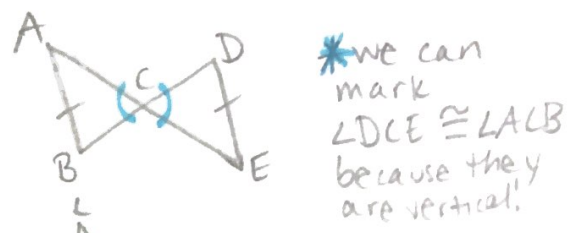


## How to Prove Triangle Congruence

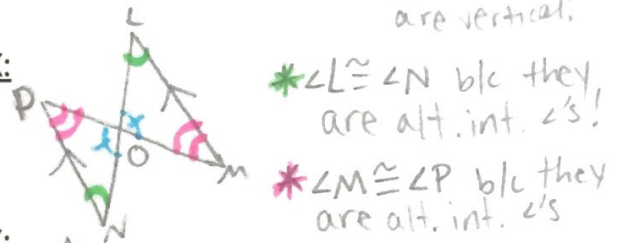
### Not-so-obvious congruence you can use:

If some angles or sides are unmarked, you can use these to mark them as congruent.

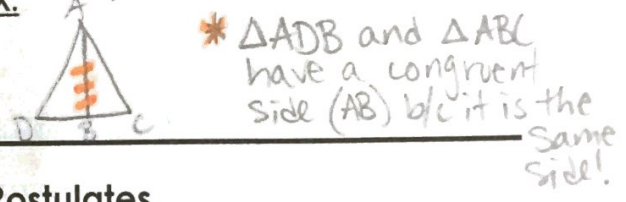
1. Vertical Angles EX:



2. Alternate Interior Angles EX:  
(only with parallel lines)



3. Reflexive Property EX:  
(shared side)

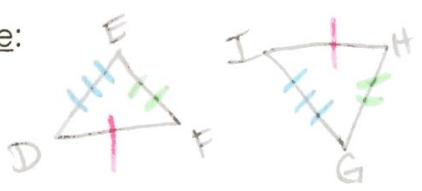


### Triangle Congruence Postulates

#### 1. Side-Side-Side (SSS)

If 3 sides of a triangle are congruent to 3 sides of another triangle, then the two triangles are congruent.

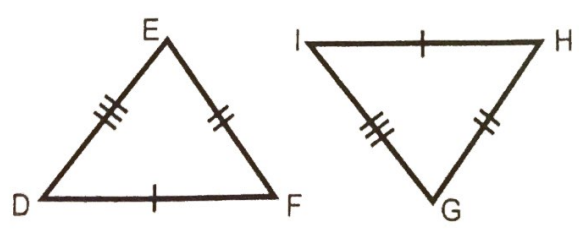
Draw me:



$$\triangle DEF \cong \triangle GHI$$

Example:

Prove  $\triangle DEF \cong \triangle GHI$

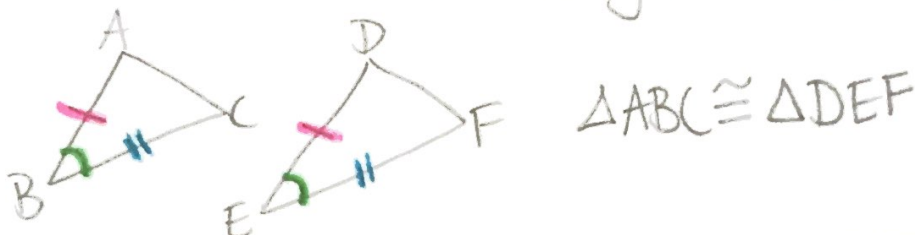


| Statements                          | Reasons       |
|-------------------------------------|---------------|
| $\overline{DE} \cong \overline{GI}$ | Given         |
| $\overline{EF} \cong \overline{HG}$ | Given         |
| $\overline{DF} \cong \overline{IG}$ | Given         |
| $\triangle DEF \cong \triangle GHI$ | SSS Postulate |

## 2. Side-Angle-Side (SAS)

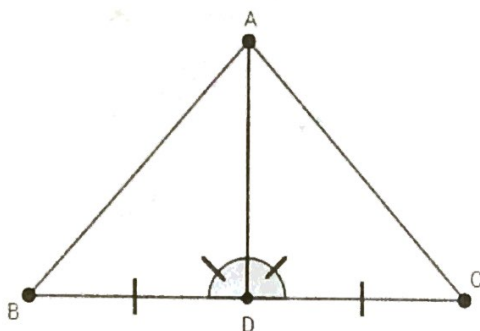
If 2 sides and the included angle of a triangle are congruent to 2 sides and the included angle of another triangle, then the two triangles are congruent.

