

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T920(E)(N14)T
NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

14 November 2014 (Y-Paper)
13:00–16:00

REQUIREMENTS: Graph paper

A scientific calculator may be used.

This question paper consists of 6 pages, a answer sheet (graph paper) and a formula sheet of 2 pages.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA
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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. Start each question on a NEW page.
 5. Use a pencil for drawings.
 6. The answers of ALL calculations must be approximated to THREE decimals.
 7. Rough calculations may be done at the back of the ANSWER BOOK.
 8. Write neatly and legibly.
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QUESTION 1

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

1.1 Simplify the following:

$$2^5 \div 2^2$$

$$= [2^7 ; 8 ; 128 ; 4^7 ; 11]$$

1.2 How many terms does the following expression have?

$$4(a+b) - 6a^2 + 4b$$

$$= [1 ; 2 ; 3 ; 4 ; 5]$$

1.3 270 km/h equals ... m/s

$$[16 ; 6 ; 75 ; 216 ; 120 ; 972]$$

1.4 The ratio of x to y is represented by:

$$[xy ; \frac{x}{y} ; yx ; x-y]$$

1.5 The graph of $y = -\frac{3}{x}$ must be drawn in the following quadrant (s):

$$[2 \text{ \& } 3 ; 1 \text{ \& } 2 ; 2 \text{ \& } 4 ; 1 \text{ \& } 3]$$

1.6 If $\tan C = 26$, then the value of angle C is ...

$$[0,488^\circ ; 54^\circ ; 87,8^\circ ; 68 ; 96^\circ]$$

1.7 ... is the symbol of similar triangles.

$$(\equiv ; \parallel ; = ; \angle\angle\angle)$$

1.8 An integer is ...

$$[\frac{2}{3} ; 1,2 ; -2 ; 2,5 ; -\frac{2}{3}]$$

1.9 The graph of $y = 3x - 6$ has the y -intercept of :

$$[3 ; -2 ; -6 ; 6]$$

1.10 Solve for x if $\frac{ax}{3} = 3$; then $x = [9a ; a ; \frac{1}{a} ; \frac{9}{a}]$

(10 x 1) [10]

QUESTION 2

2.1 Simplify the following expressions by only using exponent and log laws. Leave answers with positive exponents.

$$2.1.1 \quad (a^5)^{b+c} \bullet (a^6)^{b-c} \quad (4)$$

$$2.1.2 \quad (243)^{\frac{1}{5}} + 8^0 + (27)^{\frac{1}{3}} \quad (4)$$

$$2.1.3 \quad \frac{\sqrt{D} \log 3^{\sqrt{D}}}{3} \quad (2)$$

2.2 Simplify the following without a calculator:
 $2 \log_e e^3 + \log_2 16 - \log 100$ (4)

2.3 Calculate the product of: $(-4a)^2 \times (3a)^3$ (3)

2.4 Divide $a^3 - 4a^2 + 4a - 1$ by $a - 1$ (6)

2.5 Remove the brackets and simplify the following:
 $6a - [a + 3(a + 2)]$ (3)
[26]

QUESTION 3

3.1 Factorise the following expressions:

$$3.1.1 \quad 40x^4y^2 - 24x^2y + 16xy^3 \quad (2)$$

$$3.1.2 \quad 3(m+n) + am + an \quad (2)$$

3.2 Determine the lowest common multiple (LCM) and the highest common factor (HCF) of the following: (Use prime factors)

$$\begin{aligned} &40a^4b^6c^4 \\ &90a^4b^3c^2 \\ &60a^2b^5c^3 \end{aligned} \quad (5)$$

3.3 Solve for y

$$\frac{5-y}{3} - \frac{y}{2} = 10 \quad (3)$$

3.4 Simplify the following:

$$\frac{2a + 2b + 2c}{4a - 4b} \div \frac{5a + 5b + 5c}{15a^2 - 15ab}$$

(5)
[17]

QUESTION 4

4.1 The total resistance of resistors connected in parallel in a circuit is given by

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$

Make R_2 the subject of the formula

(4)

4.2 Determine the velocity of a point on the circumference of a shaft if the shaft has a diameter of 40 mm and rotates at 50 revolutions per minute. Give the answer in m/s.

