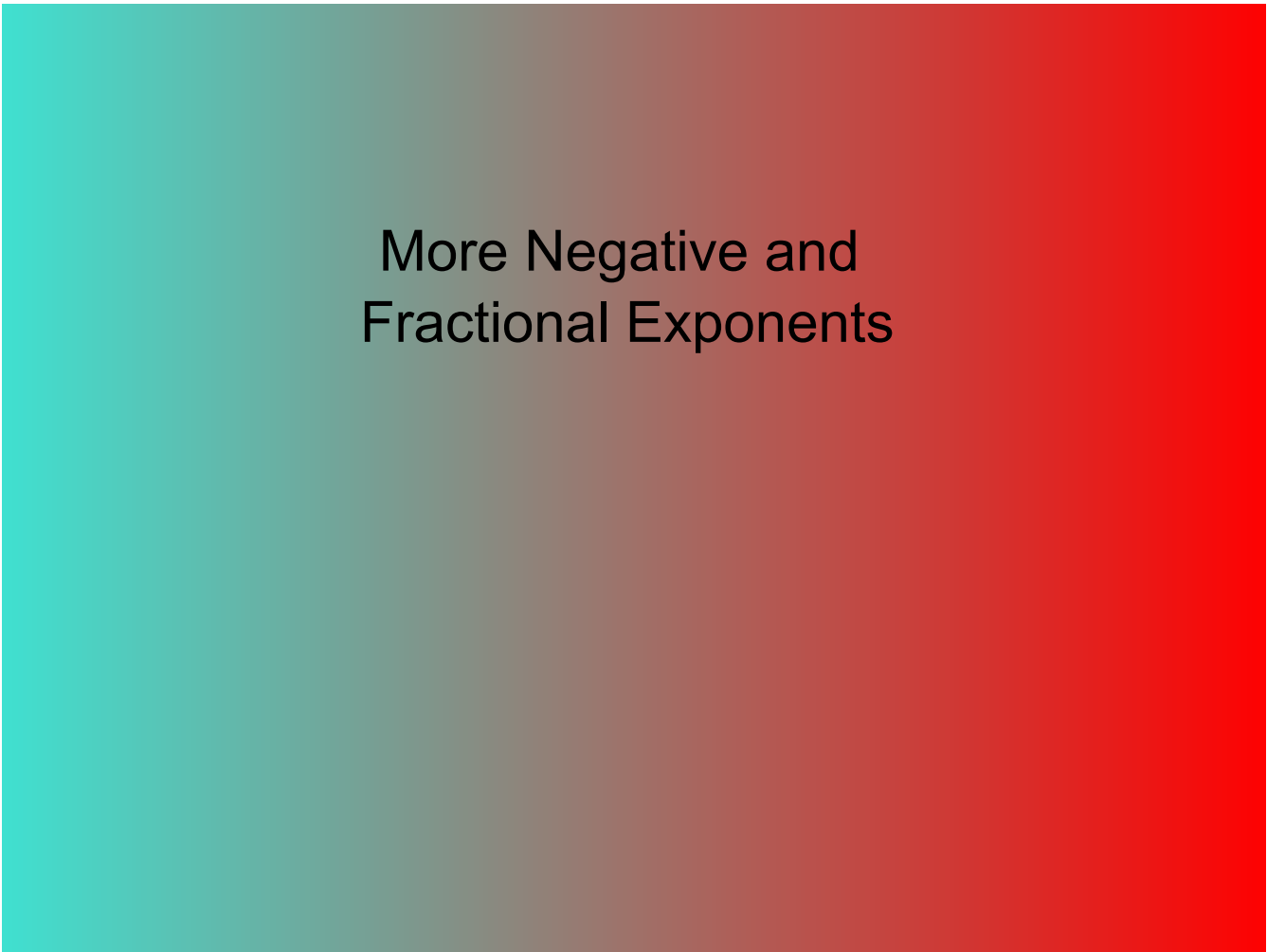




More Negative and Fractional Exponents

HW 9-3

1. $\sqrt{3}$

6. $6(2x)^{\frac{1}{2}}$

11. $\frac{2}{3}$

16. $\frac{3}{2}$

2. $\sqrt[5]{11}$

7. $\frac{1}{16}$

12. $\frac{x}{20}$

17. $2^{\frac{1}{2}}$

3. $\sqrt[4]{2x}$

8. $-\frac{8}{125}$

13. 3

18. $3^{\frac{1}{12}}$

4. $(3x)^{\frac{1}{4}}$

9. -3

14. 2

19. 4

5. $3x^{\frac{1}{4}}$

10. $-2x$

15. $\frac{1}{7}$

20. $18x^2$

$f(-1/2) = \frac{9}{2}$

Name _____

Alg 2 HW 9-3

Rewrite each exponential expression as an nth root.

