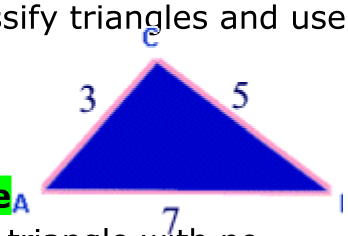
Date____________________

Classifying Triangles

Objective: to classify triangles and use it to find angle measures and side lengths
[standard 12.0]



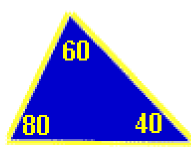
Scalene triangle

-means a normal triangle with no congruent sides.

CLASSIFY by ANGLE

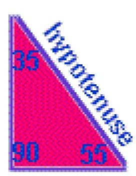
Acute scalene

--there are 3 acute angles



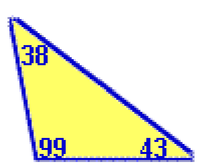
Right scalene

--there is one 90° angle

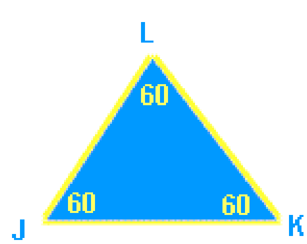


Obtuse scalene

--there is one angle greater than 90°



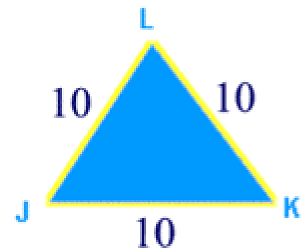
Equiangular triangle



CLASSIFY by SIDE

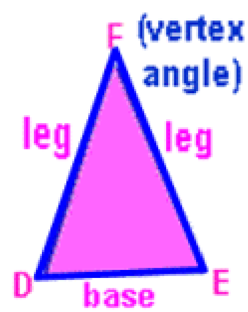
Equilateral triangle

--there are 3 congruent sides



Isosceles triangle

--there are 2 congruent sides



Note:

** Equilateral implies equiangular [not vice versa]

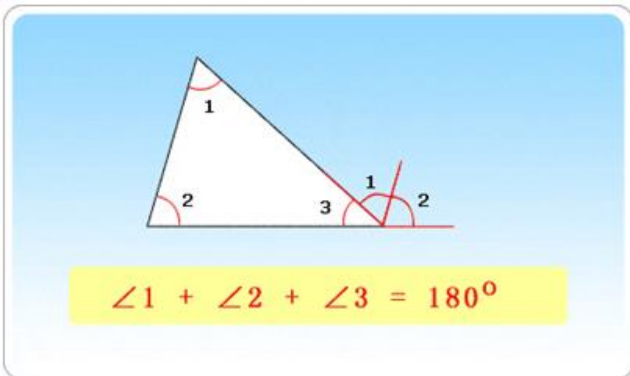
Date______________________

Angles Relationship in Triangle

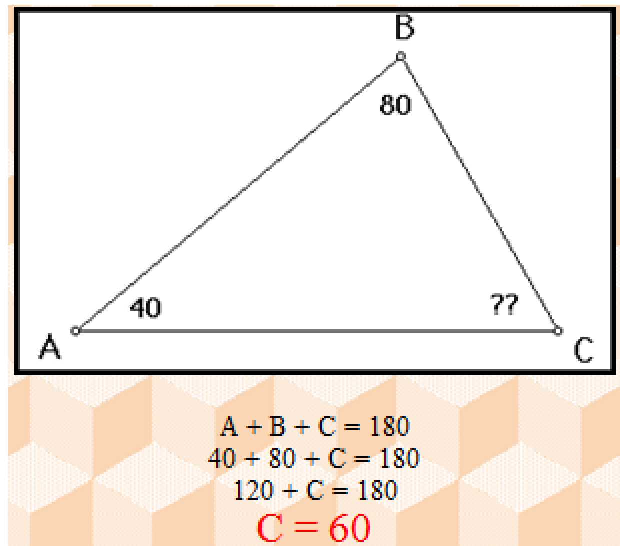
<u>Objective:</u> to find the measures of interior and exterior angles of triangles [standard 12.0 and 13.0]

