

4.2: Solving Perfect Square Equations

Here are some examples of perfect square equations:

$$x^2$$

$$(x+3)^2$$

$$(x-2)^2 + 9$$

So basically there is only one term with x, but the x is squared.

1) Solve the following equations:

$$a) \sqrt{x^2} = \sqrt{25}$$

$$x = \pm 5$$

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

$$x = \pm 12$$

$$c) \sqrt{x^2} = \sqrt{10}$$

$$x = \pm \sqrt{10}$$

How many solutions does each of the above quadratics have? Why?

Two solutions since a $\sqrt{\quad}$ comes with \pm answer

2) Solve the following equations:

$$a) \sqrt{(x-2)^2} = \sqrt{49}$$

$$x-2 = \pm 7$$

$$* x = 2 \pm 7 \begin{cases} 2+7 = 9 \\ 2-7 = -5 \end{cases}$$

* Add two in front of \pm

$$b) \sqrt{(x+3)^2} = \sqrt{1}$$

$$x+3 = \pm 1$$

$$x = -3 \pm 1 \begin{cases} -3+1 = -2 \\ -3-1 = -4 \end{cases}$$

$$c) \sqrt{(x+1)^2} = \sqrt{-4}$$

$$x+1 = \pm 2i$$

$$x = -1 \pm 2i \begin{cases} -1+2i \\ -1-2i \end{cases}$$

We need to check both options for the \pm , so we'll get two answers that aren't the same number.

3) Solve the following equations:

$$a) (x-8)^2 - 5 = -1$$

$$\sqrt{(x-8)^2} = \sqrt{4}$$

$$x-8 = \pm 2$$

$$x = 8 \pm 2 \begin{cases} 8+2 = 10 \\ 8-2 = 6 \end{cases}$$

$$b) x^2 - 10 = 11$$

$$\sqrt{x^2} = \sqrt{21}$$

$$x = \pm 11$$

$$c) (x+4)^2 + 5 = 1$$

$$\sqrt{(x+4)^2} = \sqrt{-4}$$

$$x+4 = \pm 2i$$

$$x = -4 \pm 2i \begin{cases} -4+2i \\ -4-2i \end{cases}$$

STEPS TO SOLVE A PERFECT SQUARE QUADRATIC

Write your own process as to how you would solve perfect square quadratics.

4) Solve each equations.

$$\text{a) } (x + 10)^2 - 225 = 0$$

$$\begin{array}{c} +225 \quad +225 \\ \sqrt{(x+10)^2} = \sqrt{225} \end{array}$$

$$x + 10 = \pm 15$$

$$x = -10 \pm 15$$

$$-10 + 15 = \boxed{5}$$

$$-10 - 15 = \boxed{-25}$$

$$\text{b) } (x - 1)^2 + 6 = 26$$

$$\text{c) } x^2 + 80 = 81$$

$$\text{d) } (x - 5)^2 - 25 = 10$$

$$\text{e) } x^2 - 3 = 37$$

$$\sqrt{x^2} = \sqrt{40}$$

$$x = \pm \sqrt{40}$$

$$\begin{array}{c} 4 \wedge 10 \\ \textcircled{2} \textcircled{2} \quad 2 \wedge 5 \end{array}$$

$$\boxed{x = \pm 2\sqrt{10}}$$

$$\text{f) } (x + 6)^2 - 5 = 12$$

$$\sqrt{(x+6)^2} = \sqrt{17}$$

$$x + 6 = \pm \sqrt{17}$$

$$-6 \quad -6$$

$$x = -6 \pm \sqrt{17}$$

$$\boxed{-6 + \sqrt{17}}$$

$$\boxed{-6 - \sqrt{17}}$$

Don't forget to
reduce radicals