

Similarity Unit

7-1 Ratios and Proportions

Vocabulary

-Ratio, Proportion, Extended Ratio, Extremes, Means, Cross Product Property, Distributive Property

Ratio

A ratio is a comparison of two quantities by division. (It is usually a fraction!)

$\frac{2 \text{ cars}}{3 \text{ trucks}}$, $4/1$, etc

Extended Ratio

Compares 3 or more numbers!

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

Got It? The lengths of the sides of a triangle are in the extended ratio 4 : 7 : 9. The perimeter is 60 cm. What are the lengths of the sides?

Proportion

A **proportion** is an equation stating that two ratios are equal.

$\frac{2}{3} = \frac{8}{12}$ and $\frac{1}{2} = \frac{5}{10}$ are proportions.

$\frac{2 \text{ houses}}{3 \text{ apartments}} = \frac{x \text{ houses}}{9 \text{ apartments}}$

Cross Product Property

- Can be used to solve for a variable in proportions!
- Remember to use the distributive property if necessary!
- Complete the Examples

$$\frac{9}{2} = \frac{a}{14}$$

$$\frac{(x-4)}{(x-1)} = \frac{5}{10}$$

7-2 Similar Polygons

Vocabulary

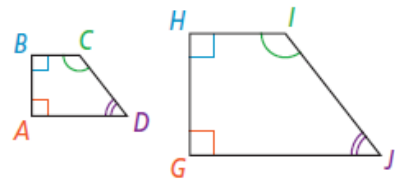
-Similar Polygons, Extended Proportion, Scale Factor

Similar Polygons

Two polygons are similar polygons if corresponding angles are congruent and if the lengths of corresponding sides are proportional.

$ABCD \sim GHIJ$. Draw a line from each angle in Column A to its corresponding angle in Column B.

- | Column A | Column B |
|---------------|------------|
| 6. $\angle A$ | $\angle H$ |
| 7. $\angle B$ | $\angle J$ |
| 8. $\angle C$ | $\angle G$ |
| 9. $\angle D$ | $\angle I$ |



10. Complete the extended proportion to show that corresponding sides of $ABCD$ and $GHIJ$ are proportional.

$$\frac{AB}{GH} = \frac{BC}{IJ} = \frac{\text{yellow box}}{\text{yellow box}} = \frac{AD}{\text{yellow box}}$$

Using Proportions

You make a scale drawing of a bridge using a 3 in = 15 ft scale. If the bridge is really 90 feet long, how long is your drawing?

Scale Factor

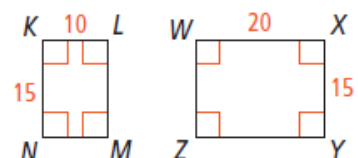
- Scale factor is the ratio of corres. sides of two similar figures.
- To see if polygon sides are proportional, you should:
 1. Create an extended proportion with sides
 2. Simplify each fraction
 3. Determine if they are proportional by check if they are all the same!

Is the following true?

$$\frac{8}{10} = \frac{4}{5} = \frac{7}{9}$$

Determining if Polygons are Similar

Got It? Are the polygons similar? If they are, write a similarity statement and give the scale factor.



7-3 Proving Triangles Similar

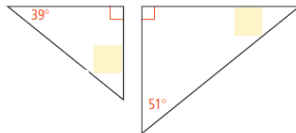
Vocabulary

-AA~, SAS~, SSS~, Indirect Measure

AA~

Angle-Angle Similarity (AA ~) Postulate If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

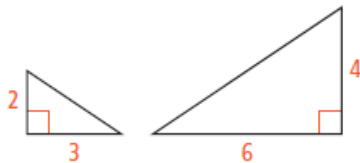
Write the postulate or theorem that proves the triangles similar.



SAS~

Side-Angle-Side Similarity (SAS ~) Theorem If an angle of one triangle is congruent to an angle of a second triangle, and the sides that include the two angles are proportional, then the triangles are similar.

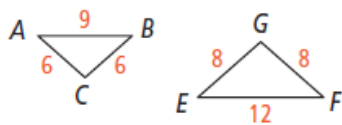
Write the postulate or theorem that proves the triangles similar.



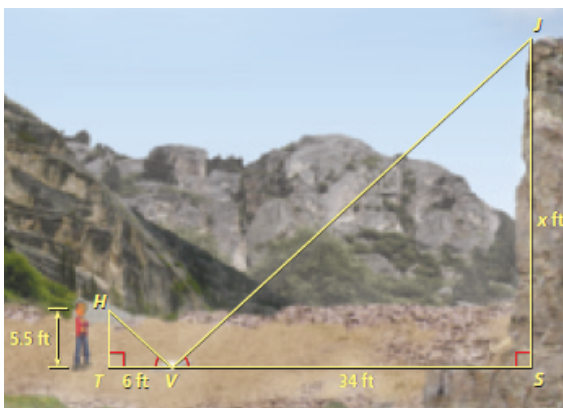
SSS~

Side-Side-Side Similarity (SSS ~) Theorem If the corresponding sides of two triangles are proportional, then the triangles are similar.

Write the postulate or theorem that proves the triangles similar.



Indirect Measure



1. Find a way to get two similar triangles using AA~, SAS~, or SSS~.
2. Set up a proportion for the missing measure.
3. Solve.

Are the two triangles in the picture similar? Why?

How tall is the cliff in the picture?

7-5 Proportions in Triangles

Vocabulary

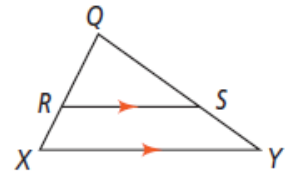
-Side Splitter Theorem, Triangle Angle Bisector Theorem

Side Splitter Theorem

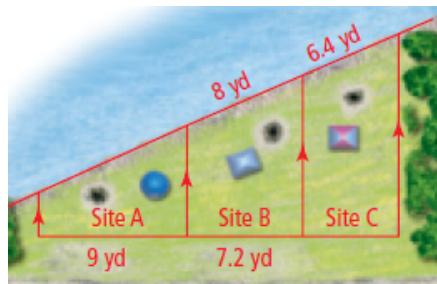
If a line is parallel to one side of a triangle and intersects the other two sides, then it divides those sides proportionally.

If $\overleftrightarrow{RS} \parallel \overleftrightarrow{XY}$, then $\frac{XR}{RQ} = \frac{\text{[]}}{SQ}$.

7. If $XR = 4$, $RQ = 4$, and $YS = 5$, then $SQ = \text{[]}$.



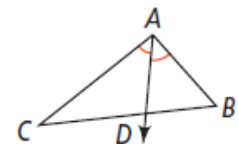
Got It? Camping Three campsites are shown in the diagram. What is the length of Site C along the road?



Triangle Angle Bisector Theorem

If a ray bisects an angle of a triangle, then it divides the opposite side into two segments that are proportional to the other two sides of the triangle.

If \overrightarrow{AD} bisects $\angle CAB$, then $\frac{CD}{DB} = \frac{CA}{BA}$.



What is the value of y in the diagram at the right?

