Name: _____ 5-a-day Further Maths

23rd January

Corbettmaths

Show that $x - 5$ is a factor of

$x^5 - 6x^4 - x + 630$

$f(5) = 5^5 - 6 \times 5^4 - 5 + 630$

$= 3125 - 3750 - 5 + 630$

$= 0$

$\therefore (x-5)$ is a factor.

The lines AB and BC are perpendicular.

The coordinates of point A are (–18, –13)
The coordinates of point B are (2, –3)
The coordinates of point C are (p, q)

Work out one possible pair of integer values for p and q

Gradient of AB: $\frac{10}{20} = \frac{1}{2}$

Gradient of AB $= -2$

$(3, -5)$

The transformation matrix

$\begin{pmatrix} p & q \\ 2p & 5q \end{pmatrix} \begin{pmatrix} 1 \\ -2 \end{pmatrix} = \begin{pmatrix} 9 \\ 24 \end{pmatrix}$

maps the point (1, –2) to the point (9, 24).

Find p and q $p = 7, q = -1$

$p - 2q = 9 \quad p = 2q + 9$

$2p - 10q = 24$

$2(2q + 9) - 10q = 24$

$4q + 18 - 10q = 24$

$-6q = 6 \quad q = -1 \quad p = 7$

Show that $\frac{\cos\theta}{1 - \cos\theta} - \frac{\cos\theta}{1 + \cos\theta}$

is equivalent to $\frac{2}{\tan^2\theta}$

$= \frac{\cos\theta(1 + \cos\theta) - \cos\theta(1 - \cos\theta)}{(1 - \cos\theta)(1 + \cos\theta)}$

$= \frac{\cos\theta + \cos^2\theta - \cos\theta + \cos^2\theta}{1 - \cos^2\theta}$

$= \frac{2\cos^2\theta}{\sin^2\theta}$

$\frac{2}{\tan^2\theta}$ QED