

## THE RATIO SHUFFLE (Solving Proportions Fast)

$\frac{a}{b} = \frac{c}{d}$  a and d can be "shuffled" to either position along the indicated diagonal. And b and c can be also along their diagonal.

Doing so creates equivalent proportions such as  $\frac{d}{b} = \frac{c}{a}$ ;  $\frac{ad}{b} = \frac{c}{1}$ ;  $\frac{ad}{c} = \frac{b}{1}$ ;  $\frac{d}{1} = \frac{bc}{a}$ ;  $\frac{a}{1} = \frac{bc}{d}$ .

The last four are essentially solutions for c, b, d and a respectively.

Notice in all cases the cross products along the diagonals remain the same  $ad = bc$ , which is why the shuffling is legitimate.

Examples for solving for a specific variable:

$$\begin{array}{l} \text{Solve} \\ \text{for } x: \end{array} \frac{x}{3} = \frac{5}{7} \rightarrow \frac{x}{1} = \frac{3 \cdot 5}{7} \rightarrow x = \frac{15}{7}$$

$$\begin{array}{l} \text{Solve} \\ \text{for } v: \end{array} \frac{3x}{4} = \frac{5v}{7} \rightarrow \frac{3x \cdot 7}{4 \cdot 5} = \frac{v}{1} \rightarrow v = \frac{21x}{20}$$

$$\begin{array}{l} \text{Solve} \\ \text{for } V_2 \end{array} \frac{P_1 T_1}{V_1} = \frac{P_2 T_2}{V_2} \rightarrow \frac{V_2}{1} = \frac{P_2 T_2 V_1}{P_1 T_1}$$

$$\begin{array}{l} \text{Solve} \\ \text{for } x \end{array} \frac{4}{x-2} = \frac{3}{5} \rightarrow \frac{4 \cdot 5}{3} = \frac{x-2}{1} \rightarrow x-2 = \frac{20}{3} \rightarrow x = \frac{26}{3}$$

NAME: \_\_\_\_\_

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Solve for the indicated variable by the RATIO SHUFFLE.

1)  $\frac{2}{x} = \frac{3}{4}$

$x =$  \_\_\_\_\_

2)  $\frac{4}{3} = \frac{5}{2x}$

$x =$  \_\_\_\_\_

3)  $\frac{7}{2} = \frac{3x}{5}$

$x =$  \_\_\_\_\_

4)  $\frac{5y}{2} = \frac{7}{3}$

$y =$  \_\_\_\_\_

5)  $\frac{x}{2} = \frac{y}{z}$

$x =$  \_\_\_\_\_

6)  $\frac{a}{b} = \frac{c}{d}$

$a =$  \_\_\_\_\_

$b =$  \_\_\_\_\_

$y =$  \_\_\_\_\_

$c =$  \_\_\_\_\_

$d =$  \_\_\_\_\_

$z =$  \_\_\_\_\_

7)  $\frac{3xy}{4} = \frac{2}{w}$

$y =$  \_\_\_\_\_

$w =$  \_\_\_\_\_

8)  $\frac{3xz}{4y} = \frac{2a}{3c}$

$x =$  \_\_\_\_\_

$y =$  \_\_\_\_\_

9)  $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$P_1 =$  \_\_\_\_\_

$V_2 =$  \_\_\_\_\_

$T_1 =$  \_\_\_\_\_

10)  $\frac{x-3}{4} = \frac{5}{w}$

$w =$  \_\_\_\_\_

$x-3 =$  \_\_\_\_\_

$x =$  \_\_\_\_\_