NAME _____

Date _____ Period_____

SYLLABUS

GEOMETRY H

Unit 3 Syllabus: Congruent Triangles

Day	Topic
1	4.1 – Congruent Figures 4.2 –Triangle Congruence SSS and SAS
2	4.3 –Triangle Congruence ASA and AAS
3	4.4 – Using Congruent Triangles CPCTC
4	Quiz
5	4.5 – Isosceles and Equilateral Triangles
6	4.6 – Congruence in Right Triangles
7	4.7 – Using CPCTC
8	Review
9	Test

NAME _____

Date _____ Period_____

NOTES

GEOMETRY H

U3 D1: Corresponding Parts of Congruence & Triangle Congruence

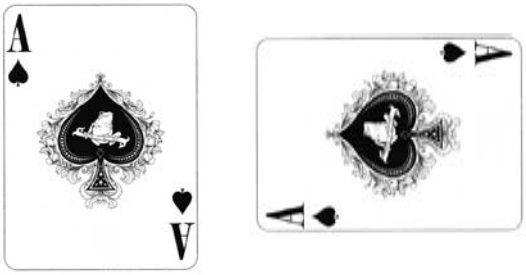
1. Warmup: Determine if each pair of "objects" is congruent or not. Explain your choice!

1)

2)

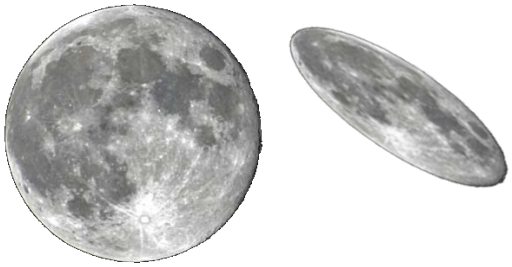
3)

4)



5)

6)



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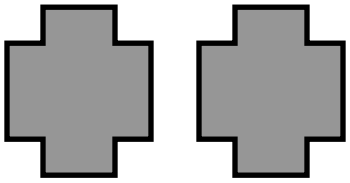
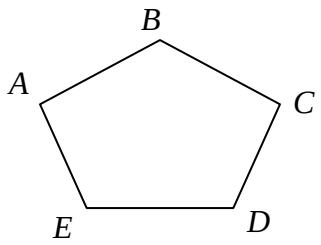


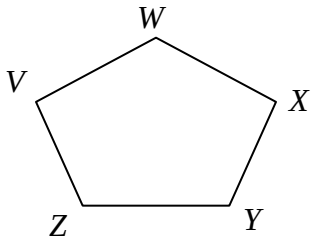
8)

Reminder: Congruent figures have the same _____ & _____.

a. Each _____ ("matching") side and angle of congruent figures will also be _____!

Example:





Congruent Angles	Congruent Sides

Naming Congruent Figures

a) Points can be named in any **consecutive** order
b) Each corresponding vertex must be in the same order for each figure

2. Example #2: Given the fact that $\square ABCD \cong \square EFGH$, complete the following.

a. Rewrite the congruence statement in a different way.

b. Name all congruent angles

c. Name all congruent sides

3. This chapter will deal with congruent triangles.

4. **Formal Definition: Congruent Triangles**

   a. Two triangles are congruent **iff** their vertices can be matched up so that the corresponding parts (angles & sides) of the triangles are congruent.

It means that if you put the two triangles on top of each other, they would match up perfectly

5. Triangle congruence works the same as it did for the pentagons, and for all polygons.

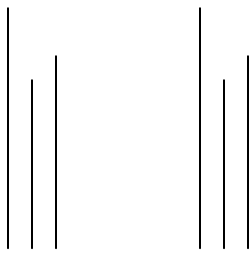
6. Given $\Delta HIJ \cong \Delta MNO$. Name all congruent sides and all congruent angles.

   Write the triangles congruent in two other ways.

7. If $\Delta ABC \cong \Delta XYZ$, and $m\angle A = 3x+12$, $m\angle B = 3x+1$ $m\angle X = x+44$, find x.

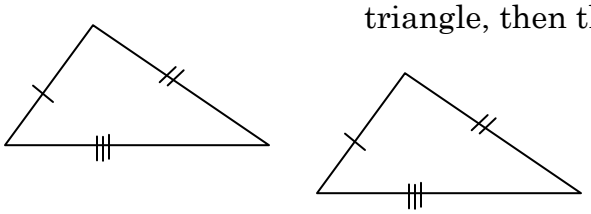
8. What if we want to **prove** that polygons are congruent? What do we need to do?!

