (3)

8.1.3 Calculate the perimeter of $PQST$. (2)

8.2 The area of a rectangle is $750\ cm^2$ *and* the length is $30\ cm$.

Calculate the breadth of the rectangle. (2)

8.3 Calculate 72% of R6 500. (2)

8.4 Two siblings must share R81 000 000 in the ratio 4:5.

Calculate each sibling's share of the money. (4)

[14]

TOTAL: 100

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MATHEMATICS N1

FORMULA SHEET

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

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

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

Rectangular prism:
Volume = $l \times b \times h$

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

Cube:
Volume = a^3

Right pyramid:
Volume = $\frac{1}{3}$(base area $\times h$)

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

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

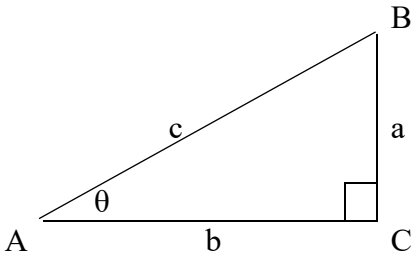
Cylinder:
Volume = $\frac{\pi D^2}{4} \times h$ or $\pi r^2 h$

Cone:
Volume = $\frac{\pi D^2}{4} \times \frac{h}{3}$ or $\frac{\pi r^2 h}{3}$

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

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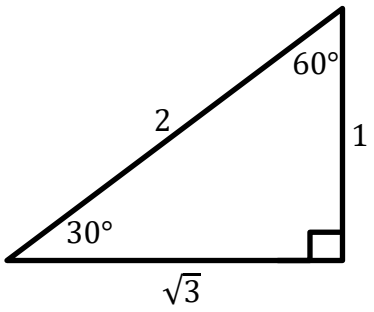
The right-angled triangle:

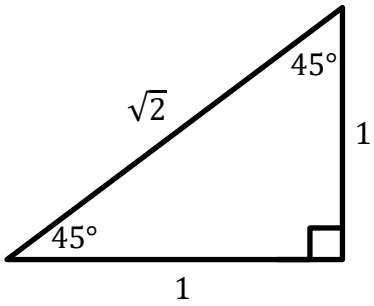


The theorem of Pythagoras:
$c^2 = a^2 + b^2$

Ratios of angle θ:
$\sin\theta = \frac{a}{c}$ $\cos\theta = \frac{b}{c}$ $\tan\theta = \frac{a}{b}$

Special angles:





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