



**education**

Department:  
Education  
PROVINCE OF KWAZULU-NATAL

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**MATHEMATICS P1**

**COMMON TEST**

**JUNE 2019**

**MARKS: 100**

**TIME: 2 hours**

**This question paper consists of 7 pages.**

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions:

1. This question paper consists of 6 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:

$$1.1.1 \quad x(2x-5)=0 \quad (2)$$

$$1.1.2 \quad 2x^2 - x - 7 = 0 \quad (\text{correct to TWO decimal places}) \quad (3)$$

$$1.1.3 \quad x - \sqrt{2x-1} = 2 \quad (5)$$

$$1.1.4 \quad 3x^2 + 7x - 6 \geq 0 \quad (3)$$

$$1.1.5 \quad 3^x \left( x + \frac{1}{3} \right) < 0 \quad (3)$$

1.2 Solve simultaneously for  $x$  and  $y$ :

$$x - 4y = 5 \quad \text{and} \quad x^2 - 2xy - 3y^2 = 0 \quad (6)$$

**[22]**

**QUESTION 2**

2.1 Simplify fully, WITHOUT using a calculator:

$$2.1.1 \quad \left( \frac{2}{\sqrt{3}} - \frac{\sqrt{3}}{2} \right)^2 \quad (2)$$

$$2.1.2 \quad \frac{\sqrt{72}}{\sqrt{8} + \sqrt{98}} \quad (3)$$

$$2.1.3 \quad \frac{6(3^{n+1})}{3^{n(n-1)}} \div \frac{2 \cdot 9^{n+1}}{3^{n^2-1}} \quad (4)$$

2.2. Solve for  $x$ :

$$3^x \cdot 5 + 3^{x+1} = 216 \quad (3)$$

$$2.3 \quad \text{If } 6^x = 5, \text{ calculate the value of } \frac{18^x}{2^{-x}} \quad (3)$$

**[15]**

**QUESTION 3**

- 3.1 Write down the next TWO terms of the quadratic sequence:  
 $5 ; 10 ; 17 ; \dots$  (2)

- 3.2 The first four terms of a quadratic sequence are  
 $(x - 3) ; (-2x + 2) ; (3x + 11)$  and  $(4x + 12)$ .  
Calculate the value of  $x$ . (4)

- 3.3 Consider the quadratic pattern:  $3 ; 7 ; 13 ; 21 ; \dots$

- 3.3.1 Determine the  $n^{\text{th}}$  term ( $T_n$ ) of the pattern in the form  $T_n = an^2 + bn + c$ . (4)

- 3.3.2 Which term of the pattern will be the first to exceed 463? (4)

- 3.3.3 Between which TWO consecutive terms in the sequence is the first difference equal to 102? (4)

- 3.3.4 Consider the number pattern:

Row 1: 3  
Row 2: 5 7  
Row 3: 9 11 13  
Row 4: 15 17 19 21

Calculate the number at the end of the 60<sup>th</sup> row. (3)

- 3.4 The following is a linear pattern:  $6 ; p ; q ; r ; 42 ; \dots$

Determine the values of  $p$ ,  $q$  and  $r$ . (4)  
**[25]**

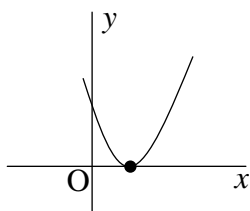
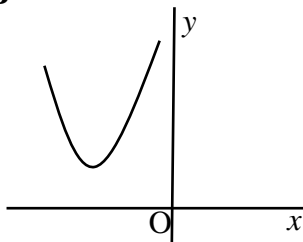
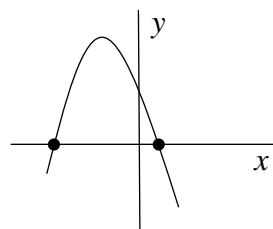
**QUESTION 4**

The hyperbola,  $f$ , is defined by  $f(x) = \frac{3}{x-2} + 1$ .

