



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T850(E)(N21)T
NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

21 November 2016 (X-Paper)
09:00–12:00

REQUIREMENTS: Graph paper

Scientific calculators may be used.

This question paper consists of 6 pages and a 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.
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QUESTION 1

1.1 Given: $7x^{-2} - 5x + 4$

Use the above equation to complete the following sentences:

1.1.1 The expression has ... terms.

1.1.2 ... is the highest exponent of x .

1.1.3 ... is the variable.

1.1.4 ... is the coefficient of x^{-2}

1.1.5 4 is the ... term

(5 × 1) (5)

1.2 Given: $\log_3 243 = 5$

Answer the following questions using the above expression:

1.2.1 ... is the number. (1)

1.2.2 ... is the base. (1)

1.2.3 ... is the logarithm. (1)

1.3 Write the expression in QUESTION 1.2 in exponential form. (2)

[10]

QUESTION 2

2.1 Simplify the following by making use only of exponential laws.

2.1.1 $-6(a^0 b^2)^3 \times \sqrt[5]{\frac{32b^{15}}{b^5}}$ (4)

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

2.2 Remove the brackets and simplify:

$2(x - y) - [2x + 2(x - y)]$ (3)

2.3 Simplify the following logarithms without the use of a calculator:

$$8 \log_e \sqrt{e} + \log_2 16 - (\log_{10} 25 + \log_{10} 4) \quad (4)$$

2.4 Use logarithms with base 10 to determine the value of x . Show ALL the calculations.

$$x = \frac{0,38 \times \sqrt{0.47}}{0.55} \quad (4)$$

[18]

QUESTION 3

3.1 Divide $x^3 + x - 5$ by $x - 2$ (7)

3.2 Subtract $47bc - 68pd + 94qr$ from $87pd - 64bc - 70qr$ (3)

3.3 Fully factorise the following expressions:

3.3.1 $24x^3y^4z^2 - 16x^2y^3z - 8xy^2$ (4)

3.3.2 $x^3 - xy - 2x^2 + 2y$ (5)

3.4 Given: $36x^6y^3z^2$; $70x^2y^2z$ and $20x^4yz^3$

By making use of prime factors, determine the following:

3.4.1 The LCM

3.4.2 The HCF

(7)
[26]

QUESTION 4

4.1 Solve for x .

$$-4(x - 3) - 5 = 3(x - 7) \quad (5)$$

4.2 Manipulate the formula to make p the subject of the formula if

$$T = 2\pi \sqrt{\frac{p}{g}} \quad (4)$$

4.3 A certain number increased by 18 is three times the original number diminished (decreased) by 8.

Find the number. (3)
[12]

QUESTION 5

5.1 Given: $g(x) = -x + 3$ and $f(x) = -\frac{4}{x}$

5.1.1 What type of graph is $y = -x + 3$?

5.1.2 Is the graph of $g(x)$ positive or negative?

5.1.3 Give the name of $f(x)$.

5.1.4 Give the y-intercept of $f(x)$.

5.1.5 In which quadrant(s) will the graph of $f(x)$ be?

(5 × 1) (5)

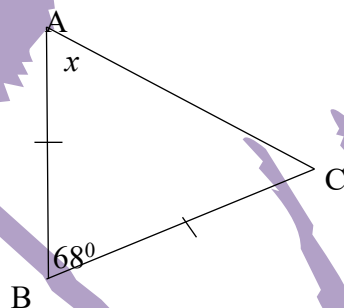
5.2 Use the following value of x to sketch the graph of $g(x)$:

$[-2 ; -1 ; 0 ; 1 ; 2 ; 3 ; 4]$

(5)
[10]

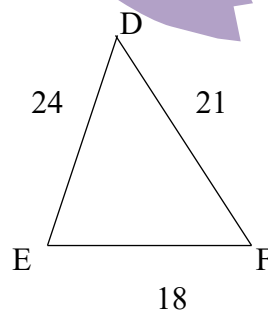
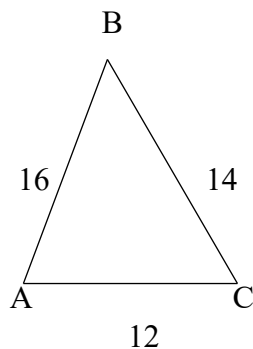
QUESTION 6

