Edexcel A level Mathematics Vectors

Topic assessment

1. The points A, B, C and D have coordinates (2, 1, 3), (4, 1, 5), (2, 5, p) and (q, r, 1) respectively. If $\overrightarrow{AB} = \overrightarrow{CD}$ what are the values of p, q and r?

   [3]

2. Points A and B have coordinates (2, 1, 1) and (20, -5, 13) respectively.
   If point C is such that $2\overrightarrow{AC} = \overrightarrow{CB}$, what are the coordinates of C?

   [5]

3. The point P has coordinates (-2, 4, 0).

   The point Q is such that $\overrightarrow{PQ} = \begin{pmatrix} 3 \\ -2 \\ 1 \end{pmatrix}$.

   The point R has coordinates (-1, 1, r).
   For which value of r is PQR an equilateral triangle?

   [5]

4. Point A has coordinates (2, 3, 6). Point B has coordinates (8, 6, 8). Find the point C so that $\overrightarrow{AB}$ and $\overrightarrow{AC}$ are in the same direction and $\left|\overrightarrow{AC}\right| = 77$.

   [6]

5. Forces $\mathbf{F_1} = \lambda(3\mathbf{i} - 2\mathbf{j} + \mathbf{k})\,\text{N}$ and $\mathbf{F_2} = \mu(\mathbf{i} + \mathbf{j} + 3\mathbf{k})\,\text{N}$, where λ and μ are scalars, act on a box.
   Prove that it is not possible for their resultant force to act in the direction of $\mathbf{k}$.

   [6]

Total 25 marks