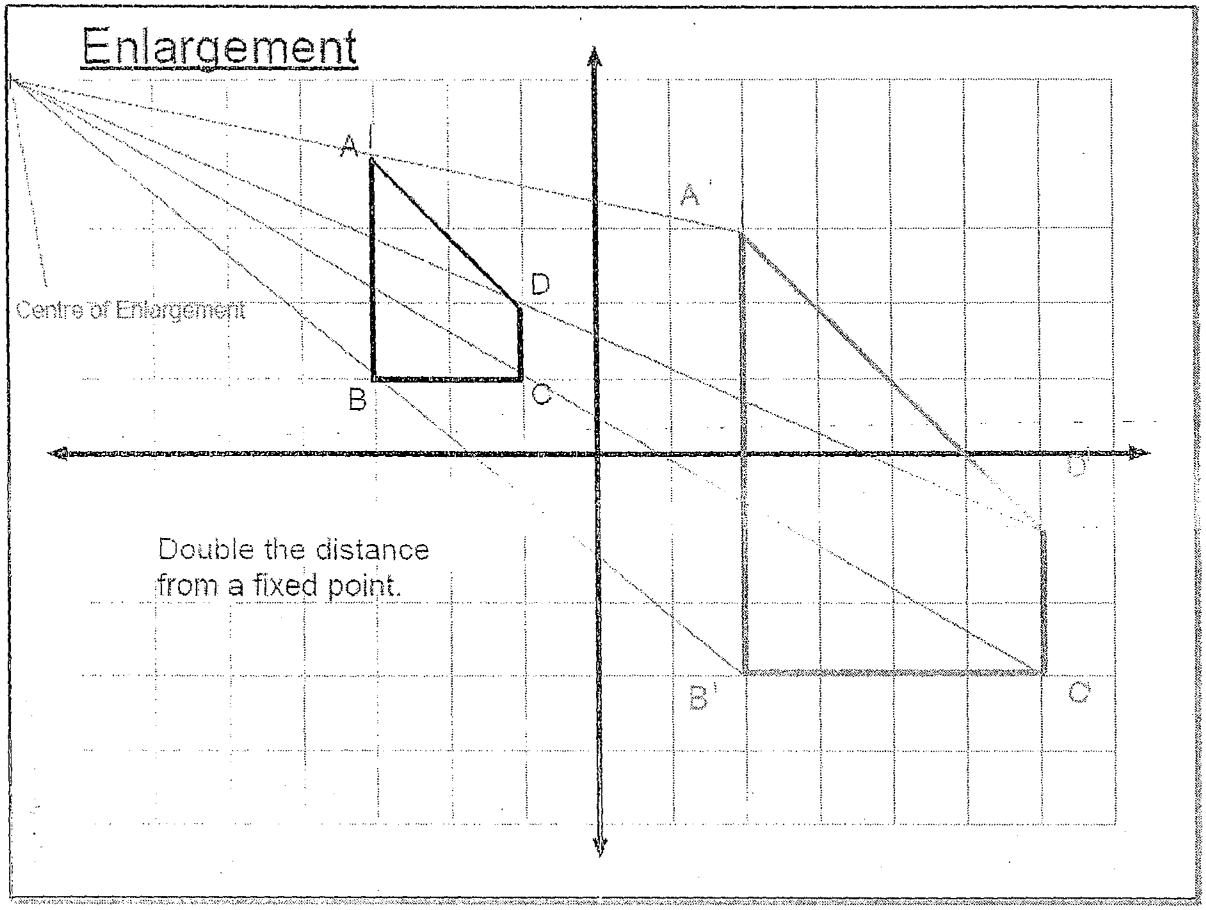
(2)

Name: ____________ Date: ____________

Similarity



ABCD ~ A'B'C'D'

What makes polygons similar?

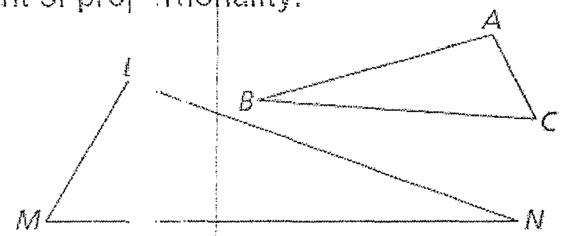
1.

2.

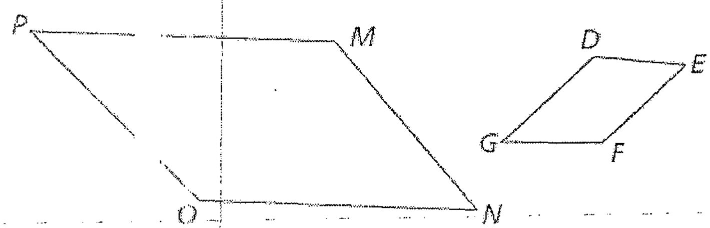
1.

List all pairs of congruent angles. Then write the ratios of the corresponding side lengths in a statement of proportionality.

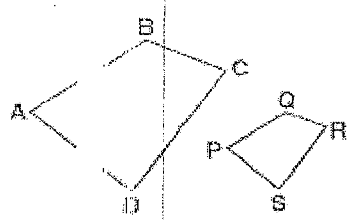
1. $\triangle LNM \sim \triangle ABC$



2. $DEFG \sim MNOP$



2.



If quadrilateral $ABCD \sim$ quadrilateral $PQRS$, $AD = 7$, $AB = 5x - 1$, $PS = 4$, and $PQ = 2x + 2$, then find the value of x.

3. The sides of a triangle are 4, 8, and 10. If the longest side of a similar triangle measures 30, find the *shortest* side.

4. If $\triangle RST \sim \triangle ABC$, $m\angle A = x^2 - 8x$, $m\angle C = 4x - 5$, and $m\angle R = 5x + 30$, find $m\angle C$.

5. A triangle has sides whose lengths are 5, 12, and 13. A similar triangle could have sides with lengths of

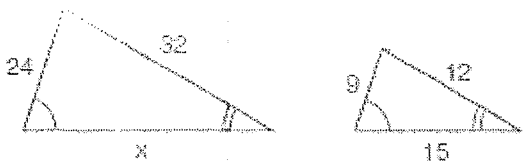
1) 3, 4, and 5

2) 6, 8, and 10

3) 7, 24, and 25

4) 10, 24, and 26

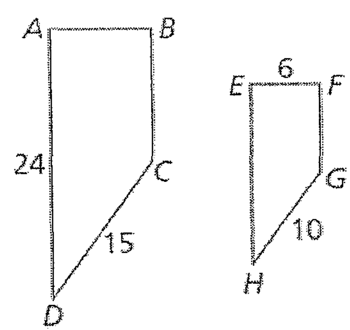
6. The accompanying diagram shows two si ilar triangles.



