

LESSON 8-6 Practice B
Radical Expressions and Rational Exponents

Simplify each expression. Assume all variables are positive.

1. $\sqrt[3]{125x^9}$ $\sqrt[3]{125} \cdot \sqrt[3]{x^9}$ $5x^3$

2. $\sqrt[4]{\frac{x^8}{81}}$ $\frac{(x^8)^{1/4}}{(81)^{1/4}}$ $\frac{x^2}{3}$

3. $\sqrt[3]{\frac{64x^3}{8}}$ $\frac{\sqrt[3]{64} \cdot \sqrt[3]{x^3}}{\sqrt[3]{8}}$ $= \frac{4x}{2}$
 $2x$

Write each expression in radical form, and simplify.

4. $64^{5/6}$ $(64^5)^{1/6}$ $\sqrt[6]{64^5} = 32$

5. $27^{2/3}$ $(27^2)^{1/3}$ $\sqrt[3]{27^2} = 9$

6. $(-8)^{4/3}$ $[(-8)^4]^{1/3}$ $\sqrt[3]{(-8)^4} = 16$

Write each expression by using rational exponents.

7. $\sqrt[5]{51^4}$ $(51^4)^{1/5}$ $51^{4/5}$

8. $(\sqrt{169})^3$ $(169^{1/2})^3$ $169^{3/2}$

9. $\sqrt[7]{36^{14}}$ $(36^{14})^{1/7}$ 36^2

Simplify each expression.

10. $4^{3/2} \cdot 4^{5/2}$ $4^{8/2} = 4^4$ 256

11. $\frac{27^{4/3}}{27^{2/3}}$ $27^{2/3} (27^{1/3})^2$ 9

12. $(125^{2/3})^{1/2}$ $125^{2/6} = 125^{1/3}$ 5

13. $(27 \cdot 64)^{2/3}$ $27^{2/3} \cdot 64^{2/3}$ $(27^{1/3})^2 \cdot (64^{1/3})^2$ $(3)^2 \cdot (4)^2$ 144

14. $(\frac{1}{243})^{1/5}$ $1^{1/5}$ $243^{1/5}$ $1/3$

15. 64^{-3} $\frac{1}{64^{1/3}}$ $1/4$

16. $(-27x^6)^{1/3}$ $-27^{1/3} \cdot (x^6)^{1/3}$ $-3 \cdot x^2$ $-3x^2$

17. $\frac{(25x)^{3/2}}{5 \cdot x^{1/2}}$ $\frac{25^{3/2} \cdot x^{3/2}}{5 \cdot x^{1/2}}$ $\frac{5^3 \cdot x^{3/2}}{5 \cdot x^{1/2}}$ $25x$

18. $(4x)^{-1/2} \cdot (9x)^{1/2}$ $4^{-1/2} \cdot x^{-1/2} \cdot 9^{1/2} \cdot x^{1/2}$ $\frac{3\sqrt{x}}{2\sqrt{x}}$ $3/2$

Solve.

19. In every atom, electrons orbit the nucleus with a certain characteristic velocity known as the Fermi-Thomas velocity, equal to $\frac{Z^{2/3}}{137} c$, where Z is the number of protons in the nucleus and c is the speed of light. In terms of c, what is the characteristic Fermi-Thomas velocity of the electrons in Uranium, for which Z = 92?

$\frac{92^{2/3}}{137} c = 0.15c$