Geometry: *Hutschenreuter* Name KEY

Section 6.2: Use Proportions to Solve Geometry Problems

Essential Question: How do you calculate actual distances from a scale drawing or map?

VOCABULARY:

Scale Drawing

Drawing that is the same shape but NOT the same size

Scale

Ratio that describes the relationship of the dimensions of the real object and the drawing

Reciprocal Property of Proportions:

If two ratios are equal, then their reciprocals are also equal.

If $\frac{a}{b} = \frac{c}{d}$, then $\frac{b}{a} = \frac{d}{c}$

Interchange Property of Proportions:

If you interchange the means in a true proportion, then you form another true proportion.

If $\frac{a}{b} = \frac{c}{d}$, then $\frac{a}{c} = \frac{b}{d}$

Add Up Property of Proportions:

If you add the value of each ratio's denominator to its numerator, then you form another true proportion.

If $\frac{a}{b} = \frac{c}{d}$, then $\frac{a+b}{b} = \frac{c+d}{d}$

EXAMPLES:

A1. Write three true proportions from $\frac{4}{15} = \frac{x}{75}$.

First: Reciprocal Prop. $\left[\frac{15}{4} = \frac{75}{x}\right]$

Second: Interchange Prop. $\left[\frac{4}{x} = \frac{15}{75}\right]$

Third: Add UP Prop. $\frac{4+15}{15} = \frac{x+75}{75} \rightarrow \left[\frac{19}{15} = \frac{x+75}{75}\right]$

A2. Complete the statement and give the name of the property used in that statement.

a) $\frac{8}{9} = \frac{x}{y} \rightarrow \frac{17}{9} = \frac{?}{?}$

$\frac{17}{9} = \frac{x+y}{y}$

Add Up prop.

b) $\frac{12}{7} = \frac{x}{y} \rightarrow \frac{7}{12} = \frac{?}{?}$

$\frac{7}{12} = \frac{y}{x}$

Reciprocal prop.

c) $\frac{3}{10} = \frac{x}{y} \rightarrow \frac{3}{x} = \frac{?}{?}$

$\frac{3}{x} = \frac{10}{y}$

Interchange prop.

A3. In the diagram, $AB:BC$ is 3:8. Find AC.

$\frac{AB}{BC} = \frac{3}{8}$ $\quad \frac{426}{BC} = \frac{3}{8}$

$AC = AB + BC$
$AC = 426 + BC$
$= 426 + 1136 =$ **$AC = 1562$**

$BC = \frac{3408}{3} = 1136$

*cross multiply
$3(BC) = 8(4260)$
$3(BC) = 3408$

A4. Kelly bought a 3-D scale model of the Tower Bridge of London. The towers of the model are 9 inches tall. The actual towers are 206 feet tall and its walkways are 140 feet high.

a) What is the scale of the model?

$\frac{\text{Model}}{\text{Actual}} = \frac{9\text{in}}{206\text{ft}}$ or **9":206'**

1in : 22.89ft

* cannot reduce if different labels

b) How high should the model's walkway be?

$\frac{\text{Model}}{\text{Actual}}$ $\quad \frac{9\text{in}}{206\text{ft}} = \frac{X\text{in}}{140\text{ft}}$

$206X = 9(140)$

$\frac{206X}{206} = \frac{1260}{206}$

$X =$ **6.12 in**

A5. From Pittsfield to Leeville it is 24 miles.

a) Find the scale of the map.

P→L = 4.7cm

$\frac{4.7\text{cm}}{24\text{mi}} = \frac{1\text{cm}}{X\text{mi}}$ $\quad \frac{4.7X}{4.7} = \frac{24}{4.7}$

$X = 5.1$ **1cm:5.1mi**

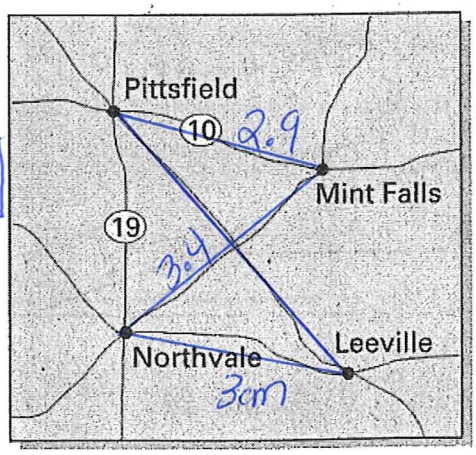
b) Find the actual distance to travel from Leeville to Northvale to Mint Falls to Pittsfield.

LN, NM, MP

3 + 3.4 + 2.9 = 9.3cm

$\frac{1\text{cm}}{5.1\text{mi}} = \frac{9.3\text{cm}}{X\text{mi}}$ $\quad 1X = (9.3)(5.1)$

$X =$ **47.43 miles**



Legend 1cm: 5.1cm

Section 6.2 Summary:

Measure the model, map, or drawing with a ruler then set up a proportion with the scale factor. Solve for the actual distance by cross multiply, then divide.

Look @ ex #4b and 5b