Quadratic Equation Applications

Solving for a Variable

Solve $V = \frac{\pi r^2 h}{3}$ for r.

$3V = \frac{\pi r^2 h}{3} \cdot 3$ multiply by 3 to get: $3V = \pi r^2 h$

$\frac{3V}{\pi h} = \frac{\pi r^2 h}{\pi h}$ divide by πh to get: $\frac{3V}{\pi h} = r^2$

$\sqrt{\frac{3V}{\pi h}} = \sqrt{r^2}$ Square root property to get r

$\pm\sqrt{\frac{3V}{\pi h}} = r$ Rationalize

$\pm\frac{\sqrt{3V\pi h}}{\pi h} = r$ $\left\{-\frac{\sqrt{3V\pi h}}{\pi h}, \frac{\sqrt{3V\pi h}}{\pi h}\right\}$

TRY:

Solve $K = \frac{xy^2}{z}$ for y.

Solve $V = \sqrt{\frac{3rt}{m}}$ for r.

$V^2 = \left(\sqrt{\frac{3rt}{m}}\right)^2$ square both sides to get: $V^2 = \frac{3rt}{m}$

$V^2 m = \frac{3rt}{m} \cdot m$ multiply by m to get: $V^2 m = 3rt$

$\frac{V^2 m}{3t} = \frac{3rt}{3t}$ divide by $3t$ to get r

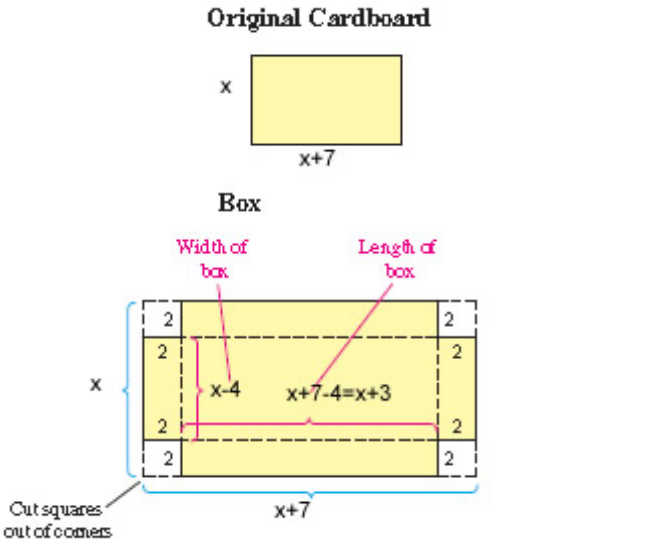
$\frac{V^2 m}{3t} = r$ $\left\{\frac{V^2 m}{3t}\right\}$

TRY:

Solve $Z = \sqrt{\frac{3xy}{w}}$ for x .

Solving an application problem:

BJ needs to create a box. He has a piece of cardboard that is 7 inches longer than it is wide. He will make the box by cutting out 2-inch squares from each corner and folding the sides up. Find the length and width of the original piece of cardboard if the volume of the finished box is 120 in^3.



X = original width

New width = Original width – corners cut out

W= x – 2 – 2 or W = x – 4

New length = 0riginal length – corners cut out

L = (x+7) – 2 – 2 or L=(x+7) – 4 or L=x+3

Height of the box = 2 …. The size of corner cut out

Volume = L · W · H

$120=(x+3)(x-4)(2)$	Divide by 2
$60=(x+3)(x-4)$	FOIL
$60=x^2-4x+3x-12$	Combine
$0=x^2-x-72$	Factor
$0=x-9$ or $0=x+8$	
$9=x$ or $-8=x$	Only 9 makes sense.

The original width was 9 inches.

The original length was x+7 or 16 inches.

TRY:

BJ needs to create another box. This time the width of his piece of cardboard is 6 inches less than its length. If he cuts out 3-inch squares from each corner and turns the sides of the box up, the volume of the resulting box is 216 in^2. Find the length and width of the original piece of cardboard.

TRY:

Tom's garden is 20' by 30'. He wants to increase the length and width by the same amount to have a 1064 ft^2 garden. What should be the new dimensions of the garden?