higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T930**(E)**(A1)T

APRIL EXAMINATION

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

1 April 2016 (X-Paper)
09:00–12:00

Nonprogrammable scientific calculators and graph paper may be used.

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

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.   Write neatly and legibly.

QUESTION 1

Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1   Natural numbers start at (-2; -1; 0; 1; 2).

1.2   The ratio of x to y is $\left(xy; \dfrac{x}{y}; yx; x - y \right)$.
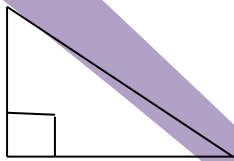
1.3   The coefficient of x^4 in the term of $10x^4$ is (40 ; x ; 10 ; -10 ; 10 x).

1.4   240 km/h equals to (864; 66,667; 0,067; 667) m/s.

1.5   Calculate the new price if the price of chocolate is R1,20 c and it is increased by 8%. (R1,25; R1,30; R1,10; R1,50)

1.6   The y-intercept of $y = 2x - 5$ $\left(2; \dfrac{2}{5}; -5; 5 \right)$.

1.7   The side opposite the 90° is called (adjacent; hypotenuse; pythagoras; angle).

1.8   The formula to calculate gradient is $\left(\dfrac{\Delta x}{\Delta y}; \dfrac{a}{x}; \dfrac{\Delta y}{\Delta x}; \dfrac{m}{x} \right)$.

1.9   (Equilateral; Scalene; Isosceles; Right-angled) triangle has two equal sides and two equal angles.

1.10   Solve for x if $\dfrac{3x}{4} = 3$; Then $x = \left(3; 12; 4; \dfrac{3}{4} \right)$.

                                                     (10 x 1)   **[10]**

QUESTION 2

2.1 Simplify the following expressions by only using exponential and log laws:

2.1.1 $\left(a^3\right)^{b-c} \times \left(a^4\right)^{b+c}$ (3)

2.1.2 $\left[\left(\frac{1}{2}\right)^2\right]^{-3}$ (3)

2.1.3 $2ab^0 \times \sqrt[3]{\dfrac{27a^3b^4}{729b}}$ (4)

2.2 Use logarithm base 10 to determine the value of x. Show ALL the calculations.

$$x = \frac{0,48 \times \sqrt{133}}{0,12}$$ (6)

2.3 Add the following terms: $16x^2y + 4xy^2 - 7xy$ and $6xy^2 - 4xy - 10x^2y$. (3)

2.4 Remove the brackets and simplify:

$8x - [x + 3(-x - 2)]$ (4)

[23]

QUESTION 3

3.1 Divide: $6x^3 - 7x + 6$ by $x + 2$. (7)

3.2 Use $32x^3y^4z^2$; $48x^5y^3z^3$ and $70x^2y^5z^4$ to answer the questions.

3.2.1 Show the prime factors of each of the terms. (3)

3.2.2 Determine the LCM. (2)

3.2.3 Determine the HCF. (2)

3.3 Fully factorise the following :

3.3.1 $ab - 8xy + 2bx - 4ay$ (5)

3.3.2 $\dfrac{1}{2}x^2 - \dfrac{1}{4}xy + \dfrac{1}{4}x^2y^2$ (4)

3.4   Simplify:

$$\frac{24x^2 - 4x}{5x} \div \frac{30x - 5}{3x}$$

(4)

[27]

QUESTION 4

4.1   Solve for y:

$$4(y - 3) - 6y = 2(y + 4)$$

(5)

4.2   Solve the number:

Four less than four times a number is equal to 24.

(4)

4.3   Make t the subject of the formula:

$$p = \frac{1}{3}gt^2$$

(3)

[12]

QUESTION 5

Given the function $y = -\dfrac{4}{x}$:

5.1   Use the table method to sketch the graph of $y = -\dfrac{4}{x}$ for the domain
         {-4; -3; -2; -1; 0; 1; 2; 3; 4}.