9. Because triangles only have three sides, we can take some shortcuts…



10. If all three sides are given, we call this _____.

a. **SSS Postulate**: If 3 sides of one triangle are congruent to 3 sides of another triangle, then the triangles are congruent.



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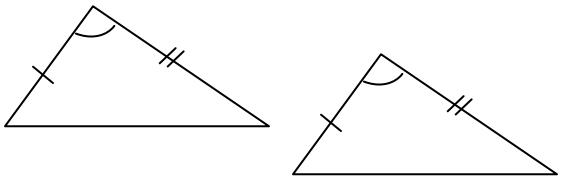
11. If two sides and the angle BETWEEN those sides are given, we call this _____.



a. **SAS Postulate:** If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.

* Included:

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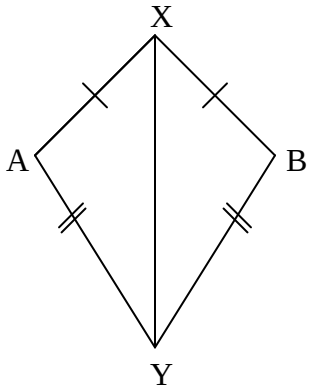
12. Using the postulates in proofs… Given the figure below, prove: $\Delta YAX \cong \Delta YBX$

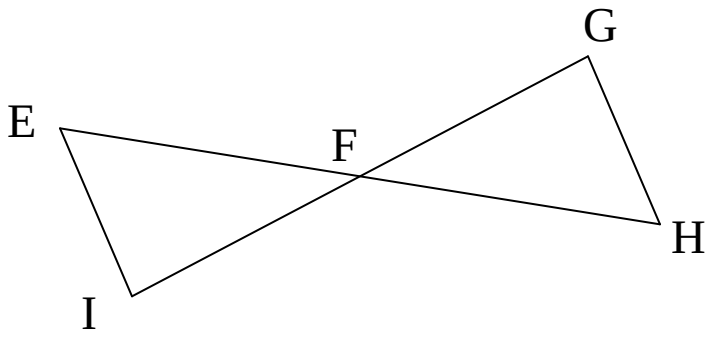


Key concept: Any time a side is shared, always think _____ property!!!

Closure: Try number #2 in the homework p. 208 . What is the other key concept there?!

Given: $\overline{IE} \cong \overline{GH}, \overline{EF} \cong \overline{HF}$ and F is the midpoint of $\overline{GI}$

