



# Warm Up

Wednesday, Feb. 28

Write each of the following with only Positive Exponents

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

d)  $3xy^2z^{-3} = \frac{3xy^2}{z^3}$

b)  $a^{-4}b^3c^{-2} = \frac{b^3}{a^4c^2}$

e)  $\frac{4a^{-2}b^3c}{2a^5bc^8}$

c)  $4c^{-4} = \frac{4}{c^4}$

$= 2a^{-2-5}b^{3-1}c^{1-8}$

$= 2a^{-7}b^2c^{-7}$

$= \frac{2b^2}{a^7c^7}$

TEST Tomorrow

# Homework

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we didn't do yesterday so do today

9(b,d,f,h), #10(b,d), 11, 12, 15(a,b,c,d), 16(a,b,c,d), 17(a,) 19(a), 21(a,b), #22(a,b)

Test Review  
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Questions

20/ 20 MC  
Short Response  
/4 1) ab) Entin → Mix  
/4 2) ab) Mix → Entin  
/8 3) abcdef Simplifi

3,6,7,11,12,14,17,18,19,

Stop

Tomorrow →



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## Homework Questions

9(b,d,f,h), #10(b,d), 11, 15(a,b,c,d),

16(a,b,c,d), 17(a), 19(a), 21(a),

#22(a).

$$\begin{aligned}
 9) b) & a^{-4} \cdot a^{-1} \\
 & = a^{(-4)+(-1)} \\
 & = a^{-5} \\
 & = \frac{1}{a^5}
 \end{aligned}$$

$$\begin{aligned}
 9f) & \frac{s^5}{s^5} \text{ or } s^5 \cdot s^{-5} \\
 & = s^{5-(5)} \\
 & = s^0 = 1
 \end{aligned}$$

$$\begin{aligned}
 10b) & \left(\frac{3}{4}\right)^{\frac{3}{4}} \cdot \left(\frac{3}{4}\right)^{\frac{5}{4}} \\
 & = \left(\frac{3}{4}\right)^{\frac{3}{4} + \frac{5}{4}} \\
 & = \left(\frac{3}{4}\right)^{\frac{8}{4}} \\
 & = \left(\frac{3}{4}\right)^2 \\
 & = \frac{3^2}{4^2} \\
 & = \frac{9}{16}
 \end{aligned}$$

$$\begin{aligned}
 11) a) & (x^{-1} y^{-2})^{-3} \\
 & = x^{(-1)(-3)} y^{(-2)(-3)} \\
 & = x^3 \cdot y^6
 \end{aligned}$$

$$\begin{aligned}
 11c) & (4m^2n^3)^{-3} \\
 & = 4^{-3} m^{2(-3)} n^{3(-3)} \\
 & = \frac{1}{4^3} \cdot m^{-6} n^{-9} \\
 & = \frac{1}{64m^6n^9}
 \end{aligned}$$

$$\begin{aligned}
 9d) & m^8 \cdot m^{-2} \cdot m^{-6} \\
 & = m^{8+(-2)+(-6)} \\
 & = m^0 \\
 & = 1
 \end{aligned}$$

$$\begin{aligned}
 h) & \frac{t^{-4}}{t^4} \\
 & = t^{-4-(4)} \\
 & = t^{-4+4} \\
 & = t^0 \\
 & = 1
 \end{aligned}$$

$$\begin{aligned}
 10d) & \left(\frac{4}{5}\right)^{\frac{4}{3}} \cdot \left(\frac{4}{5}\right)^{-\frac{4}{3}} \\
 & = \left(\frac{4}{5}\right)^{\frac{4}{3} + \left(-\frac{4}{3}\right)} \\
 & = \left(\frac{4}{5}\right)^0 \\
 & = 1
 \end{aligned}$$

$$\begin{aligned}
 b) & (2a^{-2} b^2)^{-2} \\
 & = 2^{-2} a^{(-2)(-2)} b^{2(-2)} \\
 & = \frac{1}{2^2} a^4 b^{-2} \\
 & = \frac{1}{4} \frac{a^4}{b^2} \\
 & = \frac{a^4}{4b^2}
 \end{aligned}$$

$$\begin{aligned}
 d) & \left(\frac{3}{2} m^2 n^3\right)^{-4} \\
 & = \left(\frac{3}{2}\right)^{-4} m^{2(-4)} n^{3(-4)} \\
 & = \left(\frac{2}{3}\right)^4 m^8 n^{12} \\
 & = \frac{2^4}{3^4} m^8 n^{12} \\
 & = \frac{16m^8n^{12}}{81}
 \end{aligned}$$

