

## Quadratic Word Problems

1. A garden measuring  $12\text{ m}$  by  $16\text{ m}$  is to have a pedestrian pathway that is  $w$  meters wide installed all the way around it, increasing the total area to  $285\text{ m}^2$ . What is the width,  $w$ , of the pathway?

2. Karen wants to plant a garden and surround it with decorative stones. She has enough stones to enclose a rectangular garden with a perimeter of  $68\text{ ft.}$ , and she wants the garden to cover  $240\text{ ft}^2$ . What is the length and width of her garden?

3. A plot of land for sale has a width of  $x\text{ ft.}$  and a length that is  $8\text{ ft.}$  less than its width. A farmer will only purchase the land if it measures  $240\text{ ft}^2$ . What value for  $x$  causes the farmer to purchase the land?

## Quadratic Word Problems

1. A garden measuring 12 m by 16 m is to have a pedestrian pathway that is  $w$  meters wide installed all the way around it, increasing the total area to  $285 \text{ m}^2$ . What is the width,  $w$ , of the pathway?

$$\begin{aligned}(12 + 2w)(16 + 2w) &= 285 \\ 4w^2 + 56w - 93 &= 0 \\ (2w + 31)(2w - 3) &= 0 \\ w &= \frac{3}{2} \text{ or } \frac{31}{2}\end{aligned}$$

*However, only the positive value makes sense in this context, so the width of the pathway is  $\frac{3}{2}$  m.*

2. Karen wants to plant a garden and surround it with decorative stones. She has enough stones to enclose a rectangular garden with a perimeter of 68 ft., and she wants the garden to cover  $240 \text{ ft}^2$ . What is the length and width of her garden?

$$\begin{aligned}68 &= 2l + 2w \\ w &= 34 - l \\ 240 &= (l)(34 - l) \\ l^2 - 34l + 240 &= 0 \\ (l - 10)(l - 24) &= 0 \\ l &= 10 \text{ or } 24\end{aligned}$$

*Important to notice here is that both solutions are positive and could represent the length. Because length and width are arbitrary distinctions here, the garden measures 24 ft.  $\times$  10 ft., with either quantity representing the width and the other representing the length.*

3. A plot of land for sale has a width of  $x$  ft. and a length that is 8 ft. less than its width. A farmer will only purchase the land if it measures  $240 \text{ ft}^2$ . What value for  $x$  causes the farmer to purchase the land?

$$\begin{aligned}(x)(x - 8) &= 240 \\ x^2 - 8x - 240 &= 0 \\ (x - 20)(x + 12) &= 0 \\ x &= 20 \text{ or } x = -12\end{aligned}$$

*Since the answer cannot be negative, the answer is  $x = 20$ . The farmer will purchase the land if the width is 20 ft.*

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