Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS

COMMON TEST

MARCH 2018

NATIONAL SENIOR CERTIFICATE

GRADE 10

MARKS: 50

TIME: 1 hour

This question paper consists of 5 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

1. This question paper consists of 5 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera, which you have used in determining the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Write neatly and legibly.

QUESTION 1

1.1 Determine the product of the following expressions:

1.1.1 $(2r + p)(4r^2 - 2rp - 2rp + p^2)$ (2)

1.1.2 $\left(a + \frac{\sqrt{5}}{a^x}\right)\left(a - \frac{\sqrt{5}}{a^x}\right)$ (2)

1.2 Simplify the following expressions fully:

1.2.1 $\frac{ax^2 - a^2x}{x^2 - a^2} \times \frac{x^2 + ax - bx - ab}{ax}$ (4)

1.2.2 $\frac{1}{m^3} - \frac{1}{mn^2}$ (3)

[11]

QUESTION 2

2.1 **Without using a calculator,** simplify the following expression fully:

$$\frac{18^n \times 8^{n-1}}{9^n 4^{2n-3}}$$ (3)

2.2 Solve for x in the following equations:

2.2.1 $x^{\frac{3}{2}} = 512$ (2)

2.2.2 $3^{2002} - 3^{2000} = 8.3^x$ (3)

2.3 Given: $4^{x+y} = 64$ and $3^{x-y-1} = 1$

2.3.1 Show that if $4^{x+y} = 64$, then $x + y = 3$ (2)

2.3.2 Show that if $3^{x-y-1} = 1$, then $x - y = 1$ (1)

2.3.3 Hence or otherwise, find the value of $3^x.5^y$ (4)

[15]

QUESTION 3

3.1 Solve for x:

3.1.1 $8x^2 + 14x - 15 = 0$ (2)

3.1.2 $t = 2\pi\sqrt{\frac{x}{g}}$ (2)

3.1.3 $(x-1)(y+3) = 0$

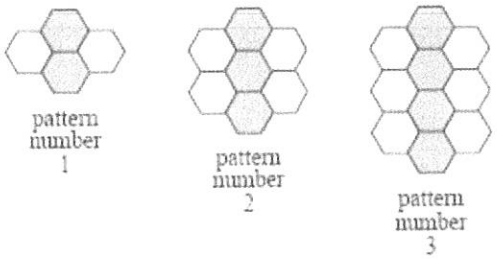
3.1.3.1 *if* $y = -3$ (1)

3.1.3.2 *if* $y = 4$ (1)

3.2 Solve for t: $-8 \leq -2t < 18$. Write your answer in interval notation. (2)
[8]

QUESTION 4

An interior decorator wants to decorate a bathroom wall with patterns of grey and white tiles as shown below:



4.1 Write down the number of tiles used in pattern 4 and pattern 5. (1)

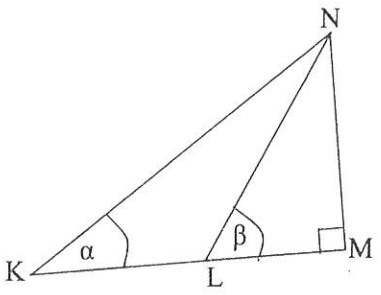
4.2 Determine the n-th term, T_n that represents the number of tiles used in each pattern. (2)

4.3 Calculate how many tiles she will need for the 200^{th} pattern. (2)

4.4 Calculate in which pattern there will there be 1000 tiles. (2)
[7]

QUESTION 5

5.1 Use the length of the sides in the figure drawn below to write down the following ratios.



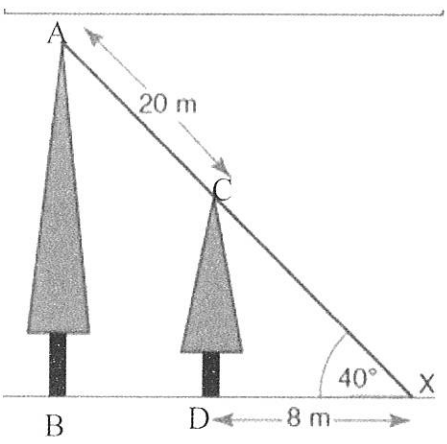
5.1.1 $\sin\alpha$ (1)

5.1.2 $\cot\beta$ (1)

5.2 Simplify the following WITHOUT the use of a calculator

$$\frac{\cos 30^\circ}{\text{cosec}\, 60^\circ}.$$ (3)

5.3 Two trees AB and CD are planted on flat ground.The angle of elevation of their tops from a point X on the ground is $40°$. The horizontal distance between X and the shorter tree is 8m and the distance between the tops of the two trees is 20m.



Calculate the height of the tall tree. (4)
[9]

TOTAL MARKS: 50