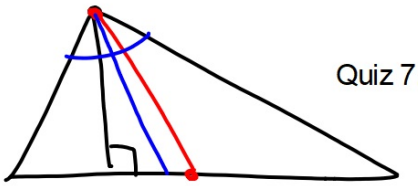
Geometry 7.5

Recognize and use proportional relationships of corresponding angle bisectors, altitudes, and medians of similar triangles

Use the triangle bisector theorem

- angle bisector
- altitude
- median
- construction

(?)



Quiz 7.3-7.4 Mon.

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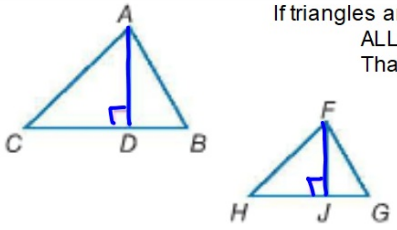
Theorems Special Segments of Similar Triangles

7.8 If two triangles are similar, the lengths of corresponding altitudes are proportional to the lengths of corresponding sides.

Abbreviation ~△s *have corr. altitudes proportional to corr. sides.*

Example If $\triangle ABC \sim \triangle FGH$, then $\frac{AD}{FJ} = \frac{AB}{FG}$.

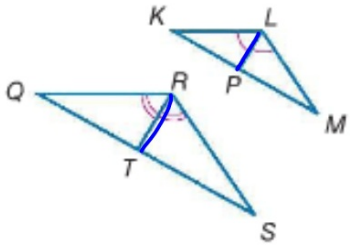


If triangles are similar...
ALL of their parts are in proportion!
That includes altitudes, medians, etc.

7.9 If two triangles are similar, the lengths of corresponding angle bisectors are proportional to the lengths of corresponding sides.

Abbreviation ~△s *have corr. ∠ bisectors proportional to corr. sides.*

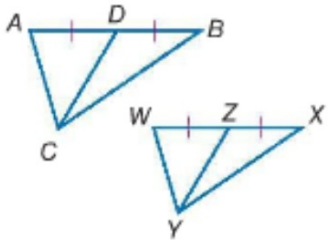
Example If $\triangle KLM \sim \triangle QRS$, then $\frac{LP}{RT} = \frac{LM}{RS}$.



7.10 If two triangles are similar, the lengths of corresponding medians are proportional to the lengths of corresponding sides.

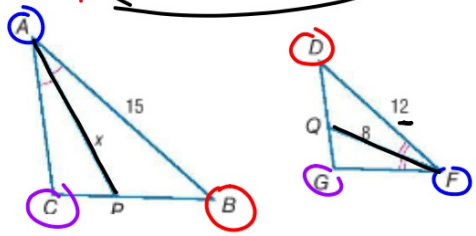
Abbreviation ~△s *have corr. medians proportional to corr. sides.*

Example If $\triangle ABC \sim \triangle WXY$, then $\frac{CD}{YZ} = \frac{AB}{WX}$.



Example 1 Use Special Segments in Similar Triangles

In the figure, $\triangle ABC \sim \triangle FDG$. Find the value of x.



$\frac{x}{8} = \frac{15}{12}$ $\frac{12x}{12} = \frac{120}{12}$ $x = 10$

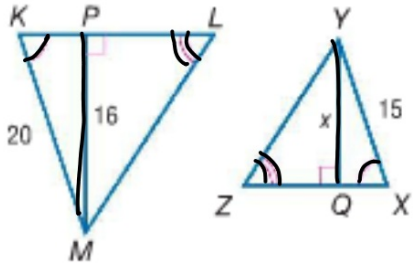
All parts are similar:
medians
angle bisectors
altitudes

Match up corresponding parts:
will be in proportion

~~0~~ 12

Find the value of x.

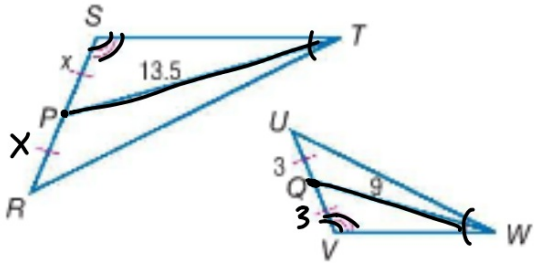
1A.



$\frac{16}{x} = \frac{20}{15}$

$\frac{20x}{20} = \frac{240}{20}$ $x = 12$

1B.



$\frac{13.5}{9} = \frac{x}{3}$ $x = 4.5$

$9x = 40.5$

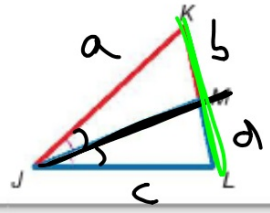
$\frac{JK}{KM} = \frac{JL}{ML}$ segments prop to sides

Theorem 7.11 Triangle Angle Bisector

An angle bisector in a triangle separates the opposite side into two segments that are proportional to the lengths of the other two sides.

Example If $\overline{JM}$ is an angle bisector of $\triangle JKL$,

then $\frac{KM}{LM} = \frac{KJ}{LJ}$. ← segments with vertex K ← segments with vertex L

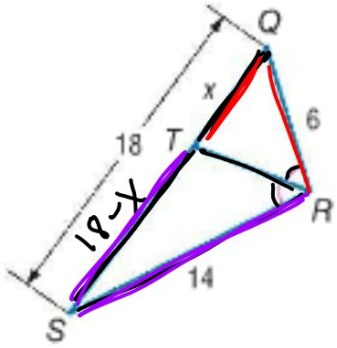


You will prove Theorem 7.11 in Exercise 25.

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

Example 3 Use the Triangle Angle Bisector Theorem

Find x.



$$\frac{6}{x} = \frac{14}{(18-x)}$$

$$14x = 6(18-x)$$

$$14x = 108 - 6x$$

$+6x \quad +6x$

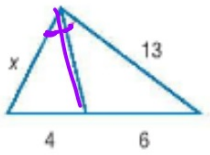
$$20x = 108$$

$$x = 5.4$$

GuidedPractice

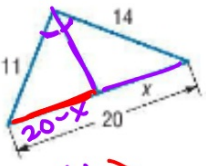
Find the value of x.

3A.



$\frac{x}{4} = \frac{13}{6}$

3B.



$\frac{11}{(20-x)} = \frac{14}{x}$

$11x = 14(20-x)$

$11x = 280 - 14x$ $\quad x = 11.2$

$25x = 280$

7.5 7-23 all
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(no constr.)