Prove: $\Delta EFI \cong \Delta HFG$

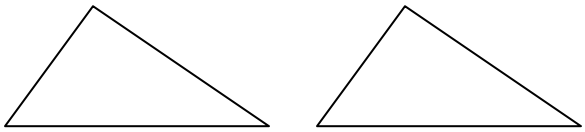


NAME _____ NOTES

Date _____ Period_____ GEOMETRY H

U3 D2: Triangle Congruence by ASA and AAS

1. Warmup: Define the postulate below. Also, mark the triangles appropriately.
2. Angle Side Angle (ASA) Postulate:



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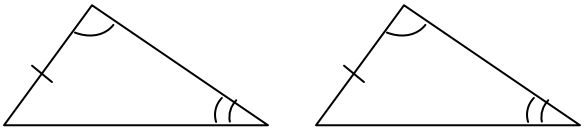
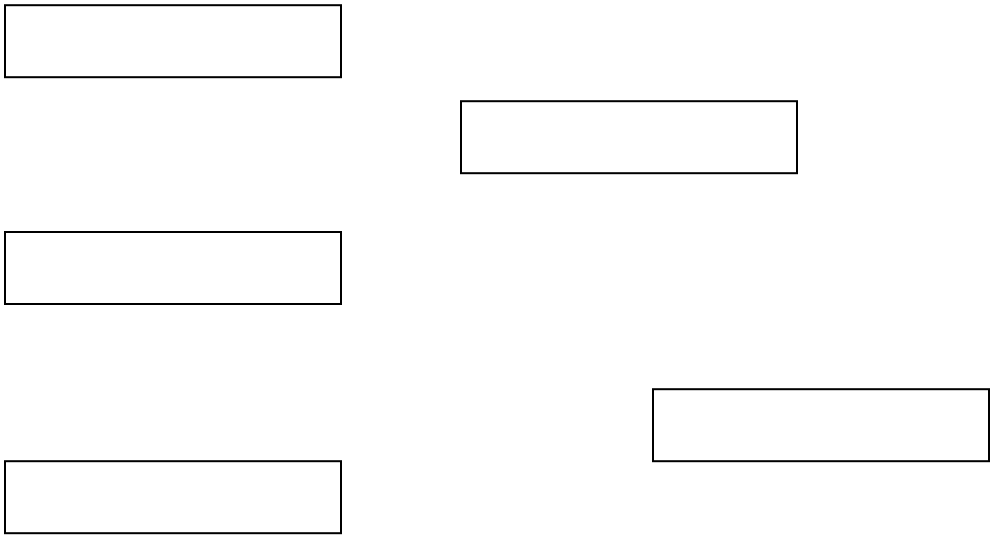
3. Angle Angle Side (AAS) **Theorem**
   a. If two angles and the non-included side of one triangle are congruent to two angles and the corresponding non-included side of another triangle, then the triangles are congruent.



Flow chart proof of AAS Theorem (remember: theorems are proven, postulates are accepted!)

Given: $\angle A \cong \angle X$, $\angle B \cong \angle Y$, and $\overline{BC} \cong \overline{YZ}$ Prove: $\Delta ABC \cong \Delta XYZ$



NAME _____

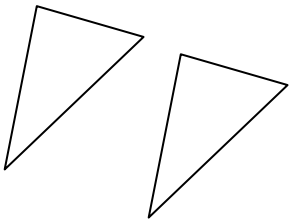
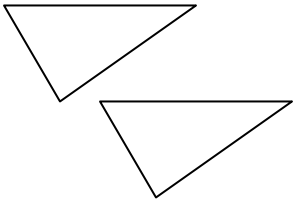
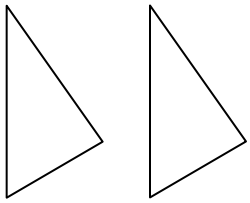
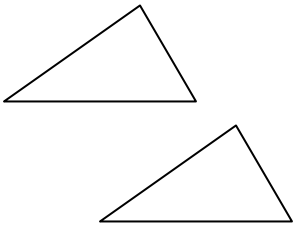
Date _____ Period_____

GRAPHIC ORGANIZER

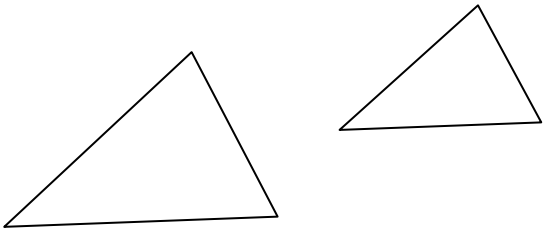
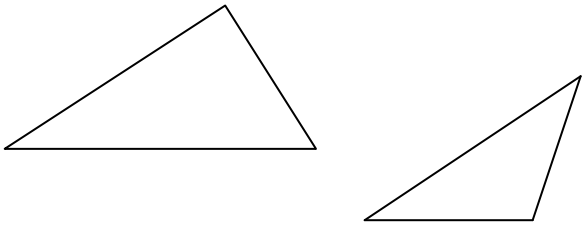
GEOMETRY X

U3 D2: Classifying Triangles and Proving Congruence

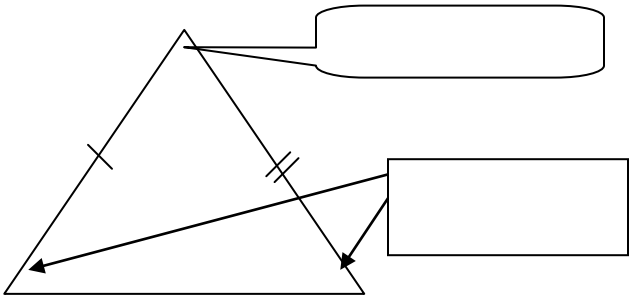
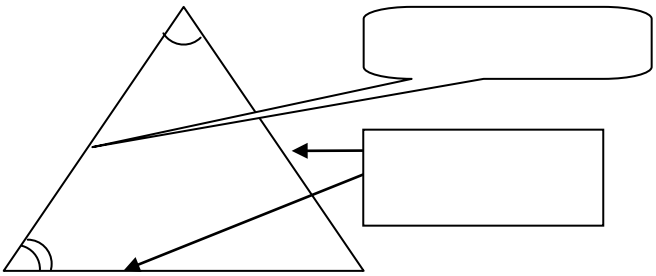
Ways to Prove Congruent Triangles