6.1 Calculate, with a reason, the magnitude of x in the following triangle:



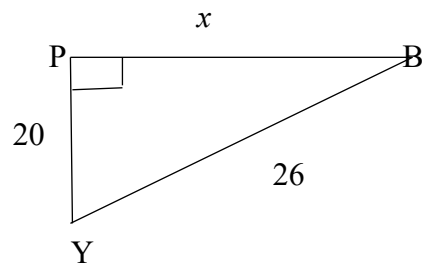
(4)

6.2 Show that the following triangles are similar:



(3)

6.3 Calculate the value of x in the following triangle:

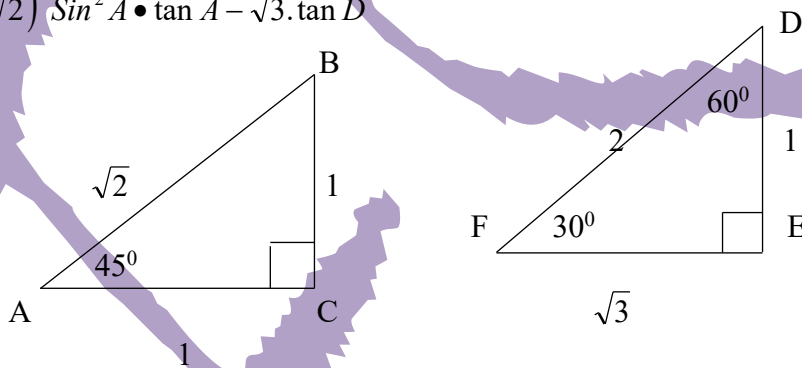


(2)
[9]

QUESTION 7

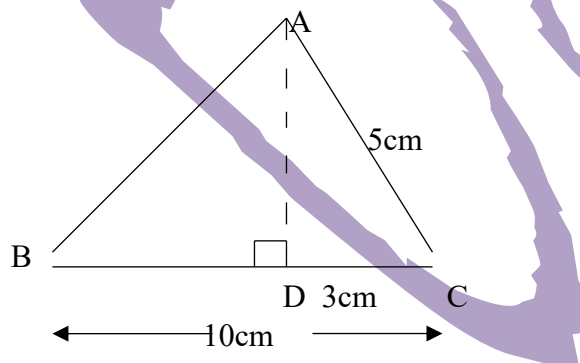
7.1 Simplify the following expressions by making use of the special angles. DO NOT USE A CALCULATOR.

$$(\sqrt{2})^2 \sin^2 A \bullet \tan A - \sqrt{3} \cdot \tan D$$



(6)

7.2



Use the shape above to determine the following:

7.2.1 Perimeter of triangle ABC (5)

7.2.2 Area of triangle ABC (4)

[15]

TOTAL: 100

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 = $\frac{1}{3}(\text{base area} \times h)$

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

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

Reghoek: Omtrek = $2(l + b)$
Area = $l \times b$

Vierkant: Omtrek = $4a$
Area = a^2

Driehoek: Omtrek = $a + b + c$
Area = $\frac{1}{2}b \times h$

Reghoekige prisma:
Volume = $l \times b \times h$

Regte driehoekige prisma:
Volume = $\frac{1}{2}b \times h \times l$

Kubus: Volume = a^3

Regte piramide:
Volume = $\frac{1}{3}(\text{basisarea} \times h)$

Ellips:
Area = $\frac{\pi}{4}(\text{hoofas} \times \text{neweas})$

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

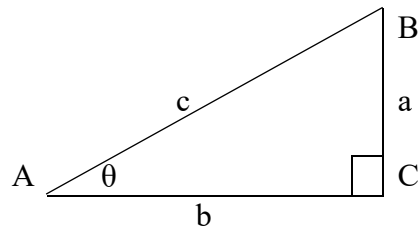
Silinder: Volume = $\frac{\pi D^2}{4} \times h$ or $\pi r^2 h$

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

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

The right-angled triangle:

Die reghoekige driehoek:



The theorem of Pythagoras:

$$c^2 = a^2 + b^2$$

Die stelling van Pythagoras:

$$c^2 = a^2 + b^2$$

Ratios of angle θ :

Verhoudings vir hoek θ :

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