KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

MATHEMATICS

GRADE 11

TERM 2 CONTROLLED TEST

2021

EXAMINER(S): MR S NCAMANI AND MRS Z.G MKHIZE
MODERATOR: MR F.W DLAMINI
MARKS: 75
DURATION: 1.5 HOUR

This question paper consists of 4 pages.

INSTRUCTION AND INFORMATION

Read the following instructions carefully before answering the questions.

1. **The question paper consists of 5 questions. Answer ALL the questions.**
2. **Clearly show ALL calculations, which you have used in determining your answers.**
3. **You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.**
4. **Diagrams are NOT necessarily drawn to scale.**
5. **If necessary, round off answers correct to TWO decimal places.**
6. **Answer the questions in the spaces provided. Write neat and legibly.**

QUESTION 1

1.1 Consider the following number pattern: $4; 9; 14; ...$

1.1.1 Write down the next two terms of the pattern. (2)

1.1.2 Determine the expression for the n^{th} term of the pattern. (2)

1.1.3 Determine if 1099 is a term of the number pattern? (3)

1.2 Consider the following quadratic number pattern: $6; 10; 18; ...$

1.2.1 Write down the following two terms of the pattern. (2)

1.2.2 Determine the equation of the general term in the form: (4)

$T_n = an^2 + bn + c$

1.2.3 Calculate the value of T_{12}. (2)

1.2.4 What term of the pattern will have a value of 766? (4)

[19]

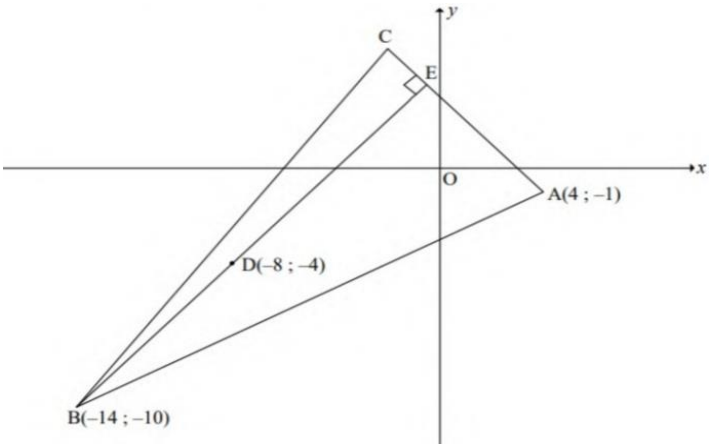
QUESTION 2

In the diagram below, $A(4; -1)$, $B(-14; -10)$ and C are the vertices of a triangle.

E is a point on AC such that $BE \perp AC$.

The point $D(-8; -4)$ lies on BE.

The equation of the line BC is $4y - 5x - 30 = 0$.



2.1 Calculate the gradient of BD. (2)

2.2 Hence, write down the gradient of AC. (1)

2.3 Determine the equation of AC in the form $y = mx + c$. (2)

2.4 The point $G(p; -5)$ lies on AB. Calculate the value of p. (3)

2.5 Calculate the coordinates of C. (4)

[12]

QUESTION 3

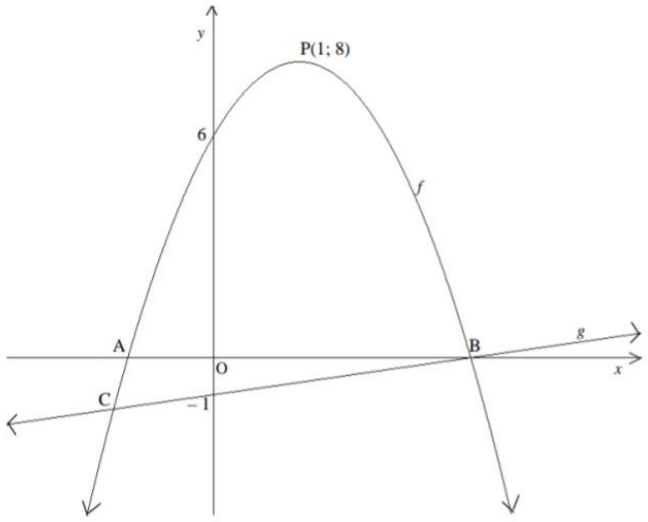
Below is a sketch graph of parabola, f, and straight line, g.

$P(1;8)$ is the turning point of f.

f cuts the y-axis at $(0;6)$ and g cuts the y-axis at $(0;-1)$.

f and g intersect at B and C.

B is a point on the x-axis.



3.1 Show that $f(x) = -2x^2 + 4x + 6$. (6)

3.2 Calculate the average gradient of $f(x)$ between $x = 1$ and $x = 3$. (3)

3.3 Show that the equation of g is $g(x) = \frac{1}{3}x - 1$. (3)

3.4 Calculate the coordinates of C. (6)

3.5 If $h(x) = f(-x)$, explain how the graph of h may be obtained from the graph of f. (2)

3.6 Write down the equation of h. (2)

[22]

QUESTION 4

Given: $f(x) = \frac{8}{x-8} + 4$

4.1 Write down the domain of f. (1)

4.2 For what value of x is $f(x) = 0$? (2)

4.3 Determine the value of p, if $A(0;p)$ lies on the graph of f. (2)

4.4 Write down the equation of the asymptotes of f. (2)

4.5 Draw a neat sketch graph of f, indicating the asymptotes and intercepts with the axes, on the diagram sheet provided. (4)

[11]

QUESTION 5

5.1 Prove the identity:

$$\frac{(\tan^2\theta - \sin^2\theta)\left(\frac{\cos^2\theta}{\sin^2\theta}+1\right)}{\tan^2\theta} = 1 \quad (5)$$

5.2 Solve for x if $4\sin^2 x + 7\cos x - 4 = 0$ and $x \in [0°; 360°]$ (6)

[11]

{TOTAL MARKS: 75}