

One corner of a rectangular parallelepiped is at $(-1, 2, 2)$ and three incident sides extend from this point to $(0, 1, 1)$, $(-4, 6, 8)$, and $(-3, -2, 4)$. Please find the volume of this parallelepiped. [98 彰師大車輛 3]

[解]設 $A(-1, 2, 2)$, $B(0, 1, 1)$, $C(-4, 6, 8)$, $D(-3, -2, 4)$

$$\overrightarrow{AB} = \mathbf{i} - \mathbf{j} - \mathbf{k}, \overrightarrow{AC} = -3\mathbf{i} + 4\mathbf{j} + 6\mathbf{k}, \overrightarrow{AD} = -2\mathbf{i} - 4\mathbf{j} + 2\mathbf{k}$$

平行六面體的體積為

$$\left| \begin{vmatrix} 1 & -1 & -1 \\ -3 & 4 & 6 \\ -2 & -4 & 2 \end{vmatrix} \right| = |8 - 12 + 12 - 8 + 24 - 6| = 18$$