TriangleAngle Sum Thoerem:

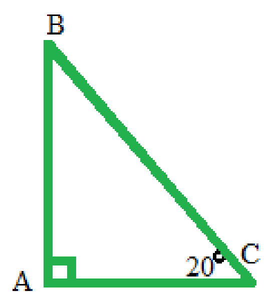
--the sum of all 3 angles in any triangle is 180°



Ex 1: **TriangleAngle Sum Thoerem**



Ex 2: Find angle B



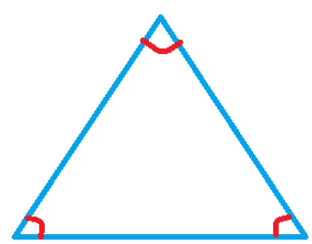
<u>Solve:</u> you are given

<A = 90°

<C = 20°

<B = 180° – (90° + 20°) = 70°

Ex 3: Find each angle

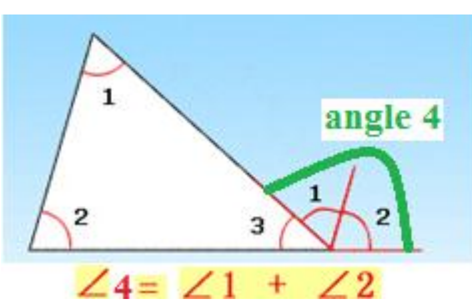


<u>Solve:</u> since there one arc

on each angle => 180÷3

each angle = 60°

Exterior AngleThoerem:



Practice problems on worksheet

Date____________________

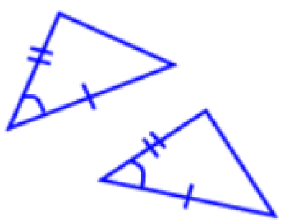
Triangles Congruence

<u>Objective:</u> to prove two triangles are congruent
[standard 5.0]

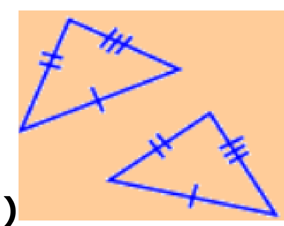
5 reasons for two triangles CONGRUENCE

1. SSS
2. SAS
3. ASA
4. AAS
5. H - L

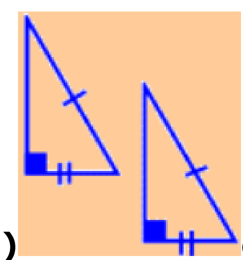
Match the following a-f to the 5 reasons listed above



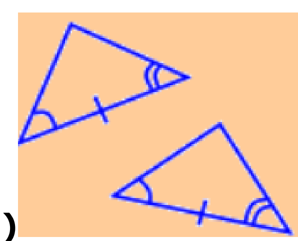
a)



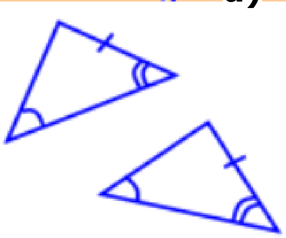
b)



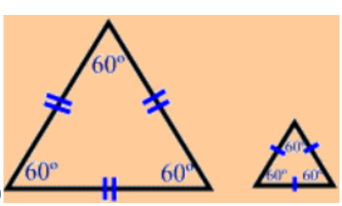
c)



d)



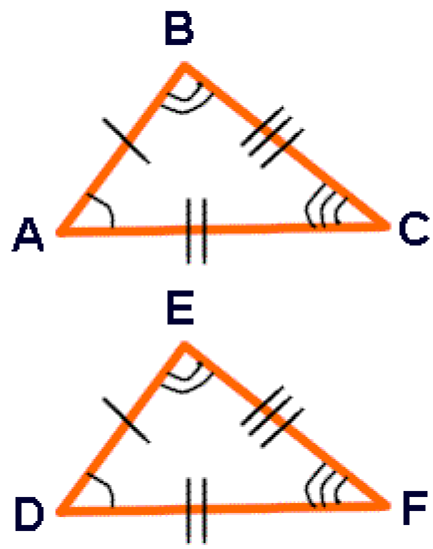
e)



f)

