

Topic Y2: Coordinate geometry and binomial (Post-TT B) [40]

1.

Find the binomial expansion of $(3x - 2)^4$.

[4]

(Total 4 marks)

2.

(i) Find the equation of the circle with radius 10 and centre $(2, 1)$, giving your answer in the form $x^2 + y^2 + ax + by + c = 0$. [3]

(ii) The circle passes through the point $(5, k)$ where $k > 0$. Find the value of k in the form $p + \sqrt{q}$. [3]

(iii) Determine, showing all working, whether the point $(-3, 9)$ lies inside or outside the circle. [3]

(iv) Find an equation of the tangent to the circle at the point $(8, 9)$. [5]

(Total 14 marks)

3.

(i) Find and simplify the first four terms in the binomial expansion of $(1 + \frac{1}{2}x)^{10}$ in ascending powers of x . [4]

(ii) Hence find the coefficient of x^3 in the expansion of $(3 + 4x + 2x^2)(1 + \frac{1}{2}x)^{10}$. [3]

(Total 7 marks)

4.

A circle with centre C has equation $x^2 + y^2 - 8x - 2y - 3 = 0$.

(i) Find the coordinates of C and the radius of the circle. [3]

(ii) Find the values of k for which the line $y = k$ is a tangent to the circle, giving your answers in simplified surd form. [3]

(iii) The points S and T lie on the circumference of the circle. M is the mid-point of the chord ST . Given that the length of CM is 2, calculate the length of the chord ST . [3]

(iv) Find the coordinates of the point where the circle meets the line $x - 2y - 12 = 0$. [6]

(Total 15 marks)