

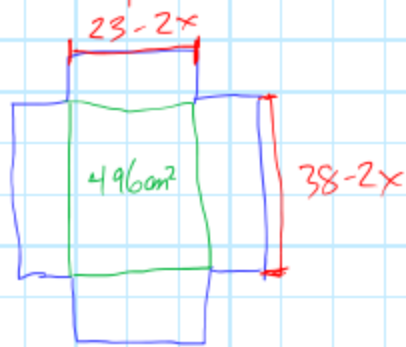
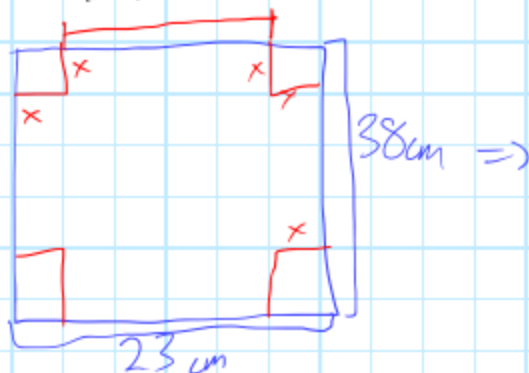
## Warm-up

A rectangular piece of cardboard  $23\text{ cm} \times 38\text{ cm}$  is made into a lidless box by cutting 4 identical squares from the corners. If the area of the base of the box is  $496\text{ cm}^2$ , find:

a) the dimensions of the box.

b) the volume of the box.

(Hint: draw a picture)



$$496 = (23 - 2x)(38 - 2x)$$

$$496 = 874 - 76x - 46x + 4x^2$$

$$0 = 4x^2 - 122x + 378$$

Quad form

$$a = 4$$

$$b = -122$$

$$c = 378$$

$$x = \frac{-(-122) \pm \sqrt{(-122)^2 - 4(4)(378)}}{2(4)}$$

$$x = \frac{122 \pm \sqrt{4884 - 6048}}{8}$$

$$x = \frac{122 \pm \sqrt{8836}}{8}$$

$$x = \frac{122 \pm 94}{8} = \frac{122+94}{8} = 27$$
$$= \frac{122-94}{8} = \underline{3.5}$$

a) Dimensions: width  $\times$  length  $\times$  Height

~~$x = 27$~~   $(23 - 2(27)) \times (38 - 2(27)) \times 27$   
neg  $\left( \begin{smallmatrix} !! \\ \sim \end{smallmatrix} \right)$   
length/width  $-31 \text{ cm} \times -16 \text{ cm} \times 27 \text{ cm}$

$$x = 3.5 \quad (23 - 2(3.5)) \times (38 - 2(3.5)) \times 3.5$$
$$\boxed{16 \text{ cm} \times 31 \text{ cm} \times 3.5 \text{ cm}}$$

b) volume:  $16 \cdot 31 \cdot 3.5 = \boxed{1736 \text{ cm}^3}$

check:  $496 = (23 - 2(3.5)) \cdot (38 - 2(3.5))$

$$496 = 16 \cdot 31$$

$$496 = 496 \quad \checkmark \quad \left( \begin{smallmatrix} !! \\ \sim \end{smallmatrix} \right)$$