Name: ______________ 5-a-day **Further Maths**

25th November

Simplify fully $\dfrac{20-\sqrt{50}}{3\sqrt{2}-5}$

Give your answer in the form $a+b\sqrt{2}$

$\sqrt{50} = 5\sqrt{2}$

$\dfrac{20-5\sqrt{2}}{3\sqrt{2}-5} \times \dfrac{3\sqrt{2}+5}{3\sqrt{2}+5}$

$= \dfrac{60\sqrt{2}+100-30-25\sqrt{2}}{18-25} = \dfrac{35\sqrt{2}+70}{-7}$

$= -10-5\sqrt{2}$

Angle θ is reflex and $cos\theta = \dfrac{3}{4}$

Work out the value of $sin\theta$

$270^\circ < \theta < 360^\circ \Rightarrow \sin\theta < 0$

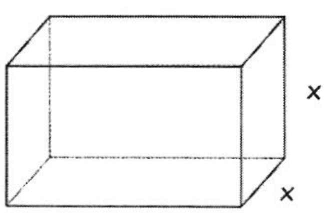
$\cos^2\theta + \sin^2\theta = 1$

$\dfrac{9}{16} + \sin^2\theta = 1$

$\sin^2\theta = \dfrac{7}{16}$

$\Rightarrow \sin\theta = -\dfrac{\sqrt{7}}{4}$

Shown below is a metal box in the shape of a cuboid.



The volume of the box is 80cm³

Show that $y = \dfrac{80}{x^2}$

$V = x^2y = 80$

$\Rightarrow y = \dfrac{80}{x^2}$

Show that the area of metal to make the box is given by
$A = 2x^2 + \dfrac{320}{x}$

$A = 2x^2+4xy = 2x^2+4x \times \dfrac{80}{x^2}$

$= 2x^2 + \dfrac{320}{x}$

Use differentiation to find the value of x for which A is a minimum

$\dfrac{dA}{dx} = 4x - \dfrac{320}{x^2} = 0$ at min

$\Rightarrow 4x = \dfrac{320}{x^2}$

$\Rightarrow x^3 = 80$

$\Rightarrow x = 4.31$ cm.