20131T201

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1010(E)(N14)

NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

14 November 2013 (X-Paper)
09:00–12:00

Calculators may be used .

This question paper consists of 6 pages, graph paper and 2 formula sheets.

ENGINEERING

Copyright reserved

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. 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.

ENGINEERING

Copyright reserved

QUESTION 1

Choose the correct answer in brackets:

1.1 Simplify the following:

$\sqrt{3}\log_e e^{\sqrt{3}} =$ (1 ; 9 ; $\sqrt{3}$; 3 ; 6)

1.2 120 m/s equals … Km/h.

(33,333 ; 432 ; 333,333 ; 4320)

1.3 … is the exponent of x .

$3ax^{-2}b + 2ab$ (2 ; -1 ; 3 ; 1 ; -2)

1.4 The graph of $y = \frac{4}{x}$ must be drawn in the following quadrant(s).

(1 & 2 ; 2 & 3 ; 3 & 4 ; 1 & 3 ; 4 & 2)

1.5 The formula to calculate gradient is:

$\left(\frac{\Delta x}{\Delta y};\frac{a}{x};\frac{\Delta y}{\Delta x};\frac{m}{\Delta x}\right)$

1.6 … is the symbol of similar triangles.

(≡ ; III ; <<s ; =)

1.7 If tan B = 24 then the value of angle B is …

(Undefined ; $87{,}614^0$; 0,445 ; $97{,}349^0$)

1.8 $(x+7)(x-9)$ equals:

$\left[(x^2-16x-63);(x^2-2x-63);(x^2+2x-63);(x^2-2x+63)\right]$

1.9 Solve for x if $\frac{2x}{3} = 4$. Then x =?

$\left(12;\frac{4}{3};6;\frac{8}{3};\frac{2}{3}\right)$

1.10 Express 70 mm as a ratio of 0,5 m in a percentage.

(71% ; 7 % ; 14% ; 1,4%)

(10 × 1) **[10]**

ENGINEERING

Copyright reserved

QUESTION 2

2.1 Simplify by ONLY making use of exponential laws.

2.1.1 $\left(8^0 y^0 - 4x^0\right)^3$ (2)

2.1.2 $\dfrac{9x^4y^4}{27x^3y^2}$ (3)

2.2 Simplify the following logarithms WITHOUT the use of calculator

2.2.1 $\log 900 - \log 9 + \log_2 80 - \log_2 5$ (6)

2.2.2 $\log_2{}^{64} - 6\log_e{}^{\sqrt{e}}$ (3)

2.3 Use logarithms to determine the value of x. Show ALL your calculations.

$$x = \frac{\sqrt[4]{168,56}}{6,58} \bullet \sqrt[3]{14,3}$$ (5)

[19]

QUESTION 3

3.1 Add the following expressions.

$4x^2y + 3xy^2$; $-3x^2y + 2xy^2$; $5x^2y - xy^2$ (3)

3.2 Divide $V^3 + 8V^2 + 19V + 12$ by $V + 1$ (6)

3.3 Simplify the following.

3.3.1 $\dfrac{2x^2y - 3\left(xy + xy^2\right)}{xy}$ (3)

3.3.2 $\dfrac{32p^2 - 96p^3}{6p} \div \dfrac{18p - 54p^2}{108p^2}$ (4)

3.4 Determine the highest common factor (HCF) and the lowest common multiple (LCM) of the following.

$30x^2y^4$
$50x^5y^2$
$70xy$ (4)

3.5 Solve for y:

$4(y-3) - (6y-6) + 3 = 0$ (4)

[24]

ENGINEERING

Copyright reserved

QUESTION 4

4.1 Draw a table and sketch the graph of: $\{(x;y)y=-2x+3\}$ using value $-2 < x \leq 3$
Use a scale of 2 cm = 1unit on both axis. Indicate the x and y axis. (9)