Find x.

7.

In the diagram, *ABCD* ~ *EFGH* Find the following.

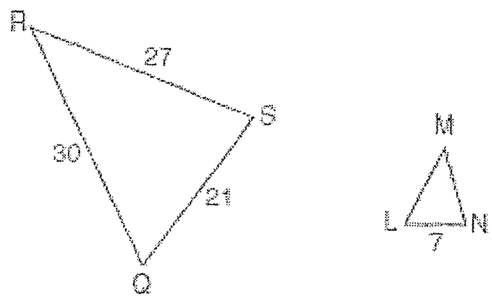


4. scale factor

5. EH

6. AB

. . In the accompanying diagram, $\triangle QRS$ is similar to $\triangle LMN$, $RQ = 30$, $QS = 21$, $SR = 27$, and $LN = 7$. What is the length of $\overline{ML}$?



9.

The sides of a triangle are 3, 4, and 5. Find the length of the *shortest* side of a similar triangle whose longest side has length 20.

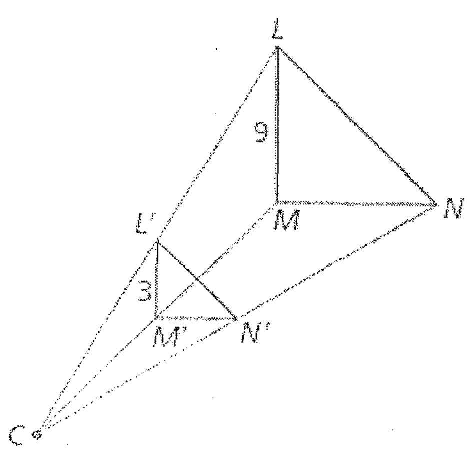
10.

Pittsburgh, Pennsylvania and State College, Pennsylvania are 9.8 inches apart on a map that has a scale showing 1.1 inches equal to 15 miles. How far apart are the cities in real life?

11.

The sides of a pentagon are 5, 8, 9, 11, and 17. What is the length of the *longest* side of a similar pentagon whose shortest side is 10

12. Find the scale factor of the dilation



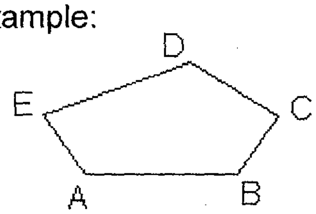
Name______________________________ Date________________________

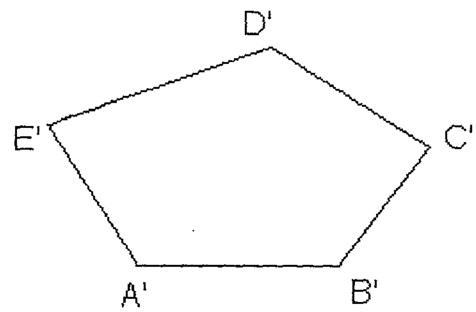
Geometry

Similar Polygons

Definition:

Example:





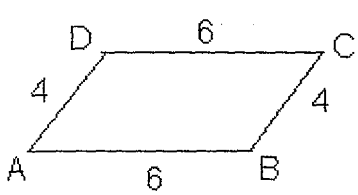
In general, two polygons are similar if:

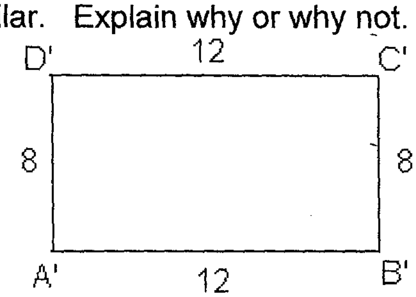
1)

2)

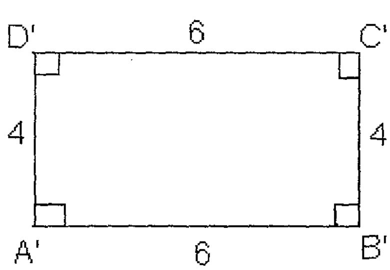
Example: State if the following figures are similar. Explain why or why not.

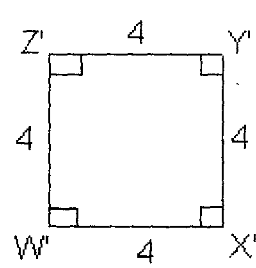
a)





b)





The ratio of the lengths of corresponding sides of similar polygons is called the _______ _________________________ of the polygons.

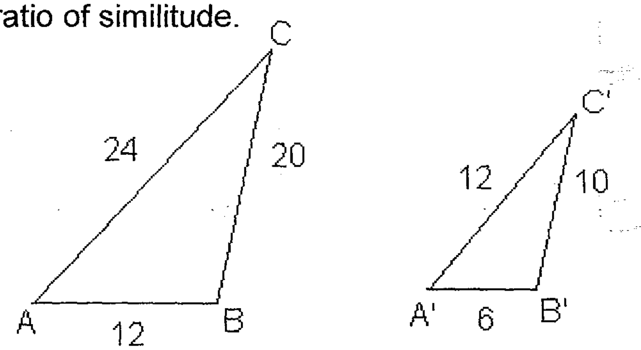
The number represented by the ____________________ is called the _____________ ___________________________.

Since triangles are also polygons, the definition given for two similar polygons will also apply to two similar triangles.

Definition:

Example 1:

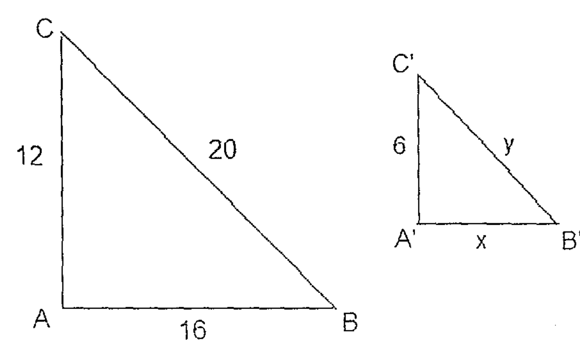
In the figure, $\Delta ABC \sim \Delta A'B'C'$ Find the ratio of similitude.



Example 2:

$\Delta ABC \sim \Delta A'B'C'$ and $A'C'$ corresponds to AC.

(a) Find the ratio of similitude of the larger triangle to the smaller.



(b) Find x and y.

We have seen that, if two triangles are similar, their corresponding sides are __________ ____________________________. We are going to examine the lengths of special segments related to triangles.

Draw a diagram for each:

<u>Theorem</u>: If two triangles are similar, the lengths of corresponding altitudes have the same ratio as the lengths of any two corresponding sides.

