

Express each as a radical and evaluate

$$1) 1728^{\frac{2}{3}} = \left(\sqrt[3]{1728}\right)^2 = (12)^2 = 144$$

2) Express each as a power: Don't evaluate

$$a) \left(\sqrt[5]{3125}\right)^3$$

$$3125^{\frac{3}{5}}$$

$$b) \left(\sqrt[2]{81}\right)^5$$

$$81^{5/2}$$

3) Entire to mixed

$$\sqrt[3]{432} \rightarrow \sqrt[3]{216 \times 2} = \sqrt[3]{216} \times \sqrt[3]{2} = 6 \sqrt[3]{2}$$

4) Express each with positive exponents (Don't evaluate)

$$a) 3^{-2} = \frac{1}{3^2}$$

$$b) \frac{1}{13^{-4}} = 13^4$$

5) Simplify (Leave your answer with positive exponents)

$$\left(4^2 x^{-5} y^2\right)^2$$

$$4^2 x^{-10} y^2$$

↓

$$\frac{16 y^2}{x^{10}}$$

Homework solutions

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Questions

3ac, 4ac, 5ac, 6ac

8aceg 9aceg

Any Questions???

We can do it on the board
if there is something that
you do not understand.

Example 1**Evaluating Powers with Negative Integer Exponents**

Evaluate each power.

a) 3^{-2} b) $\left(-\frac{3}{4}\right)^{-3}$ c) 0.3^{-4}

**Remember
Already did**

SOLUTION

$$\begin{aligned} \text{a) } 3^{-2} &= \frac{1}{3^2} \\ &= \frac{1}{9} \end{aligned}$$

$$\begin{aligned} \text{b) } \left(-\frac{3}{4}\right)^{-3} &= \left(-\frac{4}{3}\right)^3 \\ &= -\frac{64}{27} \end{aligned}$$

(Solution continues.)

Example 2**Evaluating Powers with Negative Rational Exponents**

Evaluate each power without using a calculator.

a) $8^{-\frac{2}{3}}$

b) $\left(\frac{9}{16}\right)^{-\frac{3}{2}}$

**Remember
Already did**

SOLUTION

a) $8^{-\frac{2}{3}} = \frac{1}{8^{\frac{2}{3}}}$

Write with a positive exponent.

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

Take the cube root.

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

Square the result.

$$= \frac{1}{4}$$

(Solution continues.)

Write this out

CHECK YOUR UNDERSTANDING

3. Simplify. Explain your reasoning.

$$\text{a) } (25a^4b^2)^{\frac{3}{2}}$$

$$25^{\frac{3}{2}} a^{\frac{12}{2}} b^{\frac{6}{2}}$$

$$(\sqrt{25})^3 a^6 b^3$$

$$(5)^3 a^6 b^3$$

$$125 a^6 b^3$$

multiply fraction for exponents
then reduce

$$\text{b) } (x^3y^{-\frac{3}{2}})(x^{-1}y^{\frac{1}{2}})$$

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

add ex

$$x^2 y^{-\frac{2}{2}}$$

$$x^2 y^{-1}$$

$$= \frac{x^2}{y}$$



4.6 Applying the Exponent Laws

Answers: a)

b)

$$\text{c) } \frac{12x^{-5}y^{\frac{5}{2}}}{3x^{\frac{1}{2}}y^{-\frac{1}{2}}}$$

Write this out

$$\text{d) } \left(\frac{50x^2y^4}{2x^4y^7} \right)^{\frac{1}{2}}$$



Answers: c) $\frac{4y^3}{x^{\frac{11}{2}}}$ d) $\frac{5}{xy^{\frac{3}{2}}}$

$$\begin{aligned} & x^4 y^3 \cdot (2x^{-1} y^0)^{-4} \\ & = x^4 y^3 \cdot 2^{-4} x^4 y^0 \\ & = 2^{-4} x^{4+4} y^{3+0} \\ & = 2^{-4} x^8 y^3 \\ & = \frac{x^8 y^3}{2^4} \\ & = \frac{x^8 y^3}{16} \end{aligned}$$

Write this out

$$\frac{2p}{(p^4)^0 \cdot 2p^4}$$

Write this out

$$\frac{2p^1}{2p^4}$$

$$= 1 p^{1-4}$$

$$= 1 p^{-3}$$

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

$$\frac{4a^{-3}b^{-4}}{4ba^{-3}}$$

Write this out

$$\frac{(3^{-1}x^4 y^{-2})^{-3}}{(3x^5 y^0)^2}$$

Write this out

Laws of exponents Practice Worksheet

Simplify. Your answer should contain only positive exponents.

1) $\frac{2u^3v^3 \cdot (3u^2)^2}{2u^2}$

1, 2, 6, 7
14, 15

2) $\frac{(4xy^2)^3}{(4y^3)^4 \cdot 2y^3}$

3) $\frac{(4uv^2)^2}{3u^2v^4 \cdot 3v^2}$

4) $\left(\frac{4a^4b^3}{3a^4b^3 \cdot 4a^3b^4}\right)^3$

5) $\left(\frac{3y^3 \cdot 3x^3y^4}{4x^4y^2}\right)^4$

6) $\left(\frac{3xy^4 \cdot 3x^3y^2}{yx^4}\right)^3$

7) $\frac{2ba^2}{4a(2a^3b^4)^3}$

$\frac{2ba^2}{4a^2 \cdot 2^3 a^9 b^{12}} = \frac{\cancel{2} b a^2}{2^3 a^{10} b^{12}} = \frac{1}{2^2 b^{11} a^8}$

8) $\frac{(2x^2y^2)^4}{(2x^2 \cdot (yx^2)^3)^2}$

9) $\frac{(m^2n^2)^2}{3m^4n^2 \cdot 2m^3n^2}$

$= \frac{1}{2^2 \cdot 4 b^{11} a^8} = \frac{1}{16 b^{11} a^8}$

10) $\frac{x^2}{4x^4y^2 \cdot (3x^4y^2)^2}$

11) $\left(\frac{n}{m \cdot 2m^4n^4}\right)^4$

12) $\left(\frac{3x^2y^3 \cdot 4x^3y^2}{3xy^3}\right)^4$

$256x^{16}y^8$

13) $\left(\frac{3x^2y^4 \cdot x^3y^3}{(2x^2y^3)^4}\right)^2$

14) $\left(\frac{2u^4v^3 \cdot 2uv^3}{4u^3}\right)^4$

15) $\frac{3uv^2}{2u^3v^2 \cdot (2v^2)^2}$

16) $\frac{(4y)^3}{4y \cdot 3y^2}$