

TOPIC B: POWERS WITH RATIONAL EXPONENTS

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

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

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

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

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

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

16. Evaluate $9^{\frac{1}{2}}$

17. Evaluate $(0.09)^{1/2}$

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

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

20. True or False:

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

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

21. $125^{-\frac{2}{3}}$

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

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

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

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

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

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

28. Simplify $(\sqrt[3]{x^2})(\sqrt[4]{x^5})$ using fractional exponents: $x^{a/b}$

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

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

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

32. Solve $2^{x+1} = 8^{3-2x}$

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

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

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

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

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

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