



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T990(E)(N14)T

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

14 November 2018 (X-Paper)

09:00–12:00

Nonprogrammable scientific calculators may be used.

This question paper consists of 8 pages, a formula sheet of 2 pages and 1 graph paper.

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. Show ALL formulae and intermediate steps and simplify where possible.
 5. Round off ALL final answers to THREE decimal places (unless indicated otherwise).
 6. Questions may be answered in any order, but keep subsections of questions together.
 7. Questions must be answered in blue or black ink. Writing in pencil will NOT be marked. Graphs can be drawn in pencil.
 8. Sketches/Graphs must be large, neat and fully labelled.
 9. Write neatly and legibly.
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QUESTION 1

1.1 Simplify each of the following without a calculator by using exponential laws:

1.1.1 $85 \times (735)^0$ (1)

1.1.2 $\frac{a^3(b^2)^5}{a^2b^{12}}$ (2)

1.1.3 $\frac{15^x \times 3^{x+1} \times 25^x}{9^{x+1} \times 125^x}$ (7)

1.2 Simplify each of the following logarithms without a calculator:

1.2.1 $\log_3 81 - \log_3 3$

1.2.2 $\frac{\log_2 64}{\log_2 4}$ (2 × 3) (6)
[16]

QUESTION 2

2.1 Divide $-10x + x^3 - 8 - x^2$ by $x - 4$. (3)

2.2 From $4x^2 - 5x - 2$ subtract $8 - 10x - 5x^2$. (3)

2.3 Simplify the following:

$2(x + 2)^2 - (2x - 1)(x + 3)$ (6)
[12]

QUESTION 3

3.1 Fully factorise each of the following expressions:

3.1.1 $9a + 12b$ (2)

3.1.2 $t^2(x - y) - z^2(y - x)$ (3)

3.2 Simplify the following:

$\frac{x - y}{x + y} \times \frac{(x + y)^2}{x - y} \times \frac{4}{2x + 2y}$ (3)

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

$$6x^4y^3z^2; \quad 18x^3y^2z; \quad 20x^2yz^3$$

(5)
[13]

QUESTION 4

- 4.1 Solve for x :

4.1.1 $3x - 8 = 16$ (2)

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

- 4.2 John is twice as old as Steven and the sum of their ages is 75 years.

Express the information in an equation and then calculate John and Steven's age. (4)

- 4.3 The volume of a solid is given as:

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

- 4.3.1 Change the subject of the formula to r . (3)

- 4.3.2 If $V = 147 \text{ m}^3$, determine the value of r . (2)

- 4.3.3 What is the name of the solid? (1)

[16]

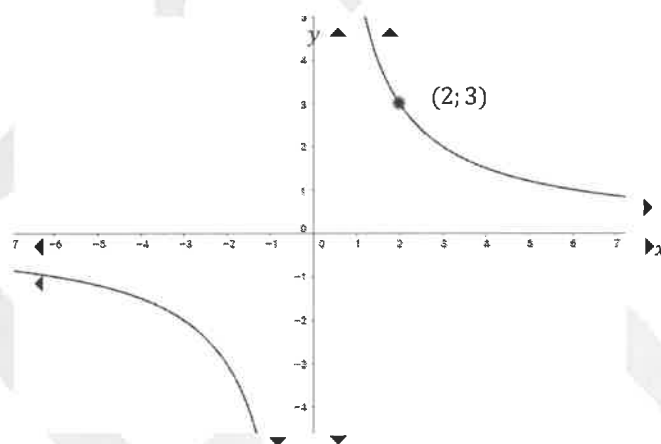
QUESTION 5

5.1 Given: $y = -3x + 5$

5.1.1 Determine the gradient of the graph. (1)

5.1.2 Draw the graph by using a table $x \in (-3 < x \leq 2)$. [Use graph paper.] (5)

5.2 Study the graph below which represents the function of $y = \frac{a}{x}$.



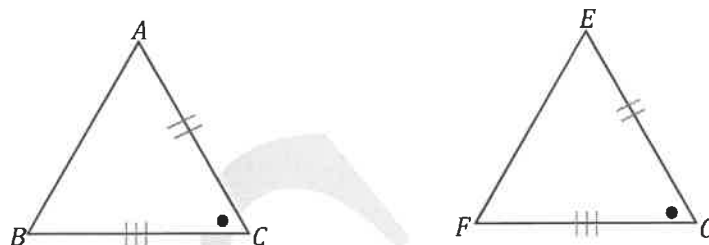
5.2.1 In which quadrant(s) is the graph drawn? (1)

5.2.2 Calculate the value of a and then determine the equation of the graph. (2)
[9]

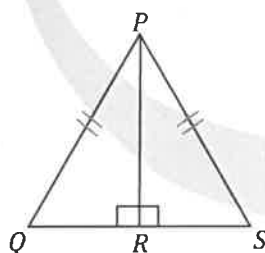
QUESTION 6

6.1 State the case of congruency represented by each of the following:

6.1.1



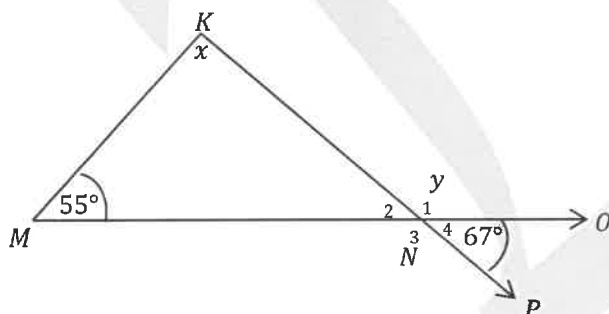
6.1.2



(2 × 1) (2)

