

# PC11 Radicals Lesson

Radicals is a math topic that has a connection with exponents. A fractional exponent can be rewritten as a radical. This year in Pre-Calculus 11 we will focus on simplifying radicals and working with radical equations. Next year you will learn more about graphing and transforming radical functions.

- Simplifying radicals
- Ordering a set of irrational numbers
- Performing operations with radicals
- Solving simple (one radical only) equations algebraically and graphically
- Identifying domain restrictions and extraneous roots of radical equations

1. Evaluate  $\sqrt{25}$

2. Solve  $x^2 = 25$

3. Write as a mixed radical:

a.  $\sqrt{8}$

b.  $\sqrt{1575}$

4. Write as an entire radical

a.  $2\sqrt{3}$

b.  $3\sqrt[3]{2}$

c.  $-2\sqrt[3]{3}$

5. If possible, evaluate

a.  $\sqrt{-9}$

b.  $\sqrt[3]{-8}$

c.  $\sqrt{4\,000\,000}$

d.  $\sqrt{0.25}$

e.  $\sqrt{\frac{4}{9}}$

6. Order from least to greatest:  $\sqrt{9}, 2\sqrt{3}, \sqrt{30}, \pi$

7.  $f(x) = \sqrt{x}$

a. Sketch and label 3 points

b. Evaluate  $f(25)$

8.  $y = \sqrt{x-2} - 3$

a. Sketch

b. Domain?

c. Range?

9.  $y = \sqrt{x-a} + b$ . Given  $a, b > 0$ , describe the transformation.

10.  $y = -2\sqrt{x+1}$

a. Sketch and describe the transformation

b. Domain?

c. Range?

11.  $y = a\sqrt{x+b} + c$

Given  $a, b, c > 0$  describe the transformation.

12.  $y = \sqrt{x-3}$   
a. Domain?

b. Range?

13.  $y = -\sqrt{x+2}$   
a. Domain?

b. Range?

14. Find the domain of:

a.  $\sqrt{3-5x}$

b.  $\frac{\sqrt{1-2x}}{x}$

c.  $\frac{\sqrt{3x-2}}{x^2-9}$

d.  $\frac{2\sqrt{x}}{x^2+x-20}$

e.  $\frac{\sqrt{2+5x}}{3x^2+13x-10}$

15. Rationalize:

a.  $\frac{1}{\sqrt{2}}$

b.  $\frac{4}{\sqrt{8}}$

c.  $\frac{9}{6-\sqrt{3}}$

d.  $\frac{5}{5+\sqrt{5}}$

e.  $\frac{1}{\sqrt[3]{3}}$

16. Simplify  $\sqrt{8} + 3\sqrt{2}$

17. Simplify  $\sqrt{8} - \sqrt[3]{32} + 3\sqrt{2} + \sqrt[3]{4}$

18. Simplify  $\frac{\sqrt{12}}{2}$

19. Simplify  $\frac{-2+\sqrt{12}}{-2}$

20.  $2\sqrt{3} \times 3\sqrt{2}$

21.  $(5\sqrt{5})(2\sqrt{5})$

22.  $\sqrt{2} \cdot \sqrt{3} \cdot \sqrt{5}$

23.  $a^b \cdot \sqrt{d} \cdot a^c \cdot \sqrt{e}$

24. Expand and simplify:

a.  $2\sqrt{2}(\sqrt{4} - 3\sqrt{2} + 1)$

b.  $(2 - \sqrt{2})^2$

c.  $(\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})$

d.  $3(\sqrt{8} - \sqrt{2})(1 - \sqrt{8})$

e.  $(\sqrt{8} - 1)^3$

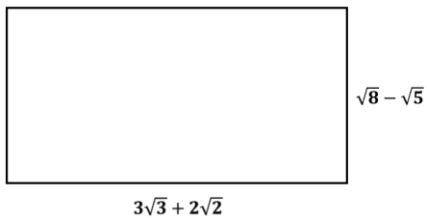
f.  $(\sqrt{27} + 2)^3$

g.  $(\sqrt{2} - \sqrt{3})(2 + \sqrt{6} + 3)$

25. A rectangle has a base of  $4\sqrt{2} - 2\sqrt{3}$   
and a height of  $\sqrt{8} - \sqrt{3}$
- a. Area in simplified form?

- b. Perimeter in simplified form?

26. See rectangle below:



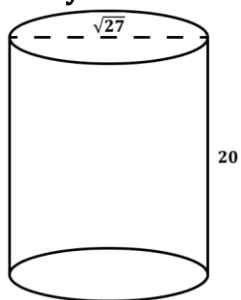
- a. Area?

- b. Perimeter?

27. A cylinder has a diameter of  $\sqrt{8}$  and a height of 10
- Volume?

- Area including the bottom?

28. See cylinder below:



- Volume?

- Area including the bottom?

29. Solve:

- $\sqrt{x} = 3$

- $2\sqrt{x} = 4$

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

30.  $\sqrt{x+4} = 2-x$

- Estimate the solution graphically

b. Find the point of intersection algebraically

c. Check for extraneous roots

d. Find the point of intersection

31. Solve  $\sqrt{x-1} = 2 - \frac{x}{2}$

32. Solve  $\sqrt{3x-2} - 1 = 6 - \frac{x}{2}$

33. Enrichment: Solve  $\sqrt{x+1} - 2 = \sqrt{x-3}$

**34. Enrichment:**

a. Define:  $|a|$

b. Simplify  $\sqrt{x^2}$

c. Simplify  $\sqrt{x^4}$

d. Simplify  $\sqrt{x^6}$

e. Simplify  $\sqrt{a^2b^8c^{14}}$