3D Vectors - Past Edexcel Exam Questions

1. **(Question 7 - C4 June 2018)**

7. The point A with coordinates $(-3, 7, 2)$ lies on a line l_1
The point B also lies on the line l_1

Given that $\overrightarrow{AB} = \begin{pmatrix} 4 \\ -6 \\ 2 \end{pmatrix}$,

(a) find the coordinates of point B.

(2)

The point P has coordinates $(9, 1, 8)$

(b) Find the cosine of the angle PAB, giving your answer as a simplified surd.

(3)

(c) Find the exact area of triangle PAB, giving your answer in its simplest form.

(3)

The line l_2 passes through the point P and is parallel to the line l_1

(d) Find a vector equation for the line l_2

(2)

The point Q lies on the line l_2

Given that the line segment AP is perpendicular to the line segment BQ,

(e) find the coordinates of the point Q.

(5)

2. **(Question 8 - C4 June 2014)**

8. Relative to a fixed origin O, the point A has position vector $\begin{pmatrix} -2 \\ 4 \\ 7 \end{pmatrix}$

and the point B has position vector $\begin{pmatrix} -1 \\ 3 \\ 8 \end{pmatrix}$

The line l_1 passes through the points A and B.

(a) Find the vector $\overrightarrow{AB}$.

(2)

(b) Hence find a vector equation for the line l_1

(1)

The point P has position vector $\begin{pmatrix} 0 \\ 2 \\ 3 \end{pmatrix}$

Given that angle PBA is θ,

(c) show that $\cos\theta = \frac{1}{3}$

(3)

The line l_2 passes through the point P and is parallel to the line l_1

(d) Find a vector equation for the line l_2

(2)

The points C and D both lie on the line l_2

Given that $AB = PC = DP$ and the x coordinate of C is positive,

(e) find the coordinates of C and the coordinates of D.

(3)

(f) find the exact area of the trapezium $ABCD$, giving your answer as a simplified surd.

(4)

3. **(Question 7 - C4 June 2009)**

7. Relative to a fixed origin O, the point A has position vector $(8\mathbf{i} + 13\mathbf{j} - 2\mathbf{k})$, the point B has position vector $(10\mathbf{i} + 14\mathbf{j} - 4\mathbf{k})$, and the point C has position vector $(9\mathbf{i} + 9\mathbf{j} + 6\mathbf{k})$.

The line l passes through the points A and B.

(a) Find a vector equation for the line l.

(3)

(b) Find $\left|\overrightarrow{CB}\right|$.

(2)

(c) Find the size of the acute angle between the line segment CB and the line l, giving your answer in degrees to 1 decimal place.

(3)

(d) Find the shortest distance from the point C to the line l.

(3)

The point X lies on l. Given that the vector $\overrightarrow{CX}$ is perpendicular to l,

(e) find the area of the triangle CXB, giving your answer to 3 significant figures.

(3)

Solutions

1. (a) $(1, 1, 4)$
   (b) $\frac{4\sqrt{21}}{21}$
   (c) $12\sqrt{5}$
   (d) NOT EXAMINABLE
   (e) NOT EXAMINABLE

2. (a) $\mathbf{i} - \mathbf{j} + \mathbf{k}$
   (b) NOT EXAMINABLE
   (c) -
   (d) NOT EXAMINABLE
   (e) $C(1, 1, 4)$, $D(-1, 3, 2)$
   (f) $9\sqrt{2}$

3. (a) NOT EXAMINABLE
   (b) $3\sqrt{14}$
   (c) $36.7°$
   (d) $3\sqrt{5}$
   (e) 30.2 units^2