CO-ORDINATE EXPRESSIONS

• in 2 dimensions

1) given two lines $y = ax + b$ and $y = cx + d$, what is a condition for the two lines to be perpendicular?
2) given two vectors $\begin{pmatrix} k \\ l \end{pmatrix}$ and $\begin{pmatrix} m \\ n \end{pmatrix}$ what is a condition for the two vectors to be perpendicular?
3) suggest a way of calculating the dot product of two vectors.

in 3 dimensions

1) generalise the expressions for 2 dimensions,
2) check your generalisations with vectors that you know are perpendicular.

× in 2 dimensions

1) in 3 dimensions, the cross product requires two vectors, and produces a third vector at right angles to the first two; suggest an analogue for 2 dimensions.
2) use your definition of • to check your analogy.

in 3 dimensions

1) consider two vectors; (1, 2, 1) and (2, 3, 4). If we let (x, y, z) = (1, 2, 1) × (2, 3, 4), what do we know about x, y and z?
2) find a possible set of values for x, y and z.
3) if (x, y, z) = (a, b, c) × (d, e, f), find a set of possible values for x, y and z.

From the results that you have generated, suggest definitions for (a, b, c) • (d, e, f)

and (a, b, c) × (d, e, f).