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# higher education & training

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

**T1000(E)(M22)T  
APRIL EXAMINATION  
NATIONAL CERTIFICATE  
MATHEMATICS N1**

(16030121)

**22 March 2013 (X-Paper)  
09:00–12:00**

**Calculators may be used.**

**This question paper consists of 6 pages and a 2-page formula sheet.**

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

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**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. 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**

- 1.1      1.1.1      300 km/h equals ... m.s<sup>-1</sup> (2)
- 1.1.2      The reciprocal of 20 is ... (1)
- 1.1.3      Express 380 mm as a percentage of 1 226 mm (1)
- 1.2      Given:  $9x^3 - 6x^2 - 3x - 7$
- 1.2.1      ... are the exponents of  $x$  (2)
- 1.2.2      9 is the ... of  $x$  (1)
- 1.2.3      ... is the variable. (1)
- 1.2.4      ... is the constant term. (1)
- 1.2.5      The number of terms is ... (1)
- [10]

**QUESTION 2**

- 2.1      Simplify by only making use of exponential laws:

$$-(6b^3)^0 \times \sqrt[4]{\frac{81a^6b}{256a^{-2}b^9}} \quad (5)$$

- 2.2      Subtract  $-10x + 12y + 20x^2$  from  $14x^2 - 10y + 16x$  (3)

- 2.3      Remove the brackets:

$$(a-2)(a^3 + 3a^2 - 5a - 6) \quad (5)$$

- 2.4      Simplify the following logarithms without the use of a calculator:

$$\log_2 64 - 3 \log_{10} 100 - \log_3 9 + \log_e e^6 \quad (5)$$

[18]

**QUESTION 3**

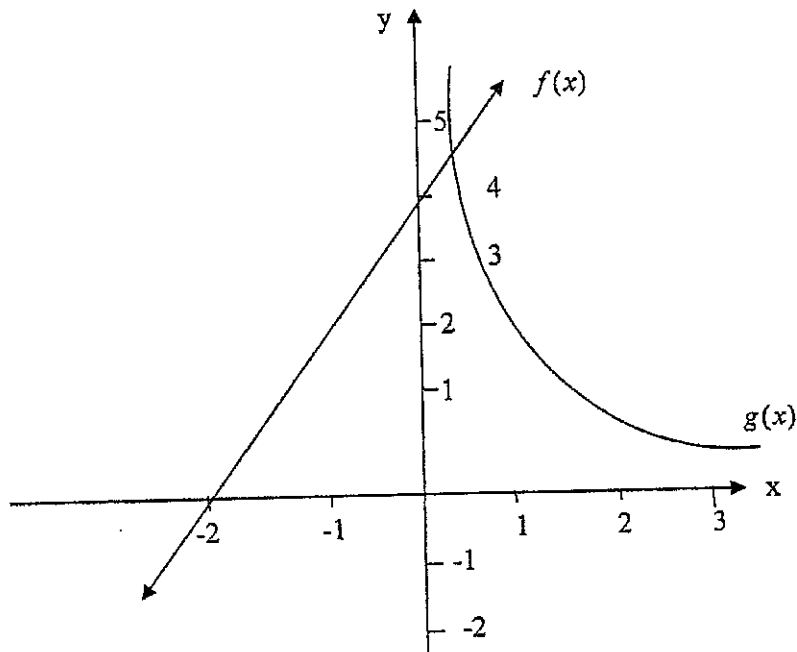
- 3.1 Divide  $2 + 4x^2 - 6x + 5x^3$  by  $x + 2$  (7)
- 3.2 Find the factors to the following expressions:
- 3.2.1  $63ab - 56ac + 7ad$  (2)
- 3.2.2  $3xy - xyd + 12x - 4xd$  (6)
- 3.3 Simplify:  $\frac{xy - x^2y^2}{xy} \div \frac{2 - 2xy}{20}$  (4)
- 3.4 Given:  $54x^4y^5z^2$ ,  $48x^2y^4z^5$  and  $63x^5y^2z^3$
- Determine the following:
- 3.4.1 Prime factors (3)
- 3.4.2 The LCM (2)
- 3.4.3 The HCF (2)
- [26]

