

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

higher education
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TI381(E)(N10)T
NOVEMBER 2010

NATIONAL CERTIFICATE

MATHEMATICS N1

(16030121)

10 November (X-Paper)
09:00 – 12:00

REQUIREMENTS: Graph paper.

This question paper consists of 9 pages and a 2-page formula sheet.



The theorem of Pythagoras:

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

Ratios of angle θ :

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

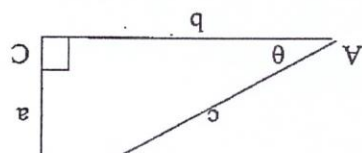
$$\cos \theta = \frac{b}{c}$$

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

Die stelling van Pythagoras:

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

Verhoudings vir hoek θ :





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

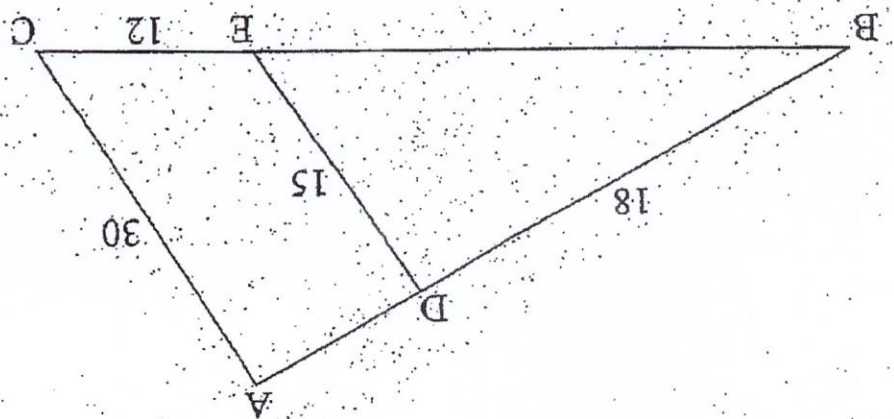
Ellips:
Area = $\frac{\pi}{4}(\text{hooftas} \times \text{nweas})$

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

PTO



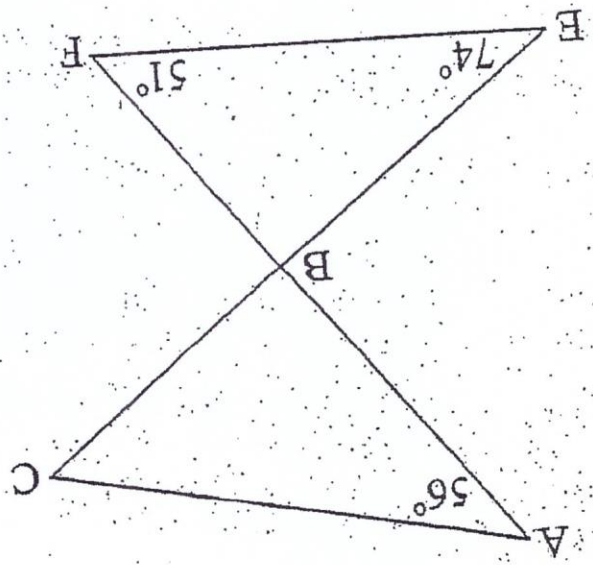
Calculate the length of AD.

(4)
[9]

TOTAL: 100

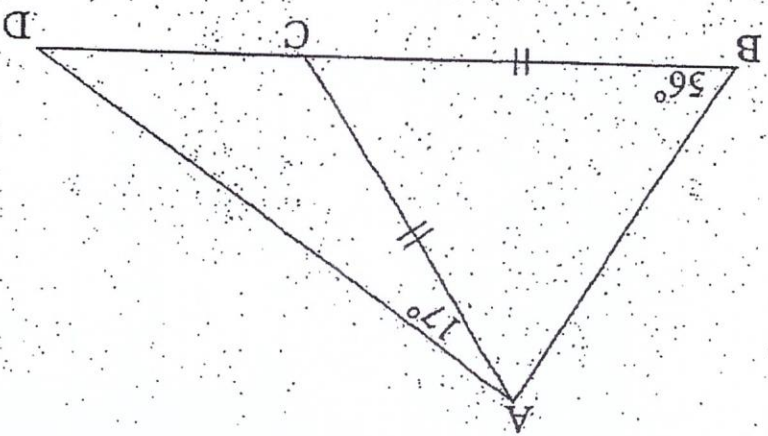
9.2

Determine the magnitude of $\angle C$.



In the given figure $AC = BC$, $\angle B = 56^\circ$ en $\angle CAD = 17^\circ$.

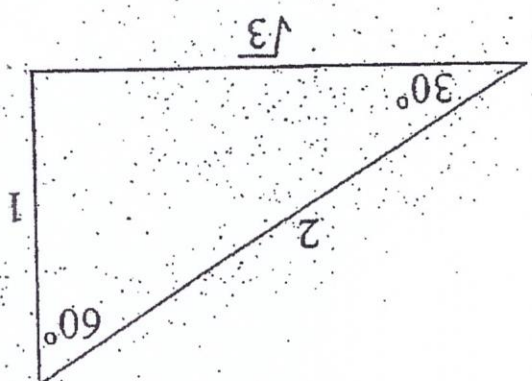
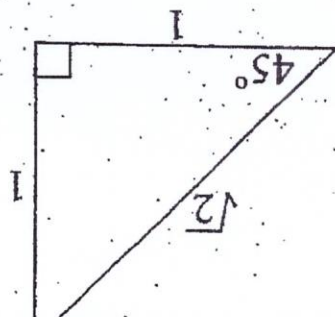
(2)



Determine the magnitude of $\angle D$.

