Important Rules to Remember !!

* Must have the same base !

Exponent Laws

Product of powers:	$a^m \cdot a^n = a^{m+n}$
Quotient of powers:	$a^m \div a^n = a^{m-n}, a \neq 0$
Power of a power:	$(a^m)^n = a^{mn}$
Power of a product:	$(ab)^m = a^m b^m$
Power of a quotient:	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$

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$5^2 \times 5^{11}$

5^{2+11}

5^{13}

$x^{2/3} \cdot x^{1/2}$

$x^{2/3 + 1/2}$

$x^{4/6 + 3/6}$

$x^{7/6}$

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$5^8 \div 5^6$

$\frac{5^8}{5^6}$

5^{8-6}

5^2

$\frac{x^{4/5}}{x^{-1/2}}$

$x^{4/5-(-1/2)}$

$x^{4/5+1/2}$

$x^{8/10+5/10}$

$x^{13/10}$

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$(5^8)^3$

$5^{8 \cdot 3}$

5^{24}

$(x^2)^3$

$x^{2 \cdot 3}$

x^6

$(b^{2/5})^{-2}$

$b^{\frac{2}{5} \cdot -\frac{2}{1}}$

$b^{\frac{-4}{5}}$

$\left(\frac{1}{b}\right)^{4/5}$

$\frac{1^{4/5}}{b^{4/5}}$

$\frac{1}{\left(\sqrt[5]{b}\right)^4}$

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$(xy)^3$

$x^3 y^3$

$(x^2y')^3$

$x^{2 \cdot 3} y^{1 \cdot 3}$

$x^6 y^3$

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$$\left(\frac{x}{y}\right)^2$$

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

$$\left(\frac{x^8}{y^6}\right)^2$$

$$\frac{(x^8)^2}{(y^6)^2}$$

$$\frac{x^{8\cdot 2}}{y^{6\cdot 2}}$$

$$\frac{x^{16}}{y^{12}}$$

Simplify by Writing as a Single Power

a) $0.3^{-3} \cdot 0.3^{5}$

0.3^{-3+5}

0.3^{2}

Simplify the numerator first!!

b) $\dfrac{b^3 \times b^{-5}}{b^7}$ ← Multiplying powers with the same base add expon

$\dfrac{b^{3+(-5)}}{b^7}$

$\dfrac{b^{-2}}{b^7}$ ← Dividing Powers with same base subtract expon.

b^{-2-7}

b^{-9} ← Negative Exponent

$\left(\frac{1}{b}\right)^9$

c) $\dfrac{(a^5 \times a^{-3})^{-2}}{a^{-2}}$

$\dfrac{(a^{5+(-3)})^{-2}}{a^{-2}}$

$\dfrac{(a^2)^{-2}}{a^{-2}}$

$\dfrac{a^{2\cdot(-2)}}{a^{-2}}$

$\dfrac{a^{-4}}{a^{-2}}$

$a^{-4-(-2)}$

a^{-2}

$\left(\dfrac{1}{a}\right)^2$ or $\dfrac{1}{a^2}$

d) $\dfrac{(1.4^3)(1.4^4)}{1.4^{-2}}$

$\dfrac{1.4^{3+4}}{1.4^{-2}}$

$\dfrac{1.4^{7}}{1.4^{-2}}$

$1.4^{7-(-2)}$

1.4^{9}

e) $\left[\left(-\frac{3}{2}\right)^{-4}\right]^{2} \cdot \left[\left(-\frac{3}{2}\right)^{2}\right]^{3}$

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

$\left(-\frac{3}{2}\right)^{-8} \cdot \left(-\frac{3}{2}\right)^{6}$

$\left(-\frac{3}{2}\right)^{-8+6}$

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

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

$\frac{(-2)^2}{(3)^2}$

$\frac{4}{9}$

f) $\left(\dfrac{7^{\frac{2}{3}}}{7^{\frac{1}{3}} \cdot 7^{\frac{5}{3}}}\right)^6$

$\left(\dfrac{7^{2/3}}{7^{1/3+5/3}}\right)^6$

$\left(\dfrac{7^{2/3}}{7^{6/3}}\right)^6$

$\left(7^{2/3-6/3}\right)^6$

$\left(7^{\frac{-4}{3}}\right)^6$

$7^{\frac{4}{3}\cdot\frac{6}{1}}$

$7^{\frac{-24}{3}}$

7^{-8}

$\left(\frac{1}{7}\right)^8$ or $\frac{1}{7^8}$

CHECK YOUR UNDERSTANDING

Simplify by writing as a single power. Explain your reasoning.

a) $0.8^{2} \cdot 0.8^{-7}$

b) $\left[\left(-\frac{4}{5}\right)^{2}\right]^{-3} \div \left[\left(-\frac{4}{5}\right)^{4}\right]^{-5}$

c) $\frac{(1.5^{-3})^{-5}}{1.5^{5}}$

d) $\frac{9^{\frac{5}{4}} \cdot 9^{-\frac{1}{4}}}{9^{\frac{3}{4}}}$

Homework

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