SSS	SAS	AAS	ASA
			

Triangle Classifications that do NOT prove Congruent Triangles

AAA	SSA
	

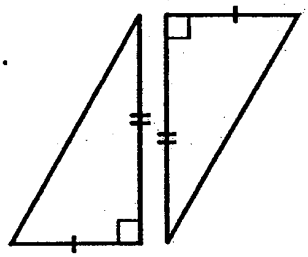
Understanding the term INCLUDED for Triangles

Given 2 Sides and 1 Angle	Given 2 Angles and 1 Side
	

Practice with Triangle Congruence Methods

State whether each pair of triangles is congruent by SSS, SAS, ASA or AAS. If none of these methods work, write N.

1.



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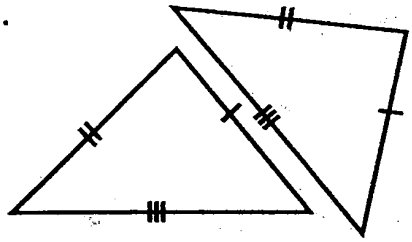

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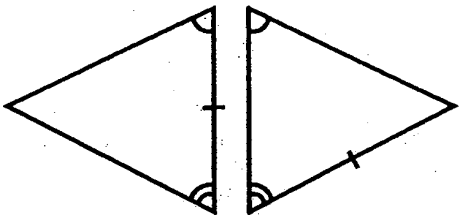

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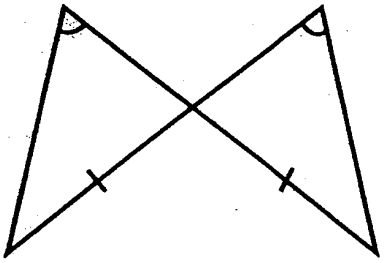

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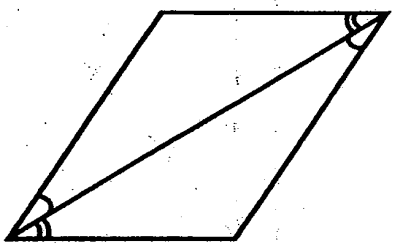
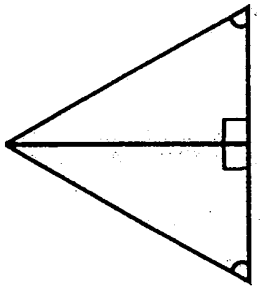


6.



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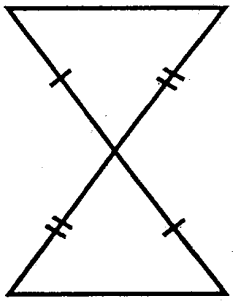

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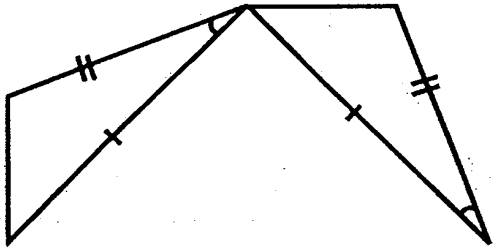

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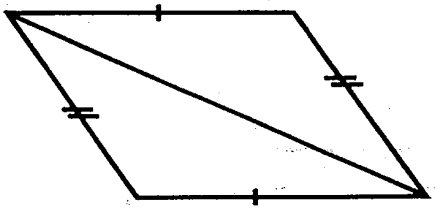

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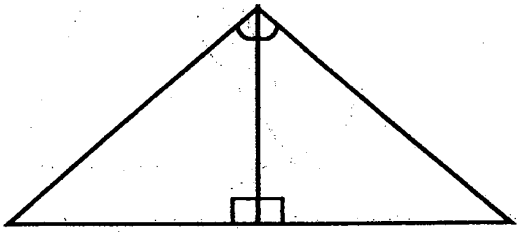


With a partner, describe the process for proving that two triangles are congruent. Be thorough in your explanation. Imagine that you were explaining it to someone that was absent the last couple of days… Use drawings, labels, or whatever you need in your explanation.

