Simple Quadratic Equations Extension

Example Problems

EXAMPLE 1: Solve the following quadratic equation,

$$(4x)^2 = 64.$$

SOLUTION: The first important thing is to notice that because the $4x$ is surrounded by brackets, which means we first need to square root both sides,

$$\begin{aligned}\sqrt{(4x)^2} &= \sqrt{64},\\ 4x &= \pm 8.\end{aligned}$$

Next to simplify $4x$ into x we need to divide by 4, but we need to remember that ± 8 really represents 8 or -8. Because of this when we divide by 4 we need to do it to both of the values on the RHS,

$$\begin{aligned}\frac{4x}{4} &= \frac{-8}{4}, \frac{8}{4},\\ x &= -2, 2.\end{aligned}$$

Then once again we can simplify $-2, 2$ into ± 2 and so

$$x = \pm 2.$$

EXAMPLE 2: Solve the following equation,

$$(x-4)^2 = 49.$$

SOLUTION: First we need to square root both sides of the equation,

$$\begin{aligned}\sqrt{(x-4)^2} &= \sqrt{49},\\ x - 4 &= \pm 7.\end{aligned}$$

Next we will add 4 to both sides, but with addition and subtraction it is even more important we separate ± 7 into -7 and 7,

$$x - 4 + 4 = -7 + 4, 7 + 4,$$
$$x = -3, 11.$$

Notice that because of the last step we have two different solutions that cannot be combined using the $\pm$ symbol, so we will just leave them separate.

EXAMPLE 3: Solve the following equation,

$$3x + 4 = \frac{25}{3x + 4}.$$

SOLUTION: First we have x on both sides of the equation, which we need to rectify. Since $3x + 4$ is the denominator of the fraction on the RHS, we can multiply both sides by $3x + 4$.

$$(3x + 4) \times (3x + 4) = \frac{25}{3x + 4} \times (3x + 4),$$
$$(3x + 4)^2 = 25.$$

Now that we have a squared side, we will square root both sides

$$\sqrt{(3x + 4)^2} = \sqrt{25},$$
$$3x + 4 = \pm 5.$$

Since our next step in simplifying the RHS will be subtracting 4, we need to separate ± 5 into -5 and 5 to ensure we account for both solutions,

$$3x + 4 - 4 = -5 - 4, 5 - 4,$$
$$3x = -9, 1,$$
$$\frac{3x}{3} = \frac{-9}{3}, \frac{1}{3},$$
$$x = -3, \frac{1}{3}.$$

Question Bank

NOTE: Any questions where you get a decimal as an answer can be rounded to 2 decimal places.

1. Solve the following equations.

   (a) .

Answers

1. (a) $x = \pm 3$