2-5 Ratios and Proportions

1.A ratio is a mathematical statement that relates

Two quantities

2.A proportion is an equation that states that two

ratios are equal

3.To find the reciprocal of a fraction we Flip exchange the numerator and the denominator

PROPERTIES OF PROPORTIONS

RECIPROCAL PROPERTY

If two ratios are equal, their reciprocals, if they exist, are also equal.

If $\frac{a}{b}=\frac{c}{d}$, then $\frac{b}{a}=\frac{d}{c}$ Example: $\frac{2}{3}=\frac{4}{6}\Rightarrow \frac{3}{2}=\frac{6}{4}$

CROSS PRODUCT PROPERTY

The product of the extremes equals the product of the means.

If $\frac{a}{b}=\frac{c}{d}$ then $ad=bc$ Example: $\frac{2}{3}\times\frac{4}{6}$ $2\cdot 6=3\cdot 4$ $12=12$ ✓

Using cross products decide whether the ratios form a proportion

ratios

$\frac{4}{5},\frac{20}{25}$ Proportion $\frac{4}{5}=\frac{20}{25}$ $4\cdot 25=5\cdot 20$ $100=100$ YES

$\frac{5}{9},\frac{7}{11}$ $\frac{5}{9}\times\frac{7}{11}$ $5\cdot 11=9\cdot 7$ $55\neq 63$ NO

$\frac{6}{7},\frac{24}{28}$ $\frac{6}{7}=\frac{24}{28}$ $6\cdot 28=7\cdot 24$ $168=168$ YES

$\frac{8}{9},\frac{72}{81}$ $\frac{8}{9}=\frac{72}{81}$ $8\cdot 81=9\cdot 72$ $648=648$ Yes

Solving a Proportion

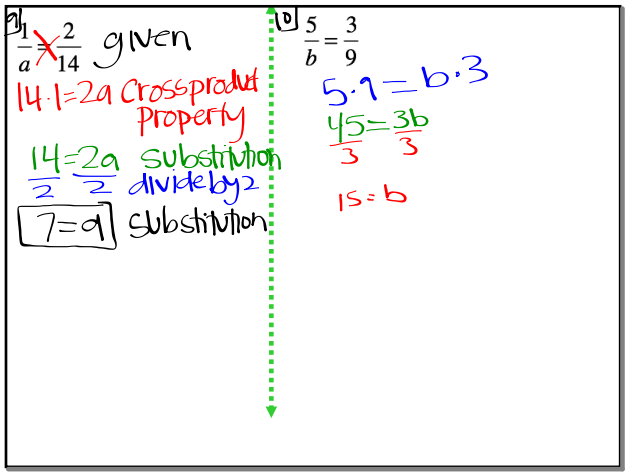
When a proportion involves a single variable, finding the value of that variable is called solving the proportion.

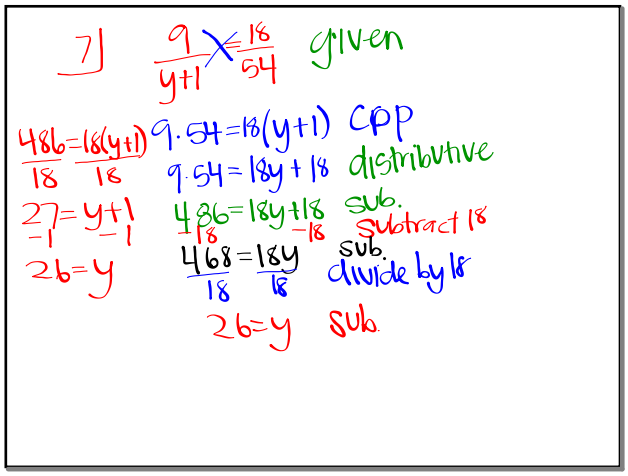
Solve the proportion $\frac{3}{y}=\frac{5}{8}$ given

$3\cdot 8=5y$ cross product property (cpp)

$\frac{24}{5}=\frac{5y}{5}$ substitution divide by 5

$\frac{24}{5}=y$ substitution


a) $\frac{1}{a}=\frac{2}{14}$ given
$14\cdot 1=2a$ Crossproduct Property
$\frac{14}{2}=\frac{2a}{2}$ substitution divide by 2
$7=a$ substitution
b) $\frac{5}{b}=\frac{3}{9}$
$5\cdot 9=b\cdot 3$
$\frac{45}{3}=\frac{3b}{3}$
$15=b$


7) $\frac{9}{y+1}=\frac{18}{54}$ given
$9\cdot 54=18(y+1)$ CPP
$9\cdot 54=18y+18$ distributive
$486=18y+18$ sub.
-18 subtract 18
$468=18y$ sub.
$\frac{468}{18}=\frac{18y}{18}$ divide by 18
$26=y$ sub.
$\frac{486}{18}=\frac{18(y+1)}{18}$
$27=y+1$
$-1 \quad -1$
$26=y$