NAME _____

Date _____ Period_____

NOTES

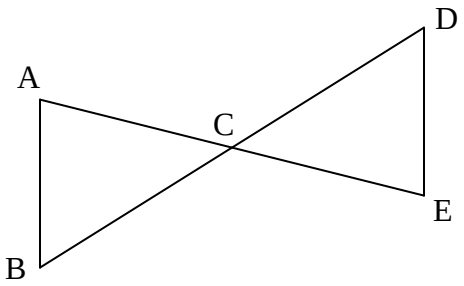
GEOMETRY H

U3 D3: Using Congruent Triangles (CPCTC)

1. Complete the proof below.

   Given: $\overline{AC} \cong \overline{CE}$, $\overline{BC} \cong \overline{CD}$

   Prove: $\Delta ACB \cong \Delta ECD$



2. Now that you know $\Delta ACB \cong \Delta ECD$ (hopefully you **proved it!**), list all of the congruent sides and congruent angles. Think back to the first day of congruence if it will help you!

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3. Look back at the triangles at the top of the page. What if the problem asked us to prove $\overline{AB} \cong \overline{DE}$ instead of asking us to prove $\Delta ACB \cong \Delta ECD$? How could we do that?

4. Well, we could use the same strategy as we used for #2!

5. Once the triangles themselves are congruent, then all _____ parts of the triangles are also congruent!

   a. We can use this as a _____ in our proofs. We call it…

C

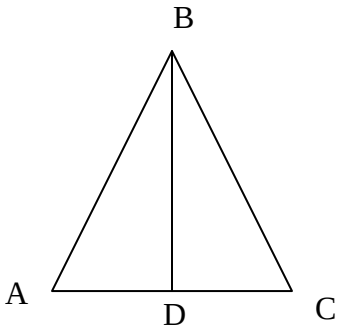
P

C

T

C

6. Example using CPCTC



Given: $AB \cong BC$ & $\overline{BD}$ is the angle bisector of $\angle ABC$

Prove: $\overline{AD} \cong \overline{CD}$

Game plan: First, prove that $\Delta ABD \cong \Delta CBD$ (we can use SSS, SAS, ASA, or AAS)

Next, conclude that $\overline{AD} \cong \overline{BC}$ using CPCTC!

Statements	**Reasons**
1. $AB \cong BC$	
2.	2. Given
3.	3. Definition of an $\angle$ bisector
4.	4.
5. $\Delta ABD \cong \Delta CBD$	5.
6. $\overline{AD} \cong \overline{CD}$	

7. Challenge: What does CPCTC stand for?
   a. Say it 3 times fast…

8. **Wrap Up**: Explain what CPCTC means. When do you use it? Why is it helpful!?

