

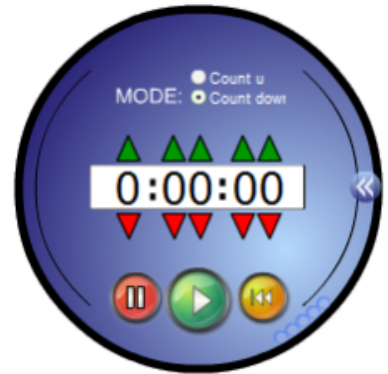
# Warm Up Questions

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

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



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

$$\begin{aligned}
 & \frac{(a^3)^2 \cdot (a^{1/2})^3}{(a^{3/2})^4} \\
 &= \frac{a^6 \cdot a^{3/2}}{a^{12/2}} \\
 &= \frac{a^{15/2}}{a^{12/2}} \\
 &= a^{3/2}
 \end{aligned}$$

Handwritten notes in blue clouds:
   
 Left cloud:  $\frac{3}{2} \times 4$ ,  $\frac{1}{2}$ ,  $\frac{12}{2}$ 
  
 Right cloud:  $\frac{1}{2} \times 3$ ,  $1$ ,  $= \frac{3}{2}$

Boxed calculations:
   
 Box 1:  $\frac{6/1 \times 2}{12/2} + \frac{3/2}{3/2} = \frac{12}{2} + \frac{3}{2} = \frac{15}{2}$ 
  
 Box 2:  $\frac{15/2 - 12/2}{1} = \frac{3}{2}$

$$\frac{(-3/5)^{-3/4} \cdot (-3/5)^{1/2}}{(-3/5)^{5/4}} \rightarrow \begin{array}{r} -3/4 + 1/2 \\ -3/4 + 2/4 \\ -1/4 \end{array}$$

$$= \frac{(-3/5)^{-1/4}}{(-3/5)^{5/4}} \rightarrow \begin{array}{r} -1/4 - 5/4 \\ -6/4 \\ \text{Reduce !!} \\ -3/2 \end{array}$$

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

$$= \left(\frac{5}{-3}\right)^{3/2}$$

## What happens when there's more than one base?

$$\begin{aligned} 1. \quad & a^4 \times a^{-4} \times b^3 \times a^2 \times b^{-4} \\ & = \underline{a^4} \times \underline{a^{-4}} \times \underline{b^3} \times \underline{a^2} \times \underline{b^{-4}} \\ & = a^2 b^{-1} \\ & = \frac{a^2}{b} \end{aligned}$$

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

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

4. 
$$\frac{10c^8d^{-2}}{2c^4d^5}$$

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

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

*-2-5  
=-7*



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

$$\begin{aligned} 6. & \left( \frac{(-10a^2b)^2}{10a^5b^{11}} \right)^{-1} \\ &= \left( \frac{100a^4b^2}{10a^5b^{11}} \right)^{-1} \\ &= \left( 10a^{-1}b^{-9} \right)^{-1} \\ &= 10^{-1}ab^9 \\ &= \frac{ab^9}{10} \end{aligned}$$