Example: Congruent statement:

$$\Delta ABC \cong \Delta DEF$$



When two triangles are congruent, there are 6 facts that are true about the triangles:

- the triangles have 3 sets of congruent (of equal length) sides *and*
- the triangles have 3 sets of congruent (of equal measure) angles.

Corresponding congruent sides are marked with ***tic marks***

Corresponding congruent angles are marked with ***arcs***

6 facts for our congruent triangles example

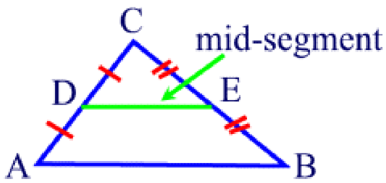
$$\overline{AB} \cong \overline{DE} \qquad \measuredangle A \cong \measuredangle D$$
$$\overline{BC} \cong \overline{EF} \qquad \measuredangle B \cong \measuredangle E$$
$$\overline{AC} \cong \overline{DF} \qquad \measuredangle C \cong \measuredangle F$$

Date____________________

Triangle Midsegment Theorem

Objective: to use properties of a triangle midsegment in solving problems. [standard 17.0]

Midsegment of ΔABC



--are segments that join the midpoints of two sides of a triangle

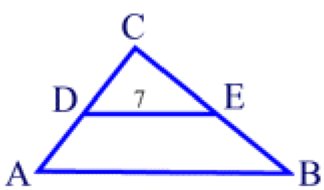
Triangle Midsegment Thoerem

If $AD = DB$ and $AE = EC$,

then $\overline{DE} \parallel \overline{BC}$ and $DE = \frac{1}{2}BC$.

--is always ***PARALLEL*** to the third side and is ***HALF*** the length of that side

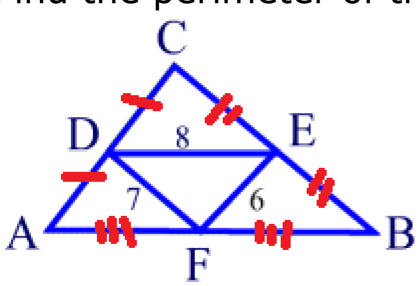
Example 1: Given *DE* is the length of the mid-segment. Find *AB*.



Solve:

Example 2:

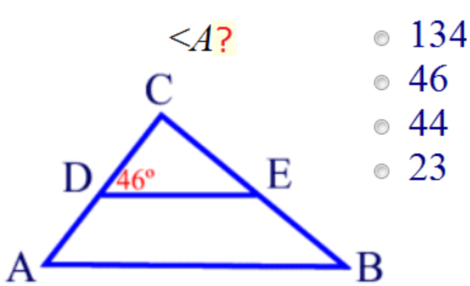
Find the perimeter of triangle *ABC*.



Solve:

Example 3:

Find angle



Answer:

[Recall: when lines are parallel DE // AB, corresponding angle are congruent.]

Date____________________

CPCTC

<u>Objective</u>: to use CPCTC in two-columns proof.
[standard 17.0]

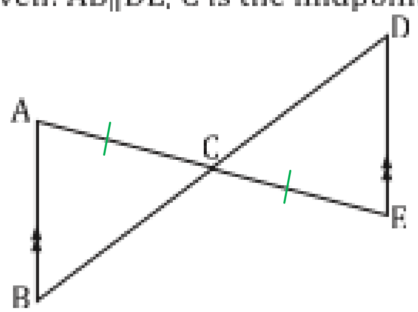
Once you prove your triangles are congruent, the "left-over" pieces that were not used in your method of proof, are also congruent. Remember, congruent triangles have 6 sets of congruent pieces. We now have a "follow-up" theorem to be used **AFTER** the triangles are known to be congruent:

