**Solving geometric problems**

For more general problems involving vectors, often **drawing a diagram** helps!

[Textbook] $A, B, C$ **and** $D$ **are the points** $\left(2,-5,-8\right)$**,** $\left(1,-7,-3\right), (0,15,-10)$ **and** $\left(2,19,-20\right)$ **respectively.**

1. **Find** $\vec{AB}$ **and** $\vec{DC}$**, giving your answers in the form**$pi+qj+rk$**.**
2. **Show that the lines** $AB$ **and** $DC$ **are parallel and that** $\vec{DC}=2\vec{AB}$**.**
3. **Hence describe the quadrilateral** $ABCD$**.**

[Textbook] $P, Q$ **and** $R$ **are the points** $\left(4,-9,-3\right),(7,-7,-7)$ **and** $\left(8,-2,0\right)$ **respectively. Find the coordinates of the point** $S$ **so that** $PQRS$ **forms a parallelogram.**

There are many contexts in maths where we can ‘compare coefficients’, e.g.

 $3x^{2}+5x≡A\left(x^{2}+1\right)+Bx+C$

 Comparing $x^{2}$ terms: $3=A$

We can do the same with vectors:

[Textbook] **Given that**$3i+\left(p+2\right)j+120k=pi-qj+4pqrk$**, find the values of** $p, q$ **and** $r$**.**

[Textbook] **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 the diagonals** $OE$ **and** $BG$ **bisect each other.**



F

The strategy behind this type of question is to find the point of intersection in 2 ways, and compare coefficients.

Ex 12C p.346-347