3.5 - Proofs with Parallel Lines
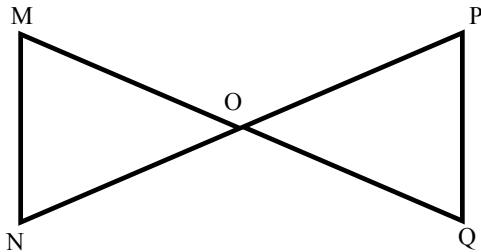
Lets see if we can use what we learned in level 4 to write some proofs

Theorems about parallel lines

1. If two parallel lines are cut by a transversal, then **alternate interior angles** are congruent

2. If two parallel lines are cut by a transversal, then **alternate exterior angles** are congruent

3. If two parallel lines are cut by a transversal, then **corresponding angles** are congruent

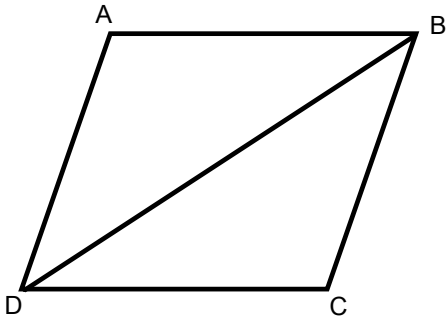4. If two parallel lines are cut by a transversal, then **same-side interior angles** are supplementary

Given: $\overline{MN} \parallel \overline{PQ}$ and $\overline{MO} \cong \overline{OQ}$
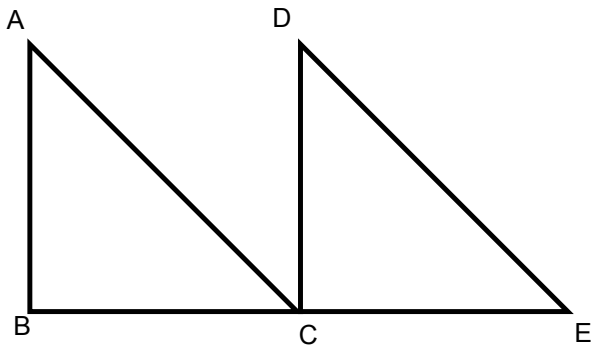
Prove: $\triangle MON \cong \triangle QOP$

M   P

O

N   Q

Given: $\overline{BC} \parallel \overline{AD}$ and $\overline{BC} \cong \overline{AD}$

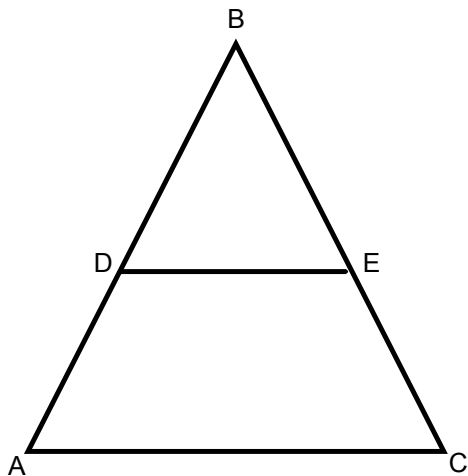Prove: $\triangle DAB = \triangle BCD$

A   B

D   C

Given: $\overline{AC}$ II $\overline{DE}$, C is the midpoint of $\overline{BE}$, and $\overline{AC} \cong \overline{DE}$

Prove: $\overline{AB} \cong \overline{DC}$

A   D
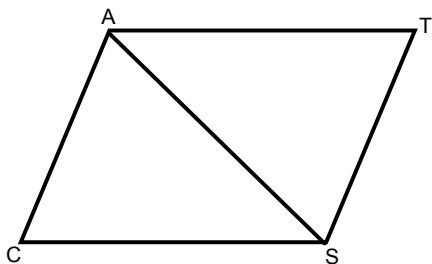
B   C   E

Given: $\overline{DE}$ II $\overline{AC}$.

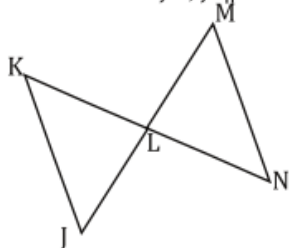Prove: △ABC ~ △DBE

B

D   E

A   C

Independent Practice

Given: $\overline{CA} \parallel \overline{TS}$, $\angle C = \angle T$
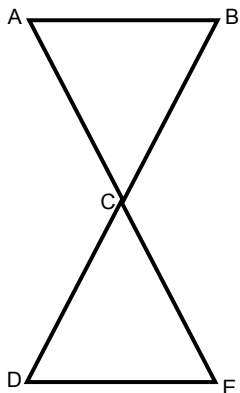
Prove: $\triangle ACS \cong \triangle STA$

Given: $\overline{KN}$ bisects $\overline{JM}$, $\overline{JK} \parallel \overline{MN}$

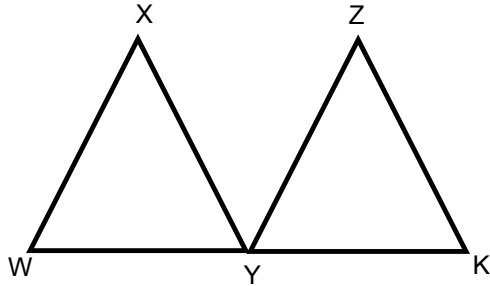Prove: $\triangle JKL \cong \triangle MNL$

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

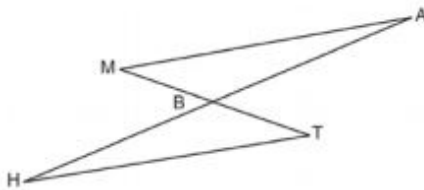Prove: $\triangle ABC \sim \triangle EDC$

Given: $\overline{WX} \parallel \overline{ZY}$, $\angle WYX \cong \angle ZKY$, and Y is the midpoint of $\overline{WK}$
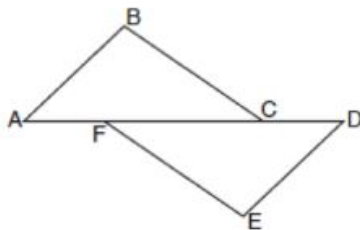
Prove: $\angle WXY \cong \angle YZK$

Given: $\overline{MT}$ and $\overline{HA}$ intersect at B, $\overline{MA} \parallel \overline{HT}$, and $\overline{MT}$ bisects $\overline{HA}$.

Prove: $\overline{MA} \cong \overline{HT}$

Given: $\overline{AFCD}$, $\overline{AB} \perp \overline{BC}$, $\overline{DE} \perp \overline{EF}$, $\overline{BC} \parallel \overline{FE}$, $\overline{AB} \cong \overline{DE}$

Prove: $\overline{AC} \cong \overline{FD}$

Statements	Reasons
1 $AFCD$	1 Given
2 $\overline{AB} \perp \overline{BC}$, $\overline{DE} \perp \overline{EF}$	2 Given
3 $\angle B$ and $\angle E$ are right angles.	3
4 $\angle B \cong \angle E$	4 All right angles are congruent.
5 $\overline{BC} \parallel \overline{FE}$	5 Given
6 $\angle BCA \cong \angle EFD$	6
7 $\overline{AB} \cong \overline{DE}$	7 Given
8 $\triangle ABC \cong \triangle DEF$	8
9 $\overline{AC} \cong \overline{FD}$	9