Name: _____ 5-a-day Further Maths

24th October

Corbettmaths

A line passes through the points $(4a, -a)$ and $(6a, 9a)$

Work out the gradient of the line

$m = \frac{9a+a}{6a-4a}$

$= 5$

Use the factor theorem to show that $(x-2)$ is a factor of $x^3 - 9x^2 + 20x - 12 = f(x)$

$f(2) = 8 - 36 + 40 - 12$

$= 0$

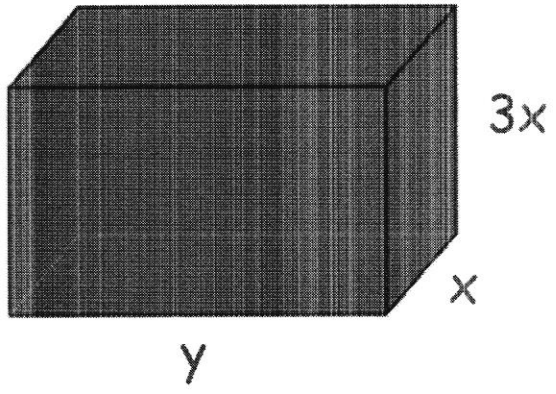
$\Rightarrow x-2$ factor

Hence, factorise fully

$x^3 - 9x^2 + 20x - 12$

$= (x-2)(x^2-7x+6)$

$= (x-2)(x-1)(x-6)$



The surface area of the cuboid is $240cm^2$

$SA = 6x^2 + 8xy = 240$

$8xy = 240 - 6x^2$

$y = \frac{30}{x} - \frac{3}{4}x$

Show that the volume of the cuboid is

$V = 90x - \frac{9}{4}x^3$

$V = 3x^2y = 3x^2\left(\frac{30}{x} - \frac{3}{4}x\right)$

$= 90x - \frac{9}{4}x^3$

Use differentiation to find the value of x for which V is a maximum

$\frac{dV}{dx} = 90 - \frac{27}{4}x^2$

At max $90 - \frac{27}{4}x^2 = 0$

$\Rightarrow x^2 = \frac{360}{27}$

$\Rightarrow x = 3.65cm$