NAME _____

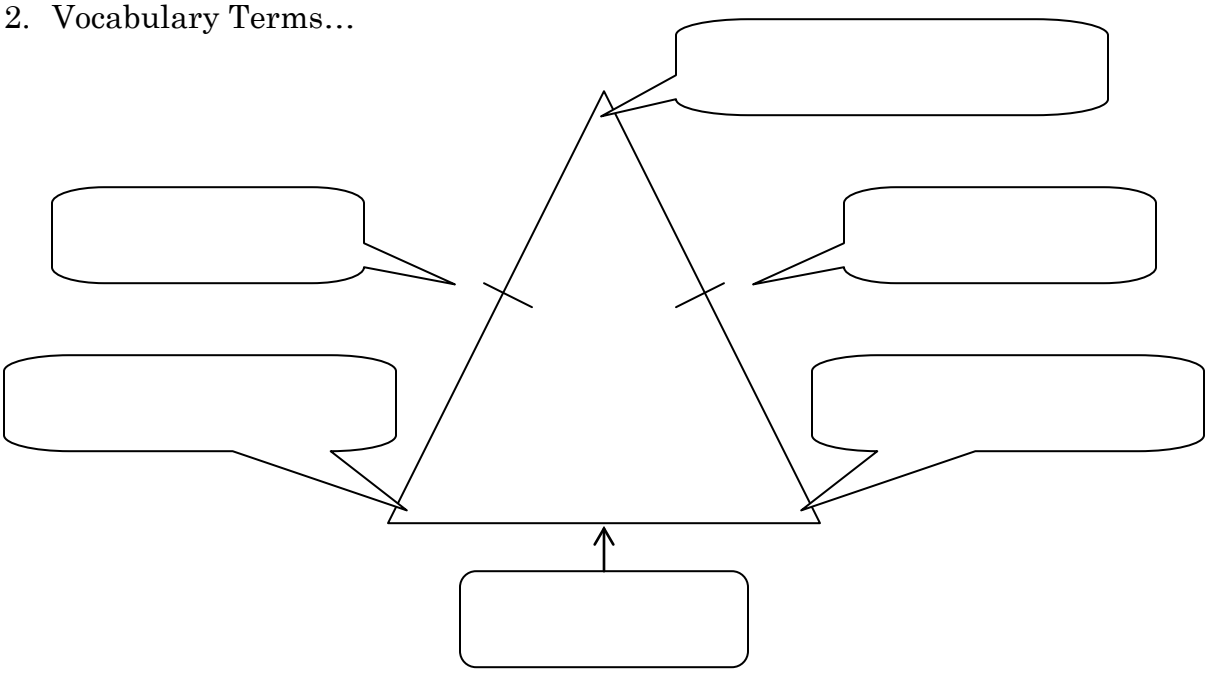
Date _____ Period_____

NOTES

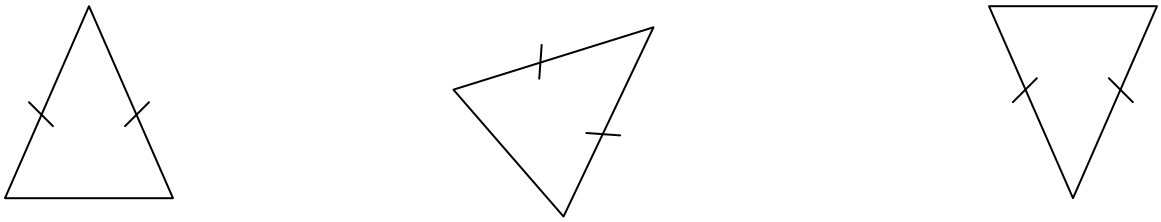
GEOMETRY H

U3 D5: Isosceles Triangles

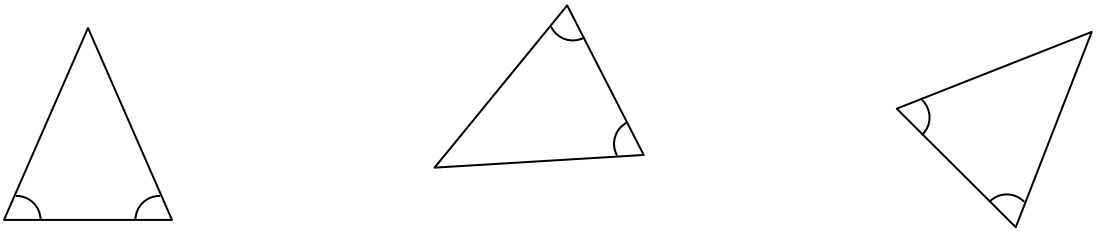
1. Definition: A triangles that has _____ congruent sides.
2. Vocabulary Terms…



3. The Isosceles Triangle Theorem:
   a. If two sides of a triangle are congruent, then the angles opposite those sides (the base angles) are also congruent (proof on page 229).

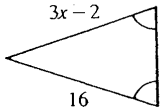


4. The **Converse** of the Isosceles Triangle Theorem
   a. If



More Examples:

9.