CPCTC

--is **Corresponding parts of congruent triangles are congruent.**

Example 1:

Given: $\overline{AB} \parallel \overline{DE}$, C is the midpoint of $\overline{AE}$



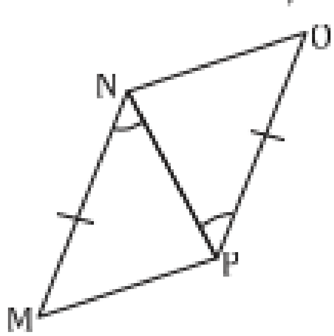
Prove: $\overline{BC} \cong \overline{DC}$

Ex 1 two-column proof

Statements	Reasons
1. $\overline{AB} \cong \overline{DE}$	1. Given
2. C is the midpoint of $\overline{AE}$	2. Given
3. $\angle BAC \cong \angle DEC$	3. Alternate Interior
4. $\overline{AC} \cong \overline{EC}$	4. Def. of Midpoint
5. $\angle ACB \cong \angle DCE$	5. Vertical Angles
6. $\triangle ABC \cong \triangle DEF$	6. ASA
7. $\overline{BC} \cong \overline{DC}$	7. CPCTC

Example 2:

Given: $\angle MNP \cong \angle OPN$, and $\overline{MN} \cong \overline{OP}$



Prove: $\overline{MP} \cong \overline{NO}$

Ex 2 proof

Statements	Reasons
1.	1. Given
2. $\overline{MN} \cong \overline{OP}$	2.
3. $\overline{NP} \cong \overline{NP}$	3.
4. $\triangle MNP \cong \triangle OPN$	4.
5.	5. CPCTC

Date____________________

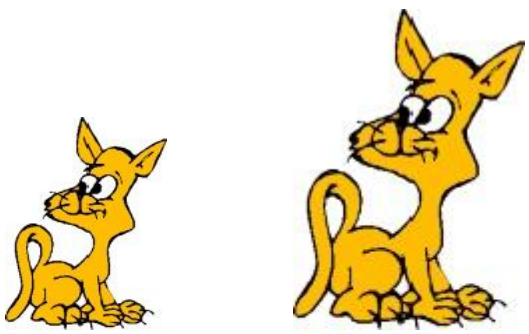
Similar Triangles

<u>Objective:</u> to determine if triangles are similar and use similar properties to solve problems.
[standard 2.0 and 5.0]

Similar

--are same shapes but not necessarily the same size

-math notation $\sim$



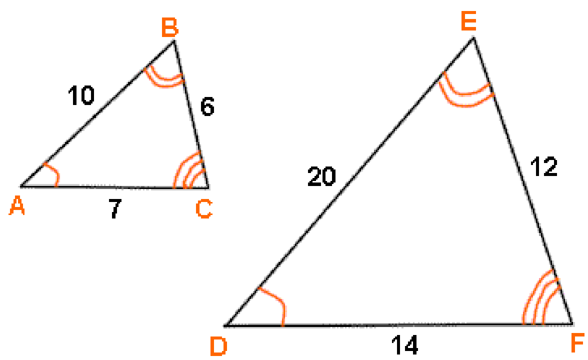
The cat on the right is an enlargement of the cat on the left. They are exactly the same shape, but they are NOT the same size.

These cats are similar figures.

Similar triangles:

--figures are similar if their corresponding (matching) ***angles are CONGRUENT*** and corresponding ***sides are PROPORTIONAL***

(This definition allows for congruent figures to also be "similar", where the ratio of the corresponding sides is 1 : 1)



$$\Delta ABC \sim \Delta DEF$$

Using numbers from triangles shown:

$$\frac{6}{12} = \frac{7}{14} = \frac{10}{20}$$

Facts about similar triangles:	
$\angle A \cong \angle D$	$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$
$\angle B \cong \angle E$	
$\angle C \cong \angle F$	

$\frac{1}{2}$ The ratio of the corresponding sides is called the similarity ratio or **scale factor**.

