

$$= (7^2)^3$$
$$= 7^6$$

Today's Learning Goal(s):

Date: _____

By the end of the class, I will be able to:

- a) simplify algebraic expressions
containing rational exponents and radicals.

Last day's work: **READ p.228**

pp. 229-230 #(1 – 6)ace, 8 – 11, 12ace, 14 [16]

$3c$ $14e$
 9
 $6e$ $4cd b$
 $10e$ $5e$

3. Write as a single power.

c) $(-11)^2(-11)^{\frac{3}{4}}$

$$= (-11)^{2 + \frac{3}{4}}$$

$$= (-11)^{\frac{8}{4} + \frac{3}{4}}$$

$$= (-11)^{\frac{11}{4}}$$

$$\frac{\sqrt{x}}{\sqrt{y}} = \sqrt{\frac{x}{y}}$$

$$\sqrt{\frac{28}{7}}$$

4. Write as a single power, then evaluate. Express answers in rational form.

a) $\sqrt{5}\sqrt{5}$

b) $\frac{\sqrt[3]{-16}}{\sqrt[3]{2}}$

$$= \sqrt[3]{\frac{-16}{2}}$$

$$= \sqrt[3]{-8}$$

$$= -2$$

c) $\frac{\sqrt{28}\sqrt{4}}{\sqrt{7}}$

$$= \frac{\sqrt{112}}{\sqrt{7}}$$

$$= \sqrt{16}$$

$$= 4^1 \text{ or } 2^2$$

d) $\frac{\sqrt[4]{18}(\sqrt[4]{9})}{\sqrt[4]{2}}$

$$= \sqrt[4]{\frac{18}{2}} \cdot \sqrt[4]{9}$$

$$= \sqrt[4]{9} \cdot \sqrt[4]{9}$$

$$= \sqrt[4]{81}$$

$$= 3$$

5. Evaluate.

a) $49^{\frac{1}{2}} + 16^{\frac{1}{2}}$

b) $27^{\frac{2}{3}} - 81^{\frac{3}{4}}$

d) $128^{-\frac{5}{7}} - 16^{0.75}$

e) $16^{\frac{3}{2}} + 16^{-0.5} + 8 - 27^{\frac{2}{3}}$

$$\begin{aligned}
 &= (\sqrt[3]{16})^3 + 16^{-\frac{1}{2}} + 8 - (\sqrt[3]{27})^2 \\
 &= 4^3 + \frac{1}{\sqrt{16}} + 8 - (3)^2 \\
 &= 64 + \frac{1}{4} + 8 - 9 \\
 &= 63\frac{1}{4} \text{ or } \frac{253}{4}
 \end{aligned}$$

6. Write as a single power, then evaluate. Express answers in rational form.

a) $4^{\frac{1}{5}}(4^{0.3})$

c) $\frac{64^{\frac{4}{3}}}{64}$

$$\begin{aligned}
 \text{e) } & \frac{(16^{-2.5})^{-0.2}}{16^{\frac{3}{4}}} \\
 &= \frac{(16^{-\frac{5}{2}})^{-\frac{1}{5}}}{16^{\frac{3}{4}}} \\
 &= 16^{\frac{1}{2} - \frac{3}{4}} \\
 &= 16^{\frac{2}{4} - \frac{3}{4}} \\
 &= 16^{-\frac{1}{4}} \\
 &= \frac{1}{16^{\frac{1}{4}}} \\
 &= \frac{1}{\sqrt[4]{16}} \\
 &= \frac{1}{2}
 \end{aligned}$$

9. Use your calculator to determine the values of $27^{\frac{4}{3}}$ and $27^{1.3333}$. Compare the two answers. What do you notice?

$$\begin{aligned} &\leftarrow (27)^{\frac{4}{3}} \rightarrow = 80.991 \\ &= 3^4 \\ &= 81 \end{aligned}$$

10. Explain why $(-100)^{0.2}$ is possible to evaluate while $(-100)^{0.5}$ is not.

C

$$\begin{aligned} &= (-100)^{\frac{1}{5}} \\ &= \sqrt[5]{-100} \end{aligned}$$

$$\begin{aligned} &= (-100)^{\frac{1}{2}} \\ &= \sqrt{-100} \end{aligned}$$

You can only have a negative radicand if the type of root is odd, otherwise it is "no Real solution".

