

Objective: To solve quadratic equations using the square root method.

To use this method: $y = ax^2 + bx + c$

1.) missing the 'bx' term in $y = ax^2 + c$
 $ax^2 + c = 0$

2.) vertex form: $y = a(x-h)^2 + k$
 $a(x-h)^2 + k = 0$

opposite operation of squaring a number?

* square rooting $\sqrt{x^2} = x$

example: $\sqrt{x^2} = \sqrt{4}$

$$x = \pm 2$$

$$x = 2 \quad x = -2$$

$$(2)^2 = 4$$

$$(-2)^2 = 4$$

* Always use \pm when applying the square root method.

solving square root Method (steps)

- 1.) Isolate whatever is being squared on one side of the equation.
- 2.) Square root both sides using \pm (plus or minus)
- 3.) Simplify

Examples :

a.) $3x^2 + 5 = 41$
 ~~-5~~ ~~-5~~

$$\frac{3x^2}{3} = \frac{36}{3}$$

$$\sqrt{x^2} = \sqrt{12}$$

$$x = \pm \sqrt{12}$$

$$x = \pm \sqrt{4 \cdot 3}$$

$$x = \pm 2\sqrt{3}$$

$$x = 2\sqrt{3}$$

$$x = -2\sqrt{3}$$

| |
|-----|
| 4 |
| 9 |
| 16 |
| 25 |
| 36 |
| 49 |
| 64 |
| 81 |
| 100 |
| 121 |
| 144 |
| 169 |
| 1 |

b.) $2(x^2 - 8) + 5 = 25$
 ~~-5~~ ~~-5~~

$$\frac{2(x^2 - 8)}{2} = \frac{20}{2}$$

$$x^2 - 8 = 10$$

~~$+8$~~ ~~$+8$~~

$$\sqrt{x^2} = \sqrt{18}$$

$$x = \pm \sqrt{18}$$

$$x = \pm \sqrt{9 \cdot 2}$$

$$x = \pm 3\sqrt{2}$$

$$x = 3\sqrt{2}$$

$$x = -3\sqrt{2}$$

c.) $\frac{1}{5}(x+3)^2 - 15 = 0$
 ~~$+15$~~ ~~$+15$~~

~~$5 \cdot \frac{1}{5}(x+3)^2 = 15 \cdot 5$~~

$$\sqrt{(x+3)^2} = \sqrt{75}$$

$$x+3 = \pm \sqrt{75}$$

~~-3~~ ~~-3~~

$$x = -3 \pm \sqrt{75}$$

$$x = -3 \pm \sqrt{25 \cdot 3}$$

$$x = -3 \pm 5\sqrt{3}$$

$$x = -3 + 5\sqrt{3}$$

$$x = -3 - 5\sqrt{3}$$

* put number in front of \pm .

d.) $(6x-3)^2 - 5 = 22$
 ~~$+5$~~ ~~$+5$~~

$$\sqrt{(6x-3)^2} = \sqrt{27}$$

$$6x-3 = \pm \sqrt{27}$$

$$6x-3 = \pm \sqrt{9 \cdot 3}$$

$$6x-3 = \pm 3\sqrt{3}$$
 ~~$+3$~~ ~~$+3$~~

$$\frac{6x}{6} = \frac{3 \pm 3\sqrt{3}}{6}$$

$$x = \frac{1}{2} \pm \frac{\sqrt{3}}{2}$$

$$x = \frac{1}{2} + \frac{\sqrt{3}}{2}$$

$$x = \frac{1}{2} - \frac{\sqrt{3}}{2}$$