# Bellwork

1. Remembering that todays assignment is for **ACCURACY** compare answers with someone **NEXT** to you.
   This means stay in your seat, but compare answers with the people around you.

## Proving Triangle Congruence

Throughout this unit we will be focusing on several methods of proving two triangles are congruent including:

1. Side-Side-Side (SSS)
2. Side-Angle Side (SAS )
3. Hypotenuse Leg (HL)
4. Angle-Side-Angle (ASA)
   [This is a main focus of this lesson]
5. Angle-Angle-Side (AAS)
   [This is a main focus of this lesson]

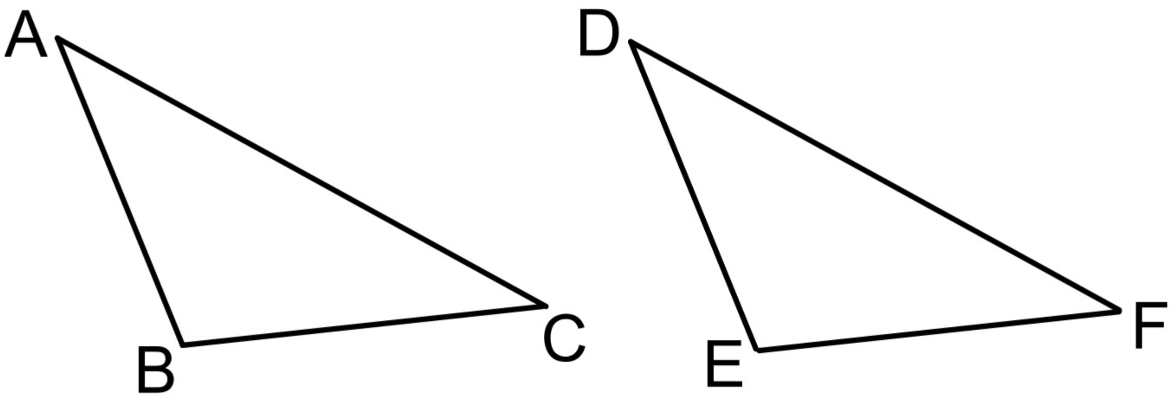
## Angle-Side-Angle

Angle-Side-Angle (ASA) Congruece Postulate:

**IF** two angles and the included side of one triangle are congruent to two angles and the included side of a second triangle,

**THEN** the two triangles are congruent.

# Angle-Side-Angle Visually



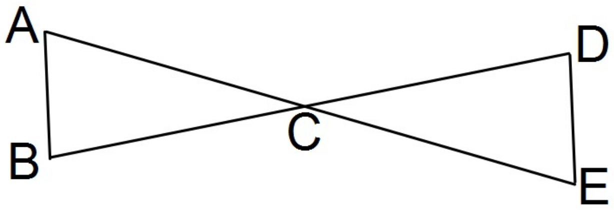

List some possible combinations that would allow for us to state that the two triangles are congruent by ASA.

$\angle A$, $\overline{AC}$, and $\angle C$ with $\angle D$, $\overline{DF}$, and $\angle F$
$\angle A$, $\overline{AB}$, and $\angle B$ with $\angle D$, $\overline{DE}$, and $\angle E$
$\angle B$, $\overline{BC}$, and $\angle C$ with $\angle E$, $\overline{EF}$, and $\angle F$

# Example

**Given:** $\overline{AB} \parallel \overline{DE}$

C is the midpt of $\overline{BD}$




**Proof:** $\triangle ABC \cong \triangle EDC$

| Statements | Reasons |
|---|---|
| 1. $\overline{AB} \parallel \overline{DE}$; C is midpt of $\overline{BD}$ | 1. Given |
| 2. $\overline{BC} \cong \overline{CD}$ | 2. Definition of Midpoint |
| 3. $\angle B \cong \angle D$ | 3. Alternate Interior Angles |
| 4. $\angle BCA \cong \angle DCE$ | 4. Vertical Angles |
| 5. $\triangle ABC \cong \triangle EDC$ | 5. ASA. |

Note: This problem could easily be altered to prove it by the next concept AAS, but it CANNOT be proven by SSS, SAS, or HL. Can you explain why?

