Example: Y varies jointly with x and z and inversely with w. If $y = 3$, $x = 2$, $z = 3$ and $w = 4$, find y when $x = 4$, $z = 3$ and $w = 5$

$$y = \frac{kxz}{w} \qquad y = \frac{kxz}{w}$$
$$3 = \frac{k(2)(3)}{4} \qquad y = \frac{(2)(4)(3)}{5}$$
$$12 = k(6) \qquad y = \frac{24}{5}$$
$$2 = k \qquad y = 4.8$$

*You try these:

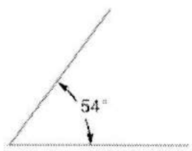
114. Y varies jointly with x and z and inversely with w. If $y = 5$, $x = 2$, $z = 3$ and $w = 1$, find y when $x = 3$, $z = 2$ and $w = 3$ $\boxed{y = 5/3}$

115. Y varies jointly with x and z and inversely with w. If $y = 5$, $x = 4$, $z = 3$ and $w = 2$, find z when $y = 4$, $x = 3$ and $w = 6$ $\boxed{z = 48/5}$

<u>Unit 4 – Similarity & Congruence</u>

Classifying Triangles

- Classify by the Angles
  - Acute



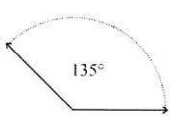
Example: A triangle can be any of the following combinations:

Scalene Acute	Equilateral Acute
Scalene Right	Equilateral Right
Scalene Obtuse	Equilateral Obtuse
Isosceles Acute	
Isosceles Right	
Isosceles Obtuse	

*Name the triangle by its sides and by its angles.

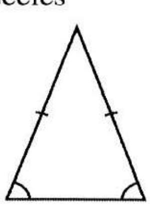
  - Right

  - Obtuse

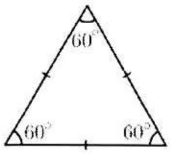


- Classify by the Sides
  - Scalene

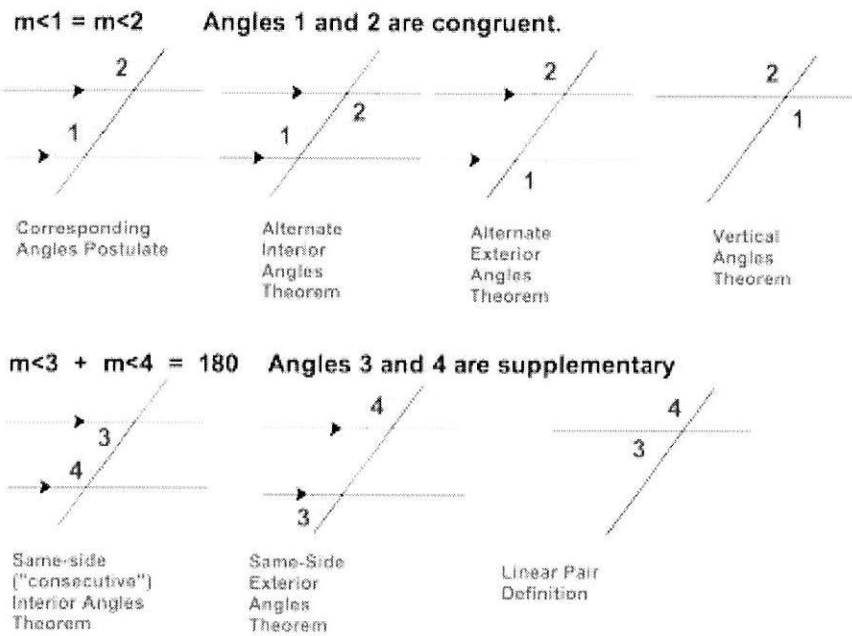
  - Isosceles



- Equilateral

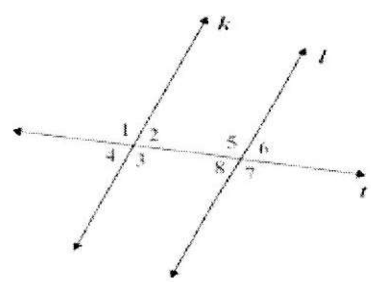


Angle Pair Relationships



Transversals

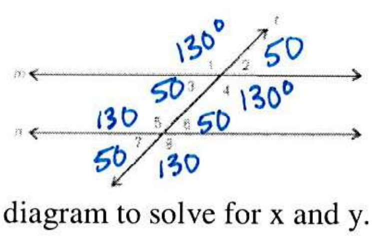
Example: The $m\angle 1 = 110°$. Find the measures of the other seven angles.