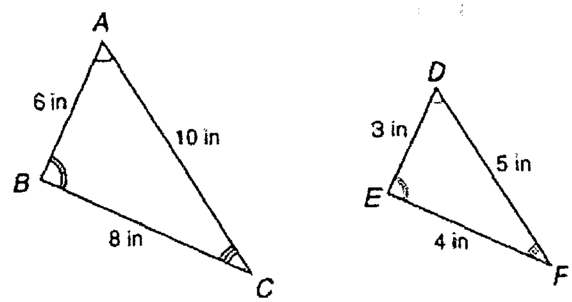
<u>Theorem</u>:

<u>Theorem</u>:

<u>Review Theorem</u>: Any two medians of a triangle intersect in a point that divides each median in the ratio ____________.

Perimeter, Area, and Volume

a) Find the ratio of similitud for the following similar triangles:

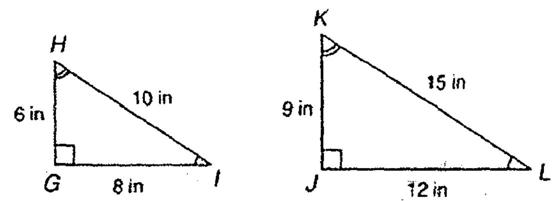


b) Find the perimeters of Δ 3C and Δ*DEF*.

Is there a relationship between arts (a) and (b)?

Theorem:

c) Find the ratio of similitu for the following triangles:

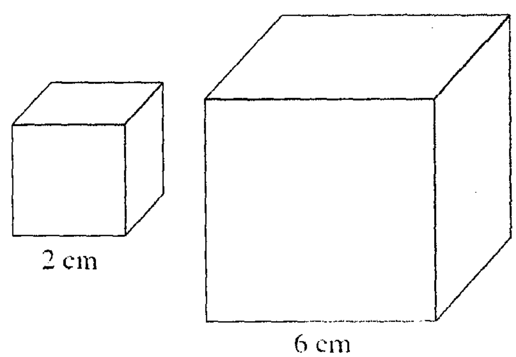


d) Find the areas of each angle.

Is there a relationship betwee parts (c) and (d)?

Theorem:

e) Find the ratio of similit e for the following cubes.



f) Find the volumes of e h cube.

Is there a relationship betwe parts (e) and (f)?

Theorem:

(3)

Name________________________________ Date__________________

Geometry

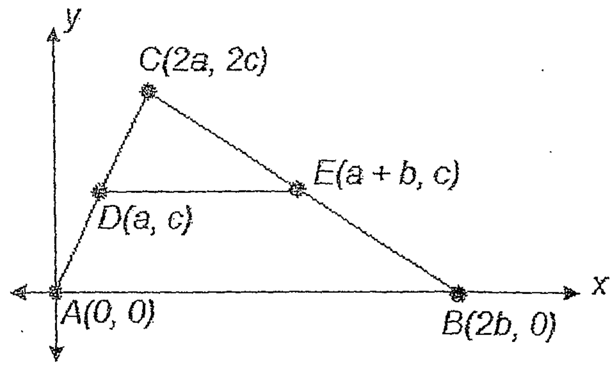
Midsegment Theorem

Using coordinate geometry prove the following:

Given: ΔABC, D is the midpoint of $\overline{AC}$, and

E is the midpoint of $\overline{BC}$.

Prove: $\overline{DE} \parallel \overline{AB}$ and $DE = \frac{1}{2}AB$

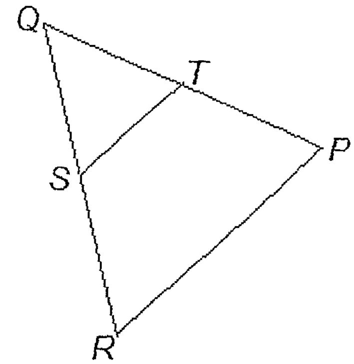


④

Name______________________________ Date__________________

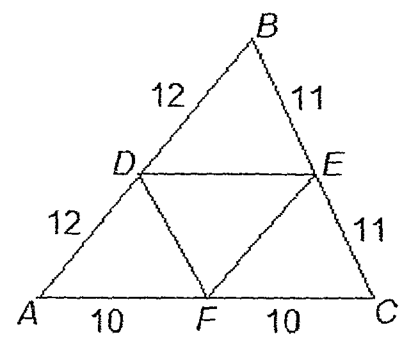
Geometry

Proportions Involving Line Segments Practice

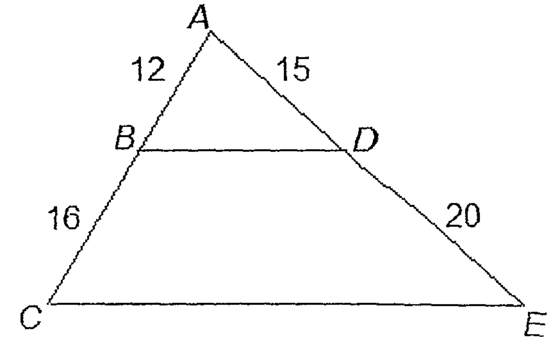


1) In ΔPQR, S is the midpoint of $\overline{RQ}$ and T is the midpoint of $\overline{PQ}$. $RP = 7x + 5$, $ST = 4x - 2$, $SR = 2x + 1$, and $PQ = 9x + 1$. Find ST, RP, SR, RQ, PQ, and TQ.

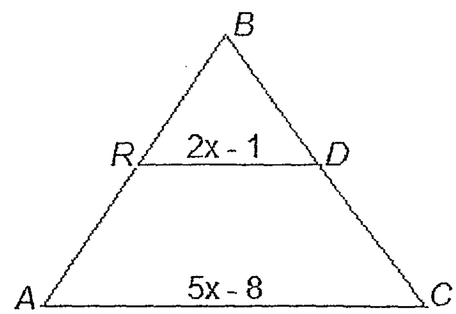
2) In ΔABC, points D, E, and F are the midpoints of the sides with the measures shown. Find the measure of the perimeter of ΔDEF.



3) In $\triangle AEC$, if $AB = 12$, $BC = 16$, $AD = 15$, and $DE = 20$, is $\overline{BD} \parallel \overline{CE}$?



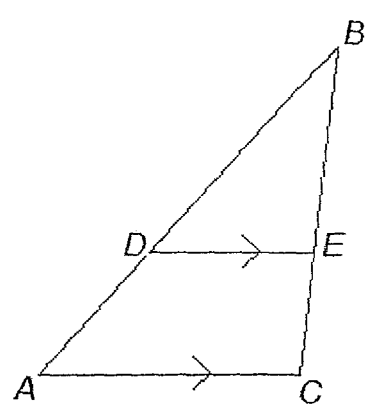
4) In $\triangle ABC$, R is the midpoint of $\overline{AB}$, and D is the midpoint of $\overline{BC}$.
If $AC = 5x - 8$, $RD = 2x - 1$, $DC = 3x + 2$, and $AB = 10x - 1$, find the lengths of AB, AC, DC, and RD.



