# Basic Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

# MATHEMATICS P1

## JUNE 2016

## COMMON TEST

**NATIONAL SENIOR CERTIFICATE**

**GRADE 11**

**MARKS:** 100

**TIME:** 2 hours

**This question paper consists of 6 pages and 1 diagram sheet.**

## 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), unless stated otherwise.
6. If necessary, round off answers to **TWO** decimal places, unless stated otherwise.
7. Diagrams are not necessarily drawn to scale.
8. ONE diagram sheet for answering **QUESTION 4.1.2** and **4.1.5** is attached at the end of this question paper. Write your name in the space provided and insert it inside your **ANSWER SHEET.**
9. Number the answers correctly according to the numbering system used in this question paper.
10. Write neatly and legibly.

## QUESTION 1

1.1 Solve the following equations:

1.1.1 $2x - \frac{3}{x} = 1$ (4)

1.1.2 $3x^2 - 6x + 1 = 0$ (correct to two decimal places) (4)

1.1.3 $5x - 2(x^2 - 6) \leq 0$ (4)

1.1.4 $2 + \sqrt{x+2} = 6 - x$ (5)

1.1.5 $3^{1-2x} - 1 = 0$ (3)

1.2 Solve for $p$ if the roots of $4x^2 = p - 5x$ are real. (3)

1.3 Solve for $x$ and $y$ simultaneously if: $x - 3 = 2y$ and $x^2 - y^2 = 45$ (6)

**[29]**

## QUESTION 2

2.1 Simplify the following without using a calculator:

2.1.1 $81^{-\frac{3}{4}}$ (3)

2.1.2 $\frac{3.5^{x+1} - 5^{x+3}}{5^{x+1} - 3.5^{x}}$ (3)

2.2 Without using a calculator, show that:

$$\frac{2}{1+\sqrt{2}} - \frac{8}{\sqrt{8}} = -2$$ (4)

**[10]**

## QUESTION 3

3.1 The following sequence of numbers is given:

2; 7; 12; 17; .....

3.1.1 Write down the values of the next two terms of the sequence. (2)

3.1.2 Write down the value of the first term in the sequence that will have a value that is greater than 107. (1)

3.1.3 Determine an expression for the $n^{th}$ term of the sequence. (2)

3.1.4 Which term of the sequence will be equal to 182? (2)

3.1.5 The terms of this sequence are also the first differences of a certain quadratic sequence. If the fourth term of this quadratic sequence is 22, write down its first, second and third terms. (3)

3.2 Given the following quadratic sequence:

51; 70; 95; 126; .....

3.2.1 Write the value of the next term of the sequence. (2)

3.2.2 Determine an expression for the $n^{th}$ term of this quadratic sequence. (5)

3.2.3 Which term of the sequence will be equal to 4063? (4)
**[21]**

## QUESTION 4

4.1 Given $f(x) = -x^2 - 2x + 3$.

4.1.1 Write $f$ in the form $y = a(x+p)^2 + q$. (3)

4.1.2 Draw a neat sketch graph of $f$ on the **DIAGRAM SHEET** provided.

Indicate all intercepts with the axes and the coordinates of the turning point. (5)

4.1.3 Write down the range of $f$. (2)

4.1.4 Describe the transformation from $f$ to $h$ if $h(x) = x^2 + 2x - 3$ (2)

4.1.5 On the same set of axes as $f$, draw a neat sketch graph of $g$ if $g(x) = -2x + 2$, showing all intercepts with the axes. (2)

4.1.6 Now use your graphs to answer the following questions:

For which value(s) of $x$ is:

(a) $f(x) - g(x) = 0$? (2)

(b) $f(x) > 0$? (2)

4.2 Draw a rough sketch graph of $k(x) = ax^2 + bx + c$, if it is given that

- $k$ has no real roots;
- $b > 0$ and
- $c > 0$. (3)

**[21]**

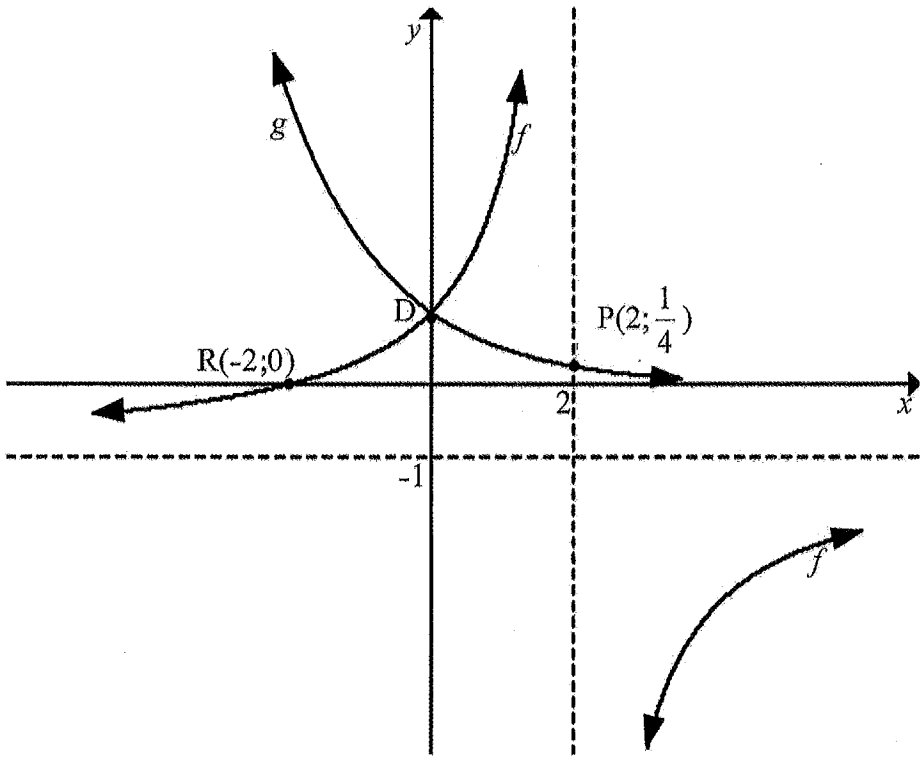
## QUESTION 5

The diagram below represents the graphs of $f(x) = \frac{a}{x+p} + q$ and $g(x) = t^x$.

