3. $(x^a)^b = x^{ab}$

4. $(xy)^a = x^a y^a$

5. $\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$

6. $(x)^0 = 1$

7. $x^{-a} = \frac{1}{x^a}$

8. $\frac{1}{x^{-a}} = \frac{x^a}{1}$

e. $\left(\frac{t}{5}\right)^3 =$

g. $wx^{-2} =$

i. $(4s^4)(-2s)^3 =$

a) $(3^2x^2y)^2 = 81x^4y^2$

f. $m^7 \cdot \frac{m^{-2}}{m^4} = m$ ($m^7 \cdot m^{-6}$)

h. $(25x^{-2} - 6x^3)^0 = 1$

j. $\frac{y^3}{x^5} \cdot \frac{x^3}{y^{-4}} =$

k. $\left(\frac{5}{6}\right)^{-3} = \frac{6^3}{5^3} = \frac{216}{125}$

l. $\frac{2x^6y^4}{6x^3} \cdot \frac{4x^2}{12y^5} = \frac{x^8y^4}{9x^3y^5} = \frac{x^5}{9y}$

## Rational Exponents

$\sqrt[n]{x^p} = x^{p/n}$

We can rewrite expressions with rational exponents as radical expressions to help us evaluate them more easily.

**Example 1: Simplify each expression**

*Turn it into a radical. The numerator is the power of the base, and the denominator is the number in the corner of the radical!

a) $27^{\frac{1}{3}}$ $\sqrt[3]{27^1} = 3$

b) $64^{\frac{1}{2}}$ $\sqrt{64^1} = 8$

c) $8^{\frac{2}{3}}$ $\sqrt[3]{64} = 4$

d) $12^{\frac{2}{3}}$ $\sqrt[3]{144}$

a) $a^{\frac{1}{6}}$ $\sqrt[6]{a}$

b) $m^{\frac{1}{2}}$ $\sqrt{m}$

c) $x^{\frac{3}{4}}$ $\sqrt[4]{x^3}$

d) $y^{\frac{7}{2}}$ $\sqrt{y^7}$

**Example 2: Write each expression as a Rational Exponent**

*The numerator is the power of the base, and the denominator is the number in the corner of the square root sign!

a) $\sqrt[3]{x^3} = x^{3/2}$

b) $\sqrt[3]{5y} = (5y)^{1/2} = 5^{1/2}y^{1/2}$

c) $(\sqrt[3]{b})^3 = b^{3/4}$

d) $\sqrt{a^3x^2y} = a^{3/2}xy^{1/2}$

a) $\sqrt{m}$ $m^{1/3}$

b) $\sqrt{2y^3}$ $2^{1/3}y^{2/3}$

c) $\sqrt{-6}$ $(-6)^{1/2}$

c) $\sqrt[3]{16a^2b^5}$ $16^{1/3}a^{2/3}b^{5/3}$

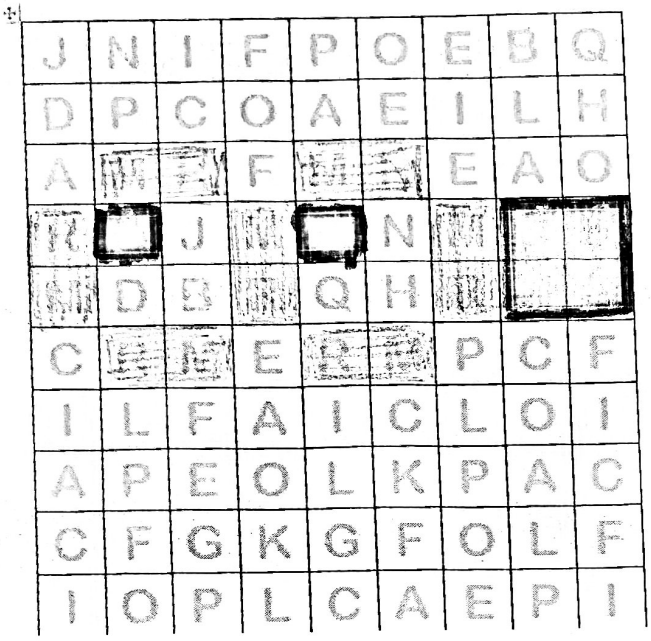
Back for

↖ Do for HW →

# EXPONENT REVIEW

Name:

Date: Period:



| | | | |
|---|---|---|---|
| A | $27b^9$ | J | $x^3$ |
| B | $-\frac{2p}{p^2}$ | K | $10a^4b$ |
| C | $\frac{2x}{y^2}$ | L | $-\frac{1}{p}$ |
| D | $20m^{15}$ | M | $20x^5y^3$ |
| E | $-x^3$ | N | $8x^4y^8$ |
| F | $-\frac{b}{4}$ | O | $3xy$ |
| G | $20m^8$ | P | $-\frac{m}{3}$ |
| H | $7a^4b$ | Q | $2xy^2$ |
| I | $-27x^3$ | R | $16x^4y^8$ |

**Simplify. Your answer should contain only positive exponents.**

black 1) $4m^5n^0 \cdot 5m^3$ G

black 2) $5ab \cdot 2a^3$ K

grey 3) $5x^5 \cdot 4y^3$ M

grey 4) $(4x^2y^4)^2$ R

yellow 5) $(3b^3)^3$ A

yellow 6) $(-3x)^3$ I

yellow 7) $-\frac{m^2n^2}{3mn^2}$ P

yellow 8) $\frac{-3x^2y^2}{-xy}$ O

yellow 9) $\frac{2yx^3}{x^2y^3}$ C

yellow 10) $-\frac{b^2 \cdot b^3}{(2b^2)^2}$ F

yellow 11) $\frac{3x \cdot (-x)^3}{3x}$ E

yellow 12) $\frac{2p^2}{-2p \cdot (-p)^2}$ L