4.5 Extension: Exponent rules **CCSS.HSN.RN.A.2**

Exponent rules

1. $4x^2 \times x^4y^3$
2. $a^3b \div a^2$
3. $(x^2y^2)^2 \times (x^3y)$
4. $(\frac{1}{2}x^3)^2$

Fractional and negative exponents

Simplify. Express as fractions or radicals

5. $49^{\frac{1}{2}}$
6. $(xy)^{\frac{1}{2}}$
7. $(ab)^{-1}$
8. $(x^2y)^{-2}$

Radicals and exponents

Simplify, leaving no negative or fractional exponents.

9. $\sqrt{x^4y^2}$
10. $\frac{\sqrt[3]{8x}}{4}$
11. $\sqrt{\frac{x^2y^6}{z^4}}$
12. $3x^{-2}y \times 2x^3y^{-1}$
13. $\sqrt{a^4b}$
14. $x^{\frac{1}{2}} \times (\frac{y}{z^3})^2$

Exponent rules

15. $3^2 \times 3^1$

16. $a^3 \times a^2 b^4$

17. $x^4 y^3 \div y^2$

18. $3x^2 y \times (y^3)^2$

Radicals and exponents

19. $\dfrac{\sqrt[3]{27}}{\sqrt{4}}$

20. $\sqrt{x^6 y^2}$

21. $\sqrt{\dfrac{a^2 b}{25c^4}}$

Fractional and negative exponents

22. $36^{\frac{1}{2}}$

24. $\left(\dfrac{1}{2}\right)^{-1}$

23. $(x^3 y^6)^{\frac{1}{3}}$

25. $(a^3)^{-2}$

Mixed

26. $5x^{-2} y \times 2x^2 y^2$

27. $\dfrac{2\sqrt{36x^2}}{\sqrt[3]{27x^3}}$

Exponent rules

28. $2^2 \times 2^3 = 2^k$
Find k.

29. $a^2 b \times a^3 b^2$

30. $\dfrac{x^5y^4}{xy^2}$

31. $(a^3)^3$

Radicals and exponents

32. $\sqrt[5]{3^{10}}$

33. $\dfrac{\sqrt[3]{8}}{\sqrt{36}}$

34. $\sqrt{x^2y^4}$

35. $\sqrt{\dfrac{9a^4b^2}{c^4}}$

Fractional and negative exponents

36. $16^{\frac{1}{2}}$

39. $16^{-\frac{3}{4}}$

37. $4^{\frac{5}{2}}$

40. $\left(\dfrac{2}{3}\right)^{-2}$

38. $(x^4y^2)^{\frac{1}{2}}$

41. $(m^5)^{-3}$

Combine like terms

42. $5\sqrt{2} + 7\sqrt{2}$

43. $a\sqrt{5} - b\sqrt{5}$

44. $\sqrt{18} - 2\sqrt{2}$

Mixed

45. $2x^2y^4 \times 2x^2y^{-2}$

46. $7x^{-2}y \times 3x^{-2}y^2$

47. $\dfrac{2\sqrt{25x^2}}{\sqrt[3]{1000x^3}}$

48. $\dfrac{2x^2\sqrt{y^2} + \sqrt[3]{x^6y^3} - y\sqrt{4x^4}}{xy}$

Simplify, leaving no negative or fractional exponents.

49. $\frac{3}{4}a^{-3} \times a^3b^{-3}$

50. $\frac{2\sqrt{36x^2}}{\sqrt[3]{27x^3}}$

51. $x^3y^{-2} \times (\frac{x}{y^2})^{-1}$

52. $(-2x^2y)^2$

53. $\frac{2}{3}(x^{-2}y)^3 \times \frac{6}{11}(x^2y^{-1})$

54. $49^{\frac{1}{4}}$

55. $\sqrt[3]{\frac{a^3b^{-9}}{z^{-6}}}$

56. $(\frac{1}{x^{-2}} - 4)^2 \times \frac{1}{5}x^{-4}y^3$

57. $\frac{x^2\sqrt{12x^6}}{xy\sqrt[5]{32x^{-5}}}$

58. $a^3b^{-3} \div a^{-4}b^{\frac{1}{2}}$

59. $\frac{6}{5}(x^{-2}y)^2 \times \frac{1}{3}(x^4y^{-1})$

60. $25^{\frac{3}{2}}$

61. $\sqrt[3]{\frac{16a^9b^{-3}}{z^{-4}}}$

62. $\sqrt{20}$

63. $\sqrt{12x^4}$

64. $4\sqrt{x} - 3\sqrt{x}$

65. $\frac{1}{2}\sqrt{ab^2} + \frac{3}{2}b\sqrt{a}$

66. $x^2\sqrt{xy^3} + 3y\sqrt{xy}$