KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS P1

COMMON TEST

JUNE 2025

MARKS: 100

TIME: 2 hours

This question paper consists of 8 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. Number the answers correctly according to the numbering system used in this question paper.

4. Clearly show ALL calculations, diagrams, graphs, etc. that 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. Write neatly and legibly.

QUESTION 1

1.1 Solve for x:

1.1.1 $(x-3)(2x+5)=0$ (2)

1.1.2 $4(x-3)=-x^2$ (3)

1.1.3 $3x^2+2x-4=0$ (answer correct to TWO decimal places) (3)

1.1.4 $-x^2+3x>0$ (4)

1.1.5 $(x^2+2)(x^2+2)-x^2-8=0$ (5)

1.2 Solve simultaneously for x and y:

$y-1=2x$ and $3x^2-5xy-24=-4y^2$ (6)

1.3 Consider the equation $mx^2+nx+p=0$.
Calculate the values of x if it is given that $m+n+p=0$. (4)
[27]

QUESTION 2

2.1 Simplify the following expressions, **WITHOUT using a calculator:**

2.1.1 $\dfrac{6^{n+2}.12^{n}}{72^{n}}$ (3)

2.1.2 $\sqrt{\left(\sqrt{13}-\sqrt[3]{-27}\right)\left(\sqrt{13}-\sqrt{9}\right)}$ (4)

2.2 It is given that $15^{x}=m$. Determine $\dfrac{3.5^{x+2}-3.5^{x}}{-18.3^{-x}}$ in terms of m. (3)

2.3 Solve for x, **WITHOUT using a calculator:**

2.3.1 $\sqrt[3]{\left(\dfrac{81}{x}\right)^{-2}}=\dfrac{1}{9}$ (4)

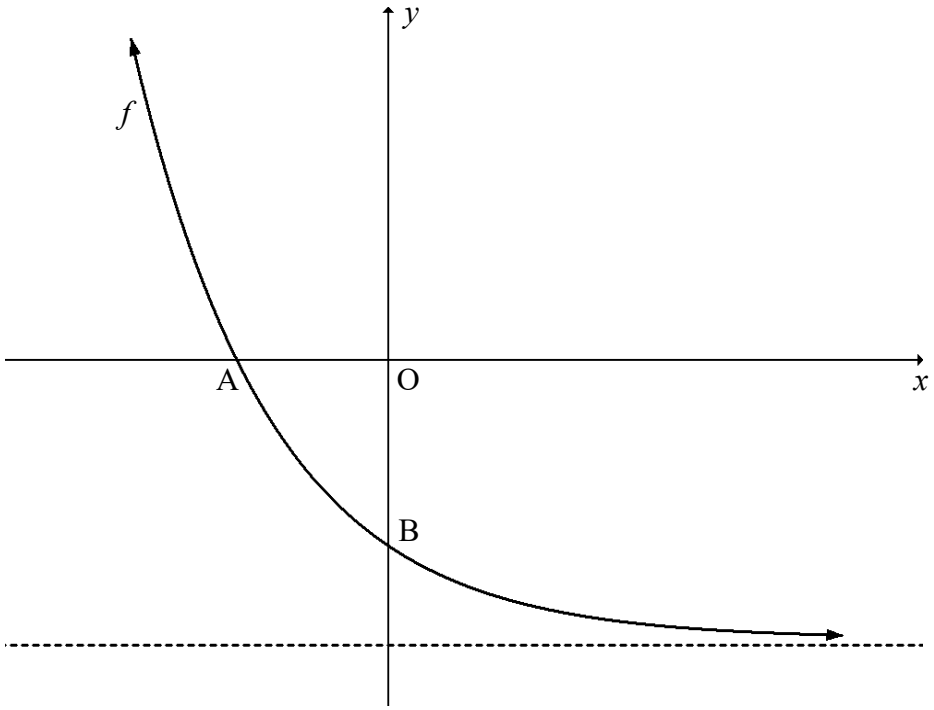
2.3.2 $\sqrt{x-2}=x-4$ (4)

2.3.3 $\dfrac{5^{x+1}-5^{x}}{5^{2x+1}-25^{x}}=125$ (4)

[22]

QUESTION 3

3.1 In the diagram below, the graph of $f(x) = 3^{-x+1} - 9$ is drawn.
Graph f cuts the $x-$axis at A and the $y-$axis at B.



3.1.1 Write down the equation of the asymptote of f. (1)

3.1.2 Calculate the coordinates of point A. (3)

3.1.3 Calculate the coordinates of point B. (2)

3.1.4 Write down the equation of p if $p(x) = f(x) + 6$ (1)

3.1.5 It is given that $f(x) = k$. Determine the values of k for which the root of the equation $f(x) = k$ is negative. (1)

3.1.6 Graph f is transformed to obtain $q(x) = \frac{1}{3^{x-3}} - 9$. Describe, in words, the transformation from f to q. (2)

3.2 The function of $g(x) = b^x + q$ has the following properties:

- $q > 0$
- $b > 1$

Draw a neat sketch of g. Indicate clearly on your sketch the asymptote and the $y-$intercept. (3)

[13]

QUESTION 4

The straight lines $y = x + 4$ and $y = -x - 2$ are the axes of symmetry of the function $g(x) = \frac{a}{x + p} + q$.