5) In $\triangle ABC$, if $\overline{DE} \parallel \overline{AC}$, which of the following are true?

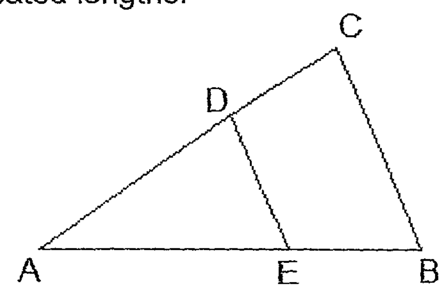
(a) $\dfrac{BD}{BA} = \dfrac{BE}{BC}$ (c) $\dfrac{BA}{DA} = \dfrac{BC}{EC}$

(b) $\dfrac{BD}{DA} = \dfrac{BE}{EC}$ (d) $\dfrac{BD}{BA} = \dfrac{DE}{AC}$



For 6 and 7, use ΔABC with D a point on $\overline{AC}$ and E a point on $\overline{AB}$ such that $\overline{DE} \parallel \overline{BC}$.

In each instance, write an algebraic equation to find the indicated lengths.



6) If $AD = 1$, $DC = x$, $AE = x$ and $EB = x + 2$, find DC.

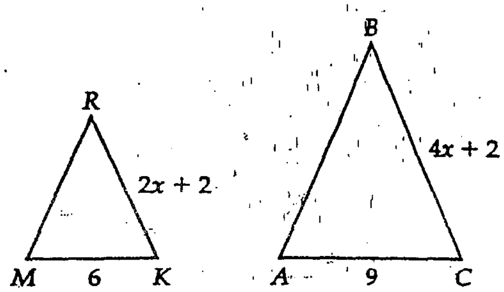
7) If $ED = x$, $DA = 6$, $CB = 6$, and $CD = x - 1$, find ED.

5

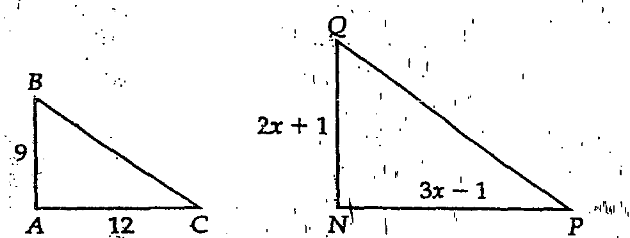
Name ______________________ Date ____________________

Geometry Pd. ______ Proportions/Similar Triangles

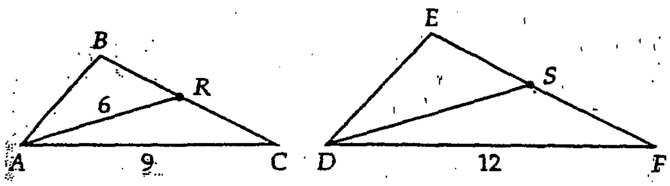
12 $\triangle RMK \sim \triangle BAC$. Find RK and BC



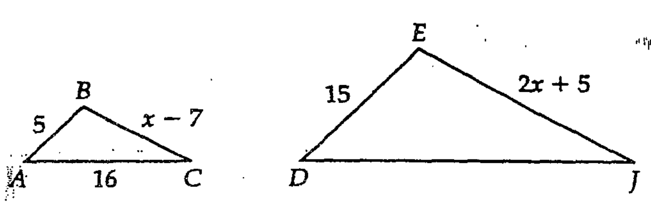
13 $\triangle ABC \sim \triangle NQP$. Find NQ and NP.



14 The two figures below are similar. Find the length of DS.

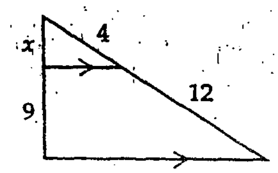


15 $\triangle ABC \sim \triangle DEJ$. Find these lengths: DJ, BC, EJ.

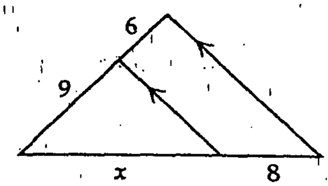


16 In each diagram, the line segment within the triangle is parallel to the third side. Find x in each case:

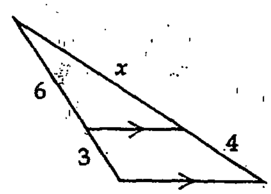
a



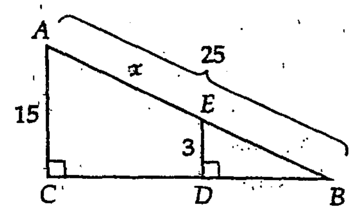
b



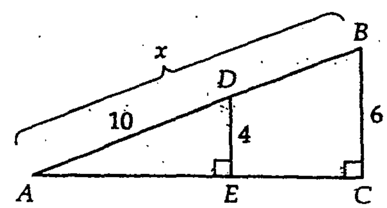
c



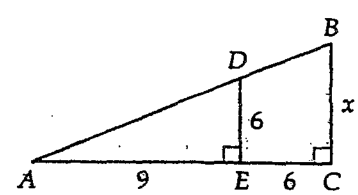
d



e



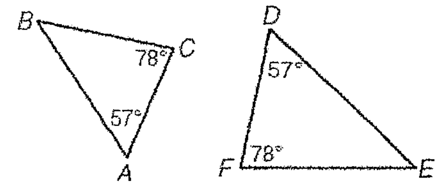
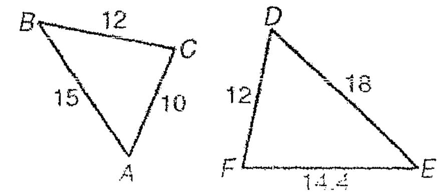
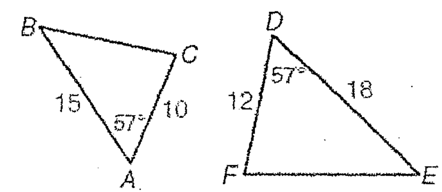
f



(6)

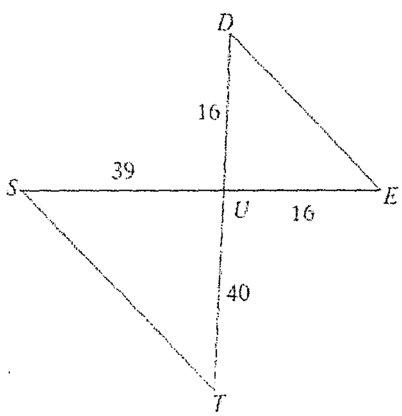
Name: ____________________ Date: __________

