**12C Modelling with Vectors**

1. $A$, $B$, $C$ and $D$ are the points $(2,-5,-8)$, $(1,-7,-3)$, $(0,15,-10) $and $(2,19,-20) $ respectively.
2. Find $\vec{AB}$ and $\vec{DC}$, giving your answers in the form $pi+qj+rk$
3. Show that the lines $AB$ and $DC$ are parallel and that $\vec{AB}=2\vec{DC}$
4. Hence, describe the quadrilateral $ABCD$
5. $P$, $Q$ and $R$ are the points $\left(4,-9,-3\right)$, $\left(7, -7, -7\right)$ and $(8,-2,0)$ respectively. Find the coordinates of a point $S$ such that $PQRS$ forms a parallelogram.
6. Given that:

$$3i+\left(p+2\right)j+120k=pi-qj+4pqrk$$

Find the values of $p$, $q$ and $r$.

1. The diagram shows a cuboid whose vertices are $O$, $A$, $B$, $C$, $D$, $E$, $F$ and $G$. Vectors $a$, $b$ and $c$ are the position vectors of the vertices $A$, $B$ and $C$ respectively. Prove that diagonals $OE$ and $BG$ bisect each other.

