Topic Y2 (Pre-TT B) Coordinate geometry and binomial [38]

1.

Expand $\left(x+\frac{2}{x}\right)^4$ completely, simplifying the terms. [5]

(Total 5 marks)

2.

(i) Find the gradient of the line l which has equation $x + 2y = 4$. [1]

(ii) Find the equation of the line parallel to l which passes through the point $(6, 5)$, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers. [3]

(iii) Solve the simultaneous equations

$$y = x^2 + x + 1 \qquad \text{and} \qquad x + 2y = 4.$$ [4]

(Total 8 marks)

3.

The points A and B have coordinates $(4, -2)$ and $(10, 6)$ respectively. C is the mid-point of AB. Find

(i) the coordinates of C, [2]

(ii) the length of AC, [2]

(iii) the equation of the circle that has AB as a diameter, [3]

(iv) the equation of the tangent to the circle in part **(iii)** at the point A, giving your answer in the form $ax + by = c$. [5]

(Total 12 marks)

4.

(i) Find and simplify the first four terms in the expansion of $(1 + 4x)^7$ in ascending powers of x. [4]

(ii) In the expansion of

$$(3 + ax)(1 + 4x)^7,$$

the coefficient of x^2 is 1001. Find the value of a. [3]

(Total 7 marks)

5.

The line l has gradient -2 and passes through the point $A(3, 5)$. B is a point on the line l such that the distance AB is $6\sqrt{5}$. Find the coordinates of each of the possible points B. [6]

(Total 6 marks)