Triangle Similarity Shortcuts

Angle-Angle (AA) Similarity	If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.	 $\triangle ABC \sim \triangle DEF$
Side-Side-Side (SSS) Similarity	If the three sides of one triangle are proportional to the three corresponding sides of another triangle, then the triangles are similar.	 $\triangle ABC \sim \triangle DEF$
Side-Angle-Side (SAS) Similarity	If two sides of one triangle are proportional to two sides of another triangle and their included angles are congruent, then the triangles are similar.	 $\triangle ABC \sim \triangle DEF$

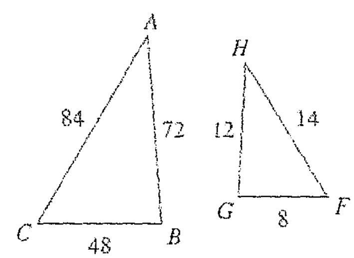
State if the triangles in each pair are similar. If so, state how you know they are similar and complete the similarity statement.

1)



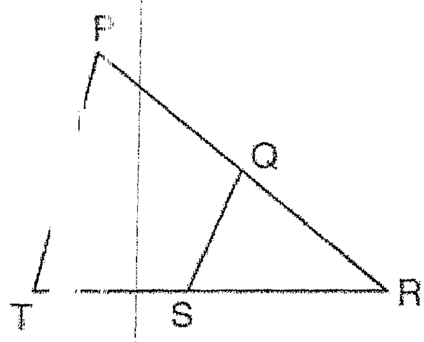
$\Delta UTS \sim$ ______

2)



$\Delta CBA \sim$ ______

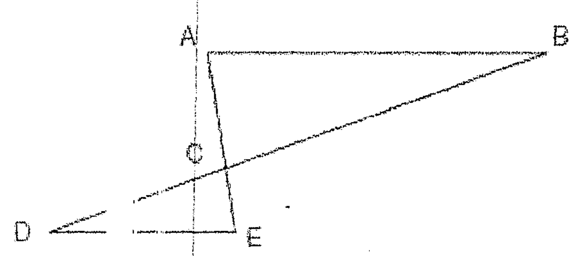
3. In the diagram below of $\triangle PRT$, Q is a point on $\overline{PR}$, S is a point on $\overline{TR}$, $\overline{QS}$ is drawn, and $\angle RPT \cong \angle RSQ$.



Which reason justifies the conclusion that $\triangle PRT \sim \triangle SRQ$?

1) AA
2) ASA
3) SAS
4) SSS

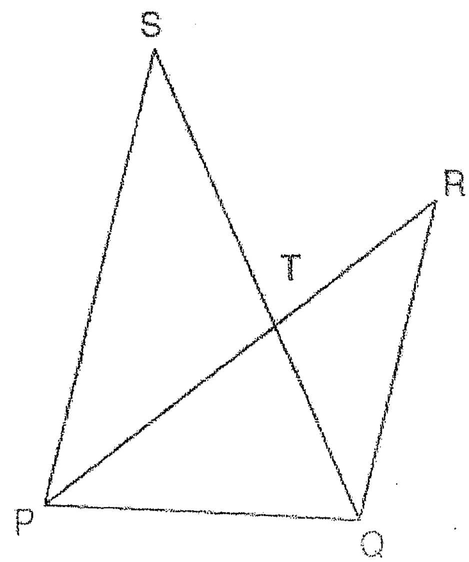
4. In the diagram of $\triangle ABC$ and $\triangle EDC$ below, $\overline{AE}$ and $\overline{BD}$ intersect at C, and $\angle CAB \cong \angle CED$.



Which method can be used to show that $\triangle ABC$ must be similar to $\triangle EDC$?

1) SAS
2) AA
3) SSS
4) HL

. In the diagram below, $\overline{SQ}$ and $\overline{PR}$ intersect at *T*, $\overline{PQ}$ is drawn, and $\overline{PS} \parallel \overline{QR}$.



What technique can be used to prove that $\Delta PST \sim \Delta RQT$?

1) SAS
2) SSS
3) ASA
4) AA

6. In triangles *ABC* and *DEF*, $AB = 4$, $AC = 5$, $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$. Which method could be used to prove $\Delta ABC \sim \Delta DEF$?

1) AA
2) SAS
3) SSS
4) ASA

7. In ΔABC and ΔDEF, $\frac{AC}{DF} = \frac{CB}{FE}$. Which adc ional information would prove $\Delta ABC \sim \Delta DEF$?

1) $AC = DF$

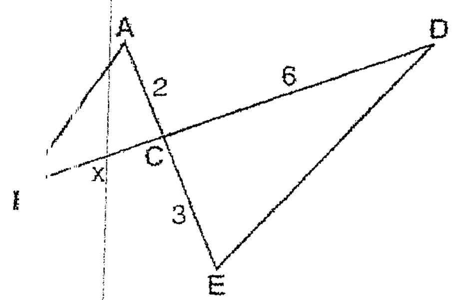
2) $CB = FE$

3) $\angle ACB \cong \angle DFE$

4) $\angle BAC \cong \angle EDF$

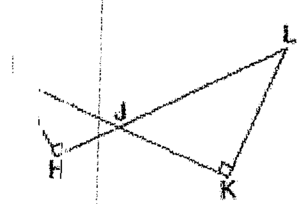
8.

In the accompanying diagram, $\overline{A\ \ CE}$, $\overline{BCD}$, and $\overline{AB} \parallel \overline{DE}$. If AC = 2, CD = 6, and CE = 3, what is the length of $\overline{BC}$



9.

In the accompanying diagram, ΔIH ~ ΔLKJ.



If IH = 5, HJ = 2, and LK = 7, fin KJ.

10.

Complete the following when $\Delta IJK \sim \Delta LMN$.

a) $m\angle K = m\angle$ _____

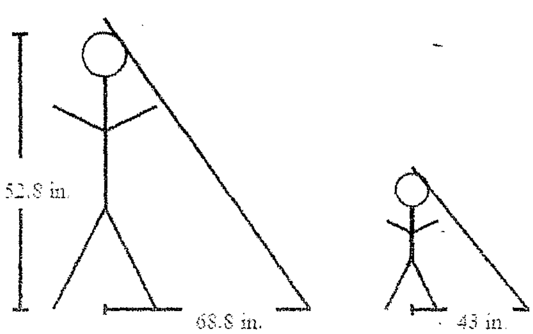
b) $\dfrac{KI}{JI} = \dfrac{NL}{?}$

11.

In ΔQRS, $QR=7$, $RS=13$, and $m\angle R=46$. In ΔUVT, $VT=14$, $TU=28$, and $m\angle T=46$. State whether the triangles are similar, and if so, write a similarity statement.