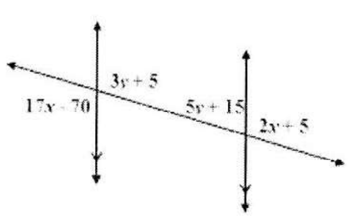
$m\angle 2 = 70°$ $m\angle 5 = 110°$
$m\angle 3 = 110°$ $m\angle 6 = 70°$
$m\angle 4 = 70°$ $m\angle 7 = 110°$
$m\angle 8 = 70°$

Some for you to try:

116. In the diagram, $m\angle 4 = 130°$. Find the measure of the other seven angles.



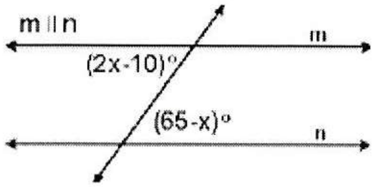
117. Use the diagram to solve for x and y.



$5y + 15 + 3y + 5 = 180$
$8y + 20 = 180$
$8y = 160$
$y = 20$

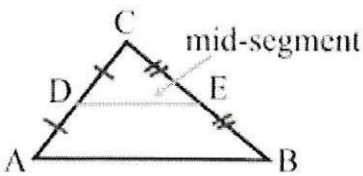
$2x + 5 = 17x - 70$
$75 = 15x$
$x = 5$

118. Solve for x.



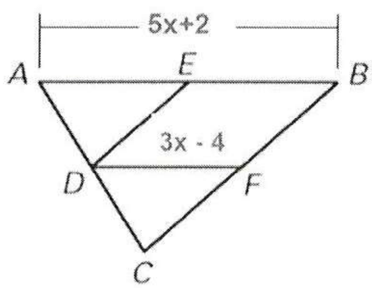
$2x-10=65-x$
$3x=75$
$x=25$

Midsegments



- The midsegment is a segment that connects the midpoints of two sides of a triangle.
- Every triangle has 3 midsegments.
- Each midsegment is parallel to its third side (the side that isn't connected to the midsegment).
- The midsegment is half as long as its parallel side.

Example: Solve for x.



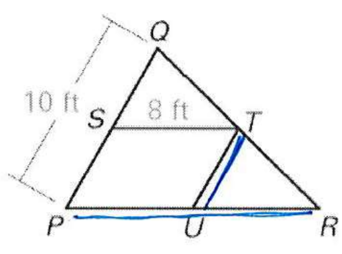
I know that $\overline{DF}$ is double the length of $\overline{AB}$, so I can set up this equation:

$$2 * (3x-4) = 5x+2$$
$$6x-8 = 5x+2$$
$$x = 10$$

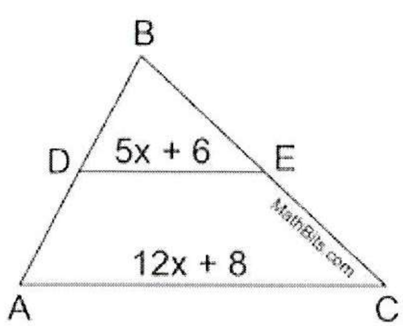
Some for you to try:

119. Find the lengths of $\overline{TU}$ and $\overline{PR}$.

$TU=5$
$PR=16$



120. Solve for x.



$2(5x+6)=12x+8$
$10x+12=12x+8$
$4=2x$
$2=x$

$DE = 5(2)+6 = 16$

$AC = 12(2)+8 = 32$

121. Use the diagram in #~~15~~ 120 and your answer for x to find the lengths of $\overline{DE}$ and $\overline{AC}$.
122. Use what you know about midsegments to PROVE that you are correct. (make sure your lengths make sense)

