higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T990**(E)**(A2)T

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

2 April 2019 (X-Paper)
09:00–12:00

REQUIREMENTS: Graph paper

Nonprogrammable calculators may be used.

This question paper consists of 7 pages and a formula sheet of 2 pages.

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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. QUESTION 5.1.3 and QUESTION 5.2 must be answered on graph paper.
5. Show ALL formulas and intermediate steps and simplify where possible.
6. Round off answers to THREE decimals unless indicated otherwise.
7. Questions may be answered in any order, but subsections of questions must be kept together.
8. Questions must be answered in BLUE or BLACK ink. Writing in pencil will NOT be marked.
9. Work neatly.

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QUESTION 1

1.1 Simplify the following using exponents. Do NOT use a calculator.

1.1.1 $\dfrac{x^4 \times x^2}{x^3}$ (2)

1.1.2 $\dfrac{(x^3y)^3 \times (2xy)^2 \times 6y}{3x^2y}$ (4)

1.1.3 $\sqrt[3]{8x^3} \times \sqrt{25x^2y^4} \times \dfrac{1}{5x^2y^2}$ (3)

1.2 Simplify the following logarithms without using a calculator:

1.2.1 $5\sqrt{\dfrac{1}{4}} - 3log_2 2 + \dfrac{1}{2}\log_3 27$

1.2.2 $\log 20 - \log 4 - \log 2 + \log 8$

(2 × 3) (6)
[15]

QUESTION 2

2.1 Subtract $x^2 - 7x$ from $8x^2 - x + 2$

2.2 Divide $x^3 - 3x^2 + 3x - 1$ by $x - 1$

2.3 Determine the product and simplify $(2x - 3)(x + 3)$

(3 × 3) **[9]**

QUESTION 3

3.1 Fully factorise the following expressions:

3.1.1 $4x^2y + 12x^3y^2 - 20xy^3$ (4)

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

3.2 Simplify $\dfrac{3x^2 - 12x}{6x} \div \dfrac{2x - 8}{5}$ (4)

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

$5x^2y^2z$

$20x^3y^4z^3$

$30x^5y^3z^2$

(6)
[17]

QUESTION 4

4.1 Solve for x:

4.1.1 $3x+2=-2x+22$ (2)

4.1.2 $4(x-2)+2x+1=-1$ (3)

4.2 The sum of four consecutive odd numbers is 51.

Find the numbers. (5)

4.3 Given: $ax-bx-2c=0$

4.3.1 Make x the subject of the formula. (3)

4.3.2 If $a=4,\ b=2$ and $c=3$, determine the value of x. (2)

[15]

QUESTION 5

5.1 Given: $y+3x-6=0$

5.1.1 Write the equation in the form $y=mx+c$. (1)

5.1.2 Determine the co-ordinate of the y-intercept of the graph. (1)

5.1.3 Determine the co-ordinate of the x-intercept of the graph. (2)

5.1.4 Give the name of the graph. (1)

5.1.5 Draw the graph of $y+3x-6=0$ on the attached graph paper. (3)

5.2 Given: $xy=-10$

Use the table method to draw the graph of $xy=-10$ on the attached graph paper, for the domain $\{-10;\ -5;\ -2;\ -1;1;2;5;10\}$. (5)

[13]

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QUESTION 6

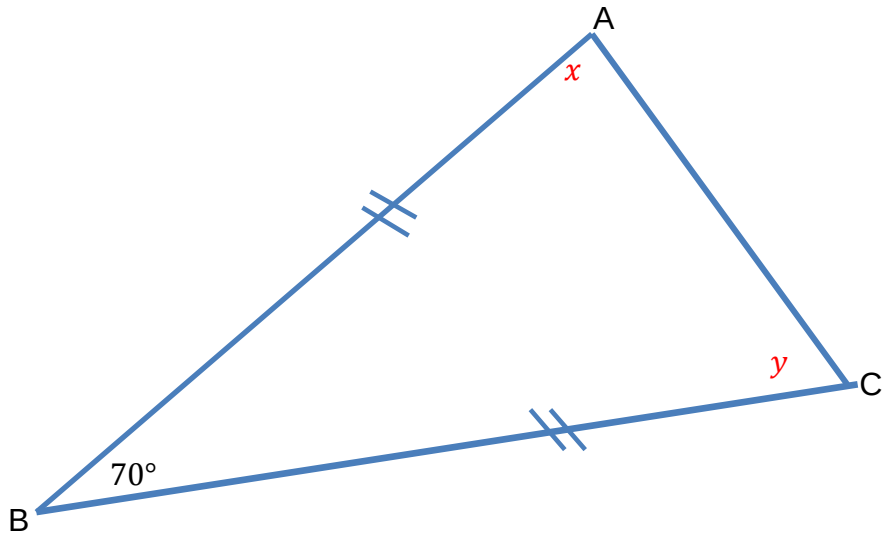
6.1 Complete the sentence below by writing the missing word next to the question number (6.1) in the ANSWER BOOK.

If two sides of a triangle are equal then the … opposite those equal sides will also be equal. (1)

6.2 Write down the FOUR cases of congruency of triangles. (4)

6.3 Given: ΔABC with $\hat{B} = 70°$ and $AB = BC$.

Determine the values of *x* and *y* with reasons.



