NewBridge GRADUATE INSTITUTE

MATHEMATICS – P1

23rd OCTOBER 2026

BREAKDOWN

Mathematics Paper 1

Friday 23rd October 2026

09h00 – 3 hours

150 marks

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PAPER 1:	
DURATION: **3 hours**	
TOTAL MARKS: **150**	
This paper will consist of the following sections:	
Algebra, Equations and Inequalities	25±3 marks
Patterns and Sequences	25±3 marks
Finance, Growth and Decay	15±3 marks
Functions and Graphs	35±3 marks
Differential Calculus	35±3 marks
Probability	15±3 marks

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Question 1 – Algebra (25)

* **All equations – quadratic (formula), inequalities, irrational**
* **Simultaneous equations**
* **Exponents**
* **Nature of Roots**

Questions 2 & 3 – Patterns & Sequences (25)

* **Geometric, Quadratic, Exponential, Linear number patterns**
* **Sigma notation, Sum to Infinity**

Questions 4 & 5 – Functions & Graphs (35)

* **Linear, Quadratic, Hyperbolic, Exponential, Inverses**

Question 6 – Finance (15)

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Questions 7, 8 & 9 – Calculus (35)

* First Principles
* Derivative by RULE
* Tangents
* Curve Sketching
* Maxima or Minima

Question 10 & 11 – Probability (15)

* Venn Diagrams
* Probability Rules
* Tree Diagrams
* Contingency Tables
* Counting Principle

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 10 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 to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. An information sheet with formulae is included at the end of the question paper.
10. Write neatly and legibly.

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INFORMATION SHEET: MATHEMATICS

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n \qquad A = P(1+i)^n$$

$$T_n = a + (n-1)d \qquad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$T_n = ar^{n-1} \qquad S_n = \frac{a(r^n - 1)}{r-1} \; ; \; r \neq 1 \qquad S_\infty = \frac{a}{1-r} \; ; \; -1 < r < 1$$

$$F = \frac{x[(1+i)^n - 1]}{i} \qquad P = \frac{x[1-(1+i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad M\left(\frac{x_1 + x_2}{2} ; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

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$$(x-a)^2+(y-b)^2=r^2$$

In ΔABC: $\dfrac{a}{\sin A}=\dfrac{b}{\sin B}=\dfrac{c}{\sin C}$

$$a^2=b^2+c^2-2bc.\cos A$$

$$\text{area } \Delta ABC=\frac{1}{2}ab.\sin C$$

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$

$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta$$

$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

$$\cos 2\alpha=\begin{cases}\cos^2\alpha-\sin^2\alpha\\ 1-2\sin^2\alpha\\ 2\cos^2\alpha-1\end{cases}$$

$$\sin 2\alpha=2\sin\alpha.\sin\alpha$$

$$\bar{x}=\frac{\sum x}{n}$$

$$\sigma^2=\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n}$$

$$P(A)=\frac{n(A)}{n(S)}$$

P(A or B) = P(A) + P(B) – P(A and B)

$$\hat{y}=a+bx$$

$$b=\frac{\sum(x-\bar{x})(y-\bar{y})}{\sum(x-\bar{x})^2}$$

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Tips to help not stress

1) Have enough stationery! (2 blue pens, a pencil, ruler and calculator)
2) USE the reading time!
3) Do not waste time on the hard questions. Leave space and move on.
4) Beware of CARELESS errors!
5) Check for realistic answers!
6) Copy formulae down correctly!

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QUESTION 1

1.1 Solve for x, in each of the following:

1.1.1 $x^2 = -4x$ (3)

1.1.2 $x^2 + x - 1 = 0$ (correct to TWO decimal places) (3)

1.1.3 $\sqrt{x+4} - \frac{4}{\sqrt{x-2}} = 0$ (5)

1.1.4 $(x+2)(-3x+1) > 0$ (3)

1.2 Solve for x and y simultaneously:

$3 - y + 2x = 0$

$6x + 4y^2 = 3 + 5xy$ (6)

1.3 Given that $9x^2 - 12px = -4p^2$. For which value(s) of p will the equation have equal roots? (4)

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QUESTION 4

Given: $f(x)=\frac{8}{x-2}+2$

4.1 Write down the domain of f. (2)

4.2 Calculate the y-intercept of f. (1)

4.3 Calculate the x-intercept of f. (2)

4.4 Sketch the graph of f, clearly indicating the coordinates of the x and y-intercepts as well as the asymptotes. (3)

4.5 If $y=-x+k$ is an equation of the line of symmetry of f, determine the value of k. (2)

4.6 Determine the equation of the graph formed if f is shifted 3 units to the right and then reflected across the x-axis. (3)