HINT: $V = 2\pi r n$

(5)
[9]

QUESTION 5

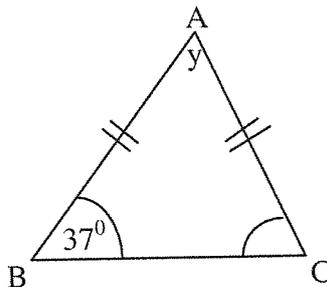
5.1 Complete the TABLE below in the ANSWER BOOK. Use the graph paper supplied to draw the graph of $y = \sin x$

x	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
y													

[13]

QUESTION 6

6.1 Given :

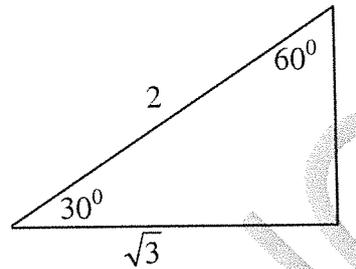


6.1.1 What is the name of the above triangle? Give a reason for your answer. (2)

6.1.2 Determine the value of y of the triangle in QUESTION 6.1.1. (4)

6.2 Simplify the following expression by making use of the special angles. Do not use a calculator.

$$\frac{4 \sin 30^\circ \times \cos 60^\circ \times \tan 60^\circ}{\tan 30^\circ}$$



(5)

6.3 Determine the value of B if $B = \tan 60^\circ 28'$

(2)

[13]

QUESTION 7

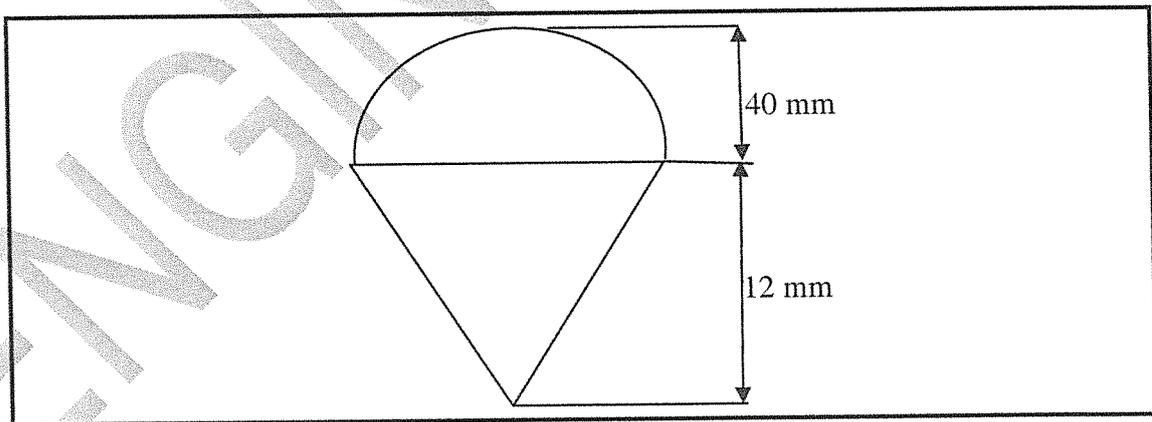
7.1 Determine the length of the hypotenuse of a right angle triangle, if the length of the two adjacent sides of the triangle are 14 mm and 16 mm respectively.

(3)

7.2 A builder needs 12 000 bricks to complete a building. How many bricks must he order if he anticipate that 6% of the bricks will break.

(3)

7.3 Calculate the area of the following figure:



HINT: The top is a semicircle.

(6)

[12]

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

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

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

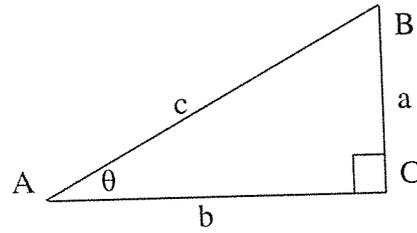
Silinder: Volume = $\frac{\pi D^2}{4} \times h$ of $\pi r^2 h$

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

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 :

$$\sin\theta = \frac{a}{c}$$

$$\cos\theta = \frac{b}{c}$$

$$\tan\theta = \frac{a}{b}$$