(4)
[9]

QUESTION 7

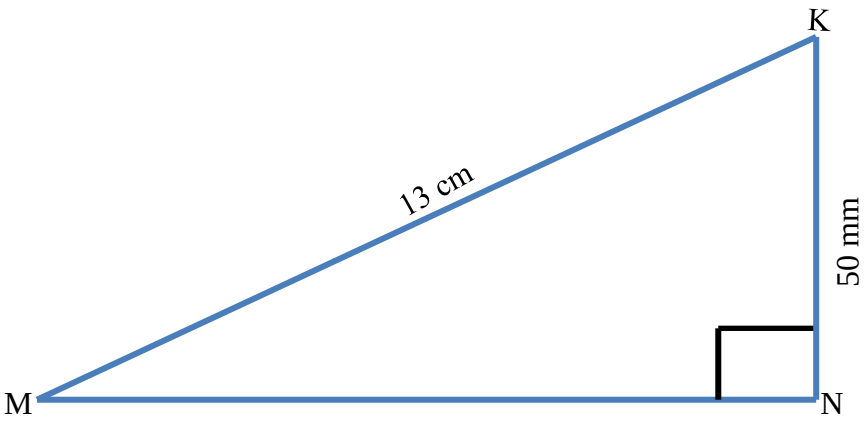
7.1 Given: $10\cos A = 6$ and $0° \leq A \leq 90°$.

Determine the values of the following:

7.1.1 $\sin A$ (3)

7.1.2 $\tan A \times \cos A$ (2)

7.2 Given: ΔKMN with $\widehat{N} = 90°$, $KM = 13$ cm and $KN = 50$ mm.



7.2.1 Calculate MN in cm.

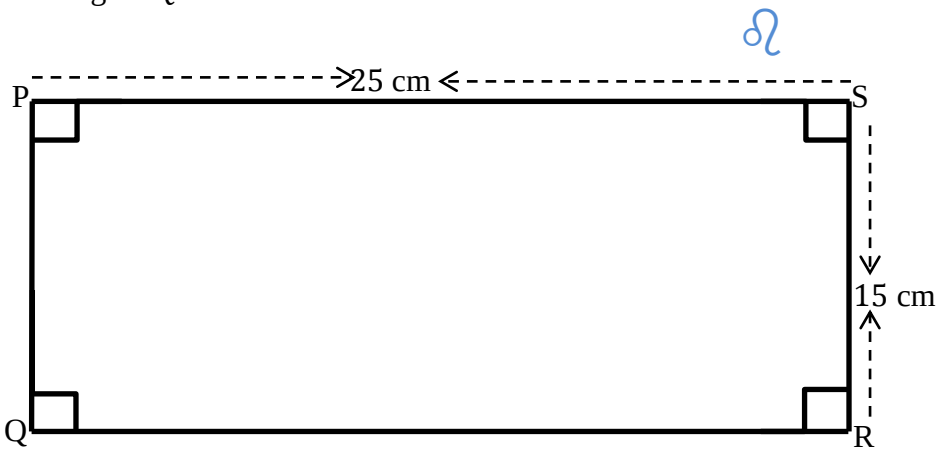
7.2.2 Calculate $\widehat{K}$.

(3 × 2) (6)

[11]

QUESTION 8

8.1 Given: Rectangle $PQRS$ with $PS = 25$ cm and $SR = 15$ cm.



8.1.1 Calculate the perimeter of the rectangle. (2)

8.1.2 Calculate the area of the rectangle. (2)

8.1.3 Calculate the area of the rectangle if the length of the rectangle is doubled. What observation can be made? (3)

8.2 The original price of a house was R275 000. Due to the recession the price is reduced with 16%.

Calculate the new price. (4)

[11]

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 = $\frac{1}{2}b \times h$

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

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

Cube:
Volume = a^3

Right pyramid:
Volume = $\frac{1}{3}$(base area × 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

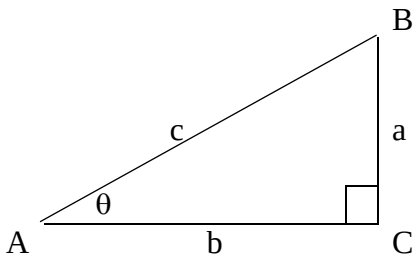
Cylinder:
Volume = $\frac{\pi D^2}{4} \times h$ or $\pi r^2 h$

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

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

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The right-angled triangle:

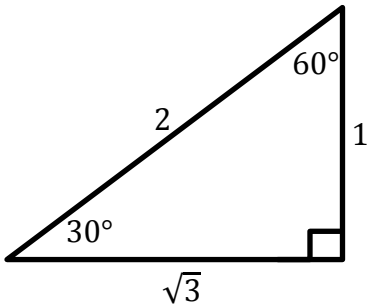


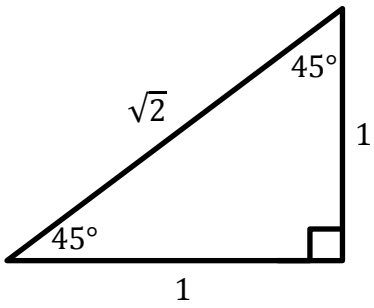
The theorem of Pythagoras:
$c^2 = a^2 + b^2$

Ratios of angle θ:

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

Special angles:





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