[13]

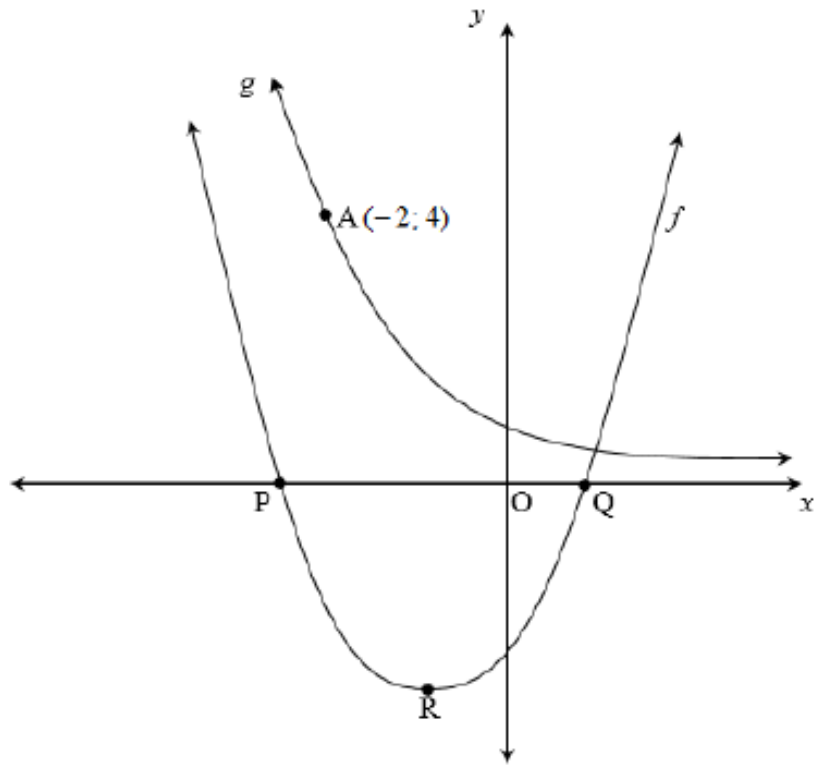
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QUESTION 5

The graphs of $f(x)=2(x+1)^2-8$ and $g(x)=\left(\frac{1}{2}\right)^x$ are represented in the sketch below.

P and Q are the x-intercepts of f and R is the turning point of f.

A$(-2;4)$ is a point on the graph of g.



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5.1 Write down the equation of the axis of symmetry of f. (1)

5.2 Write down the coordinates of R, the turning point of f. (1)

5.3 Determine the coordinates of P and Q. (4)

5.4 Determine the equation of g^{-1}, the inverse of g, in the form $y = \ldots$ (2)

5.5 Sketch the graph of g^{-1} in your ANSWER BOOK. Clearly indicate the intercept with the axis and at least ONE other point on g^{-1}. (3)

5.6 For which value(s) of x, is:

5.6.1 $g^{-1}(x) \geq -2$? (2)

5.6.2 $x.f(x) < 0$? (3)

[16]

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QUESTION 7

7.1 Determine $f'(x)$ from first principles if $f(x) = -2x^2 + x$. (5)

7.2 Determine:

7.2.1 $D_x\left[\frac{-5x}{\sqrt{x}} - \frac{x^2}{5}\right]$ (3)