$f$ cuts the $x$-axis at $R(-2;0)$ and the $y$-axis at D.

$P\left(2;\frac{1}{4}\right)$ is a point on the graph of $g$.

$f$ and $g$ intersect at point D.




5.1 Write down the values of $p$ and $q$. (2)

5.2 Determine the value of $a$. (3)

5.3 Determine the value of $t$. (3)

5.4 Calculate the average gradient of $g$ between $x=-2$ and $x=2$. (3)

5.5 Write down the equation of the asymptote of $g$. (1)

5.6 Write down the coordinates of D. (2)

5.7 Determine the equation of the axis of symmetry of $f$ that has a negative gradient. (3)

5.8 Point D is reflected in the line determined in 5.7 to give point E.
Write down the coordinates of E. (2)

**[19]**

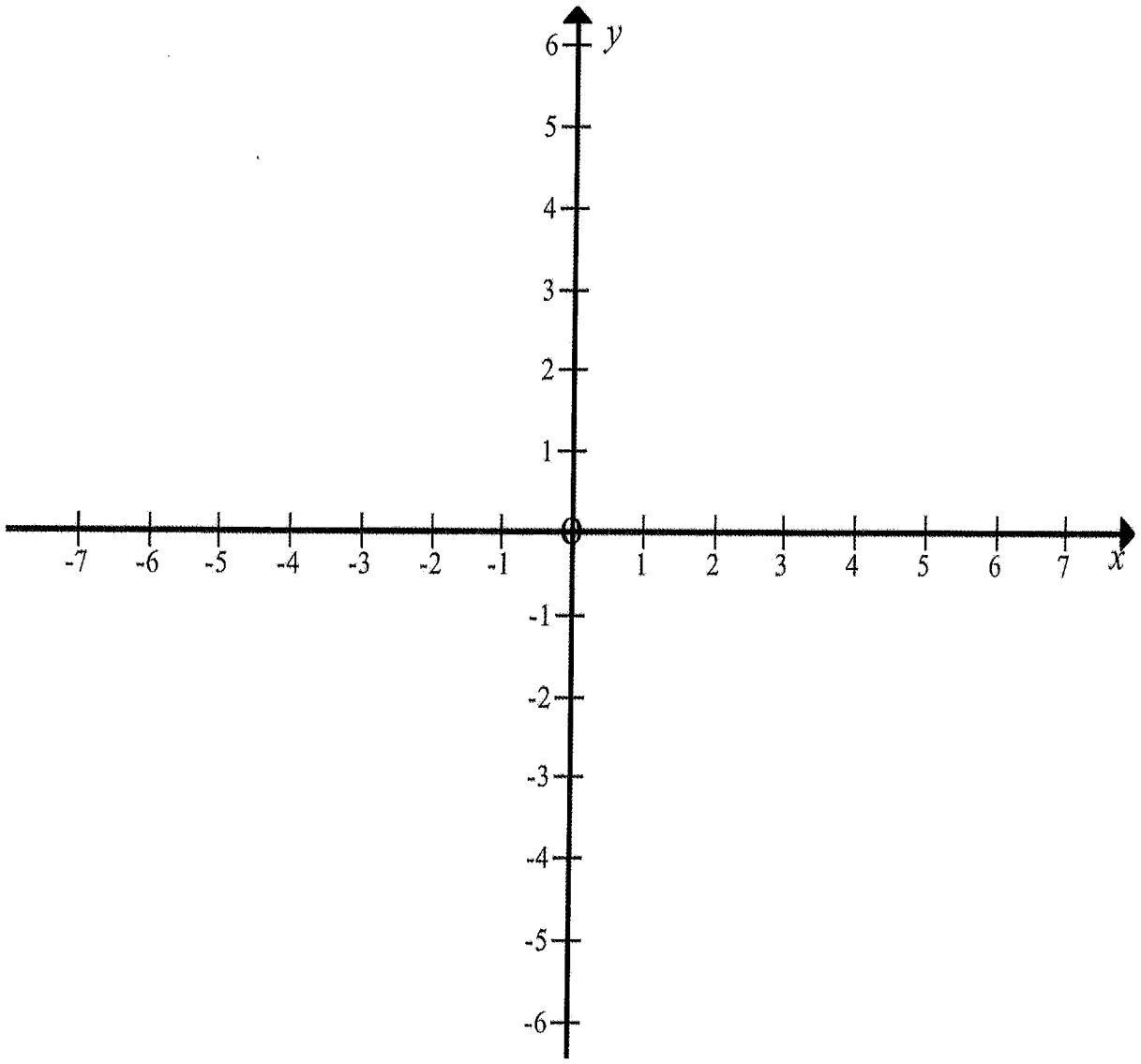
**TOTAL: 100**

**DIAGRAM SHEET**

**NAME OF LEARNER:** _____ **GRADE:**_____

**QUESTION 4.1.2 and 4.1.5**




TEAR – OFF SHEET