4.2 Name the type of graph you have drawn. (1)
[10]

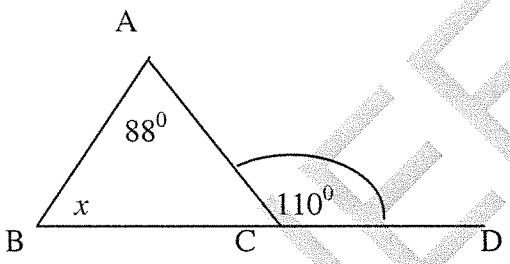
QUESTION 5

5.1 Describe and sketch the following triangles

5.1.1 Equilateral triangle. (4)

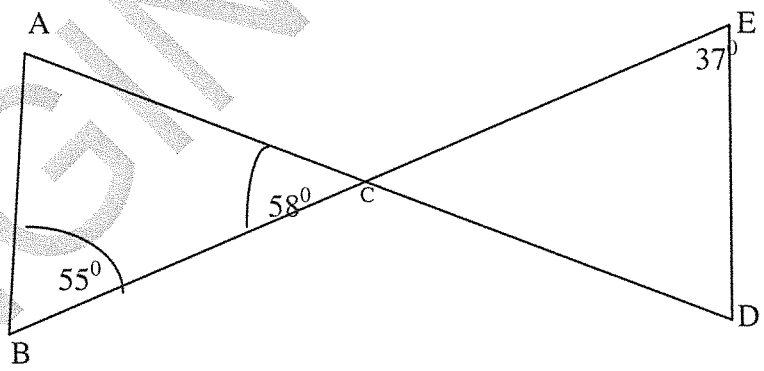
5.1.2 Isosceles triangles (4)

5.2 Determine the size of the interior angle x if the exterior angle C is 110^0. Give a reason



(3)

5.3 Given :



Make use of the above triangle to calculate, with reasons:

5.3.1 The value of angle D. (5)

5.3.2 The value of angle A if angle B is 55°. (3)

5.4 Use a calculator to simplify the following. Show ALL steps.

$\sqrt{3}\cos 60^0(\sin 45^0)+\sin 90^0$ (3)
[22]

ENGINEERING

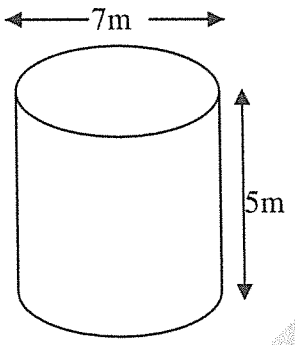
QUESTION 6

6.1 A base of rectangular block 75 mm × 65 mm has a perpendicular height of 85 mm.

Calculate the volume of the rectangular block. (3)

6.2 A tank has a diameter of 7 m and height of 5 m. Calculate the surface area of the tank.

.



(4)

6.3 Convert 8 231 mm^3 to cm^3 (1)

6.4 What percentage of 92 is 13? (2)
[10]

QUESTION 7

Indicate whether each of the following statement is TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (7.1–7.5) in the ANSWER BOOK.

7.1 2; 3; 5; 7; 11; 13 … are prime numbers and they are only divisible by one and the number itself.

7.2 In an equilateral triangle, all angles are of equal magnitude?

7.3 The graph of $y = 2x - 3$ has the …intercept of 3

7.4 Similar triangles are identical triangles?

7.5 $6x^2$; $3x^2$; x^2 are all like terms?

(5 × 1) **[5]**

TOTAL: 100

ENGINEERING

Copyright reserved

EXAMINATION NUMBER: | | | | | | | | | | | | | |

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

Copyright reserved

MATHEMATICS N1

FORMULA SHEET

This sheet must accompany the question paper.

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 $\times h$)

Ellipse:
Area = $\frac{\pi}{4}$(major axis $\times$ 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 = $\pi\left(R^2 - r^2\right)$

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 = $\frac{1}{3}$(basisarea $\times h$)

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

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 $\frac{\pi r^2 h}{3}$

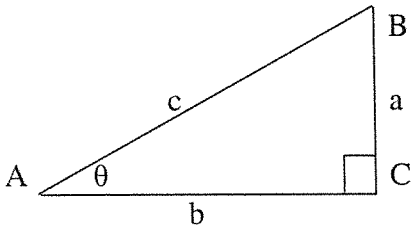
Annulus: A = $\pi\left(R^2 - r^2\right)$

ENGINEERING

Copyright reserved

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:

ENGINEERING

Copyright reserved