# Proving Triangles Congruent: Common Cycles

The key to using the givens is knowing your vocabulary. Our goal is to find corresponding parts (sides or angles) of triangles that we can prove congruent. Your job is to know which vocabulary leads to which congruent parts.
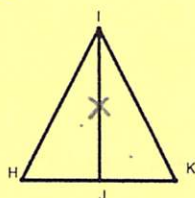
In addition to the givens there are three items that you can introduce into a proof from the picture and do not require any prior information. These are our FREEBIES!
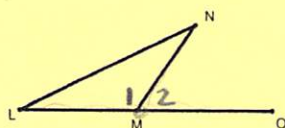
Vertical Angles
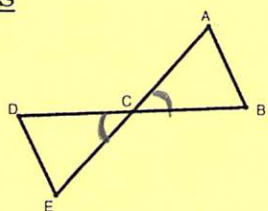
Statements	Reasons
① $\angle DCE \cong \angle ACB$	① Vertical $\angle$'s are $\cong$

Reflexive Property

Statements	Reasons
① $\overline{IJ} \cong \overline{IJ}$	① Reflexsive Prop

Linear Pair

| Statements	Reasons
① $\angle 1$ and $\angle 2$ form linear pair	① If 2 lines intersect then adjacent $\angle$'s form a linear pair
② $\angle 1 + \angle 2 = 180$	② If 2 $\angle$'s form a linear pair then they are supplementary

Using the givens and the FREEBIES in combination leads to sets of steps that occur together in many different proofs. These are called *cycles*. Learning these cycles will greatly assist you when working through proofs.

- Transitive Property
- Congruent Supplements
- Congruent Complements

- Segment Addition/Subtraction
- Angle Addition/Subtraction
- Congruent Segment/Angle Bisectors

Congruent Triangles Theorems Practice

Name _____

Are these triangles congruent???

1. Is there enough information to prove that two triangles are congruent?
2. If so, what postulate/theorem would you use: (1) S-S-S, (2) S-A-S, (3) A-S-A, (4) A-A-S
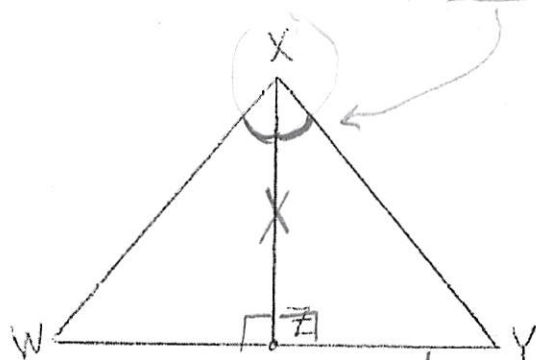3. If two triangles are congruent, write a congruence statement (example: $\triangle ABC \cong \triangle DEF$)

1.
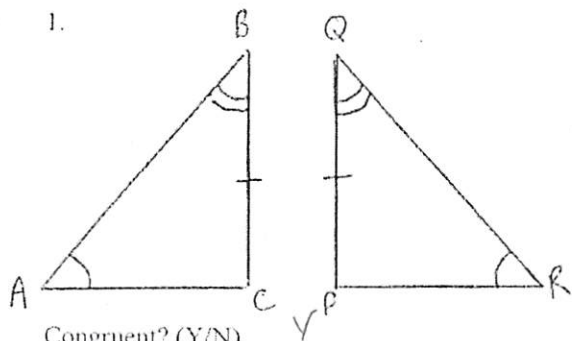
Congruent? (Y/N) ___Y___
Why? __AAS__
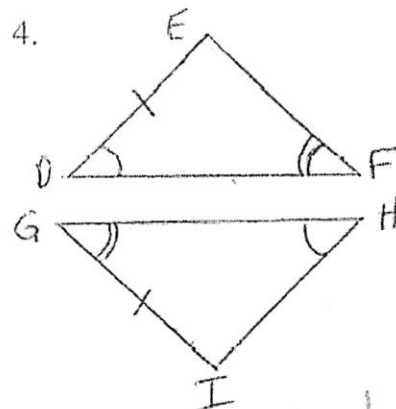Statement: $\triangle \underline{ACB} \cong \triangle \underline{RPQ}$