(3)

PTO



(Without using a calculator)

Make use of the above triangles to simplify the following expressions:

- 8.2.1 $\sin 30^\circ + \cos 60^\circ$ (2)
- 8.2.2 $\frac{3 \tan 45^\circ \times 2 \sin 30^\circ}{3 \cos 60^\circ}$ (4)
- [8]

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QUESTION 8

8.1 Determine the value of A in EACH of the following cases:

8.1.1

$$\tan A = \frac{\sqrt{3}}{1}$$

8.1.2

$$\tan 48^\circ 45' = A$$

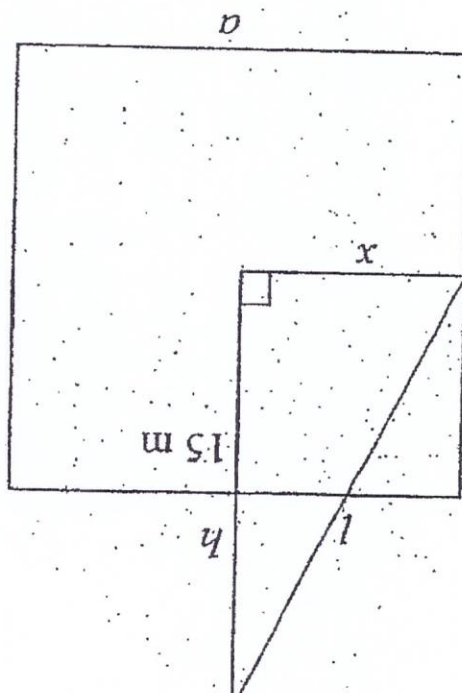
(2) (2 × 1)

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HINT: Area of slant surface = $\frac{1}{2}$ perimeter × slant height.

[14]

(8)



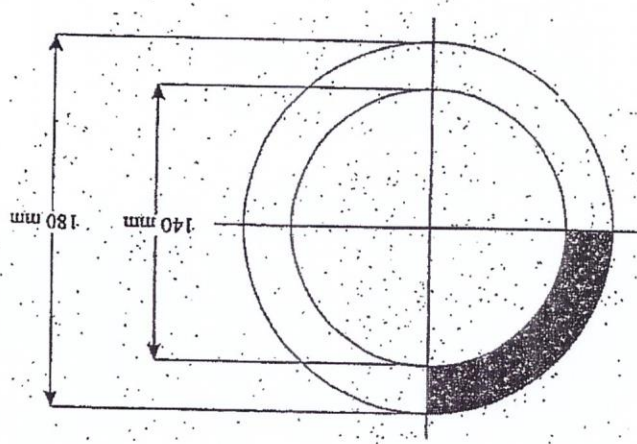
$$y = \frac{-3}{x}$$

$$y = 3x + 1$$

- 6.1 Which ONE is the straight line graph of the two?
- 6.2 Is the straight line graph positive or negative?
- 6.3 What is the name of the other graph?
- 6.4 What is the value of the y-intercept of the straight line graph?
- 6.5 In which quadrant(s) will the other graph be?
- 6.6 Draw the graph of the function $xy = 2$ for the x-values of -4; -3; -2; -1; 1; 2; 3; 4.
- [13]

QUESTION 7

- 7.1 A hole of 140 mm diameter is punched through the centre of a circular metal sheet 180 mm in diameter. Determine the shaded area.



$$\text{HINT: } A = \pi(R^2 - r^2)$$

(6)

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QUESTION 5

[11]

(3)

(2)

(6)

Factorise the following expressions:

4.2.1 $7x^3y^4 - 21x^2y^3 + 14x^4y^2$

4.2.2 $(2a - 3b)^2 - 2a + 3b$

$32x^3y^4z^2; 48x^5y^3z^3; 70x^2y^5z^4$

4.2

5.1

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

(4)

(h) $V = \pi r^2 \left(h^2 + r^2 \right)$

5.2

Calculate the value of 'V' in the following equation:

$V = \pi r^2 \left(h^2 + r^2 \right)$

(3)

if $r = 20$ mm
and $h = 30$ mm

5.3

The sum of two numbers is 70 and the difference is 30. Find the TWO numbers.

(4)

HINT: Let the smaller number be 'x'.

5.4

A field has a rectangular shape. The length is 10 m longer than 3 times the breadth. If the length is decreased by 50 m and the breadth is increased by 4 m, the length will be twice the breadth. Determine the length and the breadth.

(5)
[16]

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1.1 $4x^2 \times 3x^4 \div 6x$

1.2 a^5b^{-4}
 a^3b^2

1.3 $\sqrt[4]{\frac{81a^6}{16a^2}} \times (-2^3)^0$

1.4 $\log_{10} 3 + \log_{10} 300 - \log_{10} 9$

1.5 Use logarithms with base 'e' and determine the value of 'x' in the following case:

(5) $x = \frac{16,43^3 \times \sqrt{1,24}}{0,325}$

[15]

QUESTION 2

2.1 Subtract $-5a + 6b - 2c$ from $4c - 3a - 5b$

2.2 $(x^3 - 7x - 6) \div (x - 3)$

(5)

[8]

QUESTION 3

Simplify the following:

3.1 $\frac{25x^3 - 50x^5}{25x^3}$

(2)

3.2 $\frac{8a}{6ab - 3b^2} \div \frac{4ab}{2a - b}$

(4)

[6]

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INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions fully.
2. Show ALL the calculations and intermediary steps. Simplify where possible.
3. ALL the graph work MUST be done on the graph paper provided.
4. Final answers must be approximated to the nearest THREE decimal places.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Questions can be answered in any order, but subsections of questions must NOT be separated.
7. 1 mark = 1%
8. Write neatly and legibly.

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