**QUESTION 4**

- 4.1 Solve for  $x$ :
- $4(x - 2) - (7x - 9) + 6 = 2$  (4)
- 4.1 Solve for  $x$ :
- $4(x - 2) - (7x - 9) + 6 = 2$  (4)
- 4.2 The sum of three consecutive numbers is 135. Find the largest number of the three. (4)
- 4.3 Change the subject of the formula so that the symbol in brackets becomes the new subject:
- $A = 4\pi r^2 \dots\dots\dots(r)$  (2)
- 4.4 Calculate the value of  $r$  in QUESTION 4.3 if  $A = 10 \text{ mm}$  (2)
- [12]

**QUESTION 5**

- 5.1 Refer to the graph below to answer the following questions. The graph is not drawn to scale.

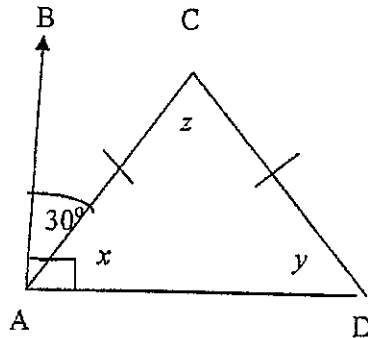


- |       |  |     |
|-------|--|-----|
| 5.1.1 | Find the gradient of $f(x)$ .                                | (2) |
| 5.1.2 | Write down the y-intercept of function $f(x)$ .              | (1) |
| 5.1.3 | Find the x-intercept of function $f(x)$ .                    | (1) |
| 5.1.4 | Write the equation of the graph of $f(x)$ .                  | (3) |
| 5.1.5 | Name the graph of $f(x)$ .                                   | (1) |
| 5.1.6 | What is the name of the graph of the function $g(x)$ ?       | (1) |
| 5.1.7 | In which quadrant is the graph of the function $g(x)$ drawn? | (1) |

**[10]**

## QUESTION 6

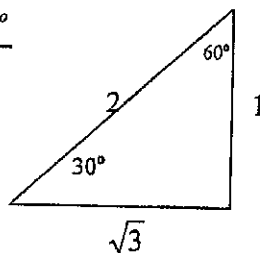
6.1 GIVEN :



Make use of the above triangle to calculate the following:

- 6.1.1 The magnitude of  $x$  (3)
- 6.1.2 The magnitude of  $y$  and give ONE reason (2)
- 6.1.3 The magnitude of  $z$  (3)
- 6.2 Determine the area of a semicircle (half-circle) if its diameter is 36 cm. (4)
- 6.3 Determine the perimeter of a rectangular farm 4 km long and 3 km wide. (3)
- 6.4 Simplify the following expressions by making use of the special angles. Do NOT use a calculator.

$$\frac{3\sin 30^\circ \cdot \tan^2 60^\circ}{\sin^2 30^\circ}$$



- (5)
- 6.5 In the right-angled triangle the hypotenuse is 250 cm and the other side is 153 cm. Determine the third side. (4)

[24]

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

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

The right-angled triangle:

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

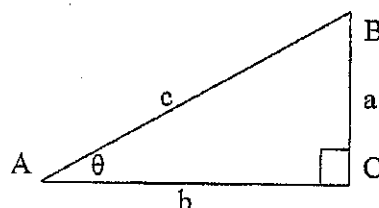
Sirkel: Omtrek =  $\pi D$  or  $2\pi r$   
Area =  $\frac{\pi D^2}{4}$  or  $\pi r^2$

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

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

Die reghoekige driehoek:



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The theorem of Pythagoras:  
 $c^2 = a^2 + b^2$

Die stelling van Pythagoras:  
 $c^2 = a^2 + b^2$

Ratios of angle  $\theta$ :

Verhoudings vir hoek  $\theta$ :

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

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

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