2.
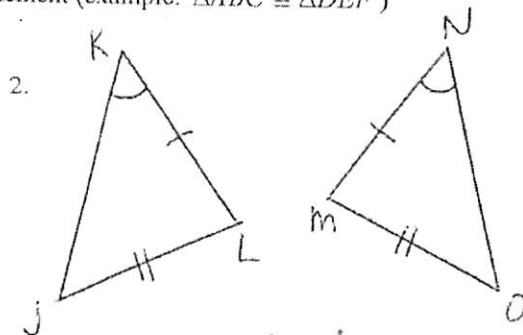
Congruent? (Y/N) __NO!__
Why? _____
Statement: _____

3. Given: $\overline{XZ} \perp \overline{WY}$; $\overline{XZ}$ bisects $\angle WXY$
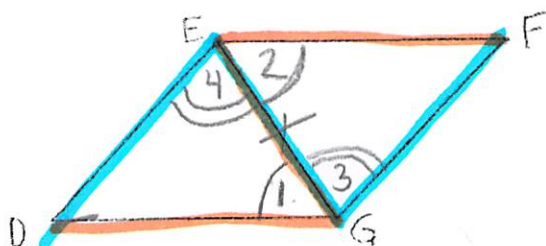
Congruent? (Y/N) __Y__
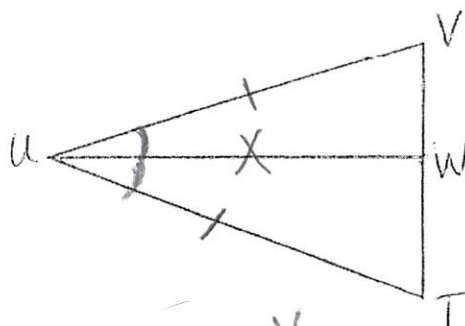Why? __ASA__
Statement: $\triangle WXZ \cong \triangle YXZ$

4.

Congruent? (Y/N) __NO!__
Why? _____
Statement: _____

5. Given: $\overline{DG} \parallel \overline{EF}$ $\overline{DE} \parallel \overline{FG}$

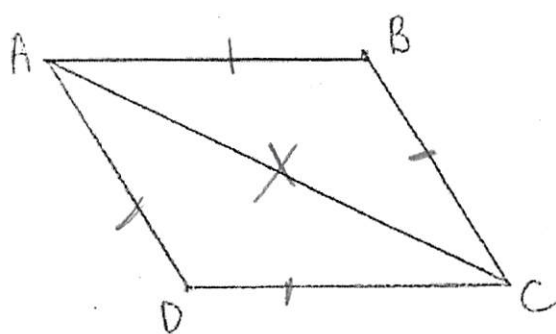Congruent? (Y/N) __Y__
Why? __ASA__
Statement: $\triangle DEG \cong AFEG$

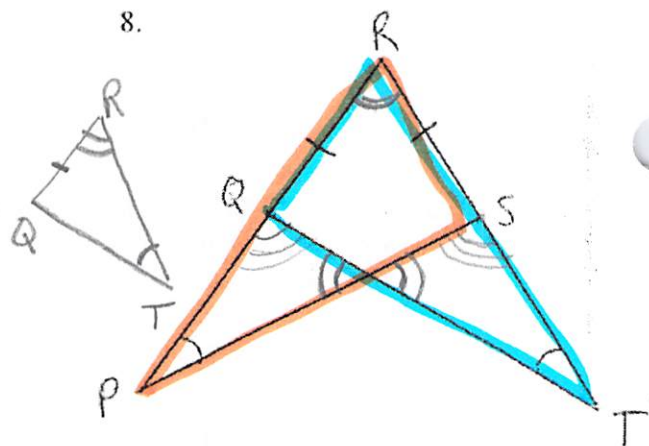6. Given: $\overline{TU} \cong \overline{UV}$; $\overline{UW}$ bisects $\angle TUV$

