ALBA MATHEMATICS
National 5 Course Revision
Task Sheet 6

1. Two vectors, ***u*** and ***v***, have components ***u*** = $\begin{pmatrix} a \\ -3 \\ 3b \end{pmatrix}$ and ***v*** = $\begin{pmatrix} 2b \\ 6 \\ -5 \end{pmatrix}$.

   If the resultant vector of ***u*** + ***v*** is $\begin{pmatrix} 5 \\ 3 \\ a \end{pmatrix}$, find the values of a and b.

2. Simplify $\frac{x^2-9}{x^2-x-12}$.

3. A ship leaves from a port on a bearing of 058°. After 48km, it changes course and sails on a bearing of 146^0 for 39km. Calculate the direct distance for the ship to return to the port.

4. A physics formula states $T = \frac{mv^2}{L}$

   Change the subject of this formula to *v*.

5. Show that $1 - \frac{Sin^2x}{Tan^2x} = Sin^2x$

6. The speeds (in km/hr) of Andy Murray's first serves in a game of tennis were recorded. The eight games gave these speeds:

   137 127 139 125 143 133

   a) Calculate the mean and standard deviation of these results.
   b) In another game, his first serves recorded had a mean speed of 141km/hr and a standard deviation of 8.3. Make two comparisons about his serves in each game.

7. Expand and simplify $(3x - 2)(2x^2 + 7x - 5)$.

8. A graph has equation $y = x^2 + 6x - 2$.

   a) Write down the coordinates of the turning point.
   b) Write down the equation of the axis of symmetry.

9. There are 3.35×10^{25} molecules of water in one litre. A pond contains 9700 litres of water. How many molecules of water does the pond contain?
   Give your answer in scientific notation.

10. A rolling pin is to be made of wood and has dimensions as shown. The handles are two congruent cylinders and the rolling surface is a larger cylinder. Find the volume of wood required to make the rolling pin. Give your answer to 3 significant figures.