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KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS P1

COMMON TEST

JUNE 2024

SEE ACADEMY

MARKS: 100

TIME: 2 hours

This question paper consists of 6 pages including cover page

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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. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your 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 correct to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Write neatly and legibly.

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QUESTION 1

1.1 Solve for x:

1.1.1 $x(1-2x)=0$ (2)

1.1.2 $2x^2-5x+3=0$ (3)

1.1.3 $x(3x-5)=7$ (correct to TWO decimal places) (4)

1.1.4 $(1-x)(x+3)\leq -5$ (4)

1.1.5 $\dfrac{x^2+7}{x^2-2x-3}+\dfrac{2}{x+1}=-\dfrac{1}{x-3}$ (5)

1.2 Given that: $x-3=2\sqrt{x}$

1.2.1 Solve for x. (4)

1.2.2 Hence, if $\sqrt[3]{3t}-2\sqrt{\sqrt[3]{3t}}=3$, determine the value of t. (3)

1.3 Solve simultaneously for x and y:
$3y=x+1$ and $(x-y)(5y-3x)=0$ (5)

1.4 The roots of the equation $x^2-3x-k=0$ are $x=\dfrac{3\pm 3\sqrt{5}}{2}$. Determine the value of k. (4)

[34]

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QUESTION 2

2.1 Simplify the following fully, **without using a calculator**:

2.1.1 $\dfrac{2^{4x+1}.9^{x}.6^{2x-1}}{2^{6x}.27^{x}.3^{x}}$ (4)

2.1.2 $\dfrac{3^{2021}-3^{2017}}{60.\left(\sqrt[3]{3^{6048}}\right)}$ (4)

2.2 Solve for x, **without using a calculator:**

2.2.1 $m^{8x-4}=1$ (3)

2.2.2 $4.3^{x}-3^{x-2}+3^{x}=\dfrac{44}{3}$ (4)

2.2.3 $x^{x}=2^{2048}$ (3)
[18]

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QUESTION 3

The function g is defined as $g(x)=\left(\frac{1}{2}\right)^x-4$

3.1 Write down the equation of asymptote of g. (1)

3.2 Calculate the y-intercept of g. (2)

3.3 Calculate the x-intercept of g. (2)

3.4 Draw a neat sketch of g. Clearly show all the intercepts with the axes and the asymptote. (3)

3.5 Calculate the average gradient of g between $x=0$ and $y=0$. (2)

3.6 Write down the equation of k if it is given that $k(x)=g(x)+4$. (1)

3.7 It is further given that $h(x)=2^{x+3}-4$. Explain, in words, how graph g must be transformed to obtain graph h. (3)

[14]

QUESTION 4

The function $f(x)=\frac{a}{x+p}+1$ has an axis of symmetry with an equation of $x=3-y$.

4.1 Write down the range of f. (1)

4.2 Determine the equation of the vertical asymptote of f. (2)

4.3 If $f(0)=2$, calculate the value of a. (2)

4.4 Calculate the x-intercept of f. (3)

4.5 Draw a neat sketch of f. Clearly show all intercepts with the axes and asymptotes. (3)

4.6 Write down the values of x for which $f(x)\leq 0$. (2)

4.7 The straight line $y=-2x+5$ passes through the point of intersection of the asymptotes and intersects f at P(1 ; 3) and Q. Write down the coordinates of Q. (2)

[15]

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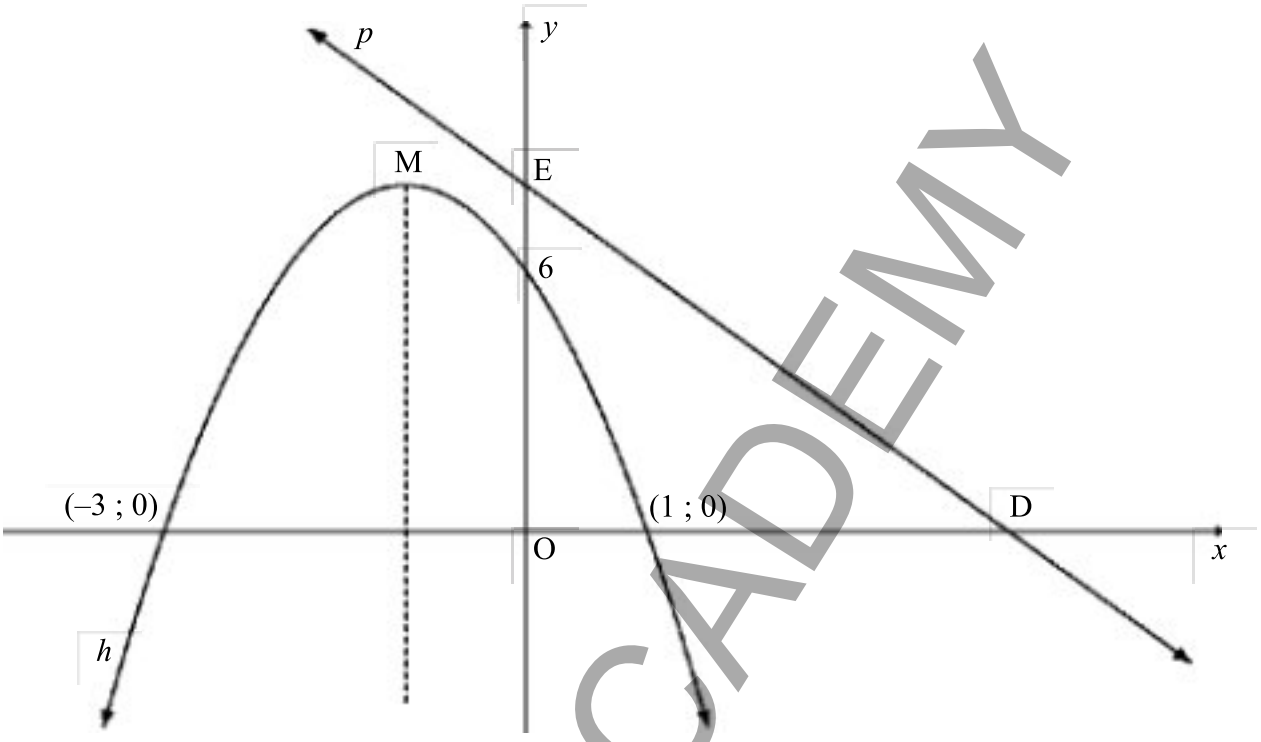
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QUESTION 5

The graphs of $h(x) = ax^2 + bx + c$ and $p(x) = 8 - 2x$ are sketched below.

The x-intercepts of h are $(-3\ ;\ 0)$ and $(1\ ;\ 0)$ and the y-intercept of h is $(0\ ;\ 6)$. M is the turning point of h. D and E are the x- and y-intercepts of p respectively.



5.1 Write down the coordinates of D. (1)

5.2 Show that $a = -2$, $b = -4$ and $c = 6$. (4)

5.3 Calculate the coordinates of M, the turning point of h. (2)

5.4 Write down the range of h. (1)

5.5 Determine the values of x for which $h(x).p(x) < 0$. (3)

5.6 If $h(x) = k$, determine the value(s) of k for which:

5.6.1 roots are non-real. (1)

5.6.2 roots have the same sign. (2)

5.7 Calculate how graph p must be translated so that it becomes a tangent to graph h. (5)

[19]

TOTAL: 100

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