1. $3^{\frac{1}{2}} = \sqrt{3}$

2. $11^{\frac{1}{5}} = \sqrt[5]{11}$

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

Write using exponents.

4. $\sqrt[4]{3x} = (3x)^{\frac{1}{4}}$

5. $3\sqrt[4]{x} = 3x^{\frac{1}{4}}$

6. $6\sqrt{2x} = 6(2x)^{\frac{1}{2}}$

Simplify each expression (positive exponents only). No calculators!

$$7. (-4)^{-2} = \frac{1}{(-4)^2} = \frac{1}{16}$$

$$8. \left(-\frac{5}{2}\right)^{-3} = \left(-\frac{2}{5}\right)^3 = -\frac{8}{125}$$

$$9. (-27)^{\frac{1}{3}} = \sqrt[3]{-27} = -3$$

$$10. \frac{-10x^{-2}}{5x^{-3}} = \frac{-2x^3}{x^2} = -2x$$

$$11. \left(\frac{8}{27}\right)^{\frac{1}{3}} = \sqrt[3]{\frac{8}{27}} = \frac{2}{3}$$

$$12. \frac{(2x)^{-2}}{5x^{-3}} = \frac{x^3}{5(2x)^2} = \frac{x^3}{5 \cdot 4x^2} \\ = \frac{x}{20}$$

Evaluate

13. $27^{\frac{1}{3}}$

$$= \sqrt[3]{27}$$

$$= 3$$

14. $16^{\frac{1}{4}}$

$$= \sqrt[4]{16}$$

$$= 2$$

15. $49^{-\frac{1}{2}}$

$$= \frac{1}{\sqrt{49}} = \frac{1}{7}$$

16. $\left(\frac{8}{27}\right)^{-\frac{1}{3}}$

$$= \left(\frac{27}{8}\right)^{\frac{1}{3}}$$

$$= \sqrt[3]{\frac{27}{8}} = \frac{3}{2}$$

Use the properties of exponents to evaluate the following expressions.

17. $2^{\frac{1}{3}} \cdot 2^{\frac{1}{6}}$

$$= 2^{\frac{2}{6}} \cdot 2^{\frac{1}{6}} \cdot 2^{\frac{3}{6}}$$

$$= 2^{\frac{1}{2}}$$

18. $\frac{3^{\frac{1}{4}}}{3^{\frac{1}{6}}}$

$$= \frac{3^{\frac{3}{12}}}{3^{\frac{2}{12}}}$$

$$= 3^{\frac{1}{12}}$$

19. $\left(4^{\frac{1}{4}}\right)^4$

$$= 4^1 = 4$$

Use the properties of exponents to rewrite the expression with positive exponents and evaluate for the given value.

20. $\frac{2}{(3x)^{-2}} = 2 \cdot (3x)^2 = 2 \cdot 9x^2 = 18x^2$

Find $f(-1/2)$

$$= 18(-\frac{1}{2})^2 \cdot 18(\frac{1}{4}) = \frac{18}{4} = \frac{9}{2}$$

More Negative and Fractional Exponents

Unit 9 Day4

Rule: $x^{\frac{m}{n}} = (\sqrt[n]{x})^m$ or $x^{\frac{m}{n}} = \sqrt[n]{x^m}$

Write each expression in exponential form.

1. $\sqrt[3]{a^2} = a^{\frac{2}{3}}$

2. $4\sqrt[5]{x^6} = 4x^{\frac{6}{5}}$

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

Rewrite each of the following without the use of fractional or negative exponents.

