LESSON #1 SQUARE ROOTS

If $b^2 = a$, then b is the square root of a.

Ex: $3^2 = 9$, so 3 is a square root of 9.

$(-3)^2 = 9$, so -3 is a square root of 9 too.

All positive real numbers have two square roots:

a positive square root and a negative square root.

Square roots are written with a radical symbol $\sqrt{\ }$.

The number or expression inside the symbol is the radicand.

EXAMPLES: Evaluate the expressions.

1. $\sqrt{64} = 8$

2. $-\sqrt{64} = -8$

plus or minus

3. $\pm\sqrt{64} = \pm 8$

4. $\sqrt{0} = 0$

EXAMPLES: Evaluate the expressions.

5. $\sqrt{\frac{225}{169}} = \frac{15}{13}$

6. $\pm\sqrt{\frac{64}{289}} = \pm\frac{8}{17}$

7. $\sqrt{-16}$

no solution

8. $-\sqrt{\frac{625}{9}} = -\frac{25}{3}$

The square of an integer is called a perfect square.

$\sqrt{4} = 2$

→ PERFECT SQUARE

$\sqrt{6} = 2.449489...$

→ NOT A PERFECT SQUARE

Evaluate the expression. Give the exact value if possible. Otherwise, approximate to the nearest hundredth.

9. $-\sqrt{49} = -7$

10. $\sqrt{3} \approx 1.73$

11. $\sqrt{26} \approx 5.10$

12. $-\sqrt{5} \approx -2.24$

13. $-\sqrt{81} = -9$

14. $\pm\sqrt{58} \approx \pm 7.62$

An expression written with a radical symbol is called a radical expression, or sometimes just a radical .

15. Evaluate $\sqrt{b^2 - 4ac}$ when $a = 1$, $b = -2$, and $c = -3$.

$$\sqrt{(-2)^2 - 4(1)(-3)}$$

$$\sqrt{4 + 12}$$

$$\sqrt{16}$$

$$4$$

An expression written with a radical symbol is called a radical expression, or sometimes just a radical .

16. Evaluate $\sqrt{b^2 - 4ac}$ when $a = 2$, $b = 3$, and $c = -5$.

$\sqrt{(3)^2 - 4(2)(-5)}$

$\sqrt{9 + 40}$

$\sqrt{49}$

7

An expression written with a radical symbol is called a radical expression, or sometimes just a radical .

17. Evaluate $\sqrt{b^2 - 4ac}$ when $a = -1$, $b = 8$, and $c = 20$.

$\sqrt{(8)^2 - 4(-1)(20)}$

$\sqrt{64 + 80}$

$\sqrt{144}$

12

If I $\sqrt{\ }$ both sides of an equation, I must include ± w/my answer.

Solve the equation. Write the solution as integers if possible. Otherwise, write them as radical expressions.

18. $\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

19. $\sqrt{k^2} = \sqrt{7}$

$k = \pm\sqrt{7}$

20. $\frac{2m^2}{2} = \frac{22}{2}$

$\sqrt{m^2} = \sqrt{11}$

$m = \pm\sqrt{11}$

21. $\frac{4g^2}{4} = \frac{81}{4}$

$\sqrt{g^2} = \sqrt{\frac{81}{4}}$

$g = \pm\frac{9}{2}$

Solve the equation. Write the solution as integers if possible. Otherwise, write them as radical expressions.

22. $\sqrt{p^2} = \sqrt{0}$

$p = \pm 0$

$p = 0$

23. $\sqrt{h^2} = \sqrt{-9}$

no solution

24. $\frac{25m^2}{25} = \frac{4}{25}$

$\sqrt{m^2} = \sqrt{\frac{4}{25}}$

$m = \pm\frac{2}{5}$

25. $\frac{7g^2}{7} = \frac{14}{7}$

$\sqrt{g^2} = \sqrt{2}$

$g = \pm\sqrt{2}$

Solve the equation. Write the solution as integers if possible. Otherwise, write them as radical expressions.

26. $3d^2 - 48 = 0$

$+48 \quad +48$

$\frac{3d^2}{3} = \frac{48}{3}$

$\sqrt{d^2} = \sqrt{16}$

$d = \pm 4$

27. $2f^2 - 72 = 0$

$+72 \quad +72$

$\frac{2f^2}{2} = \frac{72}{2}$

$\sqrt{f^2} = \sqrt{36}$

$f = \pm 6$

Solve the equation. Write the solution as integers if possible. Otherwise, write them as radical expressions.

28. $5n^2 + 5 = 20$

$-5 \quad -5$

$\frac{5n^2}{5} = \frac{15}{5}$

$\sqrt{n^2} = \sqrt{3}$

$n = \pm\sqrt{3}$

29. $3t^2 - 50 = 58$

$+50 \quad +50$

$\frac{3t^2}{3} = \frac{108}{3}$

$\sqrt{t^2} = \sqrt{36}$

$t = \pm 6$