Congruent? (Y/N) __Y__
Why? __SAS__
Statement: _____
$\triangle VUW \cong \triangle TUW$

7. Given: ABCD is an equilateral quadrilateral
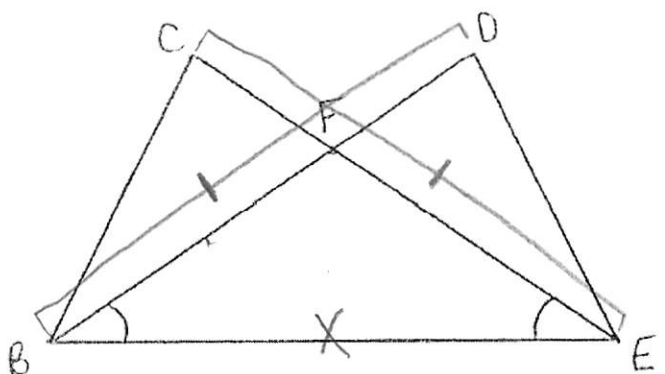

Congruent? (Y/N) _____
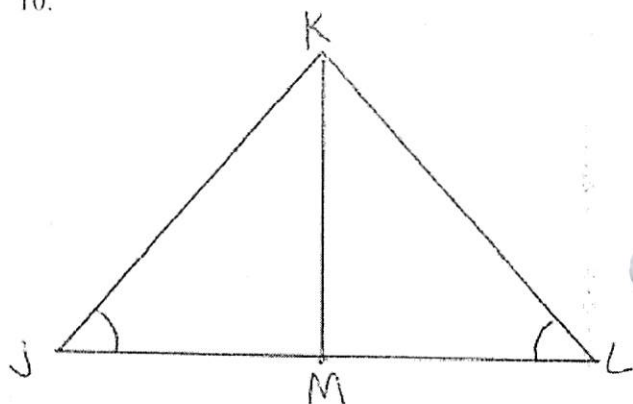Why? _____
Statement: _____

8.

Congruent? (Y/N) Y
Why? AAS
Statement: $\triangle PRS \cong \triangle TRQ$
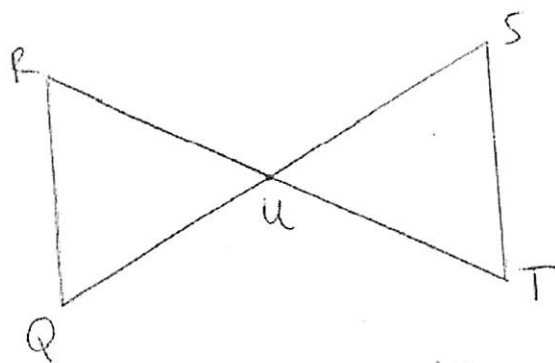
9. Given: $\overline{BD} \cong \overline{CE}$

Congruent? (Y/N) Y
Why? SAS
Statement: $\triangle DBE \cong \triangle CEB$

10.
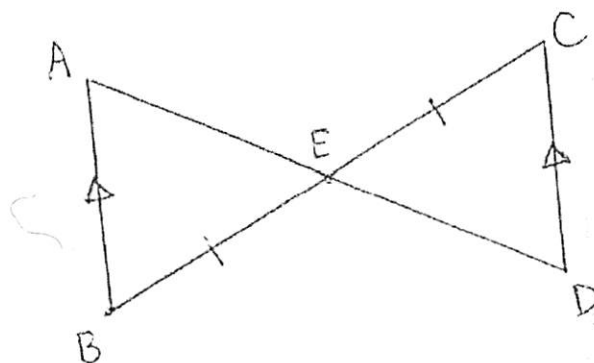

Congruent? (Y/N) NO
Why? _____
Statement: _____

11. $\angle Q \cong \angle S; \angle R \cong \angle T$

Congruent? (Y/N) NO
Why? _____
Statement: _____

12.

