

Secondary 4 Mathematics

1st Term Pre-exam

Time allowed: 1.5 hours

Total Mark: 75

Mark: _____

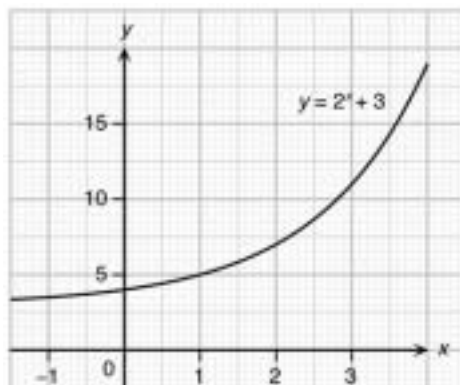
Name: _____

Instructions:

1. Attempt ALL questions. Write your answers in the spaces provided in this Question/Answer paper.
2. Unless otherwise specified, all workings must be clearly shown.
3. Unless otherwise specified, numerical answers must either be exact or correct to 3 significant figures.
4. The diagrams in this paper are not necessarily drawn to scale.

SECTION A(1): (19 marks)

1. The figure shows the graph of $y = 2^x + 3$. Solve the inequality $2^x + 3 \geq 7$ by drawing a suitable straight line on the graph. (Give your answer correct to 1 decimal place.)



(2 marks)

2. If the graph of $y = -\frac{3}{4}x^2 + x + k - 1$ does not intersect the x -axis, find the range of possible values of k .
3. An open box of base area 60 cm^2 is made by cutting squares of sides $x \text{ cm}$ from the corners of a rectangular tin sheet. If the area of the tin sheet is $14 \times 10 \text{ cm}^2$, find the value of x .

(4 marks)

4. Find the quotient and the remainder of $(3x^4 - x + 5) \div (3x + 1)$.

(3 marks)

5.

SECTION B (24 marks)

6. When the polynomial $P(x) = 2x^3 + ax^2 + bx + 6$ is divided by $x + 1$, the remainder is 18; when it is divided by $x - 1$, the remainder is -4 .

(a) Find the values of a and b .

(4 marks)

(b) Show that $2x - 1$ is a factor of $P(x)$.

(2 marks)

(c) (i) Factorize $P(x)$ completely.

(ii) Solve $P(x) = 0$.

(5 marks)

7. The figure shows the graph of $y = f(x)$ where $f(x) = -x^2 + bx + c$. The graph cuts the x -axis at $P(-2, 0)$ and $Q(8, 0)$. R is the highest point of the graph.

(a) Find the values of b and c .

(3 marks)

(b) Express the function $y = -x^2 + bx + c$ in the form of $y = -(x - h)^2 + k$.

(2 marks)

(c) Find the coordinates of R .

(1 mark)

(d) If $g(x) = f(x + 3) - 1$,

(i) describe the effect of the transformation from $y = f(x)$ to $y = g(x)$.

(ii) find the coordinates of the vertex of the graph of $y = g(x)$.

(iii) find the x -intercepts of the graph of $y = g(x)$.

(5 marks)

8.

9.

END OF PAPER