

Topic Y2 (Pre-TT A): Coordinate geometry and binomial [48]

1.

(i) Find the first three terms of the expansion, in ascending powers of x , of $(1 - 2x)^{12}$. [3]

(ii) Hence find the coefficient of x^2 in the expansion of

$$(1 + 3x)(1 - 2x)^{12}. \quad [3]$$

(Total 6 marks)

2.

A is the point $(2, 7)$ and B is the point $(-1, -2)$.

(i) Find the equation of the line through A parallel to the line $y = 4x - 5$, giving your answer in the form $y = mx + c$. [3]

(ii) Calculate the length of AB , giving your answer in simplified surd form. [3]

(iii) Find the equation of the line which passes through the mid-point of AB and which is perpendicular to AB . Give your answer in the form $ax + by + c = 0$, where a , b and c are integers. [6]

(Total 12 marks)

3.

(a) Find the first **three** terms, in ascending powers of x , of the expansion of $(1 - 2x)^{10}$ [3 marks]

(b) Carly has lost her calculator. She uses the first three terms, in ascending powers of x , of the expansion of $(1 - 2x)^{10}$ to evaluate 0.998^{10}

Find Carly's value for 0.998^{10} and show that it is correct to **five** decimal places.

[3 marks]

(Total 6 marks)

4.

(i) Find the binomial expansion of $(2x + 5)^4$, simplifying the terms. [4]

(ii) Hence show that $(2x + 5)^4 - (2x - 5)^4$ can be written as

$$320x^3 + kx,$$

where the value of the constant k is to be stated. [2]

(iii) Verify that $x = 2$ is a root of the equation

$$(2x + 5)^4 - (2x - 5)^4 = 3680x - 800,$$

and find the other possible values of x . [6]

(Total 12 marks)

5.

A circle has equation $x^2 + y^2 + 2x - 4y - 8 = 0$.

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

(ii) The circle passes through the point $(-3, k)$, where $k < 0$. Find the value of k . [3]

(iii) Find the coordinates of the points where the circle meets the line with equation $x + y = 6$. [6]

(Total 12 marks)