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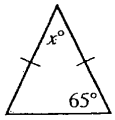

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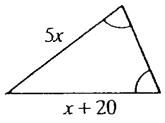

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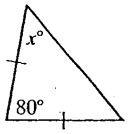
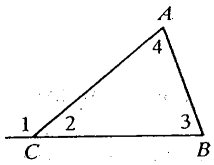


17. Given: $\overline{BC} \cong \overline{AC}$;
$m\angle 1 = 140$
Find $m\angle 2$, $m\angle 3$, and $m\angle 4$.



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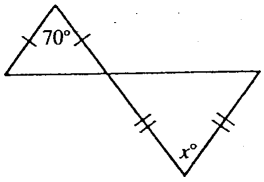

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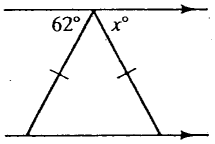
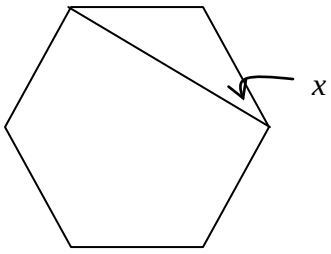


Example #1: Solve for x. The figure shown is a regular hexagon.



Example #2: Triangle ABC is isosceles with base AC.

$m\angle A = 2x + 8$
$m\angle B = 4x + 20$

What type of triangle is ABC, acute, obtuse, right, or equiangular?

Closure: Compare and contrast isosceles triangles with equilateral & equiangular triangles.

NAME _____

Date _____ Period_____

NOTES

GEOMETRY H

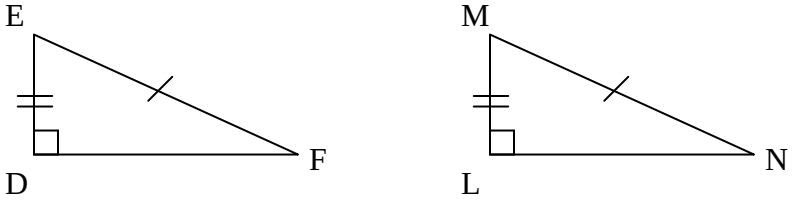
U3 D6: The HL Theorem

1. We've already briefly looked at the AAS theorem. Another method is the HL theorem.
   a. H stands for _____.
   b. L stands for _____.

***** Only applies to right triangles!**

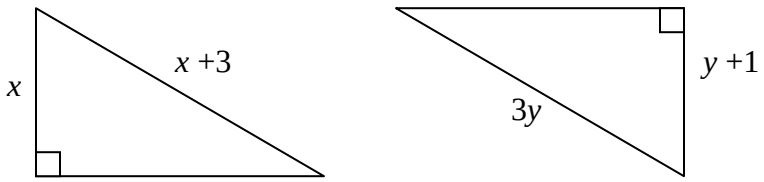
2. Quick refresher: the hypotenuse is the side _____ the right angle. Both of the other two sides are called legs.

3. The HL Theorem
   a. If the hypotenuse and a leg of one **right** triangle are congruent to the corresponding parts of another right triangle, then the triangles are congruent.

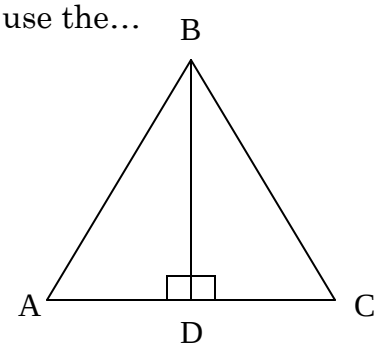


   b. Write a congruence statement: _____ * Review!
   c. Identify six congruent parts in the space below.

4. For what values of x and y can the triangles be proven congruent by the HL theorem.



5. Determine another side or angle that would have to be congruent to use the…

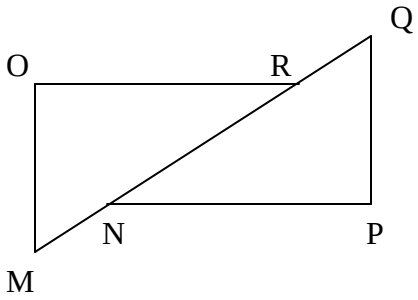


a. HL: _____

b. SAS: _____

6. Given: $m\angle O = m\angle P = 90°$, $\overline{MN} \cong \overline{QR}$, $\overline{OM} \cong \overline{PQ}$

Prove: $\Delta MOR \cong \Delta QPN$



Statements	Reasons

Closure: Answer the following.

1) Compare and contrast the HL theorem to the AAS theorem

2) When do you use the SAS postulate for a right triangle?