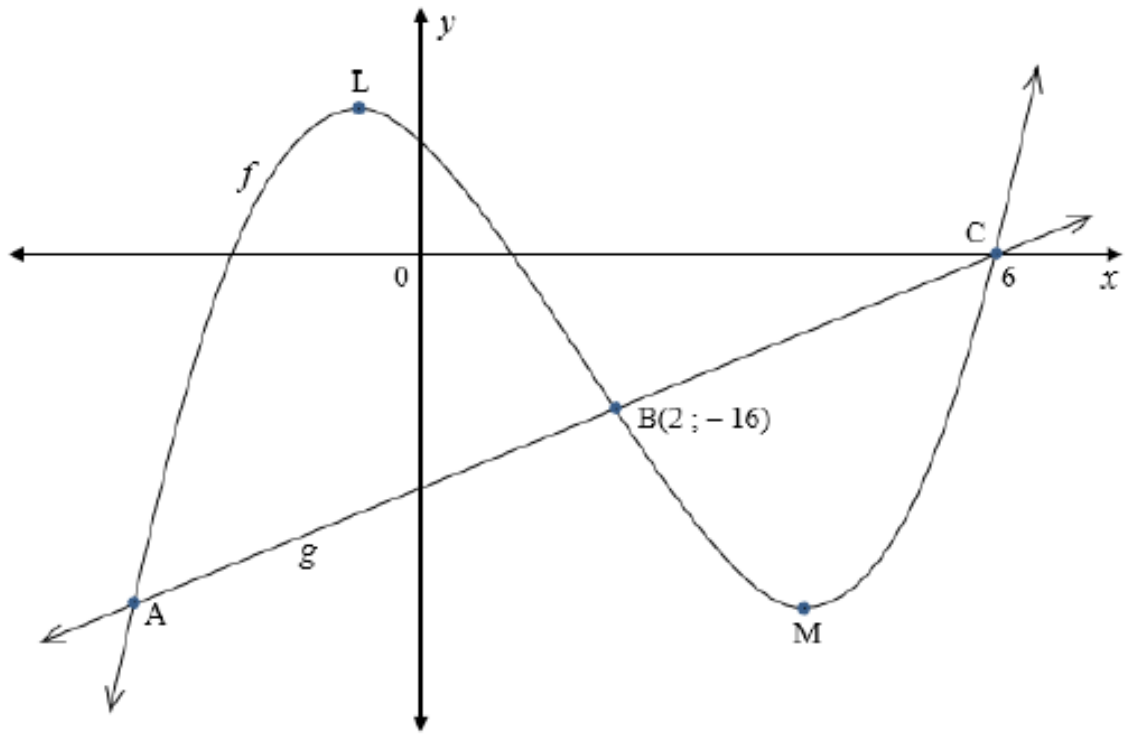
7.2.2 $\frac{d}{dx}\left[\left(x + \frac{2}{x}\right)\left(x - \frac{2}{x}\right)\right]$ (4)

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QUESTION 8

The sketch below represents the functions $f(x)=x^3+bx^2+cx+d$ and $g(x)=ax+q$.
The points A, $B(2;-16)$ and C are the points where the two graphs intersect.
$C(6;0)$ is a $x-$intercept of f, while L and M are the turning points of f.



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8.1 Show that $b=-5$, $c=-8$ and $d=12$ if it is given that, $f'(x)=3x^2-10x-8$. (4)

8.2 Determine the coordinates of the turning points, L and M, of f. (5)

8.3 Determine the equation of g. (3)

8.4 If it is further given that the coordinates of point A are $(x;-36)$, determine the length of AM. (3)

8.5 For which value(s) of x:

8.5.1 is the graph, f increasing? (2)

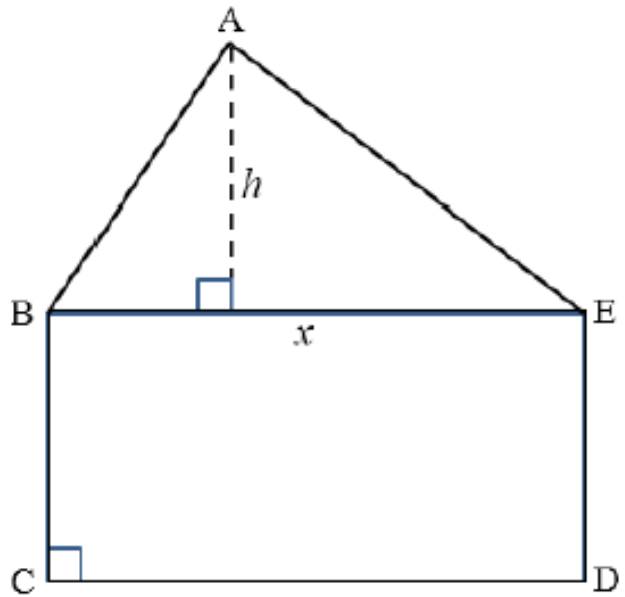
8.5.2 is the graph, f concave down? (2)

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QUESTION 9

In the figure below, ΔABE has a base of length x metres.
The base and the perpendicular height of the triangle add up to 10 metres.
The triangle is mounted on a rectangle BCDE which has a perimeter of 32 metres.



9.1 Show that the area of the figure ABCDE is equal to $-\frac{3}{2}x^2+21x \ \ m^2$. (5)

9.2 Determine the value of x for which ABCDE has a maximum area. (3)

9.3 Hence, determine the maximum area of ABCDE. (2)

[10]

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THANK YOU