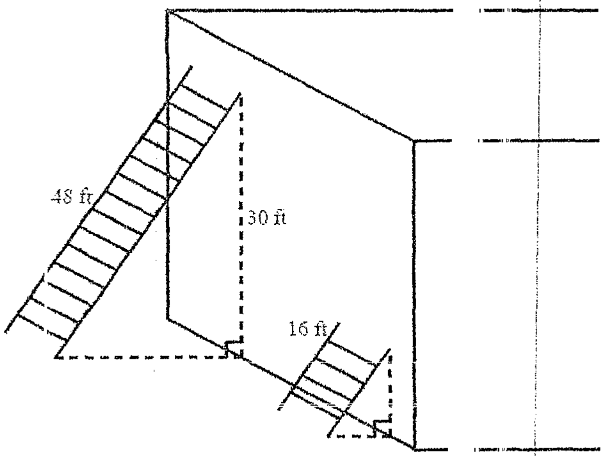
12.

At the same time of day, a man who is 52.8 inches tall casts a 68.8-inch shadow and his son casts a 43-inch shadow. What is the height of the man's son?



13.

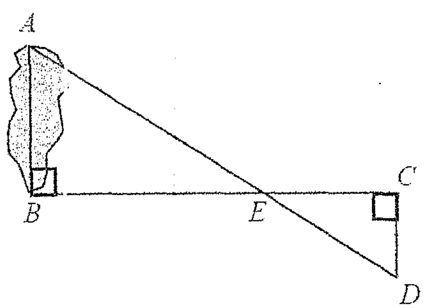
Two ladders are leaning against a wall at the same angle as shown. How far up the wall does the shorter ladder reach?



[A] 8 ft [B] 10 ft [C] 6 ft [D] 20 ft

14.

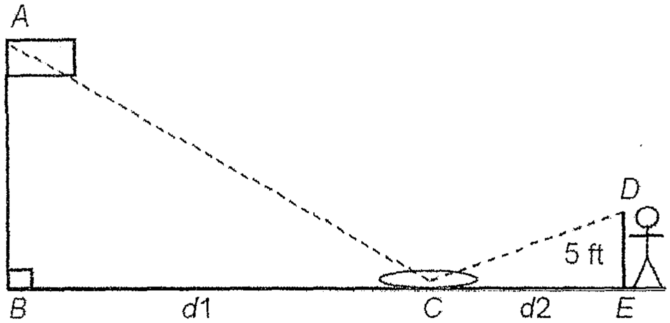
To find the distance across the lake in the figure below, which of the following proportions can you use?



[A] $\frac{BE}{CE} = \frac{AB}{CD}$ [B] $\frac{BE}{EC} = \frac{CD}{AB}$ [C] $\frac{AB}{BE} = \frac{CD}{DE}$ [D] $\frac{AB}{AE} = \frac{DE}{CD}$

15.

Karen wanted to measure the height of her school's flag pole. She placed a mirror on the ground $d1$ feet from the flag pole, then walked backwards until she was able to see the top of the pole in the mirror. Her eyes were 5 ft above the ground and she was $d2$ ft from the mirror. Using similar triangles, find the height of the flagpole if $d1 = 42$ ft and $d2 = 8$ ft. Round your answer to the nearest hundredth.

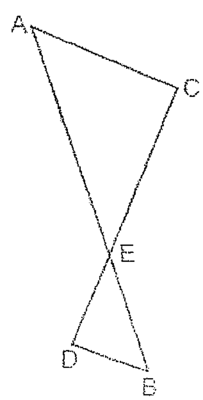


16.

In ΔQRS, $QR=7$, $RS=13$, and $m\angle R=46$. In ΔUVT, $VT=14$, $TU=28$, and $m\angle T=46$. State whether the triangles are similar, and if so, write a similarity statement.

17.

As shown in the diagram below, $\overline{AB}$ and $\overline{CD}$ intersect at E, and $\overline{AC} \parallel \overline{BD}$.



Given $\triangle AEC \sim \triangle BED$, which equation is true?

(1) $\frac{CE}{DE} = \frac{EB}{EA}$

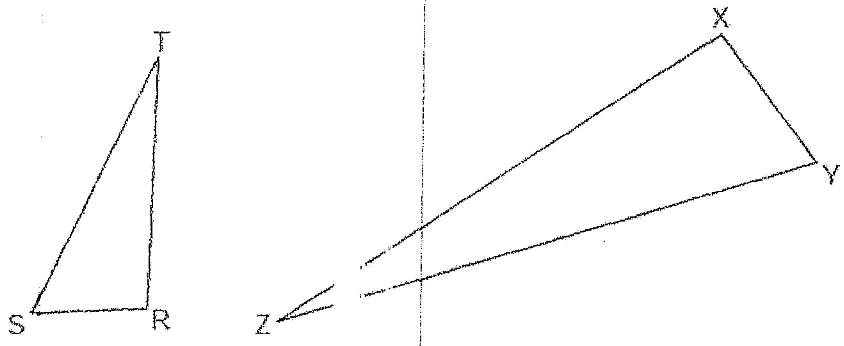
(2) $\frac{AE}{BE} = \frac{AC}{BD}$

(3) $\frac{EC}{AE} = \frac{BE}{ED}$

(4) $\frac{ED}{EC} = \frac{AC}{BD}$

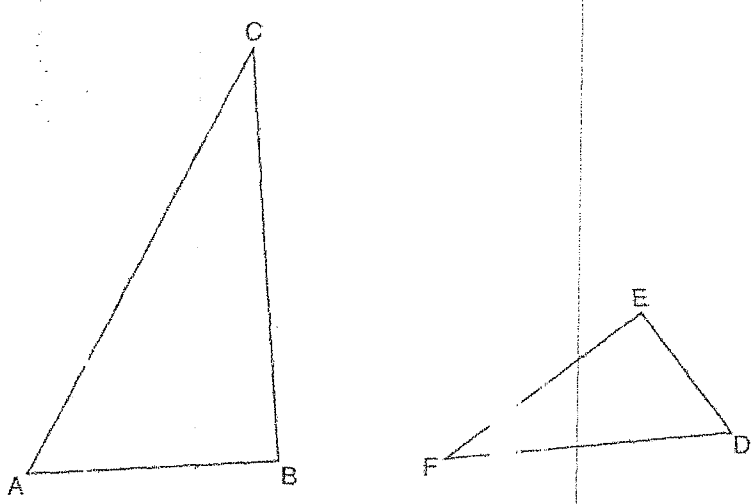
18.

Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.



19.

Triangles ABC and DEF are drawn below.



If $AB = 9$, $BC = 15$, $DE = 6$, $EF =$ [illegible], and $\angle B \cong \angle E$, which statement is true?