$$\begin{aligned}
 15) a) & (a^3 b^4)(a^2 b^3) \\
 & = a^3 \cdot a^2 \cdot b^4 \cdot b^3 \\
 & = a^{3+2} \cdot b^{4+3} \\
 & = a^5 b^7
 \end{aligned}$$

$$\begin{aligned}
 b) & (a^{-1} b^{-2})(a^{-2} b^3) \\
 & a^{-1} \cdot a^{-2} \cdot b^{-2} \cdot b^3 \\
 & a^{-1+(-2)} \cdot b^{-2+3} \\
 & a^{-3} \cdot b^{-5} \\
 & = \frac{1}{a^3 b^5}
 \end{aligned}$$

$$\begin{aligned}
 15c) & \frac{a^{-4} b^5}{a b^3} \\
 & = a^{-4-1} b^{5-3} \\
 & = a^{-5} b^2 \\
 & = \frac{b^2}{a^5}
 \end{aligned}$$

$$\begin{aligned}
 d) & \left( \frac{a^{-7} b^7}{a^9 b^{10}} \right)^{-5} \\
 & = \left( a^{-7-(-9)} \cdot b^{7-10} \right)^5 \\
 & = \left( a^{+2} \cdot b^{-3} \right)^5 \\
 & = a^{2(5)} \cdot b^{-3(5)} \\
 & = a^{10} b^{-15} \\
 & = \frac{a^{10}}{b^{15}}
 \end{aligned}$$

$$\begin{aligned}
 16a) & m^{\frac{2}{3}} \cdot m^{\frac{4}{3}} \\
 & = m^{\frac{2}{3} + \frac{4}{3}} \\
 & = m^{\frac{6}{3}} \\
 & = m^2
 \end{aligned}$$

$$\begin{aligned}
 b) & x^{\frac{3}{2}} \div x^{\frac{1}{4}} \\
 & = x^{\frac{3}{2} - \left(\frac{1}{4}\right)} \\
 & \quad \text{add opp need common denom} \\
 & = x^{\frac{6}{4} + \frac{1}{4}} \\
 & = x^{\frac{7}{4}} \\
 & = x^{\frac{1}{2}} \\
 & = \frac{1}{x^{\frac{1}{2}}}
 \end{aligned}$$

$$\begin{aligned}
 16c) & \frac{-9 a^{-4} b^{\frac{3}{4}}}{3 a^2 b^{\frac{1}{4}}} \\
 & = \frac{-9}{3} a^{-4-2} b^{\frac{3}{4}-\frac{1}{4}} \\
 & = -3 a^{-6} b^{\frac{2}{4}} \\
 & = \frac{-3 b^{\frac{1}{2}}}{a^6}
 \end{aligned}$$

$$\begin{aligned}
 d) & \left( \frac{-64 c^6}{a^9 b^{\frac{1}{3}}} \right)^{\frac{1}{3}} \\
 & = \frac{(-64)^{\frac{1}{3}} c^{\frac{6}{3}}}{a^{\frac{9}{3}} b^{\left(\frac{1}{3} \cdot \frac{1}{3}\right)}} \\
 & = \frac{-4 c^2}{a^3 b^{\frac{1}{9}}} \\
 & = \frac{-4 c^2}{a^3 b^{\frac{1}{6}}}
 \end{aligned}$$

17a    18a    21a    22a

$$17a) (x^2 y^{-3})(x^{\frac{1}{2}} y^{-1}) = x^2 \cdot x^{\frac{1}{2}} \cdot y^{-3} \cdot y^{-1}$$

*correct way*

$$= x^{2+\frac{1}{2}} \cdot y^{(-3)+(-1)}$$

$$= x^{\frac{5}{2}} \cdot y^{-4}$$

*Wrong*  
 $x^2 \cdot x^{\frac{1}{2}} \cdot y^{-3} \cdot y^{-1}$   
 $= x^1 \cdot y^3$   
 $= x y^3$