1. $x^{-\frac{2}{3}} = \frac{1}{x^{\frac{2}{3}}} = \frac{1}{\sqrt[3]{x^2}}$

2. $x^{-\frac{4}{3}} = \frac{1}{\sqrt[3]{x^4}}$

Evaluate,

$$1. \quad 27^{\frac{2}{3}} = \sqrt[3]{27}^2 = 3^2 = 9$$

$$2. \quad \left(8^{-\frac{2}{3}}\right) = \frac{1}{8^{2/3}} = \frac{1}{\sqrt[3]{8}^2} = \frac{1}{2^2} = \frac{1}{4}$$

$$3. \quad 16^{\frac{3}{4}} = \sqrt[4]{16}^3 = 2^3 = 8$$

$$4. \quad \left(\frac{4}{25}\right)^{-\frac{3}{2}} = \left(\frac{25}{4}\right)^{3/2} = \left(\sqrt{\frac{25}{4}}\right)^3 = \left(\frac{5}{2}\right)^3 = \frac{125}{8}$$

$$5. \quad (4^{\frac{1}{2}})^{3/2} = 4^{3/4} = \sqrt[4]{4}^3 = 2^3 = 8$$

$$6. \quad \left(\frac{125}{64}\right)^{-\frac{2}{3}} = \left(\frac{64}{125}\right)^{2/3} = \left(\sqrt[3]{\frac{64}{125}}\right)^2 = \left(\frac{4}{5}\right)^2 = \frac{16}{25}$$

$$7. \left(\frac{1}{4}\right)^{-\frac{1}{2}} = 4^{\frac{1}{2}} = \sqrt{4} = 2$$

$$8. (-27)^{\frac{4}{3}} = (\sqrt[3]{-27})^4 = (-3)^4 = 81$$

$$9. \left(\frac{8}{9}\right)^{-\frac{2}{3}} = \left(\frac{9^3}{8^3}\right)^{\frac{2}{3}} = \left(\sqrt[3]{\frac{9^3}{8^3}}\right)^2 = \left(\frac{9}{2}\right)^2 = \frac{81}{4}$$

10. If $h(x) = 4x^{-\frac{1}{5}}$, find $h(32)$

$$h(32) = 4((32)^{-\frac{1}{5}}) = \frac{4}{32^{\frac{1}{5}}} = \frac{4}{\sqrt[5]{32}} = \frac{4}{2} = 2$$

11. If the function $g(x) = 4x^{-\frac{1}{2}}$, find the value of $g(36)$.

$$g(36) =$$

12. Given the function $f(x) = 5(x + 4)^{\frac{3}{2}}$, which of the following represents its y-intercept?

(1) 40

(2) 20

(3) 4

(4) 30

$x = 0$

$$f(0) = 5(4)^{\frac{3}{2}} = 5\sqrt{4}^3 = 5(2)^3 = 5(8) = 40$$

13. Show how $(3^{\frac{1}{5}})^2$ can be written as the equivalent radical expression $\sqrt[5]{9}$.

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

14. Find the exact value of $9^{\frac{11}{10}} \cdot 9^{\frac{2}{5}}$ $= 9^{\frac{11}{10} + \frac{4}{10}} = 9^{\frac{15}{10}} = 9^{\frac{3}{2}} = \sqrt{9}^3 = 3^3$
27

Using the Laws of Exponents, solve for y.

$$15. \frac{x^{\frac{8}{5}}}{x^{\frac{3}{5}}} = x^y$$

$$x^{\frac{8}{5} - \frac{3}{5}} = x^y$$

$$x^{\frac{5}{5}} = x^y$$

$$\frac{5}{5} = y$$

$$\boxed{1 = y}$$

$$17. \frac{\sqrt[4]{x^9}}{(x^3)^{\frac{1}{4}}} = x^y$$

$$\frac{x^{\frac{9}{4}}}{x^{\frac{3}{4}}} = x^y$$

$$x^{\frac{9}{4} - \frac{3}{4}} = x^y$$

$$x^{\frac{6}{4}} = x^y$$

$$\frac{6}{4} = y$$

$$\boxed{\frac{3}{2} = y}$$

$$16. \frac{x^{\frac{3}{7}} x^{\frac{2}{7}}}{(x^2)^{\frac{3}{14}}} = x^y$$

$$\frac{x^{\frac{3}{7} + \frac{2}{7}}}{x^{2(\frac{3}{14})}} = x^y$$

$$x^{\frac{3}{7} + \frac{2}{7} - 2(\frac{3}{14})} = x^y$$

$$\boxed{\frac{2}{7} = y}$$

$$18. \frac{\sqrt[6]{x^2} \sqrt[3]{x^2}}{\sqrt[12]{x^2}} = x^y$$

$$\frac{x^{\frac{2}{6}} \cdot x^{\frac{2}{3}}}{x^{\frac{2}{12}}} = x^y$$

$$x^{\frac{2}{6} + \frac{2}{3} - \frac{2}{12}} = x^y$$

$$\boxed{\frac{5}{6} = y}$$

