

Warm Up

$$1. \quad \frac{(a^4 \times a^3)^2}{(a^5 \times a^2)^{-2}}$$

$$2. \quad \frac{(2b^2 \times 3b^3)^2}{6b^3 \times b^2}$$

$$3. \quad \frac{n^5 \times (n^3 \times n)^3}{(n^3)^3}$$

$$1. \quad \frac{(a^4 \times a^3)^2}{(a^5 \times a^2)^{-2}}$$

$$\frac{(a^7)^2}{(a^7)^{-2}}$$

$$\frac{a^{14}}{a^{-14}} \quad 14 + (+14)$$
$$a^{28}$$

$$2. \quad \frac{(2b^2 \times 3b^3)^2}{6b^3 \times b^2}$$

$$= \frac{(6b^5)^2}{6b^5}$$

$$= \frac{6^2 b^{10}}{6 b^5} \qquad \frac{36b^{10}}{6b^5}$$

$$= \frac{6 b^5}{6 b^5}$$

$$3. \frac{n^5 \times (n^3 \times n)^3}{(n^3)^3}$$

$$= \frac{n^5 \times (n^4)^3}{n^9}$$

$$= \frac{n^5 \times n^{12}}{n^9}$$

$$= \frac{n^{17}}{n^9} \quad 17-9$$

$$= n^8$$

$$8^5 \times 8^3 = 8^8$$

$$5^4 \times 5^3 = 5^7$$

$$3^8 \times 3^{-3} = 3^5$$

$$10^{11} \times 10^2 = 10^{13}$$

$$8^7 \times 8^3 = 8^{10}$$

$$4m^3 \times 2m^2 = 8m^5$$

$$7r^3 \times 5r^1 = 35r^4$$

$$3x^5 \times 2x^3 = 6x^8$$

$$5m^3 \times 2m^2 = 10m^5$$

$$2p^5 \times 3p^2 \times 4p^{-3} = 24p^4$$

$$(w^5)^2 = w^{10}$$

$$(p^3)^4 = p^{12}$$

$$(m^7)^{-2} = m^{-14} = \frac{1}{m^{14}}$$

$$(4n^3)^3 = 4^3 n^9$$

$$(3p^4)^2 = 3^2 p^8$$

$$\frac{W^8}{W^2} = W^6$$

$$\frac{p^5}{p^3} = p^2$$

$$\frac{10w^3}{2w^1} = 5w^2$$

$$\frac{14n^5}{7n^1} = 2n^4$$

$$\frac{7r^8}{3r^{-2}} = \frac{7r^{10}}{3} \quad 8 + +2$$

Warm Up Questions

Simplify by writing as a single power.

$$1. \frac{(b^9 \cdot b^{-7} \cdot b^3)^2 \times (b^4 \cdot b^{-3})^2}{b^{-14}}$$

$$2. \frac{(a^3)^2 \cdot (a^{1/2})^3}{(a^{3/2})^4}$$

tricky!

$$3. \frac{(-3/5)^{-3/4} \cdot (-3/5)^{1/2}}{(-3/5)^{5/4}}$$

$$\begin{aligned} & \frac{(b^9 \cdot b^{-7} \cdot b^3)^2 \times (b^4 \cdot b^{-3})^2}{b^{-14}} \\ &= \frac{(b^5)^2 \times (b^1)^2}{b^{-14}} \\ &= \frac{b^{10} \times b^2}{b^{-14}} \\ &= \frac{b^{12}}{b^{-14}} \\ &= b^{26} \end{aligned}$$

$$\begin{array}{l}
 \frac{(a^3)^2 \cdot (a^{1/2})^3}{(a^{3/2})^4} \\
 \frac{3}{2} \times \frac{4}{1} \\
 \frac{12}{2} = 6 \\
 \frac{6 \times 2}{1 \times 2} + \frac{3}{2} \\
 \frac{12}{2} + \frac{3}{2} = \frac{15}{2} \\
 \frac{15}{2} - \frac{12}{2} \\
 \frac{3}{2} \\
 \frac{1}{2} \times \frac{3}{1} = \frac{3}{2} \\
 \frac{a^6 \cdot a^{3/2}}{a^{12/2}} \rightarrow \boxed{\begin{array}{r} 6/1 + 3/2 \\ 12/2 + 3/2 \\ = 15/2 \end{array}} \\
 \frac{a^{15/2}}{a^{12/2}} \rightarrow \boxed{\begin{array}{r} 15/2 - 12/2 \\ = 3/2 \end{array}} \\
 = a^{3/2}
 \end{array}$$

$$\frac{(-3/5)^{-3/4} \cdot (-3/5)^{1/2}}{(-3/5)^{5/4}}$$

→

$-3/4$	+	$1/2$
$-3/4$	+	$2/4$
		$-1/4$

$$= \frac{(-3/5)^{-1/4}}{(-3/5)^{5/4}}$$

→

$-1/4$	-	$5/4$
		$-6/4$
		Reduce !!
		$-3/2$

$$= (-3/5)^{-3/2}$$
$$= (-5/3)^{3/2}$$

What happens when there's more than one base?

$$1. \quad a^4 \times a^{-4} \times b^3 \times a^2 \times b^{-4}$$

$$= \underline{a^4} \times \underline{a^{-4}} \times \underline{b^3} \times \underline{a^2} \times \underline{b^{-4}}$$

$$= a^2 \times b^{-1}$$

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

$$2. \quad (a^3b^2)^3$$
$$= a^9b^6$$

$$\begin{aligned} 3. \quad & \frac{(a^5b^3)^2}{a^3b^{-2}} \\ & \begin{array}{l} 10 - 3 = 7 \\ 6 + 2 = 8 \end{array} = \frac{a^{10}b^6}{a^3b^{-2}} \\ & = a^{10-3} b^{6-(-2)} \\ & = a^7b^8 \end{aligned}$$

$$4. \quad \frac{10c^8d^{-2}}{2c^4d^5} \quad \begin{array}{l} 8-4=4 \\ -2-5=-7 \end{array}$$

$$= 5c^4d^{-7}$$

$$= \frac{5c^4}{d^7}$$

$$\begin{aligned} 5. \quad & \frac{(4d^3c^{-3})(3d^6c^7)}{(2d^3c)^2} \\ 9-6=3 & = \frac{12d^9c^4}{4d^6c^2} \quad 4-2=2 \\ & = 3d^3c^2 \end{aligned}$$

$$\begin{aligned}
 & \mathbf{6.} \quad \left(\frac{(-10^4 a^2 b)^2}{10 a^5 b^{11}} \right)^{-1} \\
 & \begin{array}{l} 4 - 5 = -1 \\ 2 + 11 = 13 \end{array} \quad \left(\frac{100 a^4 b^2}{10 a^5 b^{11}} \right)^{-1} \\
 & = \left(10^{-1} a^{-1} b^{-9} \right)^{-1} \text{ END} \\
 & = 10^1 a^1 b^9 \\
 & = \frac{ab^9}{10}
 \end{aligned}$$

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#9, 10, 11, 14, 16, 17