*didn't add but they multiply exponents*

$$= x^{\frac{4}{2} + \frac{1}{2}} \cdot y^{-4}$$

$$= \frac{x^{\frac{5}{2}} y^4}{y^4}$$

19a)  $\frac{(m^{-3} n^2)^4}{(m^1 n^{-3})^2} = \frac{m^{-3 \times 4} n^{2 \times 4}}{m^{2 \times 1} n^{-3 \times 2}}$  ← *Correct method*

$$= \frac{m^{-12} n^8}{m^2 n^{-6}}$$

*didn't apply a power to a power first*

$$= m^{-12-4} n^{8-(-6)}$$

$$= m^{-16} n^{14}$$

$$= \frac{n^{14}}{m^{16}}$$

21a)  $\left(\frac{a^{-3} b}{c^2}\right) \cdot \left(\frac{c^5}{a^4 b^{-3}}\right)^{-1}$

$$= \frac{a^{-3} b}{c^2} \cdot \frac{c^{5 \times -1}}{a^{4 \times -1} b^{-3 \times -1}}$$

$$= \frac{a^{-3} b}{c^2} \cdot \frac{c^{-5}}{a^{-4} b^3}$$

$$= \frac{a^{-3}}{a^4} \cdot \frac{b^1}{b^3} \cdot \frac{c^{-5}}{c^2}$$

$$= a^{-3-4} b^{1-3} c^{-5-2}$$

$$= a^{-7} b^{-2} c^{-7}$$

$$= \frac{a}{b^2 c^7}$$

22a)  $(x^{\frac{1}{2}} y^{\frac{2}{3}})^2$

$$= x^{\frac{1}{2} \times 2} y^{\frac{2}{3} \times 2}$$

$$= x^1 y^{\frac{4}{3}}$$

$$= x^1 y^{\frac{4}{3}}$$

*Sub in x=a^{-2} y=a^{\frac{2}{3}}*

$$= a^{-2} \left(a^{\frac{2}{3}}\right)^{\frac{4}{3}}$$

$$= a^{-2} a^{\frac{8}{9}}$$

$$= a^{-\frac{18}{9}} \cdot a^{\frac{8}{9}}$$

$$= a^{-\frac{10}{9}}$$

$$= \frac{1}{a^{\frac{10}{9}}}$$

# Homework

20 MC

Test Review  
Page 246-248  
Questions

Short Response  
/4 1) ab) Entin → Mix  
/4 2) ab) Mix → Entin  
/8 3) abcdef Simplifi

3,6,7,11,12,14,17,18,19,

Stop

42 pts

Tomorrow →



3. Estimate the value of each radical to 1 decimal place. What strategies can you use?

a)  $\sqrt{11}$       b)  $\sqrt[3]{-12}$       c)  $\sqrt[4]{15}$

6. Tell whether each number is rational or irrational. Justify your answers.

- |                |                   |                      |
|----------------|-------------------|----------------------|
| a) $-2$        | b) $17$           | c) $\sqrt{16}$       |
| d) $\sqrt{32}$ | e) $0.756$        | f) $12.\overline{3}$ |
| g) $0$         | h) $\sqrt[3]{81}$ | i) $\pi$             |



7. Determine the approximate side length of a square with area  $23 \text{ cm}^2$ . How could you check your answer?

**12.** Write each mixed radical as an entire radical.

a)  $6\sqrt{5}$

b)  $3\sqrt{14}$

c)  $4\sqrt[3]{3}$

d)  $2\sqrt[4]{2}$

**14.** A student simplified  $\sqrt{300}$  as shown:

$$\begin{aligned}\sqrt{300} &= \sqrt{3} \cdot \sqrt{100} \\ &= \sqrt{3} \cdot \sqrt{50} \cdot \sqrt{50} \\ &= \sqrt{3} \cdot \sqrt{2} \cdot \sqrt{25} \cdot \sqrt{2} \cdot \sqrt{25} \\ &= 3 \cdot 5 \cdot \sqrt{2} \cdot 5 \\ &= 75\sqrt{2}\end{aligned}$$

Identify the errors the student made, then write a correct solution.

17. Express each power as a radical.

a)  $12^{\frac{1}{4}}$

b)  $(-50)^{\frac{5}{3}}$

c)  $1.2^{0.5}$

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

**18.** Express each radical as a power.

a)  $\sqrt{1.4}$

b)  $\sqrt[3]{13^2}$

c)  $(\sqrt[5]{2.5})^4$

d)  $\left(\sqrt[4]{\frac{2}{5}}\right)^3$

**19.** Evaluate each power without using a calculator.

a)  $16^{0.25}$

b)  $1.44^{\frac{1}{2}}$

c)  $(-8)^{\frac{5}{3}}$

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

- 22.** Kleiber's law relates a mammal's metabolic rate while resting,  $q$  Calories per day, to its body mass,  $M$  kilograms:

$$q = 70M^{\frac{3}{4}}$$

What is the approximate metabolic rate of each animal?

