Name: _____ 5-a-day Further Maths

28th August

Corbettmaths

Rationalise the denominator

$$\frac{\sqrt{2}}{\sqrt{10}+\sqrt{8}}$$

$$\frac{\sqrt{2}}{\sqrt{10}+\sqrt{8}} \times \frac{\sqrt{10}-\sqrt{8}}{\sqrt{10}-\sqrt{8}}$$

$$= \frac{\sqrt{20}-4}{10-8} = \frac{2\sqrt{5}-4}{2}$$

$$= \sqrt{5}-2$$

$\mathbf{A} = \begin{pmatrix} 5 & -3 \\ -2 & 7 \end{pmatrix}$

Work out the matrix $\mathbf{A}^2$

$$\underline{A}^2 = \begin{pmatrix} 5 & -3 \\ -2 & 7 \end{pmatrix}\begin{pmatrix} 5 & -3 \\ -2 & 7 \end{pmatrix}$$

$$= \begin{pmatrix} 31 & -36 \\ -24 & 55 \end{pmatrix}$$

$y = 4x^3 - 2x^2 + 6x$

Work out the value of $\frac{d^2y}{dx^2}$ when $x = 5$

$$\frac{dy}{dx} = 12x^2 - 4x + 6$$

$$\frac{d^2y}{dx^2} = 24x - 4$$

$$x = 5 \Rightarrow \frac{d^2y}{dx^2} = 116$$

Prove

$sin^2x - cos^2x \equiv 3sin^2x - 2$

$$LHS = \sin^2x - 2(1-\sin^2x)$$

$$= \sin^2x - 2 + 2\sin^2x$$

$$= 3\sin^2x - 2$$

Hence, work out the values of x between $0°$ and $360°$ for which

$sin^2x - 2cos^2x = 0$

$$3\sin^2x - 2 = 0$$

$$\sin^2x = \frac{2}{3}$$

$$\sin x = \pm\sqrt{\frac{2}{3}}$$

$$x = 54.7°, 125.3°, 234.7°, 305.3°$$