

Topic Y2: Coordinate geometry and binomial (Post-TT A) [44]

1.

A is the point $(-2, 6)$ and B is the point $(3, -8)$. The line l is perpendicular to the line $x - 3y + 15 = 0$ and passes through the mid-point of AB . Find the equation of l , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. [7]

(Total 7 marks)

2.

(a) Find the first 3 terms, in ascending powers of x , of the binomial expansion of

$$\left(2 - \frac{x}{2}\right)^7, \text{ giving each term in its simplest form.}$$

(4)

(b) Explain how you would use your expansion to give an estimate for the value of 1.995^7

(1)

(Total 5 marks)

3.

The points A , B and C have coordinates $(5, 1)$, $(p, 7)$ and $(8, 2)$ respectively.

(i) Given that the distance between points A and B is twice the distance between points A and C , calculate the possible values of p . [7]

(ii) Given also that the line passing through A and B has equation $y = 3x - 14$, find the coordinates of the mid-point of AB . [4]

(Total 11 marks)

4.

The points A and B have coordinates $(-5, -2)$ and $(3, 1)$ respectively.

(i) Find the equation of the line AB , giving your answer in the form $ax + by + c = 0$. [3]

(ii) Find the coordinates of the mid-point of AB . [2]

The point C has coordinates $(-3, 4)$.

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

(iv) Determine whether the line AC is perpendicular to the line BC , showing all your working. [4]

(Total 12 marks)

5.

In the binomial expansion of $(k + ax)^4$ the coefficient of x^2 is 24.

(i) Given that a and k are both positive, show that $ak = 2$. [3]

(ii) Given also that the coefficient of x in the expansion is 128, find the values of a and k . [4]

(iii) Hence find the coefficient of x^3 in the expansion. [2]

(Total 9 marks)