- a) a cow with mass 475 kg
  - b) a mouse with mass 25 g
-

**24.** Evaluate each power without using a calculator.

a)  $2^{-2}$       b)  $\left(\frac{2}{3}\right)^{-3}$       c)  $\left(\frac{4}{25}\right)^{-\frac{3}{2}}$



25. Kyle wants to have \$1000 in 3 years. He uses this formula to calculate how much he should invest today in a savings account that pays 3.25% compounded annually:  $P = 1000(1.0325)^{-3}$   
How much should Kyle invest today?

28. Simplify. Explain your reasoning.

a)  $(3m^4n)^2$       b)  $\left(\frac{x^2y}{y^{-2}}\right)^{-2}$

c)  $(16a^2b^6)^{-\frac{1}{2}}$       d)  $\left(\frac{r^3s^{-1}}{s^{-2}r^{-2}}\right)^{-\frac{2}{3}}$

29. Simplify. Show your work.

a)  $(a^3b)(a^{-1}b^4)$     b)  $\left(x^{\frac{1}{2}}y\right)\left(x^{\frac{3}{2}}y^{-2}\right)$

c)  $\frac{a^3}{a^5} \cdot a^{-3}$     d)  $\frac{x^2y}{x^{\frac{1}{2}}y^{-2}}$

30. Evaluate.

a)  $\left(\frac{3}{2}\right)^{\frac{3}{2}} \cdot \left(\frac{3}{2}\right)^{\frac{1}{2}}$

b)  $\frac{(-5.5)^{\frac{2}{3}}}{(-5.5)^{-\frac{4}{3}}}$

c)  $\left[\left(-\frac{12}{5}\right)^{\frac{1}{3}}\right]^6$

d)  $\frac{0.16^{\frac{3}{4}}}{0.16^{\frac{1}{4}}}$

Assignment

Date \_\_\_\_\_

Simplify. Your answer should contain only positive exponents.

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

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

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

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

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

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

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

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

Answers to Assignment (ID: 1)

4)  $\frac{1}{27a^9b^{12}}$   
 8)  $\frac{4y^2}{x^8}$   
 12)  $256x^{16}y^8$   
 16)  $\frac{16}{3}$

3)  $\frac{16}{9v^2}$   
 7)  $\frac{1}{16a^8b^{11}}$   
 11)  $\frac{1}{16m^{20}n^{12}}$   
 15)  $\frac{3}{8u^2v^4}$

2)  $\frac{x^3}{8y^9}$   
 6)  $729y^{15}$   
 10)  $\frac{1}{36x^{10}y^6}$   
 14)  $u^8y^{24}$

1)  $9u^5v^3$   
 5)  $\frac{6561y^{20}}{256x^4}$   
 9)  $\frac{1}{6m^3}$   
 13)  $\frac{9}{256x^6y^{10}}$

Assignment

Date \_\_\_\_\_

Simplify. Your answer should contain only positive exponents.

1)  $k^3 \cdot 8k^3$

2)  $7x^3 \cdot 8x^2$

3)  $8x^2 \cdot 8x^2$

4)  $6n \cdot 8n^3$

5)  $4k^3 \cdot 8k^3$

6)  $\frac{5x^4}{8x}$

7)  $\frac{8n^3}{5n}$

8)  $\frac{2b^4}{b^3}$

9)  $\frac{3v^2}{6v^3}$

10)  $\frac{5x^4}{2x^4}$

11)  $\frac{x^3}{2x^2 \cdot 5x}$

12)  $\frac{2p^2 \cdot 5p^3}{6p}$

13)  $\frac{4n^3 \cdot 3n^2}{6n}$

14)  $\frac{6m^2}{3m^2 \cdot 6m}$

15)  $\frac{2r}{4r^2 \cdot 5r^2}$

16)  $(2x^4)^2$

17)  $(3a)^2$

18)  $(5k^4)^3$

19)  $(3p)^4$

20)  $(3n)^3$

Answers to Assignment (ID: 1)

4)  $48n^4$   
8)  $2b$   
12)  $\frac{5p^4}{3}$   
16)  $4x^8$   
20)  $27n^3$

3)  $64x^4$   
7)  $\frac{8n^2}{5}$   
11)  $\frac{1}{10}$   
15)  $\frac{1}{10r^3}$   
19)  $81p^4$

2)  $56x^5$   
6)  $\frac{5x^3}{8}$   
10)  $\frac{5}{2}$   
14)  $\frac{1}{3m}$   
18)  $125k^{12}$

1)  $8k^6$   
5)  $32k^6$   
9)  $\frac{1}{2v}$   
13)  $2n^4$   
17)  $9a^2$

