SOLN

Ratios and Proportions

Definitions:

- Ratio: a comparison of a number ***a*** to a number ***b*** using division. Written in 2 different ways: $a:b$ or $\frac{a}{b}$
- Proportion: a statement that two ratios are equal. Written as $\frac{a}{b} = \frac{c}{d}$ Eg: $\frac{3}{7} = \frac{9}{21}$
- When two ratios are equal, what do you know about the cross products?

They are equal!

Determine whether the ratios are equivalent:

1. $\frac{9}{5} \stackrel{?}{=} \frac{45}{25}$ (225 = 225) Yes
2. $\frac{13}{2} \stackrel{?}{=} \frac{52}{10}$ (130 ≠ 104) NO

Use equivalent ratios to find the unknown value"

3. $\frac{2h}{12} = \frac{7}{4}$ $h = \frac{21}{2} = 10.5$
4. $\frac{4}{9} = \frac{r-3}{6}$ $9(r-3) = 24$, $9r - 27 = 24$, $9r = 51$, $r = \frac{51}{9} = 5.\overline{6}$
5. $\frac{7}{9} = \frac{b}{b-10}$ $b = -35$
6. $\frac{x}{13-2x} = \frac{8}{1}$ $x = \frac{104}{17} = 6.12$

7. A 10-foot length of 8-inch carbon steel pipe weighs 286 pounds. What is the weight of a 15-foot pipe of the same diameter?

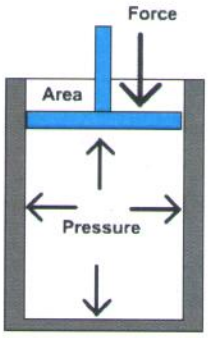
$\frac{10\text{ ft}}{286\text{ lb}} = \frac{15\text{ ft}}{x}$ $x = 429\text{ lb}$

8. Use the scale in a CAD drawing for land surveillance to determine how many feet a 0.825" length translates to.

$0.825'' = 16.5'$

$\frac{1''}{20'} = \frac{0.825''}{x}$ $x = 16.5'$

9. Pressure in a holding tank is increasing as the volume decreases. How does this relate to temperate, given $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$. The pressure was 6 bars and now is 10 bars. The Volume was 50cc and is now ~~30~~ 35cc. Temperature was ~~300~~ 310°K. What is the temperature now?



$\frac{6\text{ bar} \cdot 50\text{ cc}}{300^\circ K} = \frac{10\text{ bar} \cdot 35\text{ cc}}{T_2}$

$\frac{300}{300} = \frac{350}{T_2}$ $T_2 = 300^\circ$

$300T_2 = 108500$

$T_2 = 361.7^\circ$

$\frac{300}{300} = \frac{300}{T}$

$\frac{300T}{300} = \frac{90000}{300}$

$T = 300^\circ K$