

# Radicals are fractional exponents

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Algebra II

## Given Fractional Exponents

Evaluate each of the following:

1.  $25^{\frac{1}{2}}$

$$\sqrt{25^1}$$
$$5^1 = 5$$

2.  $8^{\frac{1}{3}}$

$$\sqrt[3]{8^1}$$
$$2^1 = 2$$

3.  $100^{\frac{1}{2}}$

$$\sqrt{100^1}$$
$$10^1 = 10$$

4.  $4^{\frac{3}{2}}$

$$\sqrt{4^3}$$
$$2^3 = 8$$

5.  $27^{\frac{2}{3}}$

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

6.  $125^{\frac{5}{3}}$

$$\sqrt[3]{125^5}$$
$$5^5 = 3125$$

7.  $8^{\frac{5}{3}}$

$$\sqrt[3]{8^5}$$
$$2^5 = 32$$

8.  $81^{\frac{3}{4}}$

$$\sqrt[4]{81^3}$$
$$3^3 = 27$$

9.  $16^{\frac{3}{2}}$

$$\sqrt{16^3}$$
$$4^3 = 64$$

10.  $16^{\frac{5}{4}}$

$$\sqrt[4]{16^5}$$
$$2^5 = 32$$

11.  $36^{\frac{3}{2}}$

$$\sqrt{36^3}$$
$$6^3 = 216$$

12.  $32^{\frac{2}{5}}$

$$\sqrt[5]{32^2}$$
$$2^2 = 4$$

Express each of the following without exponents:

13.  $5x^{\frac{1}{3}}$

$$5\sqrt[3]{x}$$

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

$$\sqrt[3]{5x}$$

15.  $27x^{\frac{3}{2}}$

$$27\sqrt{x^3}$$

Express each of the following in simplest terms

16.  $(4x^2y^5)^{\frac{1}{2}}$   
 $4^{\frac{1}{2}}x^1y^{\frac{5}{2}}$   
 $2xy^{\frac{5}{2}}$

17.  $(8x^{-6}y^5)^{\frac{1}{3}}$   
 $8^{\frac{1}{3}}x^{-2}y^{\frac{5}{3}}$   
 $\frac{8^{\frac{1}{3}}y^{\frac{5}{3}}}{x^2} = \frac{2y^{\frac{5}{3}}}{x^2}$

18.  $(25x^{-8}y^7)^{\frac{3}{2}}$   
 $25^{\frac{3}{2}}x^{-12}y^{\frac{21}{2}}$   
 $\frac{25^{\frac{3}{2}}y^{\frac{21}{2}}}{x^{12}} = \frac{125y^{\frac{21}{2}}}{x^{12}}$

19.  $(27x^{-3}y^2)^{-\frac{1}{3}}$   
 $27^{-\frac{1}{3}}x^1y^{-\frac{2}{3}}$   
 $\frac{x}{27^{\frac{1}{3}}y^{\frac{2}{3}}}$

20.  $\left(\frac{16x^3y^{-6}}{z^4}\right)^{\frac{5}{2}}$

21.  $\left(\frac{64x^{-3}y^7}{z^6}\right)^{\frac{2}{3}}$

22. The expression  $x^{\frac{2}{5}}$  is equivalent to

- (1)  $-\sqrt[2]{x^5}$    (2)  $-\sqrt[5]{x^2}$    (3)  $\sqrt[2]{x^5}$    (4)  $\sqrt[5]{x^2}$     $\frac{x^{\frac{2}{5}}}{1}$     $\frac{1}{x^{\frac{2}{5}}}$     $\frac{1}{\sqrt{x^2}}$

23. Which expression is equivalent to  $(9x^2y^6)^{-\frac{1}{2}}$ ?

- (1)  $\frac{1}{3xy^3}$    (2)  $3xy^3$    (3)  $\frac{3}{xy^3}$    (4)  $\frac{xy^3}{3}$

$\frac{9^{-\frac{1}{2}}x^{-1}y^{-3}}{1}$   
 $\frac{1}{9^{\frac{1}{2}}xy^3}$   
 $\frac{1}{3xy^3}$

24. If  $n > 0$ , the expression  $\left(\frac{1}{n}\right)^{\frac{2}{3}}$  is equal to

- (1)  $-n^{\frac{2}{3}}$    (2)  $-n^{\frac{3}{2}}$    (3)  $\sqrt[3]{n^2}$    (4)  $\sqrt{n^3}$

$\frac{1^{\frac{2}{3}}}{n^{\frac{2}{3}}} = \frac{n^{\frac{2}{3}}}{1^{\frac{2}{3}}} = \frac{n^{\frac{2}{3}}}{1}$   
 $\rightarrow n^{\frac{2}{3}} = \sqrt[3]{n^2}$