

Simple Quadratic Equations

Example Problems

EXAMPLE 1: Solve the following equation for x ,

$$x^2 = 49.$$

SOLUTION: To find the answer to the equation we need to find the square root of both sides of the equation,

$$\sqrt{x^2} = \sqrt{49},$$

the LHS simplifies and for the RHS we can evaluate the square root,

$$x = \pm 7.$$

Note here that the \pm is important since $7^2 = 49$ and $(-7)^2 = 49$ so we use it to indicate that $x = -7$ or 7 .

EXAMPLE 2: Solve the following equation for x ,

$$3x^2 - 19 = 56.$$

SOLUTION: In order to simplify the LHS, we first will remove the -19 since it is the last operation performed on x . We can do this by adding 19 to both sides

$$\begin{aligned} 3x^2 - 19 + 19 &= 56 + 19, \\ 3x^2 &= 75. \end{aligned}$$

Next we will divide both sides by 3,

$$\begin{aligned} 3x^2 \div 3 &= 75 \div 3, \\ x^2 &= 25, \end{aligned}$$

and finally square root both sides,

$$\begin{aligned} \sqrt{x^2} &= \sqrt{25}, \\ x &= \pm 5. \end{aligned}$$

EXAMPLE 3: Solve the following equation for x ,

$$\frac{x^2 - 12}{4} = 13.$$

SOLUTION: To simplify the LHS first we need to notice that the numerator of the fraction has implicit brackets,

$$\frac{(x^2 - 12)}{4} = 13,$$

which means that we first need to multiply both sides by 4,

$$\begin{aligned}\frac{x^2 - 12}{4} \times 4 &= 13 \times 4, \\ x^2 - 12 &= 52,\end{aligned}$$

then we add 12 and square root

$$\begin{aligned}x^2 - 12 + 12 &= 52 + 12, \\ x^2 &= 64, \\ \sqrt{x^2} &= \sqrt{64}, \\ x &= \pm 8.\end{aligned}$$

Question Bank

1. Solve the following equations.

(a) $x^2 = 9$

(d) $x^2 = 169$

(b) $x^2 = 1$

(e) $x^2 = 0$

(c) $x^2 = 441$

(f) $x^2 = 200$

2. Solve the following equations.

(a) $5x^2 = 45$

(i) $\frac{x^2}{4} = 25$

(b) $13x^2 = 637$

(j) $\frac{x^2}{28} = \frac{9}{7}$

(c) $-3x^2 = -27$

(d) $x^2 + 14 = 95$

(e) $x^2 - 17 = 47$

(f) $x^2 - 256 = -87$

(k) $\frac{x^2}{52} = 3.25$

(g) $x^2 - 36 = 0$

(h) $\frac{x^2}{3} = 27$

(l) $\frac{-x^2}{4} = -16$

Answers

1. (a) $x = \pm 3$
(b) $x = \pm 1$
(c) $x = \pm 21$
(d) $x = \pm 13$
2. (a) $x = \pm 3$
(b) $x = \pm 7$
(c) $x = \pm 3$
(d) $x = \pm 9$
(e) $x = \pm 8$
(f) $x = \pm 13$
- (e) $x = 0$
(f) $x = \pm 14.14$ ($x = \pm 10\sqrt{2}$ as an exact value)
- (g) $x = \pm 6$
(h) $x = \pm 9$
(i) $x = \pm 10$
(j) $x = \pm 6$
(k) $x = \pm 13$
(l) $x = \pm 8$