

# PC11 Rational Exponents Lesson

Powers is another topic in the BC Pre-Calculus 11 curriculum. Although you may have learned about exponent laws since Grade 9, this is the first year that BC math students fully learn the topic of powers which include negative exponents and fractional exponents.

- Positive and negative rational exponents
- Exponent laws
- Evaluation using order of operations
- Numerical and variable bases

1.  $2^{10}$

2.  $(-2)^4$

3.  $-2^4$

4.  $0^1 + 1^0$

5. Enrichment:  $0^0$

6.  $-3(-3)^2$

7.  $(-1)^{1234}$

8.  $3\left(\frac{2}{3}\right)^2$

9.  $2^{-3}$

10.  $ab^{-c}$

11.  $\left(\frac{3}{5}\right)^{-3}$

12.  $\frac{a^3}{a^{-2}}$

13.  $\frac{x(x^5)^2(x^3)}{x^{-1}}$

14.  $\left(\frac{8a^3b^5}{4a^2b^7}\right)^{-3}$

15.  $\frac{2x^2y(3xy)^{-3}}{(4xy^{-3})^2}$

16. Write  $\sqrt{8}$  in the form  $a\sqrt{b}$

17. Write  $\sqrt{x}$  as a fractional exponent

18.  $9^{\frac{1}{2}}$

19.  $x^{\frac{a}{b}} = \sqrt[b]{x^a}$

20. Write  $x^{\frac{3}{2}}$  as a mixed radical

21.  $(0.09)^{1/2}$

22.  $(-8)^{\frac{1}{3}}$

23.  $\sqrt[3]{\sqrt{x}} = x^k$ . Find  $k$

24. True or False:

a.  $\sqrt{9} = \pm 3$

b. Given  $x^2 = 9$ ,  $x = \pm 3$

25. Solve  $a^2 = 100$

26. Solve  $32 = w^4 + w^4$

27. Solve  $x^4 = -16$

28.  $125^{-\frac{2}{3}}$

29. Show that  $1^{-2.5} = 1$

30. Convert  $\sqrt{8}$  to a mixed radical

31. Convert  $\sqrt[3]{243}$  to a mixed radical

32. Convert  $3\sqrt{2}$  to an entire radical

33. Convert  $2\sqrt[5]{3}$  to an entire radical

34. Simplify  $x^2 \times x^{1/2}$  and express as a mixed radical in the form  $a\sqrt{b}$

35. Simplify  $\frac{x}{x^{2/3}}$ . Express your answer in the form  $x^{\frac{a}{b}}$

36. Simplify  $(\sqrt[3]{x^2})(\sqrt[4]{x^5})$  using fractional exponents in the form  $x^{a/b}$

37. Write  $\frac{15^6}{3^6}$  as a single power

38. Solve  $\frac{3^{10}}{3^x} = 3^6$

39. Solve  $25^{2x-3} = 125^{2-5x}$

40. Solve  $x^{3/5} = 2$

41. Solve  $x^{2/3} = 4$

42. Solve  $\left(\frac{2^{1-2x}}{2^{x+3}}\right)^3 = 4$

43. Simplify  $\frac{(0.6x^{-1})^{-2}}{\left(\frac{2}{x}\right)^3}$

44. Evaluate  $\frac{(-2)^{100}}{-2^{97}} + 8^{-\frac{1}{3}} \div 2$

45. Simplify  $\left(\frac{-16x^{-2}y}{2x^{-3}y^3}\right)^{-\frac{2}{3}}$  using positive fractional exponents.

46. Enrichment: Show that  $\sqrt[b]{x^a} = (\sqrt[b]{x})^a$

47. Challenge:  $4^x = 9^y = 6$ . Find  $\frac{1}{x} + \frac{1}{y}$ ?

See photos...