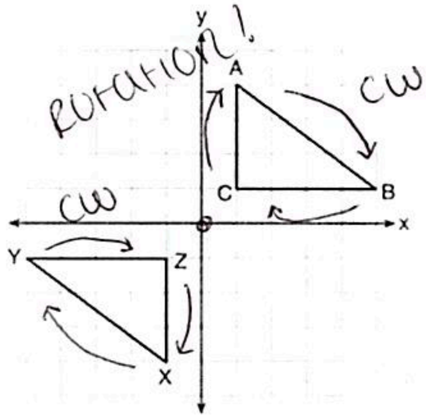
Name: Key   Date: ____________

UNIT 3   **LESSON 2**

AIM: WHAT ARE THE SSS, SAS AND HL "SHORTCUTS" TO PROVE TRIANGLES ARE CONGRUENT?

Do Now: In the diagram below, ΔABC and ΔXYZ are graphed.



1. Use properties of rigid motions to explain why $\Delta ABC \cong \Delta XYZ$.

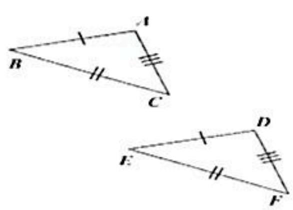
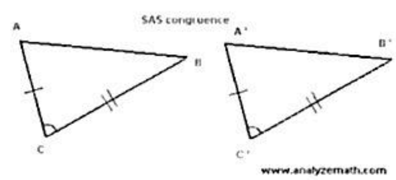
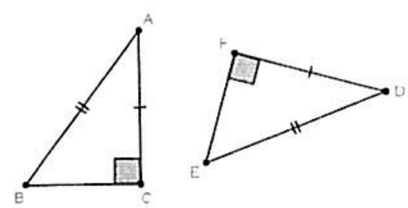
A rotation of 180° about (0,0) is a rigid motion which preserves ∡ measure & Distance

2. Identify all corresponding sides and angles: order of letters!

ANGLES	SIDES
$\angle A \cong \angle X$ $\angle B \cong \angle Y$ $\angle C \cong \angle Z$	$\overline{AB} \cong \overline{XY}$ $\overline{BC} \cong \overline{YZ}$ $\overline{AC} \cong \overline{XZ}$

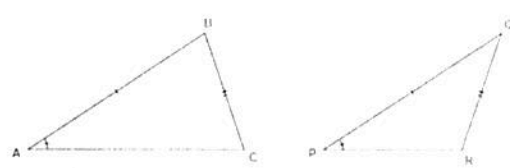
RECALL:

- Basic rigid motions produce congruent figures.
- Therefore, in order for triangles to be congruent all sides must be of equal length and all angles must be of equal measure.
- **BUT** we do not need to know that *ALL* sides and *ALL* angles are congruent in order to identify congruent triangles! We can use 5 "shortcuts" to help us out! *(Today, we will learn three of them!)*

1. **SSS Shortcut (Side-Side-Side)**	2. **SAS Shortcut (Side-Angle-Side)**	3. **HL Shortcut (Hyptoenuse-Leg)**
	 ***THE ANGLE MUST BE <u>BETWEEN</u> THE SIDES!***	 ***ONLY VALID IN <u>RIGHT</u> TRIANGLES!***

BEWARE! There is a method that DOES NOT work – SSA (Side-Side-Angle) **<u>WHY?!</u>**

- There are **<u>2 possible triangles</u>** that can be created with these conditions. It is clear that one of the possibilities does not produce a congruent triangle (same shape, different size)
- Therefore, you **<u>MUST</u>** only use the **<u>INCLUDED</u>** angle!

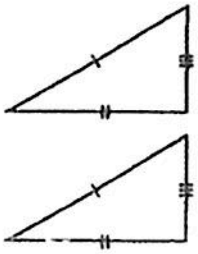


DON'T BE AN  **!**

The following are all examples of rigid motions!

For each of the following, iidentify which postulate will prove these triangles congruent (HL, SSS, SAS, or none)

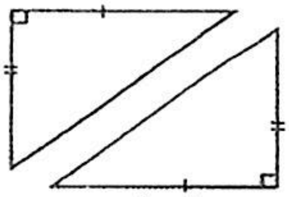
1)



SSS

translation

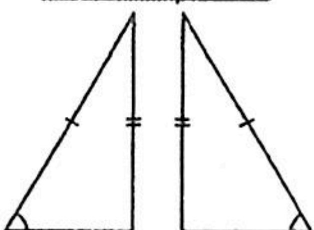
2)



SAS

Rotation

3)



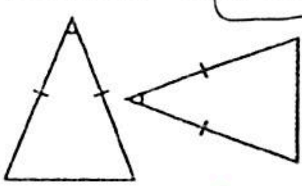
None!