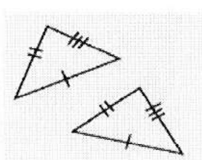
$16(2) = 32$

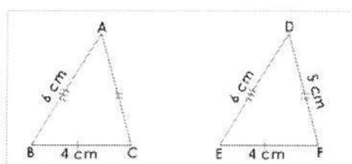
$32 = 32$ ✓

Triangle Congruency

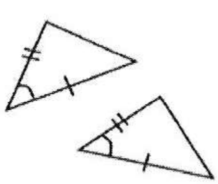
- Your handout is a great thing to study this!
- Third Angle Theorem
  - Says that you have two triangles. If two angles from one triangle match two angles from the other triangle, then the third angles also match (are congruent/ the same).
- Isosceles Triangle Theorem
  - Says that if you have an isosceles triangle (two sides of the triangle are congruent), then the opposite angles of those congruent sides are congruent to each other.
- Corollary to the Isosceles Triangle Theorem
  - Corollary means "flipped around"
  - Says that if you have two angles congruent to each other, then the sides opposite of those angles are congruent.
- CPCTC
  - **C**orresponding **P**arts of **C**ongruent **T**riangles are **C**ongruent
  - Basically says that if you have two congruent triangle, then the corresponding sides and corresponding angles are congruent.

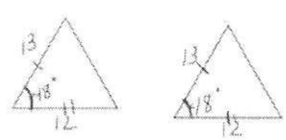
- Proving Congruence
  - Once you use the theorems above to find out as much as you can about the triangles in your problem, use the following 5 congruency theorems to prove yourself.
  - Side – Side – Side
    - SSS



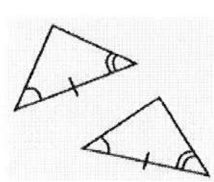


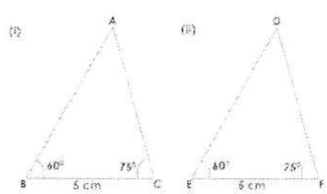
  - Side – Angle – Side
    - SAS



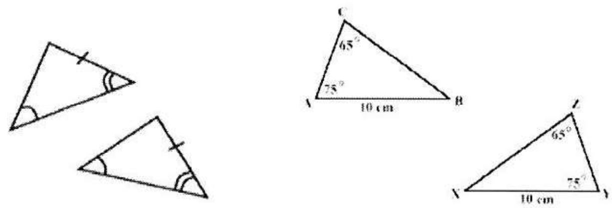


  - Angle – Side – Angle
    - ASA

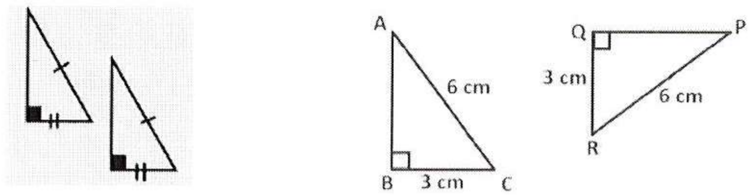




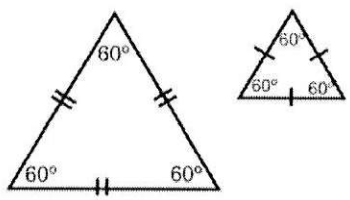
- Angle – Angle – Side
    - AAS



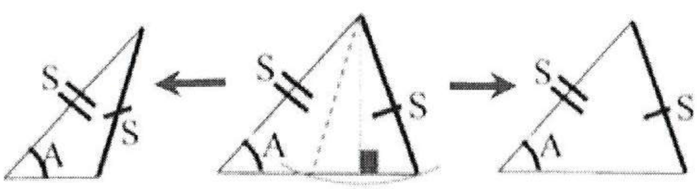
- Hypotenuse – Leg
    - HL
    - Remember: This one only works with RIGHT triangles!!!!



- Also → remember you can't use AAA or ASS to prove congruence of two triangles. Only the ones above work!!!



PROOF that AAA doesn't work…both of these triangles have the same angles, but different sides.

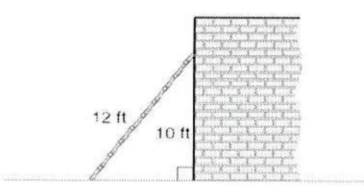


PROOF that ASS doesn't work….basically you can make an isosceles triangle inside the bigger one and then two triangles form that have ASS but the triangles aren't congruent.

<u>Unit 5 – Trigonometry</u>

Pythagorean Theorem

123. A 12-foot ladder is leaning against the side of a building. The top of the ladder reaches 10 feet up the side of the building. Approximately how far is the bottom of the ladder from the base of the building?



$10^2+x^2=12^2$

$x=\sqrt{44}\approx 6.63$