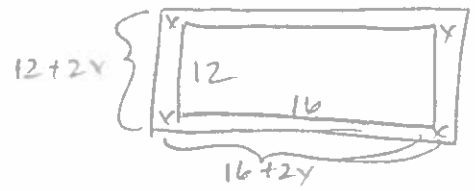


# KEY

- A garden measuring 12 meters by 16 meters is to have a pedestrian pathway installed all around it, increasing the total area to 285 square meters. What will be the width of the pathway?

$x = \text{width of pathway}$



$A = 285$

$(12 + 2x)(16 + 2x) = 285$

$192 + 56x + 4x^2 = 285$   
 $-285$   $-285$

$4x^2 + 56x - 93 = 0$

$a = 4$   
 $b = 56$   
 $c = -93$

$x = \frac{-56 \pm \sqrt{(56)^2 - 4(4)(-93)}}{2(4)}$

$x = \frac{-56 \pm \sqrt{4624}}{8}$

$x = \frac{-56 \pm 68}{8}$   $x = \frac{-56 + 68}{8}$

$x = 1.5$

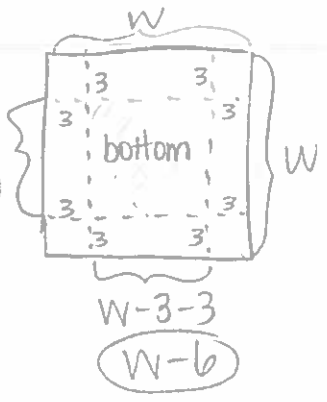
$x = \frac{-56 - 68}{8}$

$x = -15.5$

reject

width = 1.5m

- You have to make a square-bottomed, unridged box with a height of three inches and a volume of approximately 42 cubic inches. You will be taking a piece of cardboard, cutting three-inch squares from each corner, scoring between the corners, and folding up the edges. What should be the dimensions of the cardboard, to the nearest quarter inch?



$W - 3 - 3$   
 $W - 6$

W = 9.75

$V = lwh$   
 $V = 42$

$3(W - 6)(W - 6) = 42$

$3(W^2 - 12W + 36) = 42$

$3W^2 - 36W + 108 = 42$   
 $-42$   $-42$

$3W^2 - 36W + 66 = 0$

$3(W^2 - 12W + 22) = 0$

$a = 1$   $b = -12$   
 $c = 22$

$W = \frac{12 \pm \sqrt{(-12)^2 - 4(1)(22)}}{2(1)}$

$W = \frac{12 \pm \sqrt{56}}{2}$

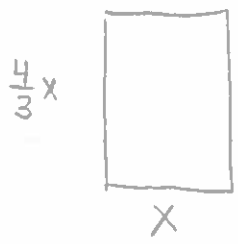
$W = \frac{12 + \sqrt{56}}{2} = 9.7416$

$W = \frac{12 - \sqrt{56}}{2} = 2.2583$

reject

can't fold up 3 inches on side if it's only 2.25 in. high.

- A picture has a height that is 4/3 its width. It is to be enlarged to have an area of 192 square inches. What will be the dimensions of the enlargement?



$(\frac{4}{3}x)(x) = 192$

$\frac{4}{3}x^2 = 192$   
 $\cdot \frac{3}{4}$

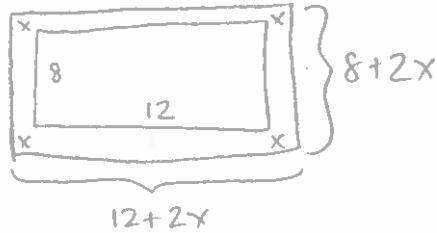
$\sqrt{x^2} = \sqrt{144}$

$x = \pm 12$

$x = 12$

~~$x = -12$~~  reject

- A vacant rectangular lot is being turned into a community vegetable garden measuring 8 meters by 12 meters. A path of uniform width is to surround garden. If the area of the lot is 140 square meters, find the width of the path surrounding the garden.



$$x = 1 \text{ m}$$

$$(8+2x)(12+2x) = 140$$

$$96 + 40x + 4x^2 = 140$$

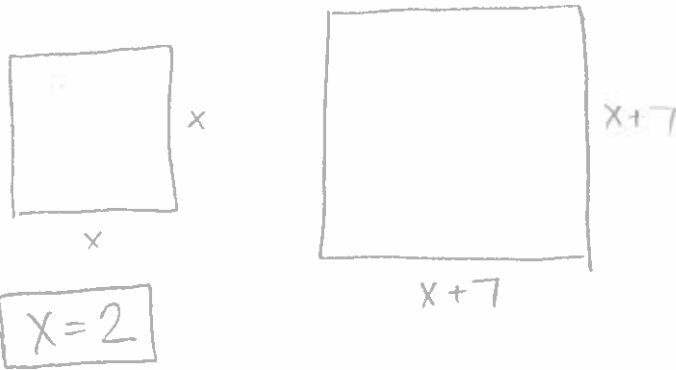
$$\begin{array}{r} 96 + 40x + 4x^2 = 140 \\ -140 \phantom{+ 40x} \\ \hline 4x^2 + 40x - 44 = 0 \end{array}$$

$$4(x^2 + 10x - 11) = 0$$

$$4(x+11)(x-1) = 0$$

$$\begin{array}{l|l} x = -11 & x = 1 \\ \hline \text{reject} & \end{array}$$

- Each side of a square is lengthened by 7 inches. The area of this new larger square is 81 square inches. Find the length of a side of the original square.



$$x = 2$$

$$(x+7)(x+7) = 81$$

$$x^2 + 14x + 49 = 81$$

$$\begin{array}{r} x^2 + 14x + 49 = 81 \\ -81 \phantom{+ 14x} \\ \hline x^2 + 14x - 32 = 0 \end{array}$$

$$(x+16)(x-2) = 0$$

$$\begin{array}{l|l} x = -16 & x = 2 \\ \hline \text{reject} & \end{array}$$