SSA

Reflection

can't assume right *

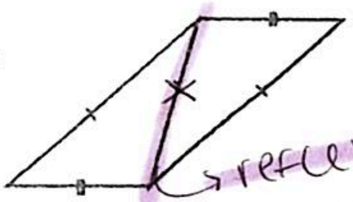
4)



SAS

rotation

5)



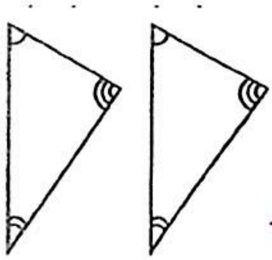
SSS

reflexive!

rotation

visual FREEBIE!

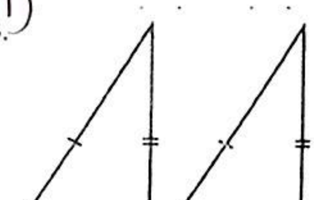
6)



None!

* you need at least one side to be ≅! *

7)



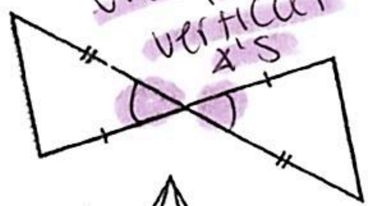
HL

translation

8)

visual FREEBIE

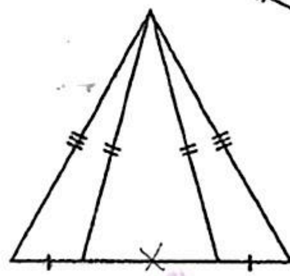
vertical ∡'s



SAS

Rotation

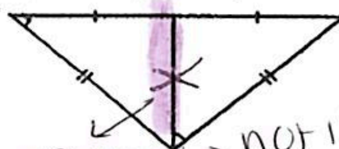
9)



SSS

Rotation

10) *



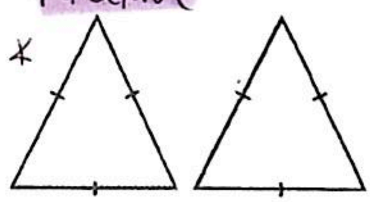
SSS

reflexive

not included!

Reflection

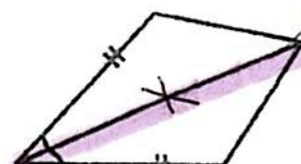
11)



SSS

translation

12)



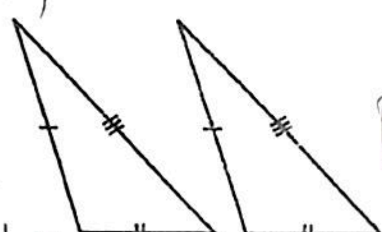
* reflexive

SAS

Reflection

visual FREEBIE

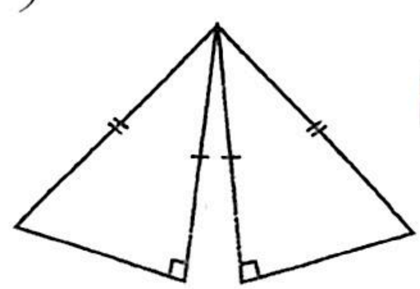
13)



SSS

translation

14)

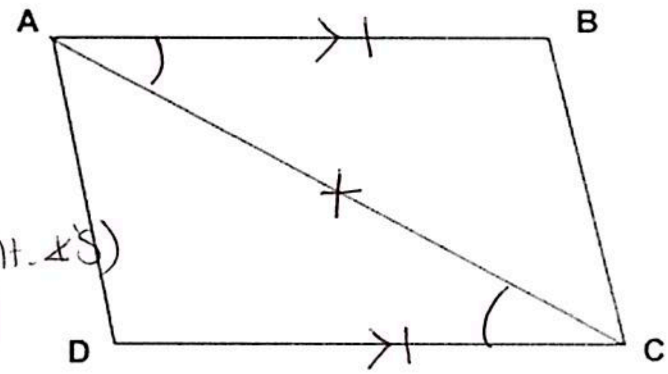


HL

Rotation

Based on the given information, determine what shortcut should be used and write a plan on how you would prove the triangles congruent.