(8)

5.2   Give the name of the graph.

(1)

5.3   What is the y-intercept?

(1)

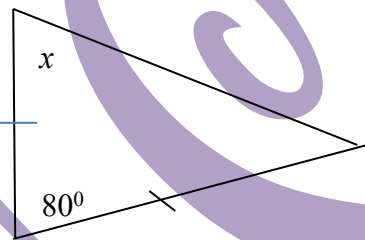5.4   In which quadrants is the graph drawn?

(1)

[11]

QUESTION 6
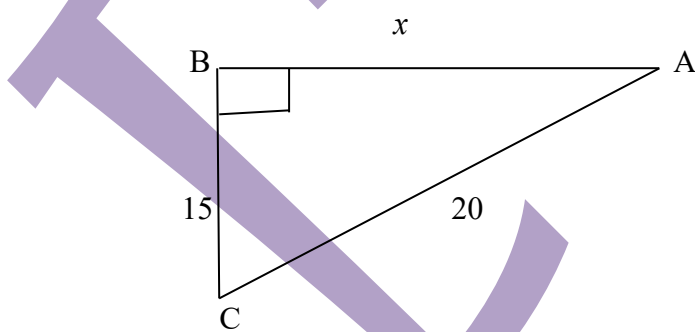
Calculate the magnitude of x in the following diagram:

6.1
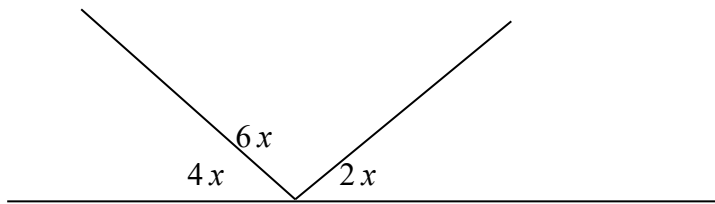
6.2   Adjust the sketch to show that the sides are equal.
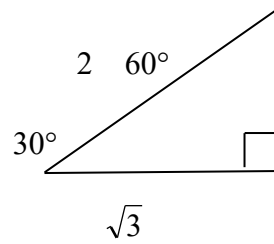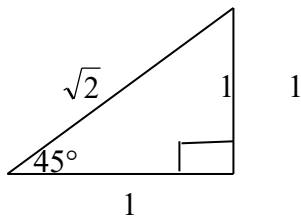

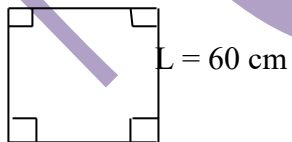
6.3

(3 x 3)   **[9]**

QUESTION 7

7.1

Simplify the following expressions by making use of the special angle. Do not use a calculator.

7.1.1 $2\sin 30° + 3\cos 60°$ (2)

7.1.2 $4\cos 30°(\sin 45°)(\cos 45°)$ (2)

7.2   Find the perimeter of the following square:

L = 60 cm

(2)

7.2   Determine the volume in cubic centimetre if the dimensions of the rectangular prism are: length 200 mm; breadth 125 mm and height 90 mm.   (2)

[8]

TOTAL: **100**

MATHEMATICS N1

FORMULA SHEET

Rectangle: Perimeter = 2(*l* + *b*)
Area = *l* × *b*

Square: Perimeter = 4*a*
Area = *a*^{2}

Triangle: Perimeter = *a* + *b* + *c*
Area = ½*b* × *h*

Rectangular prism:
Volume = *l* × *b* × *h*

Right triangular prism:
Volume = ½*b* × *h* × *l*

Cube: Volume = *a*^{3}

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

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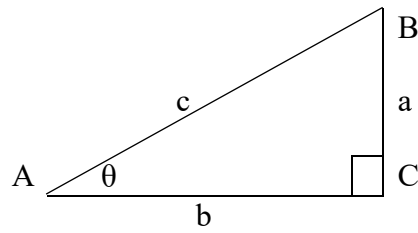Area = $\frac{\pi}{4}$(major axis × minor axis)

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

The right-angled triangle:

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

Ratios of angle θ:

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