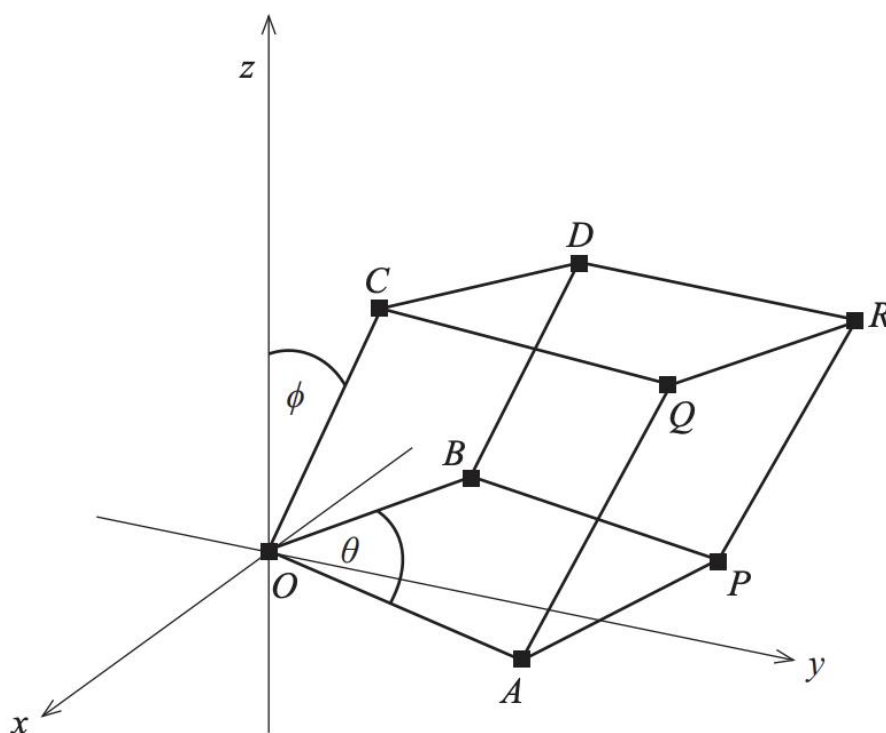


Question 8**(5 marks)**

A parallelepiped is a prism where each face is a parallelogram. Let $OAPB$ be the parallelogram formed by the horizontal sides $a = \overrightarrow{OA}$ and $b = \overrightarrow{OB}$ where

$$a = \begin{pmatrix} 3 \\ 6 \\ 0 \end{pmatrix} \text{ and } b = \begin{pmatrix} -8 \\ 2 \\ 0 \end{pmatrix}.$$

The third side that forms the parallelepiped is $c = \overrightarrow{OC}$ where $c = \begin{pmatrix} -1 \\ 2 \\ 5 \end{pmatrix}$.



Let $\theta =$ the size of $\angle AOB$

$\phi =$ the angle between \overrightarrow{OC} and the positive z axis

(a) Determine $a \times b$.

(2 marks)

The volume of any prism can be found by considering the formula $Volume = Area\ (Base) \times h$, where h = the perpendicular height of the prism.

It is also true that $|a \times b| = |a||b| \sin\theta$.

(b) Explain why $c \cdot (a \times b)$ will determine the volume of the parallelepiped. (2 marks)

(c) Hence determine the exact volume of the parallelepiped.

(1 mark)