Solving geometric problems

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

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

a. **Find $\overrightarrow{AB}$ and $\overrightarrow{DC}$, giving your answers in the form $pi + qj + rk$.**

b. **Show that the lines AB and DC are parallel and that $\overrightarrow{DC} = 2\overrightarrow{AB}$.**

c. **Hence describe the quadrilateral $ABCD$.**

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

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

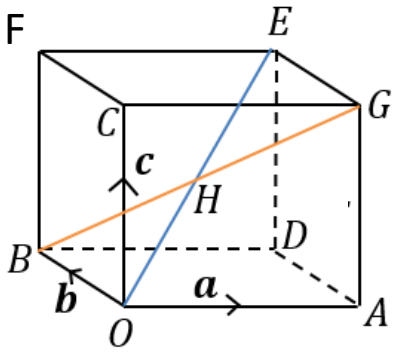
$3x^2 + 5x \equiv A(x^2 + 1) + Bx + C$

Comparing x^2 terms: $3 = A$

We can do the same with vectors:

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

[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.**



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