# Education

KwaZulu-Natal Department of Education
**REPUBLIC OF SOUTH AFRICA**

## MATHEMATICS

## COMMON TEST

## MARCH 2018

## NATIONAL
## SENIOR CERTIFICATE

## GRADE 11

MARKS:   75

TIME:   1½ hours

This question paper consists of 6 pages.

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions:

1.  This question paper consists of 4 questions.

2.  Answer ALL the questions.

3.  Number the answers correctly according to the numbering system used in this question paper.

4.  Clearly show ALL calculations, diagrams, graphs, et cetera, which you have used in determining the answers.

5.  Answers only will NOT necessarily be awarded full marks.

6.  You may use an approved scientific calculator (non-programmable and non-graphical) unless stated otherwise.

7.  If necessary, round off answers to TWO decimal places, unless stated otherwise.

8.  Diagrams are NOT necessarily drawn to scale.

9.  Write neatly and legibly.

## QUESTION 1

1.1 Solve for $x$ in each of the following:

1.1.1 $3x^2 + 10x - 5 = 0$    (correct to TWO decimal places)      (4)

1.1.2 $3^{x+1} - 3^{x+3} = -\dfrac{8}{27}$      (4)

1.1.3 $5 - x = \sqrt{4x + 1}$      (5)

1.2 Solve for $x$ and $y$ if:
$y + 7 = 2x$   and   $x^2 - xy + 3y^2 = 15$      (6)

1.3 Given: $f(x) = 9x^2 - 15x + 4$

1.3.1 Solve for $x$ if $f(x) > 0$.      (3)

1.3.2 Show that $f(x) = -3$ has no real roots.      (4)

**[26]**

## QUESTION 2

Simplify fully, WITHOUT using a calculator:

2.1 $\dfrac{12^{n+1}.27^{n-2}}{18^{2n-1}.\sqrt{9^{-3}}} + 8^0$      (5)

2.2 If $y = \sqrt[6]{100\,000}$, WITHOUT USING A CALCULATOR, determine the value of $\sqrt[5]{16} \times \sqrt[3]{625} \times \sqrt{10}$ in terms of $y$.      (4)

**[9]**

**QUESTION 3**

3.1   Consider the following quadratic number pattern:  64 ; 42 ; 24 ; …

    3.1.1   Write down the next TWO terms of the number pattern.                (2)

    3.1.2   Determine an expression for the general term, $T_n$, in the form
        $T_n = an^2 + bn + c$.                                                   (4)

    3.1.3   Calculate the value of the $20^{th}$ term of this number pattern.        (2)

    3.1.4   Determine the general term of the sequence of first differences of this
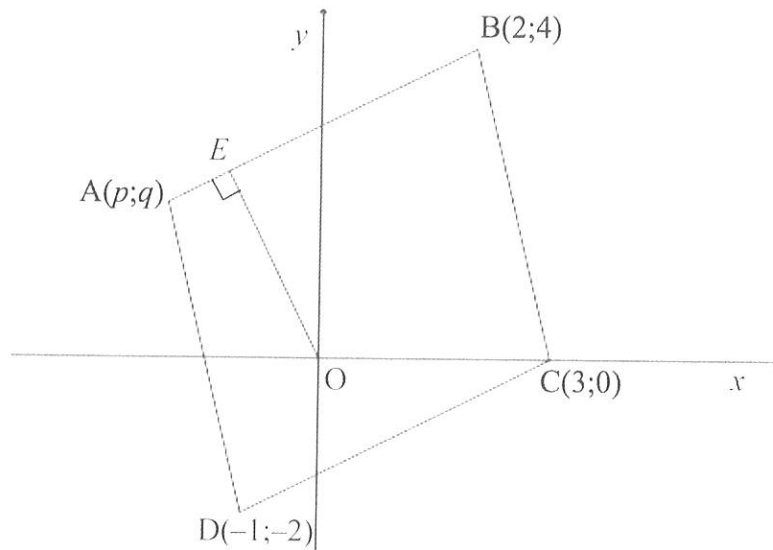        number pattern.                                                          (2)

    3.1.5   Between which two consecutive terms of the quadratic number pattern
        will the difference be equal to 174?                                      (2)

3.2   If  $p$ ; 11 ; 21 ; $6p$  form a quadratic number pattern.
    Calculate the value of $p$.                                                  (4)

                                                **[16]**

**QUESTION 4**

4.1    $A(p;q)$,  $B(2;4)$,  $C(3;0)$  and  $D(-1; -2)$ are the vertices of parallelogram ABCD.
       O is the origin and OE is perpendicular to AB.



4.1.1    Calculate the length of  DC. (leave your answer in surd form)    (2)

4.1.2    Hence, write down the length of  AB.    (1)

4.1.3    Calculate the values of  $p$ and  $q$.    (2)

4.1.4    Determine the equation of  OE.    (4)

4.1.5    Calculate the coordinates of  E.    (4)

4.2 In the diagram P (3 ; 7), Q (–3 ; 4) and R (1 ; –6) are the vertices of a triangle. PQ is produced to cut the *x*-axis at S. PR cuts the *x*-axis at T. QR cuts the *x*-axis at A.
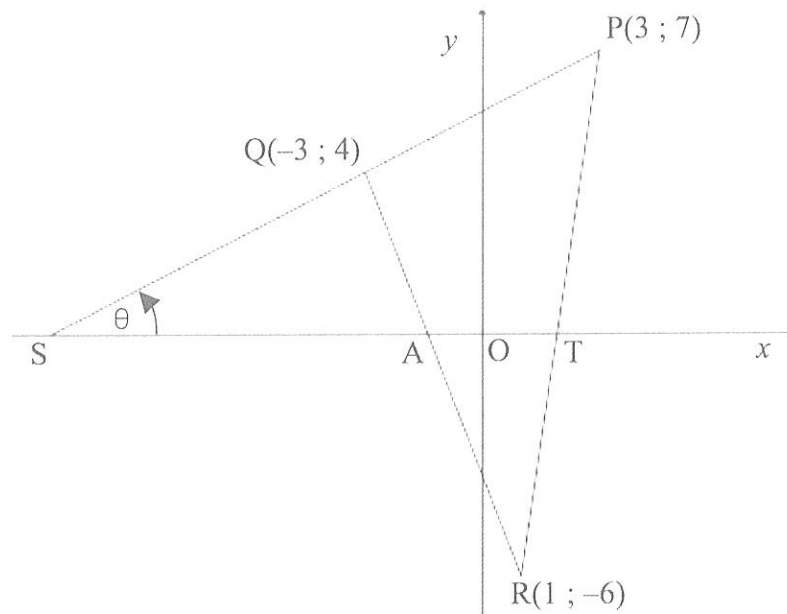


4.2.1 Calculate θ the angle of inclination of the line PS. (3)

4.2.2 Calculate the size of RQ̂S. (4)

4.2.3 N is the point (3 ; –11). Are the points N, R and Q collinear? Justify your answer by means of calculations. (4)

[24]

**TOTAL MARKS: 75**