Congruent? (Y/N) Yes
Why? AAS or ASA
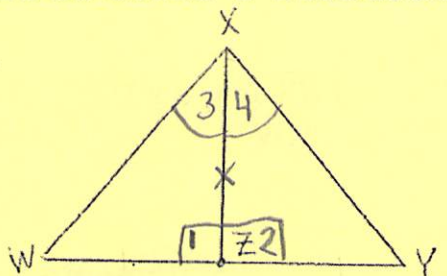Statement: $\triangle ABE \cong \triangle DCE$

Congruent Triangles Theorems Practice Proofs

3.

Given: $\overline{XZ} \perp \overline{WY}$; $\overline{XZ}$ bisects $\angle WXY$
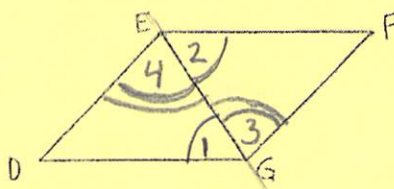
Prove: $\triangle WXZ \cong \triangle YXZ$

Statements	Reasons
① $\overline{XZ} \perp \overline{WY}$, $\overline{XZ}$ bisects $\angle WXY$	① Given
② $\angle 1 \cong \angle 2$	② If 2 segments are $\perp$ then $2 \cong 90°$ are formed.
③ $\angle 3 \cong \angle 4$	③ If a segment bisects an $\angle$ then $2 \cong \angle$'s are formed
④ $\overline{XZ} \cong \overline{XZ}$	④ Reflexsive Prop.
⑤ $\triangle WXZ \cong \triangle YXZ$	⑤ ASA

5.

Given: $\overline{DG} \parallel \overline{EF}$; $\overline{DE} \parallel \overline{FG}$
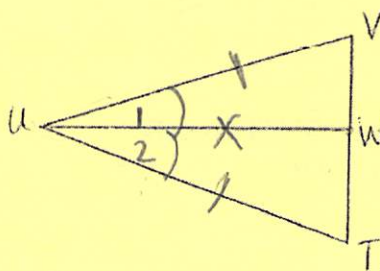
Prove: $\triangle DEG \cong \triangle FGE$

Statements	Reasons
① $\overline{DG} \parallel \overline{EF}$, $\overline{DE} \parallel \overline{FG}$	① Given
② $\angle 1 \cong \angle 2$ $\angle 3 \cong \angle 4$	② If $\parallel$ lines are cut by a transversal then alt int $\angle$'s are formed
③ $\overline{EG} \cong \overline{EG}$	③ Reflexsive Prop
④ $\triangle DEG \cong \triangle FGE$	④ ASA

6.

Given: $\overline{TU} \cong \overline{UV}$; $\overline{UW}$ bisects $\angle TUV$

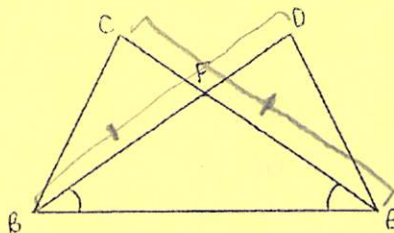**Prove:** $\triangle WUT \cong \triangle WUV$

Statements	Reasons
① $\overline{TU} \cong \overline{UV}$, $\overline{UW}$ bisects $\angle TUV$	① Given
② $\angle 1 \cong \angle 2$	② If a segment bisects on $\angle$ then $2 \cong \angle$'s are formed.
③ $\overline{UW} \cong \overline{UW}$	③ Reflexsive Prop
④ $\triangle WUT \cong \triangle WUV$	④ SAS

9.

Given: $\overline{BD} \cong \overline{CE}$

Prove: $\triangle CBE \cong \triangle DEB$

Statements	Reasons
① $\overline{BD} \cong \overline{CE}$, $\angle DBE \cong \angle CEB$	① Given
② $\overline{BE} \cong \overline{BE}$	② Reflexsive Prop
③ $\triangle CBE \cong \triangle DEB$	③ SAS