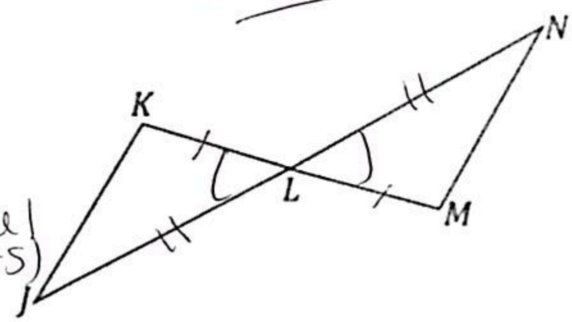
1. Given: $\overline{AB} \parallel \overline{CD}$ and $\overline{AB} \cong \overline{CD}$
   Prove: $\Delta ABC \cong \Delta CDA$



PLAN: (S) $\overline{AB} \cong \overline{CD}$ (given)
(A) $\angle BAC \cong \angle DCA$ (alt. int. ∡'s)
(S) $\overline{AC} \cong \overline{AC}$ (reflexive)

VISUAL FREEBIES!

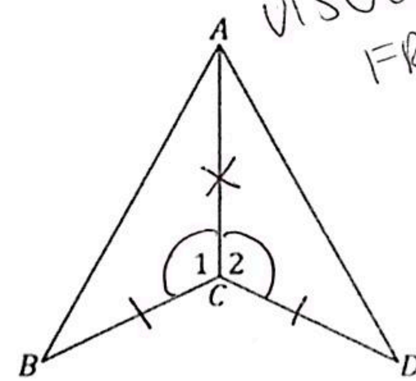
2. Given: $\overline{JN}$ *and* $\overline{KM}$ bisect each other at L
   Prove: $\Delta JKL \cong \Delta NML$



PLAN: (S) $\overline{KL} \cong \overline{LM}$ (bisected)
(A) $\angle KLJ \cong \angle MLN$ (vertical ∡'s)
(S) $\overline{JL} \cong \overline{LN}$ (bisected)

VISUAL FREEBIE!

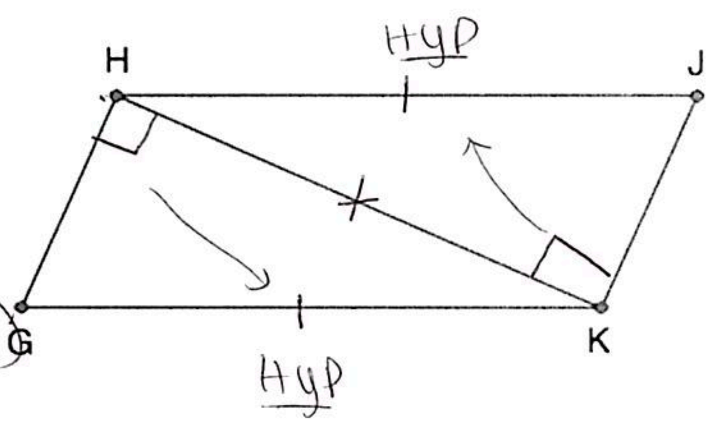
3. Given: $\angle 1 \cong \angle 2, \overline{BC} \cong \overline{DC}$
   Prove: $\Delta ABC \cong \Delta ADC$



PLAN: (S) $\overline{BC} \cong \overline{CD}$ } given
(A) $\angle 1 \cong \angle 2$ } given
(S) $\overline{AC} \cong \overline{AC}$ reflexive

right ∡ right ∡

4. Given: $\overline{GH} \perp \overline{HK}, \overline{JK} \perp \overline{KH}, \overline{GK} \cong \overline{JH}$
   Prove: $\Delta GHK \cong \Delta JKH$



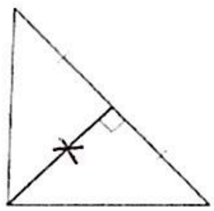
PLAN: (H) $\overline{GK} \cong \overline{HJ}$ (given)
(L) $\overline{HK} \cong \overline{HK}$ (reflexive)

Name: Key   Date: ____________

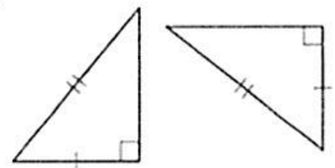
UNIT 3   **LESSON 1**

HOMEWORK

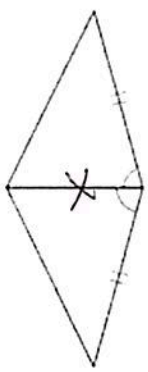
For numbers 1-6, identify the shortcut used to prove the triangles are congruent, if possible!