Draw me:



Example:

Prove  $\triangle ABD \cong \triangle ADC$



| Statements                          | Reasons            |
|-------------------------------------|--------------------|
| $\overline{BD} \cong \overline{CD}$ | Given              |
| $\angle ADB \cong \angle ADC$       | Given              |
| $\overline{AD} \cong \overline{DA}$ | Reflexive property |
| $\triangle ABD \cong \triangle ADC$ | SAS Postulate      |

## 3. Angle-Side-Angle (ASA)

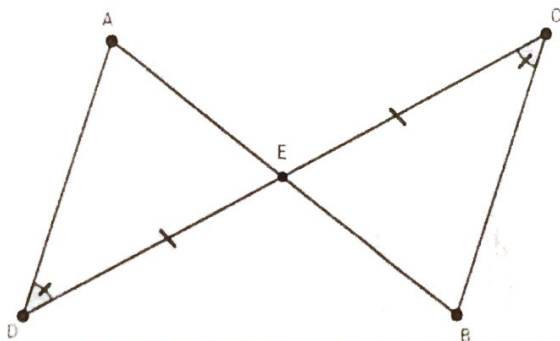
If 2 angles and the included side of a triangle are congruent to 2 angles and the included side of another triangle, then the two triangles are congruent.

Draw me:



Example:

Prove  $\triangle ADE \cong \triangle CBE$

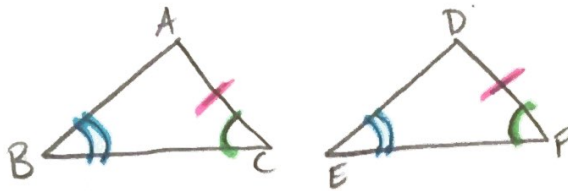


| Statements                          | Reasons         |
|-------------------------------------|-----------------|
| $\angle D \cong \angle C$           | Given           |
| $\overline{DE} \cong \overline{CE}$ | Given           |
| $\angle AED \cong \angle CEB$       | vertical angles |
| $\triangle ADE \cong \triangle CBE$ | ASA Postulate   |

#### 4. Angle-Angle-Side (AAS)

If 2 angles and the non-included side of a triangle are congruent to 2 angles and the non-included side of another triangle, then the two triangles are congruent.

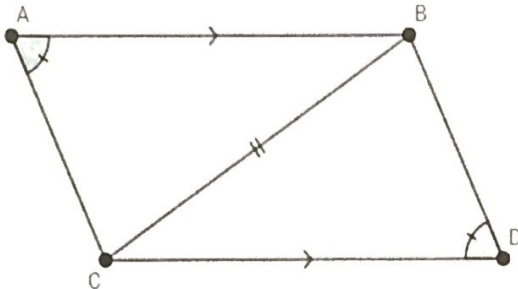
Draw me:



$$\triangle ABC \cong \triangle DEF$$

Example:

Prove  $\triangle ABC \cong \triangle DCB$

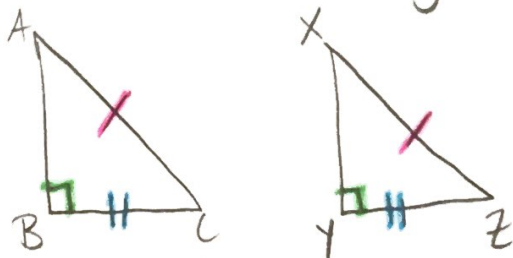


| Statements                              | Reasons                        |
|---|--------------------------------|
| $\angle A \cong \angle D$               | Given                          |
| $\overline{AB} \parallel \overline{CD}$ | Given                          |
| $\angle ABC \cong \angle DCB$           | Alternate interior $\angle$ 's |
| $\overline{BC} \cong \overline{CB}$     | Reflexive property             |
| $\triangle ABC \cong \triangle DCB$     | AAS Postulate                  |

#### 5. Hypotenuse-Leg:

Two right triangles are congruent if they each have a congruent hypotenuse and a congruent leg. \*Pythagorean theorem makes this SSS!

Draw me:

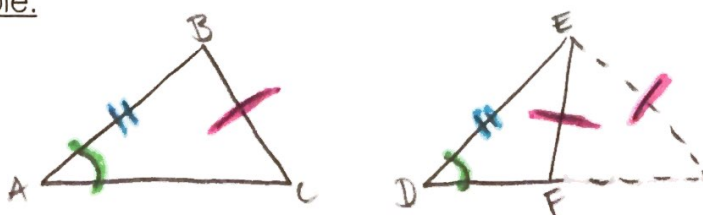


$$\triangle ABC \cong \triangle XYZ$$

#### 6. Angle-Side-Side:

Don't be one! This is NOT a method of proving triangle congruence! ☹️

Example:



$$\triangle ABC \text{ is } \underline{\underline{\text{NOT}}} \cong \triangle DEF$$