(1) $\angle CAB \cong \angle DEF$

(2) $\frac{AB}{CB} = \frac{FE}{DE}$

(3) $\triangle AB$[illegible] $\sim \triangle DEF$

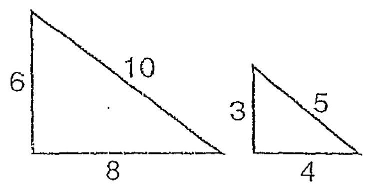
(4) $\frac{AB}{DE} = \frac{[illegible]E}{[illegible]B}$

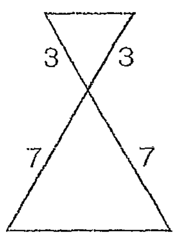
Name: ______________________________ Date ______________

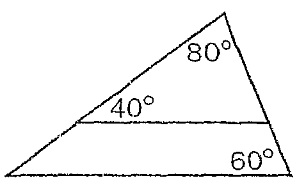
ometry Pd. __________ Triangle Similarity

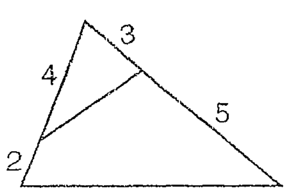
Questions 1 through 7 refer to the following:

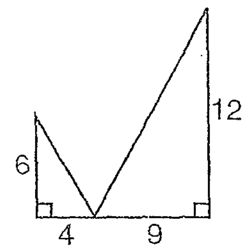
Determine whether the two triangles are similar and, if they are similar, state a reason.

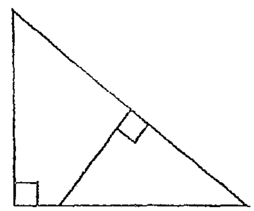
1) 

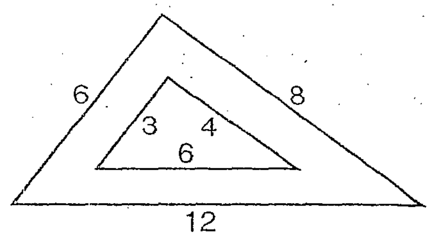
2) 

3) 

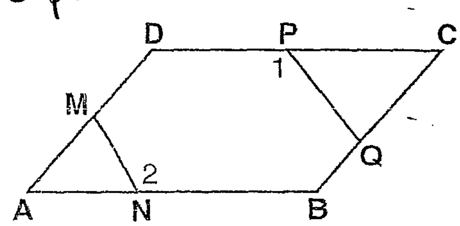
4) 

5) 

6) 

7) 

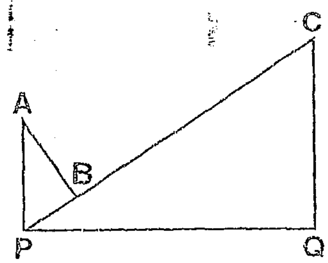
★Write proofs on separate paper.★

8) 

Given: ABCD is a parallelogram

$\angle 1 \cong \angle 2$

Prove: $\frac{MN}{PQ} = \frac{AN}{PC}$

9) 

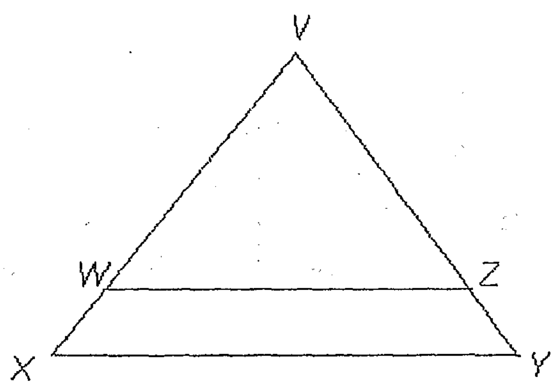
Given: $\overline{AP} \perp \overline{PQ}$
$\overline{CQ} \perp \overline{PQ}$
$\overline{AB} \perp \overline{PC}$

Prove: $AP \cdot QC = PB \cdot PC$

10)

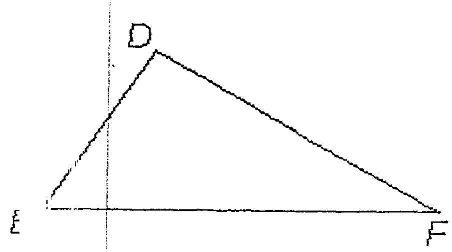
Given: $\dfrac{VW}{VX} = \dfrac{VZ}{VY}$

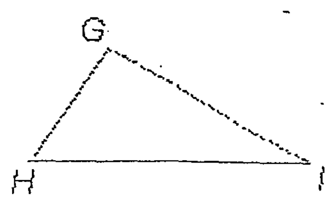
Prove: $\overline{WZ} \parallel \overline{XY}$



11) Given: $\dfrac{DE}{GH} = \dfrac{DF}{GI} = \dfrac{EF}{HI}$

Prove: $\angle E \cong \angle H$

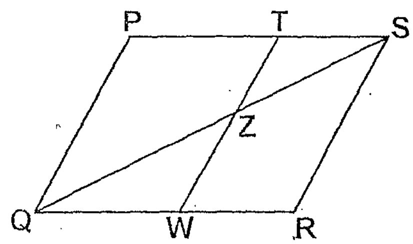




Name: ______________________ Date ______________________

eometry Pd. __________ Similar Triangle Proofs

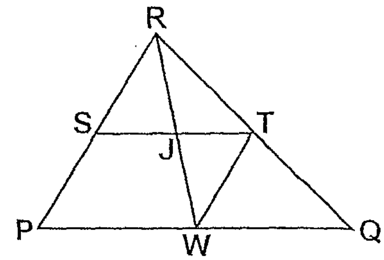
1)



Given: $\overline{PS} \parallel \overline{QR}$, with diagonal $\overline{QS}$.
$\overline{QS}$ and $\overline{TW}$ intersect at Z.