1) 

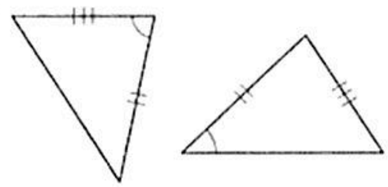
SAS

2) 

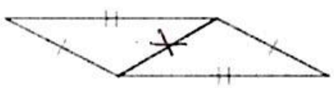
HL

3) 

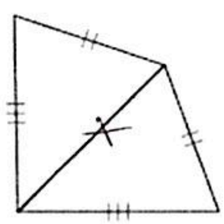
SAS

4) 

None

5) 

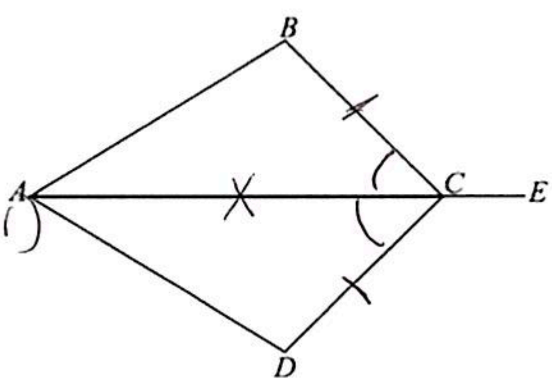
SSS

6) 

SSS

For numbers 7-8, use the given information to determine the shortcut and write a plan for how you would prove the triangles are congruent

7. Given: $\overline{AE}$ bisects $\angle BCD$ and $\overline{BC} \cong \overline{DC}$
   Prove: $\Delta CAB \cong \Delta CAD$

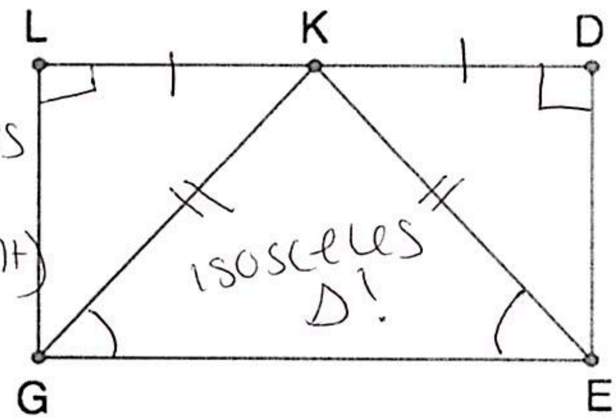


PLAN: S $\overline{BC} \cong \overline{CD}$ (given)
A $\measuredangle BCA \cong \measuredangle DCA$ (bisector)
S $\overline{AC} \cong \overline{AC}$ reflexive

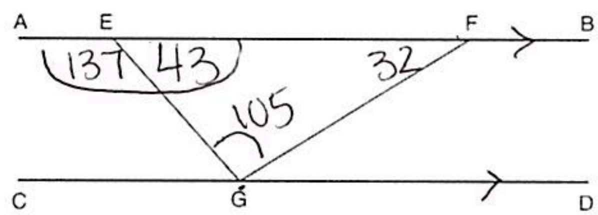
right ∡ right ∡

8. Given: $\angle KGE \cong \angle KEG$, $\overline{GL} \perp \overline{LD}$, $\overline{ED} \perp \overline{DL}$ and K is the midpoint of $\overline{LD}$
Prove: $\Delta KLG \cong \Delta KDE$

PLAN: (H) $\overline{KG} \cong \overline{KE}$ (isosceles Δ)
(L) $\overline{LK} \cong \overline{KD}$ (midpoint)



9. In the diagram below, $\overline{AEFB} \parallel \overline{CGD}$, and $\overline{GE}$ and $\overline{GF}$ are drawn.



If $m\angle EFG = 32°$ and $m\angle AEG = 137°$, what is $m\angle EGF$?

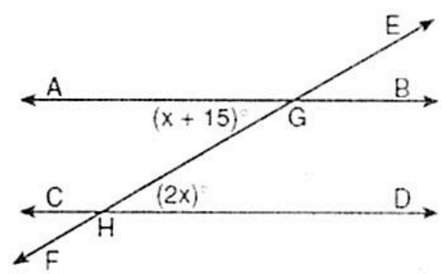
1) 11º
2) 43º
3) 75º
4) 105º

$180 - 137 = 43$
$180 - 43 - 32 = \underline{105}$!

10. In the accompanying diagram, parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are intersected by transversal at points G and H, respectively, $m\angle AGH = x + 15$, and $m\angle GHD = 2x$.

Which equation can be used to find the value of x?

1) $2x = x + 15$
2) $2x + x + 15 = 180$
3) $2x + x + 15 = 90$
4) $2x(x + 15) = 0$



$x + 15 = 2x$

alt. int. ∡'s are =!