6.2 Given: $\triangle KMN$ with KN extended to P , MN extended to O , $\hat{M} = 55^\circ$ and $\hat{N}_4 = 67^\circ$

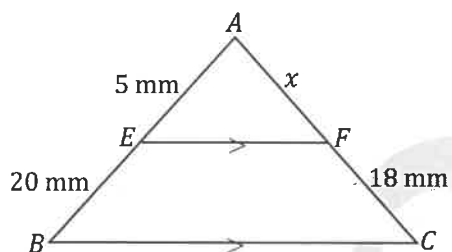
Calculate the value of x and y . Give reasons for the answers.



(4)

6.3 Given: $\triangle ABC$ III $\triangle AEF$ with $EF \parallel BC$

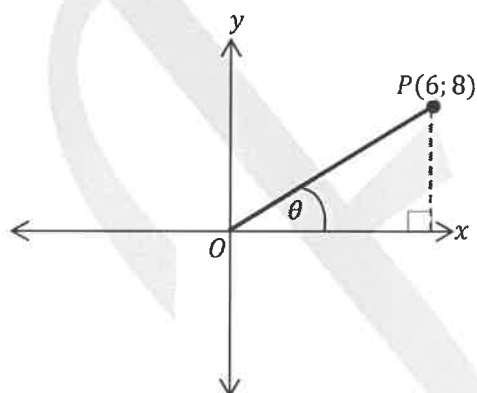
Calculate the value of x .



(2)
[8]

QUESTION 7

7.1 Given:



7.1.1 Find the length of OP. (3)

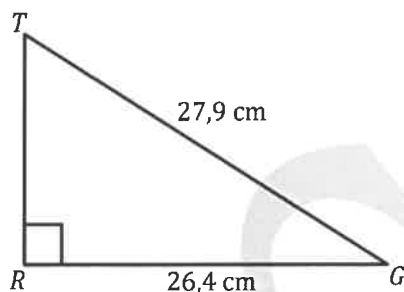
Determine the values of each of the following trigonometric ratios:

7.1.2 $\sin \theta$ (1)

7.1.3 $\frac{\cos \theta}{\tan \theta}$ (3)

7.2 Given: $\triangle TRG$ with $\hat{R} = 90^\circ$, $TG = 27,9$ cm and $RG = 26,4$ cm

Calculate the following:



7.2.1 $\hat{G}$

7.2.2 $\hat{T}$ (Give a reason for the answer.)

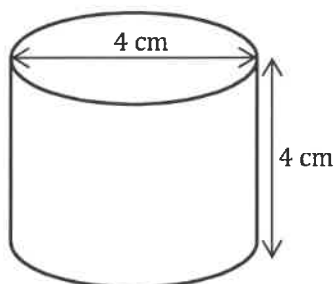
(2 × 2) (4)
[11]

QUESTION 8

8.1 Calculate 20% of R850. (1)

8.2 Calculate the percentage decrease of the price of rice if it decreases from R1 280 per ton to R1 165 per ton. (3)

8.3 Given: A cylinder with a diameter of 4 cm and a height of 4 cm.



8.3.1 Calculate the volume of the cylinder. (4)

8.3.2 Calculate the surface area of the cylinder. (4)

8.4 A circle has a diameter of 80 cm.

Calculate the circumference of this circle. Give the answer in m. (3)
[15]

TOTAL: 100

FORMULA SHEET**Rectangle:**

$$\text{Perimeter} = 2(l + b)$$

$$\text{Area} = l \times b$$

Square:

$$\text{Perimeter} = 4a$$

$$\text{Area} = a^2$$

Triangle:

$$\text{Perimeter} = a + b + c$$

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

Rectangular prism:

$$\text{Volume} = l \times b \times h$$

Right triangular prism:

$$\text{Volume} = \frac{1}{2}b \times h \times l$$

Cube:

$$\text{Volume} = a^3$$

Right pyramid:

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

Ellipse:

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

Circle:

$$\text{Circumference} = \pi D \text{ or } 2\pi r$$

$$\text{Area} = \frac{\pi D^2}{4} \text{ or } \pi r^2$$

Cylinder:

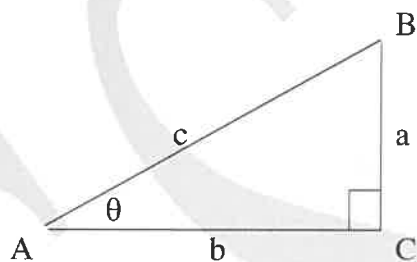
$$\text{Volume} = \frac{\pi D^2}{4} \times h \text{ or } \pi r^2 h$$

Cone:

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

Annulus:

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

Right-angled triangle:**The theorem of Pythagoras:**

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

Ratios of angle θ :

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

**GRAPH PAPER • GRAFIEKPAPIER**

(Return this sheet with the other answers)
(Lewer hierdie blad in saam met u antwoordboek)

Examination number
Eksamennummer