14. State whether each expression is true or false.

a) $9^{\frac{1}{2}} + 4^{\frac{1}{2}} = (9 + 4)^{\frac{1}{2}}$

d) $\left(\frac{1}{a} \times \frac{1}{b}\right)^{-1} = ab$

b) $9^{\frac{1}{2}} + 4^{\frac{1}{2}} = (9 \times 4)^{\frac{1}{2}}$

e) $\left(x^{\frac{1}{3}} + y^{\frac{1}{3}}\right)^6 = x^2 + y^2$

$$\begin{aligned} &(x^3 y^2)^4 \\ &= (x^3)^4 (y^2)^4 \\ &= x^{12} y^8 \end{aligned}$$

$$LS = (x^{\frac{1}{3}} + y^{\frac{1}{3}})^6$$

$$RS = x^2 + y^2$$

FALSE

4.4 Simplifying Algebraic Expressions Involving Exponents

Date: Oct. 24/19

Ex.1 Simplify. Express answers in rational form with positive exponents.

a) $\frac{(3x^{-2}y^2)^2}{(x^3y^{-2})^3}$

Recall: $(ab)^n = a^n b^n$

$$\begin{aligned}
 &= \frac{(3)^2 (x^{-2})^2 (y^2)^2}{(x^3)^3 (y^{-2})^3} \\
 &= \frac{9x^{-4}y^4}{x^9y^{-6}} \\
 &= 9x^{-4-9}y^{4-(-6)} \\
 &= 9x^{-13}y^{10} \\
 &= 9\left(\frac{1}{x^{13}}\right)y^{10} \\
 &= \frac{9y^{10}}{x^{13}}
 \end{aligned}$$



$$\frac{9y^{10}}{x^{13}}$$

b) $\frac{(64a^{-6}b^{12})^{\frac{1}{3}}}{(16a^{-4}b^6)^{\frac{1}{2}}}$

$$\begin{aligned}
 &= \frac{\sqrt[3]{64} (a^{-6})^{\frac{1}{3}} (b^{12})^{\frac{1}{3}}}{\sqrt{16} (a^{-4})^{\frac{1}{2}} (b^6)^{\frac{1}{2}}} \\
 &= \frac{4a^{-2}b^4}{4a^{-2}b^3} \\
 &= b^{4-3} \\
 &= b
 \end{aligned}$$

c) $\frac{b^{-4}}{a^{-2}}$

$$\begin{aligned}
 &= \left(\frac{1}{b}\right)^4 \div \left(\frac{1}{a}\right)^2 \\
 &= \frac{1}{b^4} \div \frac{1}{a^2} \\
 &= \frac{1}{b^4} \times \frac{a^2}{1} \\
 &= \frac{a^2}{b^4}
 \end{aligned}$$

d) $\frac{\sqrt[6]{x^8}}{\sqrt[3]{x^5}}$

$$\begin{aligned}
 &= x^{\frac{8}{6}} \div x^{\frac{5}{3}} \\
 &= x^{\frac{4}{3} - \frac{5}{3}} \\
 &= x^{-\frac{1}{3}} \\
 &= \frac{1}{x^{\frac{1}{3}}}
 \end{aligned}$$

b



$$\frac{a^2}{b^4}$$



$$\frac{1}{x^{\frac{1}{3}}}$$

Simplify.

$$\frac{a^2 b^{-1} c^{-3} d^5}{e^{-6} f^2 g^{-1} h^{-7}}$$
$$= \frac{a^2 d^5 e^6 g^1 h^7}{f^2 b^1 c^3}$$

Ex.2 Simplify and evaluate for $x = -3$ and $n = -2$.

$$\frac{(x^{3n+1})(x^{5n-3})}{(x^{6n-3})}$$

$$= x^{3n+1+5n-3-(6n-3)}$$

$$= x^{3n+1+5n-3-6n+3}$$

$$= x^{2n+1}$$

$$= (-3)^{2(-2)+1}$$

$$= (-3)^{-4+1}$$

$$= (-3)^{-3}$$

$$= \frac{1}{(-3)^3}$$

$$= \frac{1}{-27}$$


$$\frac{-1}{27}$$



Extra, if time.

$$\left(\frac{(x^{18})^{-\frac{1}{6}}}{\sqrt[5]{243x^{10}}} \right)^{0.5}$$

$$= \frac{(x^{-3})^{0.5}}{[3(x^{\frac{2}{5}})^{\frac{1}{5}}]^{0.5}}$$



$$\frac{1}{\sqrt{3x^5}}$$

$$\begin{aligned} & \sqrt[5]{343} \rightarrow \frac{x^{-\frac{3}{2}}}{(3x^2)^{\frac{1}{2}}} \\ &= \frac{x^{-\frac{3}{2}}}{3^{\frac{1}{2}}(x^2)^{\frac{1}{2}}} \\ &= \frac{x^{-\frac{3}{2}}}{\sqrt{3}x} \\ & \rightarrow \frac{x^{-\frac{3}{2}}}{\sqrt{3}x^1} \\ &= \frac{1}{\sqrt{3}} x^{-\frac{3}{2}-1} \\ &= \frac{1}{\sqrt{3}} x^{-\frac{5}{2}} \\ &= \frac{1}{\sqrt{3}} \cdot \frac{1}{x^{\frac{5}{2}}} \\ &= \frac{1}{\sqrt{3}x^{\frac{5}{2}}} \end{aligned}$$

Are there any Homework Questions you would like to see on the board?

Last day's work: **READ p.228**

pp. 229-230 #(1 – 6)ace, 8 – 11, 12ace, 14 [16]

The mid-chapter review is good practice for tomorrow's quiz!

SWYK Next Class

Today's Homework Practice includes:

pp. 235-237 #(1 – 2)ace, 3, (4 – 9)ace [14]

Review p. 239