NAME _____

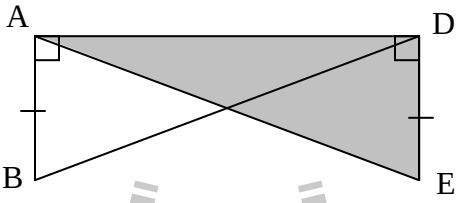
Date _____ Period_____

NOTES

GEOMETRY H

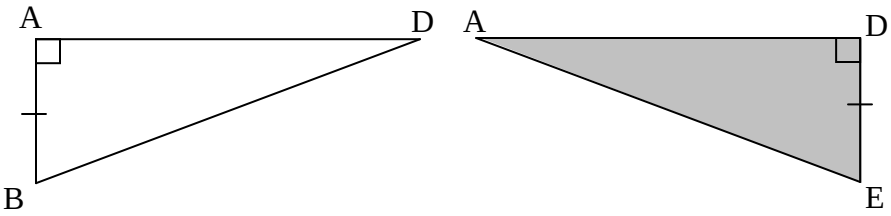
U3 D7: Using CPCTC for Overlapping Triangles

4. Given: $\overline{AB} \cong \overline{DE}$ & $\angle BAD$ and $\angle ADE$ are rt $\angle$'s Prove: $\Delta ADB \cong \Delta DAE$



STATEMENTS	REASONS

Sometimes it is easier to prove triangles are congruent when you separate them…

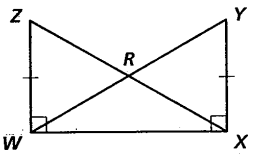


Overlapping Triangles will sometimes have "shared" sides or angles.

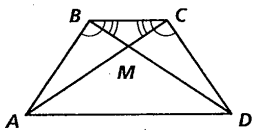
Make sure to state that they are congruent using the _____ property

Examples: **Name a pair of overlapping congruent triangles in each diagram. State whether the triangles are congruent by SSS, SAS, ASA, AAS, or HL.**

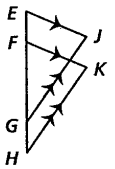
1. Given: $\overline{ZW} \cong \overline{XY}$, $\angle YXW$ and $\angle ZWX$ are right $\angle$s



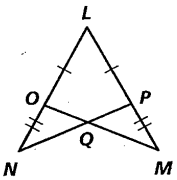
2. Given: $\angle ABC \cong \angle DCB$, $\angle CBD \cong \angle BCA$



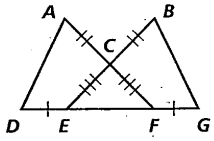
3. Given: $\overline{EJ} \parallel \overline{FK}$, $\overline{GJ} \parallel \overline{HK}$, $\overline{EG} \cong \overline{HF}$



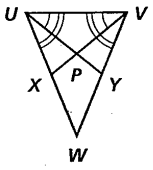
4. Given: $\overline{LP} \cong \overline{LO}$, $\overline{PM} \cong \overline{ON}$



5. Given: $\overline{DE} \cong \overline{FG}$, $\overline{AC} \cong \overline{CB}$, $\overline{EC} \cong \overline{FC}$

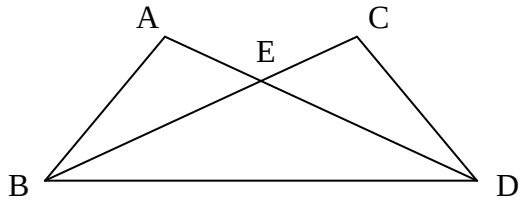


6. Given: $\angle YUV \cong \angle XVU$, $\angle WUV \cong \angle WVU$

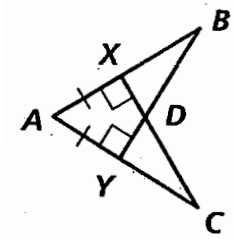


5. Formal Proof: Redraw the triangles, add arc and tick marks and complete the proof.

Given: $\angle ABD \cong \angle CDB$ and $\angle CBD \cong \angle ADB$ Prove: $\overline{AB} \cong \overline{CD}$



4. Given: $\overline{AX} \cong \overline{AY}$, $\overline{CX} \perp \overline{AB}$, $\overline{BY} \perp \overline{AC}$
Prove: $\triangle BYA \cong \triangle CXA$



Closure: Confidence Meter for the upcoming test? 1 2 3 4 5 6 7 8 9 10
Name the "good" and the "bad" …