



education

Department:
Education
PROVINCE OF KWAZULU-NATAL

**NATIONAL
SENIOR CERTIFICATE**

GRADE 10

MATHEMATICS P1

COMMON TEST

JUNE 2019

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, etc. which you have used in determining your 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 correct to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Write neatly and legibly.

QUESTION 1

1.1 Simplify the following expressions fully:

1.1.1 $3x^3 - 2x^2(x + 5)$ (2)

1.1.2 $(2x - 1)(2x + 1)$ (2)

1.1.3 $\frac{1}{4}x(4x^{-1} - 8x)$ (2)

1.2 Factorise the following expression fully:

$y^2(y - 2) + x^2(2 - y)$ (3)

1.3 Given that $x \leq 12\frac{1}{4}$, write down the largest possible value of x if:

1.3.1 x is an integer (1)

1.3.2 x is a prime number (1)

1.3.3 x is a rational number (1)

[12]

QUESTION 2

2.1 Determine, without the use of a calculator, the value of x in each of the following:

2.1.1 $2x^2 - 5x + 3 = 0$ (3)

2.1.2 $\frac{x+1}{3} - \frac{x-2}{5} - 2 = 0$ (3)

2.2 Given that: $2x - 3y = 3$ and $2x + y = 7$

Determine the values of x and y simultaneously. (4)

2.3 The formula $F = 32 + \frac{9C}{5}$ is used for converting temperatures for degrees Celsius ($^{\circ}\text{C}$) to degrees Fahrenheit ($^{\circ}\text{F}$).

Make C the subject of this formula. (2)

[12]

QUESTION 3

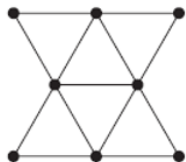
A company manufactures security fencing using identical metal rods (R), which are one metre in length, and bolts (B). The rods are bolted together at their ends.

Some fences, with different lengths, are shown below.

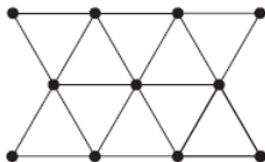
Length = 1m



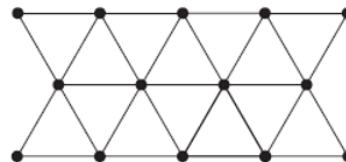
Length = 2m



Length = 3m



Length = 4m



Also • shows the position of a bolt

The table shows the numbers of bolts and rods used for various lengths of fence.

Length (metres)	1	2	3	4
Number of bolts (B_n)	5	8	11	p
Number of rods (R_n)	6	13	20	q

- 3.1 Write down the values of p and q . (2)
- 3.2 Given that $B_n = 3n + k$, where k is a constant, find the value of k . (1)
- 3.3 Write down the general term (R_n) for the number of rods used in each length. (2)
- 3.4 The company has 200 bolts and 400 rods in stock.
How many complete fences can he make which have a length of 6m? (3)

[8]**QUESTION 4**

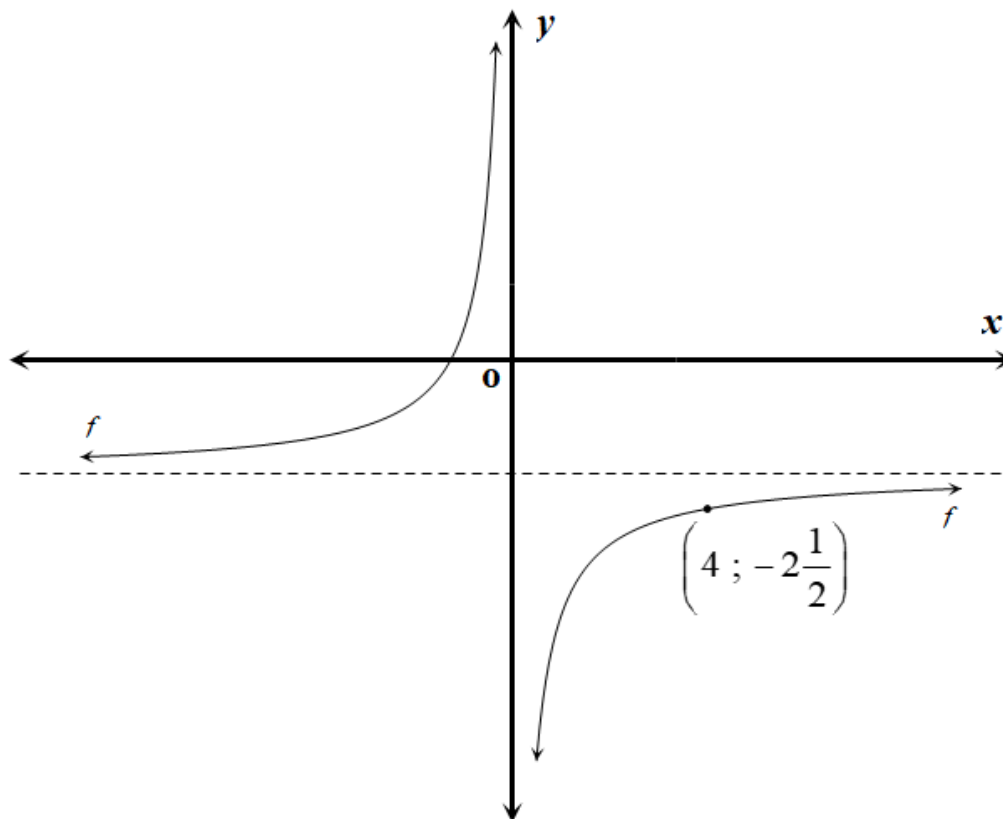
Given: $f(x) = x^2 - 16$ and $g(x) = 3^x - 3$

- 4.1 Write down the coordinates of the y -intercept of f . (1)
- 4.2 Calculate the x -intercept of g . (2)
- 4.3 Sketch the graphs of f and g on the same system of axes.
Clearly indicate ALL the intercepts and the asymptote on the graph. (5)
- 4.4 For which value(s) of x is $g(x) > 6$? (1)
- 4.5 Describe in words the transformation of f to h if $h(x) = -(x-4)(x+4)$ (1)

[10]

QUESTION 5

The diagram below shows the graph of $f(x) = \frac{-a}{x} - 2$



- 5.1 Write down the equation of the horizontal asymptote of f , represented by the dotted line. (1)
- 5.2 It is further given that f passes through the point $\left(4; -2\frac{1}{2}\right)$.
Show that $a = 2$. (2)
- 5.3 Determine the equation of g , the axis of symmetry of f which has a negative gradient. (2)
- 5.4 The graph of f is reflected about the y -axis and then translated 2 units upwards to produce a new graph. Determine the domain of the new graph. (2)
- 5.5 For which values of x is f decreasing? (1)

[8]**TOTAL: 50**