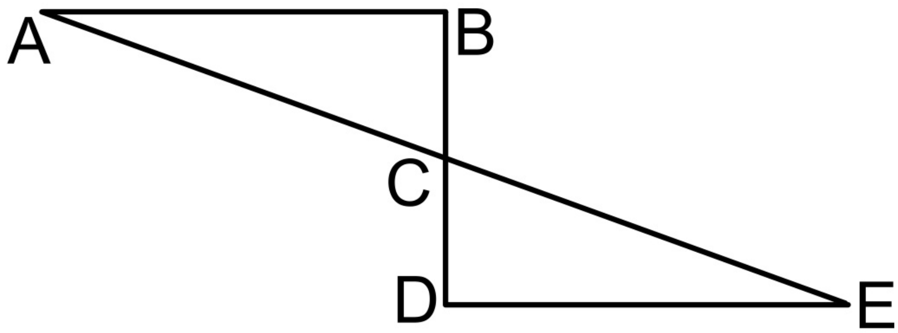
## Angle-Angle-Side

Angle-Angle-Side (AAS) Congruence Postulate:

**IF** two angles and a non-included side of one triangle are congruent to two angles and the corresponding non-included side,

**THEN** , the triangles are congruent.

# Angle-Angle-Side Visually




List some possible combinations that would allow for us to state that the two triangles are congruent by AAS.

**ONE OF THE FOLLOWING...**

$\angle A, \angle B$, and $\overline{BC}$ with $\angle E, \angle D$, and $\overline{CD}$
$\angle A, \angle B$, and $\overline{AC}$ with $\angle E, \angle D$, and $\overline{CE}$
$\angle B, \angle ACB$, and $\overline{AC}$ with $\angle D, \angle ECD$, and $\overline{CE}$
$\angle B, \angle ACB$, and $\overline{AB}$ with $\angle D, \angle ECD$, and $\overline{DE}$
$\angle A, \angle ACB$, and $\overline{AB}$ with $\angle E, \angle ECD$, and $\overline{DE}$
$\angle A, \angle ACB$, and $\overline{BC}$ with $\angle E, \angle ECD$, and $\overline{CD}$

## Useful Information

Supplementary angles of two congruent angles are congruent.

Reasoning -

Given: $\angle A \cong \angle B$

Let: $\angle C$ be supplementary to A

$\angle D$ be supplementary to B

Then: A + C = 180

B + D = 180

So... A + C = B + D (by transitive prop)

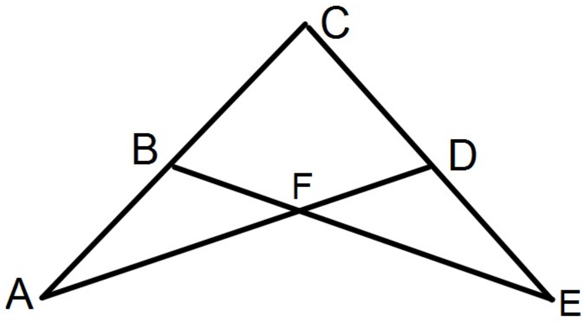
A + C = A + D (Since B = A)

C = D (By subtraction)

# Example

**Given:** $\angle CBF \cong \angle CDF$
$\overline{BF} \cong \overline{FD}$

**Prove:** $\triangle ABF \cong \triangle EDF$




| Statements | Reasons |
|---|---|
| 1. $\angle CBF \cong \angle CDF$; $\overline{BF} \cong \overline{FD}$ | 1. Given |
| 2. $\angle BFA \cong \angle DFE$ | 2. Vertical Angles |
| 3. $\angle ABF$ is supplementary to $\angle CBF$<br>$\angle EDF$ is supplementary to $\angle CDF$ | 3. Definition of Supplementary |
| 4. $\angle ABF \cong \angle EDF$ | 4. Supplements of $\cong$ angles are $\cong$ |
| 5. $\triangle ABF \cong \triangle EDF$ | 5. ASA |