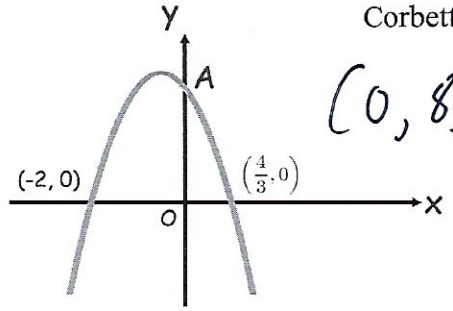
28th March

Here is the graph of
$y = a + bx - 3x^2$
Work out the coordinates of the point A.



$y = -(3x+2)(x-4)$

$y = -(3x^2 - 10x - 8)$

$y = -3x^2 + 10x + 8$

(0, 8)

$A = 4x \quad B = 9x$

C is 125% more than A
D is 60% less than B

C is 162 greater than D

Work out the value of x

$C = 2.25 \times 4x = 9x$

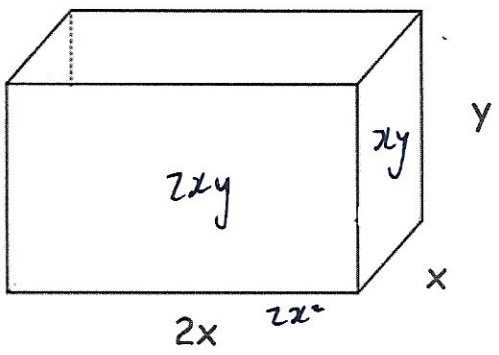
$D = 0.4 \times 9x = 3.6x$

$C - D = 162$

$5.4x = 162$

$x = 30$

An open-topped tank in the shape of a cuboid is shown below.



The surface area of the cuboid is 300cm²

The volume of the cuboid is V

Show that $y = \frac{50}{x} - \frac{x}{3}$

$A = 2xy + 4xy + 2x^2$

$6xy + 2x^2 = 300$

$6xy = 300 - 2x^2$

$y = \frac{50}{x} - \frac{x}{3}$ QED

Show that the volume of the tank is
$V = 100x - \frac{2}{3}x^3$

$V = 2x^2y$

$= 2x^2\left(\frac{50}{x} - \frac{x}{3}\right)$

$= 100x - \frac{2}{3}x^3$

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

$\frac{dV}{dx} = 100 - 2x^2$

$100 - 2x^2 = 0$

$x^2 = 50$

$x = \sqrt{50}$

$\sqrt{50}$ cm