Name _____ Key Date _____ Class _____

LESSON 5-6

Practice B

Radical Expressions and Rational Exponents

Simplify each expression. Assume all variables are positive.

1. $\sqrt[3]{125x^9}$ — $5x^3$

2. $\sqrt[4]{\frac{x^8}{81}}$ — $\frac{x^2}{3}$

3. $\sqrt[3]{\frac{64x^3}{8}}$ — $2x$

Write each expression in radical form, and simplify.

4. $64^{\frac{5}{6}}$ — $\sqrt[6]{64^5} = 32$

5. $27^{\frac{2}{3}}$ — $\sqrt[3]{27^2} = 9$

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

Write each expression by using rational exponents.

7. $\sqrt[5]{51^4}$ — $51^{4/5}$

8. $\left(\sqrt{169}\right)^3$ — $169^{3/2}$

9. $\sqrt[7]{36^{14}}$ — 36^2

Simplify each expression.

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

11. $\frac{27^{\frac{4}{3}}}{27^{\frac{2}{3}}}$ — $27^{2/3} = 9$

12. $\left(125^{\frac{2}{3}}\right)^{\frac{1}{2}}$ — $125^{2/6} = 5$

13. $(27 \cdot 64)^{\frac{2}{3}}$ — $27^{2/3} \cdot 64^{2/3} = 144$

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

15. $64^{-\frac{1}{3}}$ — $1/4$

16. $\left(-27x^6\right)^{\frac{1}{3}}$ — $-3x^2$

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

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

Solve.

19. In every atom, electrons orbit the nucleus with a certain characteristic velocity known as the Fermi–Thomas velocity, equal to $\frac{Z^{\frac{2}{3}}}{137}c$, 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 $Z = 92$?

about $0.15c$

LESSON 5-6

Practice C

Radical Expressions and Rational Exponents

Simplify each expression. Assume all variables are positive.

1. $\sqrt[4]{(2x)^8} \cdot \sqrt[3]{(2x)^6}$ — $16x^4$

2. $\sqrt[4]{\frac{x^{16}y^8}{81}}$ — $\frac{x^4y^2}{3}$

3. $\sqrt[3]{\frac{x^7}{27x^3}}$ — $\frac{x\sqrt[3]{x}}{3}$

Write each expression in radical form, and simplify.

4. $216^{\frac{2}{3}}$ — 36

5. $1000^{-\frac{2}{3}}$ — $\frac{1}{100}$

6. $(16x^3)^{\frac{3}{2}}$ — $64x^4\sqrt{x}$

Write each expression by using rational exponents.

7. $\sqrt[5]{(3x)^4}$ — $(3x)^{4/5}$

8. $\left(\sqrt[5]{-6}\right)^3$ — $(-6)^{3/5}$

9. $\sqrt[4]{30x^3}$ — $30^{1/4} \cdot x^{3/4}$

Simplify each expression.

10. $25^{\frac{1}{4}} \cdot 25^{-\frac{7}{4}}$ — $\frac{1}{125}$

11. $(-64)^{\frac{1}{3}}$ — -4

12. $\left(\frac{x^8}{y^4}\right)^{\frac{3}{4}}$ — $\frac{x^5}{y^3}$

13. $\left(\frac{x^3}{125}\right)^{\frac{1}{3}}$ — $\frac{x}{5}$

14. $\left(-8x^{18}\right)^{\frac{2}{3}}\left(\sqrt[3]{y^6}\right)$ — $4x^{12}y^2$

15. $\left(a^4b^8\right)^{-\frac{1}{4}}$ — $\frac{1}{ab^2}$

16. $\left(\sqrt[3]{-8x^9}\right)^2$ — $4x^6$

17. $(3x)^{\frac{2}{3}}(3x)^{\frac{7}{3}}$ — $27x^3$

18. $\left(\frac{m^8}{n^{12}}\right)^{-\frac{1}{4}}$ — $\frac{n^3}{m^2}$

Solve.

19. Each key on a piano produces a frequency that is $2^{\frac{1}{12}}$ times higher than the frequency of the key immediately to its left. Moving n keys to the right of any key increases the frequency of the starting note by a factor $2^{\frac{n}{12}}$. The key corresponding to Concert A has a frequency of 440 Hz. What is the frequency of note D, which is 5 keys to the right of Concert A?

about 587.3 Hz