Similarity cont.

Scale factor

--is the ***reduced fraction*** from proportional sides

Ratios:

--is used to compare x and y ie. x to y

x : y or $\frac{x}{y}$

Ratio of congruent figures

[congruent implies similar]

--is one to one [1 : 1]

Ratio of perimeters

[corresponding sides, altitudes, medians, diagonals, & angle bisectors]

--are all in the ***SAME*** ratio

Example 1:

If the sides of two similar triangles are in the ratio 4:9, what is the ratio of their perimeters?

Answer: 4:9

Ratio of areas

--is equal to the ***SQUARE*** of the ratio of their corresponding sides

Example 2:

If the sides of two similar triangles are in the ratio of 3:5, find the ratio of their areas.

Answer: 9:25

Ratio of volumes

--is equal to the ***SQUARE*** of the ratio of their corresponding sides

Example:

If the sides of two similar triangles are in the ratio of 2:3, find the ratio of their volumes.

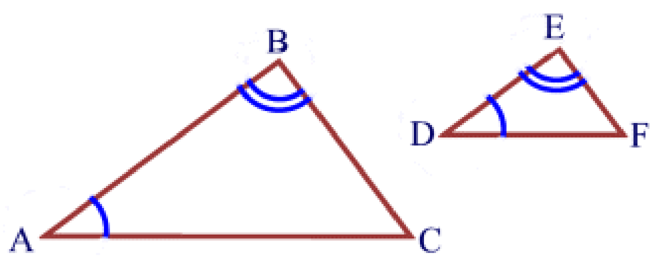
Answer: 8:27

Similarity proofs

3 reasons for two triangles SIMILAR

1. AA
2. SSS
3. SAS

Angle – Angle theorem:



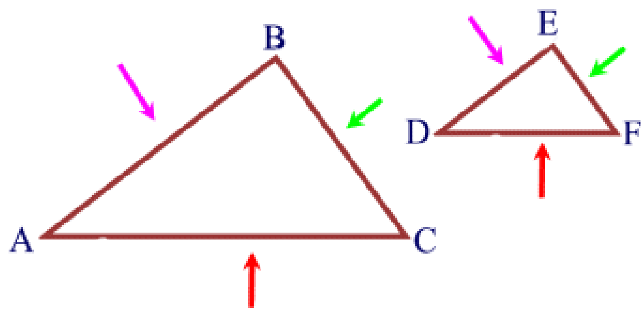
If: $\measuredangle A \cong \measuredangle D$

$\measuredangle B \cong \measuredangle E$

Then: $\Delta ABC \sim \Delta DEF$

Side – Side – Side theorem:

[NOT the same as in $\cong$ triangles]

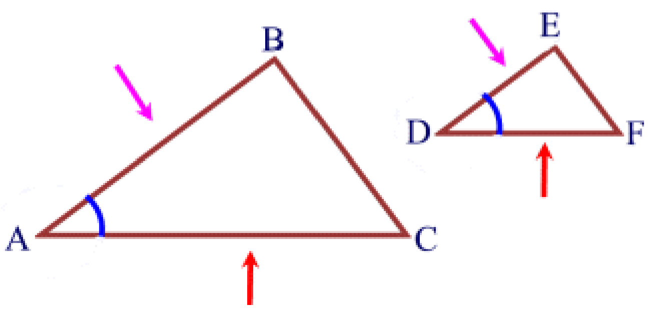


If: $\dfrac{AB}{DE} = \dfrac{AC}{DF} = \dfrac{BC}{EF}$

Then: $\Delta ABC \sim \Delta DEF$

Side – Angle – Side theorem:

[NOT the same as in $\cong$ triangles]



If: $\measuredangle A \cong \measuredangle D$

$\dfrac{AB}{DE} = \dfrac{AC}{DF}$

Then: $\Delta ABC \sim \Delta DEF$