TOPIC C: RADICALS

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. Express $\sqrt{8}$ as a mixed radical

4. Express $3\sqrt{3}$ as an entire radical

5. Express $-2\sqrt[3]{3}$ as an entire radical

6. $\sqrt{-9}$

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

8. $\sqrt{4\ 000\ 000}$

9. $\sqrt{0.25}$

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

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

12. $f(x) = \sqrt{x}$
    a. Sketch and label 3 points

    b. Evaluate $f(25)$

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

a. Sketch

b. Domain?

c. Range?

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

15. $y = -2\sqrt{x + 1}$
    a. Sketch

    b. Domain?

    c. Range?

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

17. Find the domain of $y = \sqrt{x - 3}$

18. Find the domain of $\sqrt{3 - 5x}$

19. Find the domain of $\frac{\sqrt{1-2x}}{x}$

20. Find the domain of $\frac{\sqrt{3x-2}}{x^2-9}$

21. Find the domain of $\frac{2\sqrt{x}}{x^2+x-20}$

22. Rationalize:
    a. $\frac{1}{\sqrt{2}}$

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

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

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

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

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

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

26. Evaluate $\sqrt{\frac{9}{25}}$

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

28. $2\sqrt{3}\times 3\sqrt{2}$

29. Expand and simplify:
    a. $2\sqrt{2}\left(\sqrt{4}-3\sqrt{2}+1\right)$

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

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

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

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

30. 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?

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

    b. Area including the bottom?

32. Solve:
    a. $\sqrt{x} = 3$

    b. $2\sqrt{x} = 4$

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

33. $\sqrt{x+4} = 2 - x$
    a. Estimate the solution graphically

    b. Find the point of intersection algebraically

    c. Check for extraneous roots

    d. Find the point of intersection

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

35. Solve $\sqrt{2x+2} + 3 = x$

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

37. Enrichment: Simplify $\sqrt{x^2}$