4.1 Determine the equations of asymptotes of g. (3)

4.2 It is given that g passes through $(-7\ ;\ 2)$. Show that $g(x) = \frac{-4}{x + 3} + 1$ (3)

4.3 Calculate the coordinates of the $x-$intercept of g. (3)

4.4 Calculate the coordinates of the $y-$intercept of g. (2)

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

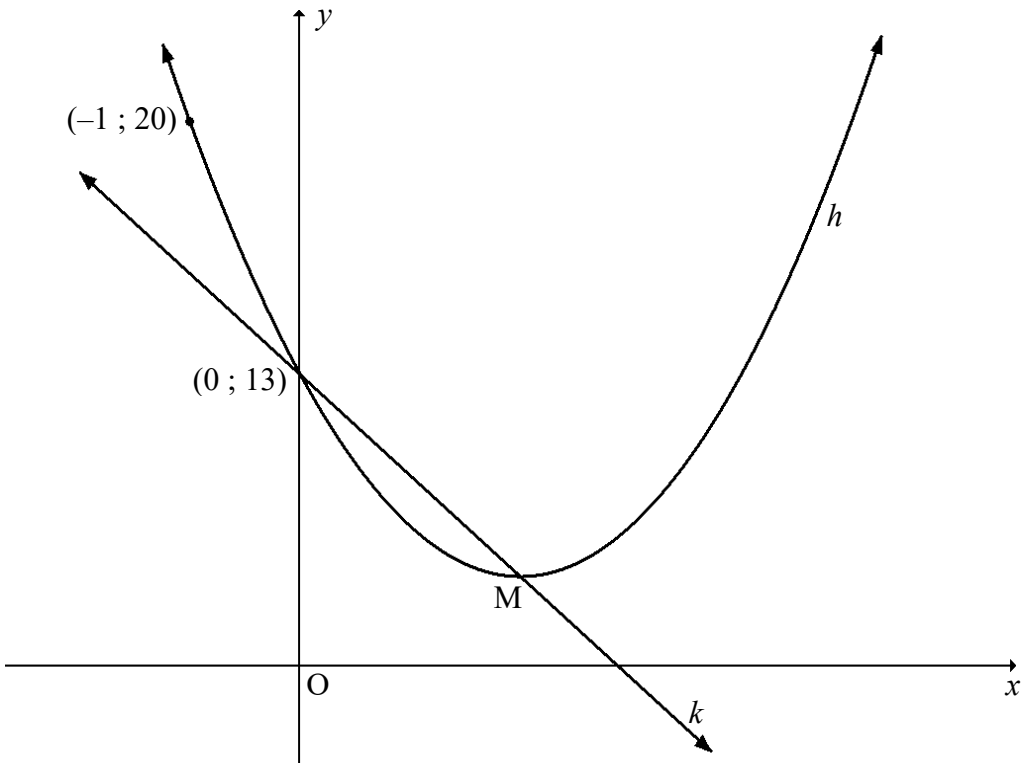
4.6 It is given that $m(x) = g(x - 7) + 2$. Determine the domain of m. (2)

4.7 Determine the value(s) of x for which $m(x) \geq 0$. (2)

[18]

QUESTION 5

5.1 In the diagram below, the graphs of $h(x) = (x-3)^2 + q$ and straight line k are drawn. Graph h has a turning point at M and passes through (–1 ; 20). Graphs h and k intersect at (0 ; 13) and M.



5.1.1 Calculate the value of q. (2)

5.1.2 Write down the range of h. (1)

5.1.3 Write down the equation of the axis of symmetry of h. (1)

5.1.4 Calculate the equation of straight line k in the form $y = mx + c$. (3)

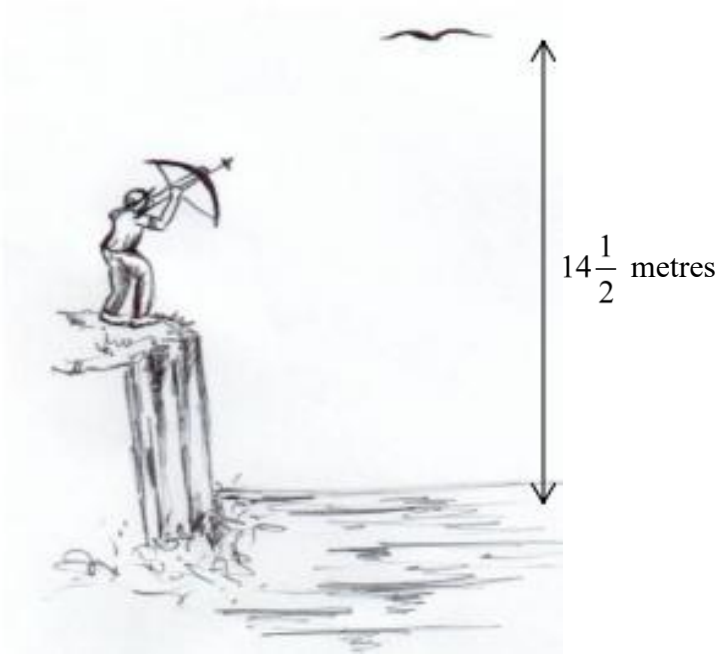
5.1.5 Determine the values of x for which:

(a) $h(x) < k(x)$ (2)

(b) $h(x).k(x) \geq 0$ (2)

5.1.6 Determine the values of t for which the graph of $g(x) = -2x + t$ does not intersect h. (4)

5.2 A hunter, armed with a bow and an arrow, is standing on a cliff that is 6 metres above ground level. He spots an eagle flying horizontally at a height of $14\frac{1}{2}$ metres above ground level. He then shoots the arrow at the eagle. The flight path of the arrow is defined as $h(t) = -5t^2 + 13t + 6$, where h represents the distance, in metres, above ground level and t represents time elapsed, in seconds, after the arrow is shot.



Will the arrow hit the eagle? Support your answer with necessary calculations. (5)
[20]

TOTAL MARKS : 100