

Simplify each of the following. Present your answer without exponential notation.

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|-----------------|-------------------|--------------------|--------------------|
| 1. $9^{1/2}$ | 9. $(-8)^{1/3}$ | 17. $-36^{1/2}$ | 24. $(-8)^{2/3}$ |
| 2. $9^{-1/2}$ | 10. $16^{-3/4}$ | 18. $(-36)^{1/2}$ | 25. $-16^{1/2}$ |
| 3. $-9^{1/2}$ | 11. $5^{1/2}$ | 19. $(-36)^{-1/2}$ | 26. $(-16)^{1/2}$ |
| 4. $-9^{-1/2}$ | 12. $-4^{-5/2}$ | 20. $36^{-3/2}$ | 27. $8^{-2/3}$ |
| 5. $(-9)^{1/2}$ | 13. $(-32)^{1/5}$ | 21. $-4^{-3/2}$ | 28. $(32)^{-4/5}$ |
| 6. $9^{3/2}$ | 14. $32^{2/5}$ | 22. $(-4)^{-3/2}$ | 29. $(-32)^{-4/5}$ |
| 7. $8^{1/3}$ | 15. $36^{1/2}$ | 23. $(-8)^{1/3}$ | 30. $81^{-3/4}$ |
| 8. $8^{-1/3}$ | 16. $36^{-1/2}$ | | |

Simplify each of the following. Present your final answers using positive exponents only. For example, $x^{-2/3} = \frac{1}{\sqrt[3]{x^2}}$. Assume that all variables represent positive numbers.

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|---|---|---|
| 31. $(x^{1/3})^6$ | 35. $\left(\frac{p^{2/3}p^{5/3}}{(-p^{1/6})^2}\right)^{-1/2}$ | 38. $(-3x^{-1/2}y^{3/8}x^{-7/2})^0$ |
| 32. $\frac{x^{1/2}x^{2/3}}{x^{1/6}}$ | 36. $(-8a^6b^{-24})^{1/3}$ | 39. $(A^{2/3})^{3/2}$ |
| 33. $(a^{-1/2})^{-4/5}$ | 37. $\left(\frac{16x^4y^{2/3}}{36x^2y^2}\right)^{3/2}$ | 40. $\frac{(y^{-3/4})^{-8}}{(y^{-1/2})^{10}}$ |
| 34. $\frac{(m^{1/2})(m^{3/2})}{m^{-3}}$ | | |

Use exponential notation to simplify each of the following. Present your answer using positive integers only.

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|--------------------------|---|--|
| 41. $\sqrt[8]{x^6}$ | 44. $(\sqrt{x})(\sqrt[3]{x})$ | 46. $\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{x}}}}}$ |
| 42. $(\sqrt[6]{y})^9$ | | |
| 43. $(\sqrt[6]{2})^{18}$ | 45. $\frac{\sqrt[5]{x}\sqrt[3]{x^2}}{x\sqrt[6]{x}}$ | |

Answers

1. 3 2. $\frac{1}{3}$ 3. -3 4. $-\frac{1}{3}$ 5. undefined 6. 27 7. 2 8. $\frac{1}{2}$ 9. -2 10. $\frac{1}{8}$ 11. $\sqrt{5}$
12. $-\frac{1}{32}$ 13. -2 14. 4 15. 6 16. $\frac{1}{6}$ 17. -6 18. undefined 19. undefined
20. $\frac{1}{216}$ 21. $-\frac{1}{8}$ 22. undefined 23. -2 24. undefined 25. -4 26. undefined 27. $\frac{1}{4}$
28. $\frac{1}{16}$ 29. undefined 30. $\frac{1}{27}$ 31. x^2 32. x 33. $\sqrt[5]{a^2}$ 34. m^5 35. $\frac{1}{p}$ 36. $\frac{-2a^2}{b^8}$
37. $\frac{8x^3}{27y^2}$ 38. 1 39. A 40. y^{11} 41. $\sqrt[4]{x^3}$ 42. $(\sqrt{y})^3$ 43. 8 44. $\sqrt[6]{x^5}$
45. $\frac{\sqrt[5]{x^3}\sqrt[3]{x^2}}{x^6\sqrt{x}} = x^{\left(\frac{1}{5}+\frac{2}{3}-\left(1+\frac{1}{6}\right)\right)} = x^{-\frac{3}{10}} = \frac{1}{\sqrt[10]{x^3}}$
46. $\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{x}}}}} = \left(\left(\left(\left(x^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}} = x^{\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}} = x^{\frac{1}{32}} = \sqrt[32]{x}$

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