- 4.1 Write down the equations of the asymptotes of  $f$ . (2)
- 4.2 Write down the  $y$ -intercept of  $f$ . (1)
- 4.3 Determine the  $x$ -intercept of  $f$ . (2)
- 4.4 Sketch the graph of  $f$ , showing all intercepts with the axes and any asymptotes. (3)
- 4.5 Write down the domain of  $h$ , if  $h(x) = f(x-2)$ . (2)

**[10]****QUESTION 5**

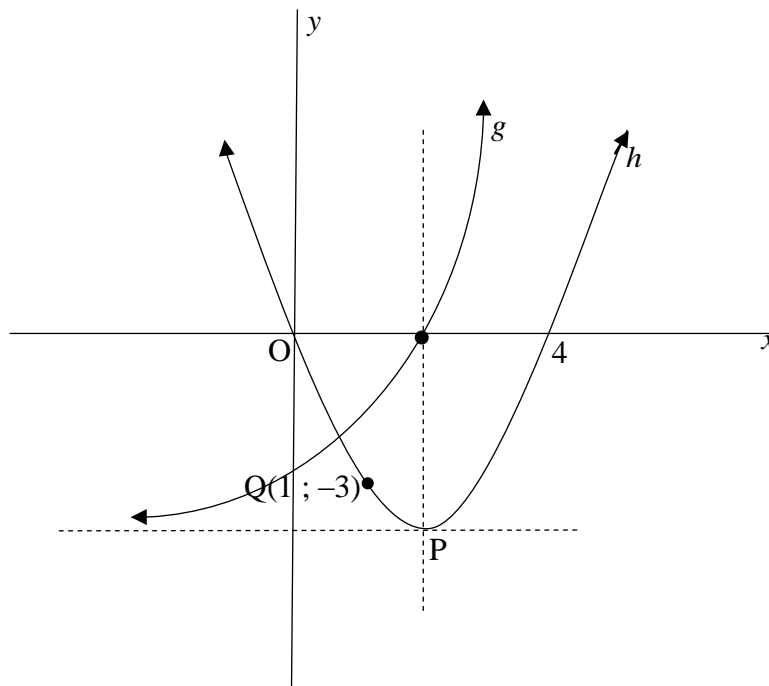
- 5.1 The following are graphs defined by  $y = ax^2 + bx + c$ .

**A****B****C**

Match each of the following statements below with an associated graph above.  
You must only write down the letter of the corresponding graph.

- 5.1.1  $b^2 - 4ac > 0$  (1)
- 5.1.2  $b^2 - 4ac = 0$  (1)
- 5.1.3  $b^2 - 4ac < 0$  (1)

- 5.2 The sketch below shows the graphs of  $y = k^x + t$  and  $y = ax^2 + bx + c$ .  
 The  $x$ -intercepts of  $h$  are  $(0; 0)$  and  $(4; 0)$ .  $Q(1; -3)$  is a point on  $h$ .  
 The horizontal line through  $P$ , the turning point of  $h$ , is the asymptote of  $g$ .  
 The  $x$ -intercept of  $g$  lies on the axis of symmetry of  $h$ .



- 5.2.1 Show that  $a = 1$  and  $b = -4$ . (3)
- 5.2.2 Determine the coordinates of  $P$ , the turning point of  $h$ . (2)
- 5.2.3 Write down the range of  $h$ . (1)
- 5.2.4 Write down the value of  $t$ . (1)
- 5.2.5 Hence, calculate the value of  $k$ . (2)
- 5.2.6 For which value(s) of  $r$  will the roots of  $x^2 - 4x + r$  be non-real? (2)

[14]

**QUESTION 6**

Given the functions  $p(x) = -2x^2 - 5x + 3$  and  $q(x) = mx + 3$ .

The angle of inclination of  $q$  is  $135^\circ$ .

- 6.1 Determine the intercepts of  $p$  with the  $x$  and  $y$  axes. (3)
- 6.2 Determine the coordinates of the turning point of  $p$ . (2)
- 6.3 Write down the value of  $m$ , the gradient of  $q$ . (1)
- 6.4 Sketch the graphs of  $p$  and  $q$  on the same set of axes. Clearly indicate ALL the intercepts with the axes as well as the coordinates of the turning point. (5)
- 6.5 Determine the value of  $k$  for which the straight line  $y = -x + k$  will be a tangent to  $p$ . (3)

**[14]**

**TOTAL MARKS: 100**