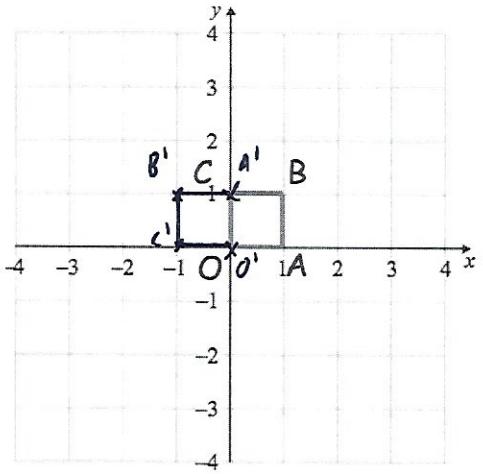
Name: _____ 5-a-day Further Maths

21st December



OABC is transformed by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ to give OA'B'C'

Draw and label OA'B'C'

$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$

$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$

$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 1 \\ 1 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$

$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$

Describe the transformation fully.

Rotation 90° anticlockwise about (0, 0)

Show that $(3n+2)^3 + 1$ is divisible by 9 for all integer values of n

$(3n+2)^3$

$(3n+2)(3n+2) = 9n^2 + 12n + 4$

$(9n^2+12n+4)(3n+2) =$

$27n^3 + 18n^2 + 36n^2 + 24n + 12n + 8$

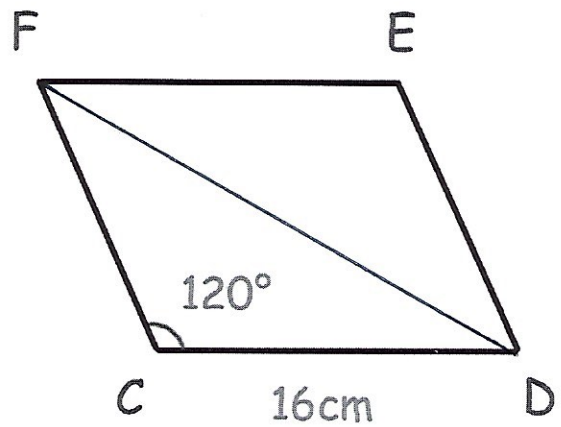
$27n^3 + 54n^2 + 36n + 8 + 1$

$= 27n^3 + 54n^2 + 36n + 9$

$= 9(3n^3 + 6n^2 + 4n + 1)$

$\therefore$ divisible by 9.

CDEF is a rhombus.



Calculate the area of the rhombus.

$\frac{1}{2} \times 16 \times 16 \times \sin 120$

$= 64\sqrt{3}$

$64\sqrt{3} \times 2 = 221.703 cm^2$