

DEPARTMENT OF EDUCATION
REPUBLIC OF SOUTH AFRICA
NATIONAL CERTIFICATE
MATHEMATICS N1
TIME: 3 HOURS
MARKS: 100

Nov 2005

Answer ALL the questions.

QUESTION 1

Choose the correct answer in brackets in each of the following questions:

1.1 Simplify the following:

$$\text{Log}_e e^4 = \{1, 0,863; 2; e; 0; 4\} \quad (1)$$

1.2 How many terms does the following expression have:

$$3(a + b) - 6a^2 \div 4b$$

$\{1; 2; 3; 4; 5\} \quad (1)$

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

$$\{16,6; 75; 216; 120; 96\} \quad (1)$$

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

$$\{2\&3; 1\&2; 3\&4; 1\&3; 4\&2\} \quad (1)$$

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

$$\{14^\circ; 0,48^\circ; 44^\circ; 87,79^\circ; 54^\circ\} \quad (1)$$

1.6 An integer is:

$$\{-2; -1,2; 0; 3; 0,5; 2,5\} \quad (1)$$

- 1.7 Express 340 mm as a ratio of 1,340 m in percentage.
{25,373%; 17%; 23%; 76%; 96%} (1)
- 1.8 The graph of $y = 3x + 6$ has the y -intercept of:
{3; 4; 4,5; 6; x } (1)
- 1.9 $(a + 12)(a + 3)$ equals:
{ $a^2 + 12a + 3$; $a^2 + 15a + 36$; $a^2 + 36$; $a^2 + 15a - 36$ } (1)
- 1.10 Solve for x if $\frac{ax}{2} = 4$. Then $x = ?$
{8; a ; $4a$; $\frac{8}{a}$; 2} (1)
- [10]

QUESTION 2

- 2.1 Simplify by ONLY making use of exponential laws:
- 2.1.1 $(7y^0 - 3x^0)^2$ (2)
- 2.1.2 $\frac{\sqrt[3]{27x^{27}}}{3x^{-2}} \times \frac{(-3x)^3}{3x^{-1}}$ (6)
- 2.2 Simplify by ONLY making use of log laws:
 $\log_2 256 + \log_{10} 100 - \log_e e$ (3)
- 2.3 Apply logarithms with base 10 to determine the value of 'C' in the following expression:
 $C = \frac{6,7^3 \times \sqrt[4]{6,842}}{0,273}$ (5)
- [16]

QUESTION 3

- 3.1 Divide $4x^3 - 12x^2 + 5x + 6$ by $2x - 3$ (6)
- 3.2 Find the factors to the following expressions:
- 3.2.1 $16ab - 18ac + 4ad$ (2)
- 3.2.2 $3a + 6b - at - 2bt$ (4)

PTO

3.3 Simplify:

$$\frac{16x^2 - 4x}{8x} \div \frac{20x - 5}{12x} \quad (4)$$

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

$$\begin{aligned} &14x^2y \\ &49xy^2 \\ &21xy \end{aligned} \quad \begin{array}{l} (5) \\ [21] \end{array}$$

QUESTION 4

4.1 Solve for x:

$$\frac{3(2x-3)}{7} - 3 = 0 \quad (3)$$

4.2 A mother is twice as old as her son. Ten years ago the mother was three times as old as the son was. Determine their present ages. (4)

4.3 Change the subject of the formula so that the symbol in brackets becomes the new subject:

$$T = 2\pi\sqrt{\frac{l}{g}} \quad (g) \quad (3)$$

4.4 Calculate the value of g in QUESTION 4.3 if:

$$T = 10 \text{ mm} \quad l = 5 \text{ mm} \quad (3)$$

4.5 A hot air balloon rises 50 m in 80 s. Calculate the height it should reach after 4 min. (3)
[16]

QUESTION 5

5.1 Given: $y = x + 2$

Answer the following questions:

5.1.1 What is the gradient of the given function? (1)

5.1.2 What is the y-intercept of the given function? (1)

5.1.3 Give a name to the given function. (2)

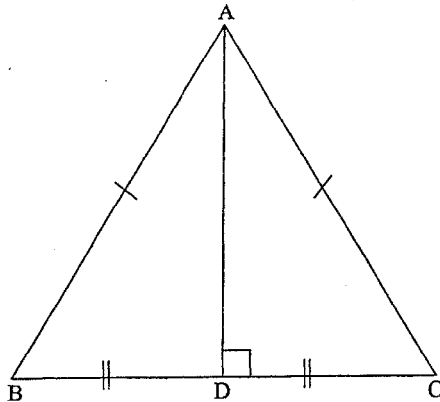
PTC

- 5.2 Draw the graph of the function: $xy=9$, for the x -values of: $\{-9; -3; -2; -1; 1; 2; 3; 9\}$. Make use of the scale $1\text{ cm} = 1\text{ unit}$ on both the axes. (7)
[11]

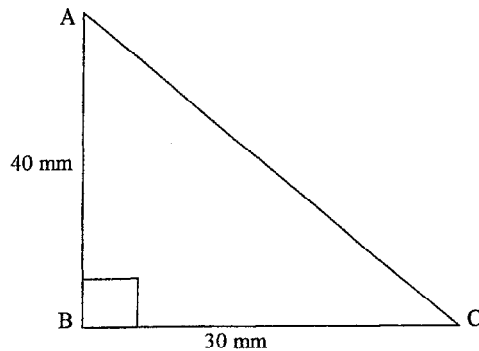
QUESTION 6

6.1 Given:

In $\triangle ABC$ is $AB = AC$ and angle $BAD = 30^\circ$.



- 6.1.1 Determine the value of angle B. (1)
- 6.1.2 What is the value of angle C? Give a reason for your answer. (2)
- 6.2 In $\triangle ABC$ is $AB = 40\text{ mm}$, $BC = 30\text{ mm}$ and angle $CBA = 90^\circ$. Use the theorem of Pythagoras to determine the length of AC.

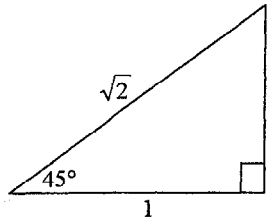
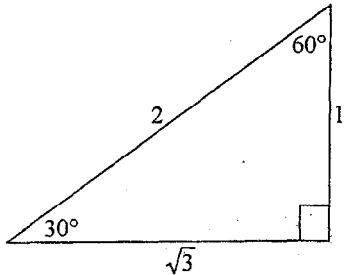


(3)

6.3 Simplify the following expressions by making use of the special angles. Do NOT use your calculator.

6.3.1 $\sqrt{3} \tan 60^\circ - \sqrt{2} \cos 45^\circ + \sqrt{2} \sin 45^\circ$ (2)

6.3.2 $\frac{3 \tan 45^\circ \times 2 \sin 30^\circ}{3 \cos 60^\circ}$ (3)



6.4 Determine the value of 'A' in each of the following cases:

6.4.1 $\cos A = \frac{11}{18}$ (1)

6.4.2 $\sin 67^\circ 18' = A$ (1)

[13]

QUESTION 7

7.1 A cone has a slant height of 180 mm and a perpendicular height of 120 mm. Determine the volume of the cone. (4)

7.2 The circumference of a circle is 77,285 cm. Determine the radius of the circle. (4)

7.3 Determine the area of an isosceles triangle with a base of 80 mm and two equal sides of 60 mm. Express the answer in cm^2 . (5)

[13]

TOTAL: 100

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