Prove: $\triangle TSZ \sim \triangle QWZ$

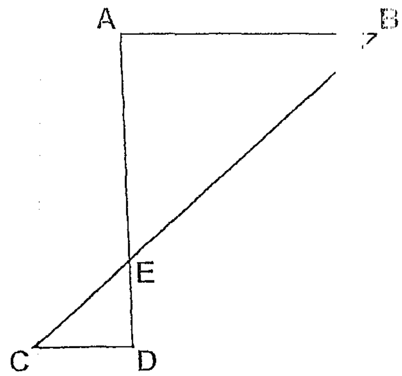
2)



Given: $\overline{RP} \parallel \overline{TW}$

Prove: $RS \cdot TJ = TW \cdot SJ$

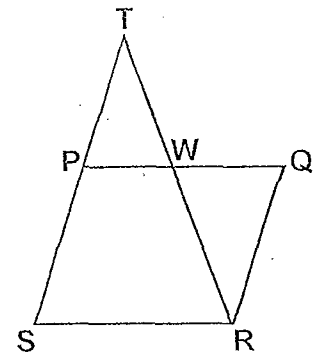
3)



Given: $\overline{AB} \parallel \overline{CD}$

Prove: $\frac{AE}{ED} = \frac{BE}{CE}$

4)



Given: $\overline{TS} // \overline{QR}$ with $\overline{SPT}$ and $\overline{TWR}$

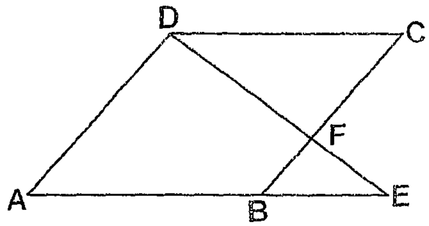
Prove: $\frac{PT}{PW} = \frac{QR}{QW}$

8 Hw

Name: ______________________ Date ____________

eometry Pd. ________

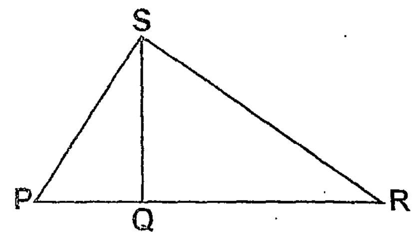
1)



Given: $\overline{DC} \parallel \overline{ABE}$, ABE, $\overline{DFE}$, $\overline{BFC}$

Prove: $\triangle DFC \sim \triangle EFB$

2)

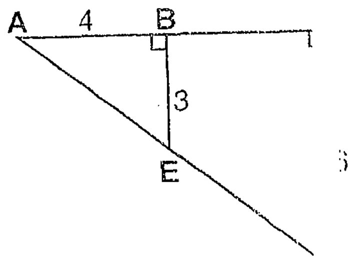


Given: Right $\triangle PSR$ with altitude $\overline{SQ}$ drawn to hypotenuse $\overline{PR}$

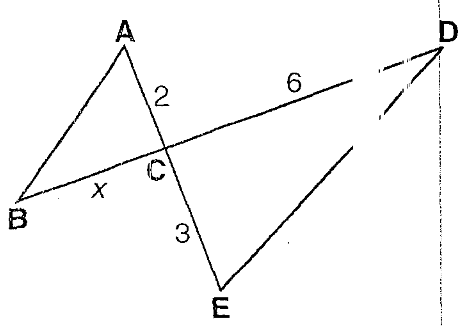
Prove: a) $\frac{PR}{PS} = \frac{PS}{PQ}$

b) $PR \cdot PQ = PS \cdot PS$

3) In the accompanying figure, $\overline{AB} \perp \overline{BE}$, $\overline{AC} \perp \overline{CD}$, AB = 4, BE = 3, and CD = 6. Find the length of $\overline{AC}$.



4) In the accompanying diagram, $\overline{ACE}$, $\overline{BCD}$, and $\overline{AB} \parallel \overline{DE}$. If AC = 2, CD = 6, and CE = 3, what is the length of $\overline{BC}$.

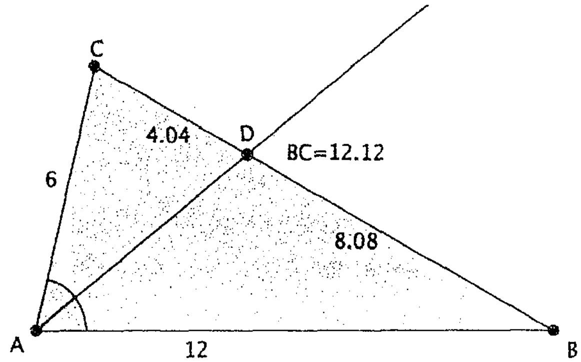


5) In triangle ABC, D is a point on $\overline{AB}$ and E is a point on $\overline{AC}$ such that $\overline{DE} \parallel \overline{BC}$. If AD = 2, DB = x - 1, AE = x, and EC = $x+2$. find AE.

9

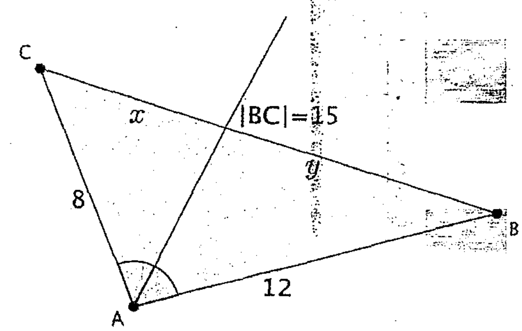
ussion

ue diagram below, the angle bisector of in meets side at point . Does the angle bisector create any observable lationships with respect to the side lengths of the triangle?

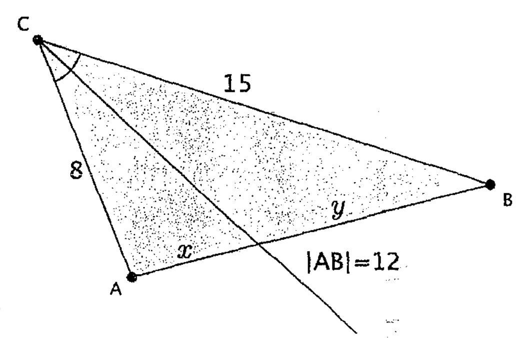


ractice:

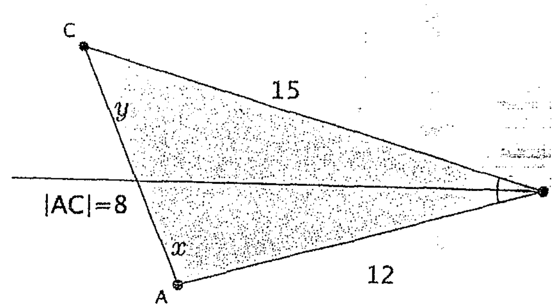
The sides of a triangle are 8,12, and 15. An angle bisector meets the side of length 15. Find the lengths x and y. Explain how you arrived at your answers.



The sides of a triangle are 8,12 , and 15. An angle bisector meets the side of length 12. Find the lengths x and y.



The sides of a triangle are 8,12, and 15. An angle bisector meets the side of length 8. Find the lengths x and y.



The angle bisector of an angle splits the opposite side of a triangle into lengths 5 and 6. The perimeter of the triangle is 33. Find the lengths of the other two sides.

The sides of a triangle are 10.5, 16.5, and 9. An angle bisector meets the side of length 9. Find the lengths of the segments of the side of 9.

In the diagram of triangle DEF below, DC is an angle bisector, ED = 8, DF = 6, and 8 1/6 . Find FG and EG.