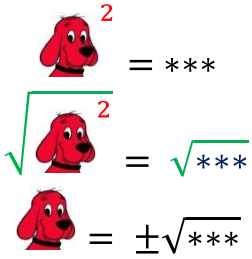
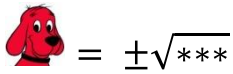
Here are the steps to follow to solve a quadratic equation using square roots.

Step 1 – Get the "squared thing" by itself (on one side of the equation)

Step 2 – Take the square root of both sides (remember to use $\pm$)



Step 3 – Get the variable by itself (if necessary)



Let's look at some examples!

Example 1 Solve for x $5x^2 = 405$

Step 1 – Get "squared thing" by itself

The "squared thing" is x^2, so let's get x^2 by itself.

$$5x^2 = 405$$
$$x^2 = 81$$

Step 2 – Square root both sides

$$x^2 = 81$$
$$\sqrt{x^2} = \sqrt{81}$$
$$x = \pm 9$$

Step 3 – Get variable by itself

Already done!

$$\boxed{x = \pm 9}$$

[or you can write $x = -9, 9$]

Example 2 Solve for x $\frac{x^2}{16} - 2 = 3$

Step 1 – Get "squared thing" by itself

The "squared thing" is just x^2, so let's get x^2 by itself.

$$\frac{x^2}{16} - 2 = 3$$
$$\frac{x^2}{16} = 5$$
$$x^2 = 80$$

Step 2 – Square root both sides

$$x^2 = 80$$
$$\sqrt{x^2} = \sqrt{80}$$
$$x = \pm\sqrt{16} \bullet \sqrt{5}$$
$$x = \pm 4\sqrt{5}$$

Step 3 – Get variable by itself

Already done!

$$\boxed{x = \pm 4\sqrt{5}}$$

[or you can write $x = -4\sqrt{5}, 4\sqrt{5}$]

Example 3 Solve for x $2(x-7)^2 = 128$

Step 1 – Get "squared thing" by itself

The "squared thing" is $(x-7)^2$, so let's get $(x-7)^2$ by itself.

$$2(x-7)^2 = 128$$

$$(x-7)^2 = 64$$

Step 2 – Square root both sides

$$(x-7)^2 = 64$$
$$\sqrt{(x-7)^2} = \sqrt{64}$$
$$x - 7 = \pm 8$$

Step 3 – Get variable by itself

Move the –7.

$$x - 7 = \pm 8$$
$$x = 7 \pm 8$$

We can combine these numbers on the right side (they are like terms)

$$x = 7 + 8 \qquad x = 7 - 8$$
$$x = 15 \qquad x = -1$$

$$\boldsymbol{x = -1, 15}$$

Example 4 Solve for x $\quad 6(x+5)^2 - 1 = 59$

Step 1 – Get "squared thing" by itself

The "squared thing" is $(x+5)^2$, so let's get $(x+5)^2$ by itself.

$$6(x+5)^2 - 1 = 59$$
$$6(x+5)^2 = 60$$
$$(x+5)^2 = 10$$

Step 2 – Square root both sides

$$(x+5)^2 = 10$$
$$\sqrt{(x+5)^2} = \sqrt{10}$$
$$x + 5 = \pm\sqrt{10}$$

Step 3 – Get variable by itself

Move the +5.

$$x + 5 = \pm\sqrt{10}$$
$$x = -5 \pm \sqrt{10}$$

We can't combine these numbers on the right side because they are not like terms.

$$\boxed{\boldsymbol{x = -5 \pm \sqrt{10}}}$$