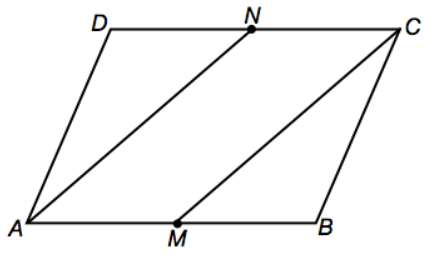
Geometry LAB **Name** _____ **Date**_____ **Section**_____

Unit 6 Day 9 Triangles within Quadrilaterals

Relating Polygons

When you are working with triangles and quadrilaterals, determine which sides or angles that BOTH polygons have in common.

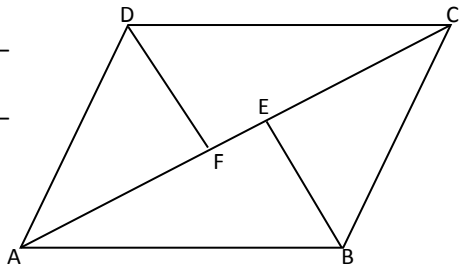
Example 1: Highlight triangles AND and CMB. State which angles and sides that the triangles have in common with parallelogram ABCD and why they are congruent.



Sides: _____

Angles: _____

Example 2: Highlight triangles ADF and CBE. State which angles and sides that the triangles have in common with parallelogram ABCD and why they are congruent.



Sides: _____

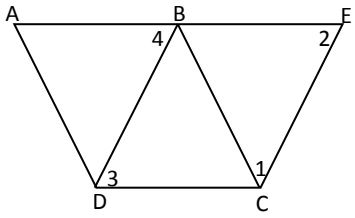
Angles: _____

What pair of congruent alternate interior angles are formed by the parallel sides?

_____

Why can't you state that $\measuredangle ADF \cong \measuredangle CBE$? _____

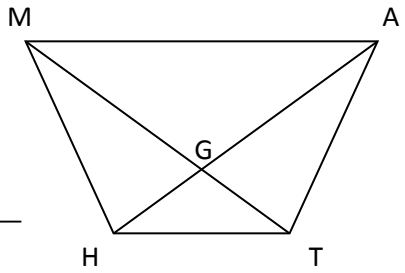
Example 3: Highlight triangles ABD and ECB. State which angles and sides that the triangles have in common with trapezoid ECDA and why the pairs would be congruent.



Sides: _____

Angles: _____

Example 4: Given isosceles trapezoid MATH with diagonals intersecting at G,



How many pairs of congruent triangles are there? _____

Which pair(s) of triangles shares the legs with the trapezoid? _____

Which pair(s) of triangles shares the diagonals with the trapezoid? _____

Which pair(s) of triangles share the base angles with the trapezoid? _____

Although triangles MGA and TGH are not congruent, are there any congruent pairs of angles or sides that can be concluded? _____

Given Quadrilaterals

Use properties of given quadrilaterals to get a relationship within a pair of segments and angles. This can give you triangle congruency criteria, isosceles triangle theorems, transitive/substitution, or another type of quadrilateral.

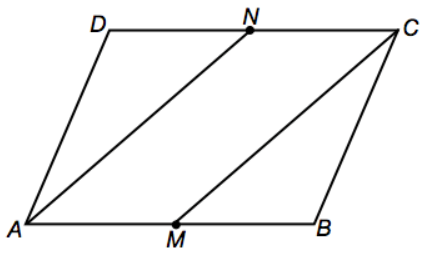
Parallelograms

- Parallel Segments/Lines (opposite sides) → congruent or supplementary angles
- Perpendicular Segments/lines (consecutive sides/diagonals) → Right angles
- Segment Bisectors (diagonals) → congruent segments
- Congruent Segments (opposite sides, consecutive sides)

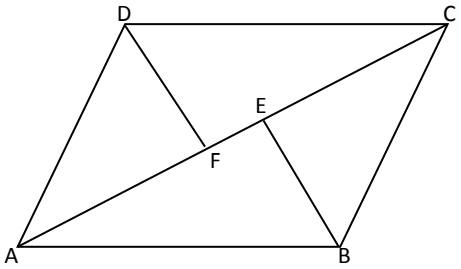
Trapezoids

- Parallel Segments/Lines (1 set of opposite sides) → congruent or supplementary angles
- Congruent Segments (legs/diagonals of an isosceles trapezoid)
- Congruent Angles (base angle pairs of an isosceles trapezoid)

5. Given: $ABCD$ is a parallelogram and $\overline{DN} \cong \overline{BM}$.
   Prove: $\Delta AND \cong \Delta CMB$



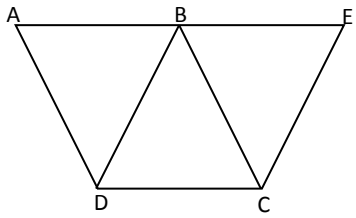
6. Given: Parallelogram ABCD, $\overline{AFEC}$ and $\measuredangle ADF \cong \measuredangle CBE$
   Prove: $\Delta ADF \cong \Delta CBE$



Proving Quadrilaterals through Congruent Triangles & CPCTC

To prove a type of quadrilateral, use given information to 1) get congruent triangles and 2) use corresponding parts of congruent triangles to 3) satisfy a set of conditions for a parallelogram or trapezoid.

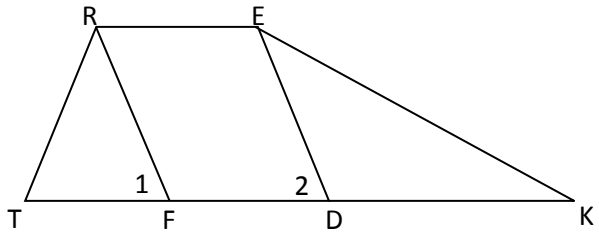
7. Given: isosceles trapezoid ECDA and B is the midpoint of $\overline{AE}$
   Prove: 1) $\Delta ABD \cong \Delta EBC$
   2) Triangle BDC is isosceles



Proving Quadrilaterals through Other Quadrilaterals

To prove a quadrilateral given a different quadrilateral, look for parallel lines and whether any sides are coincident.

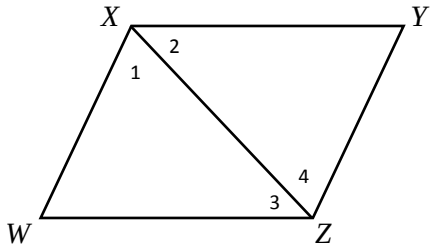
8. Given: TREK is a trapezoid; $\measuredangle 1 \cong \measuredangle 2$
   Prove: FRED is a parallelogram



- Since TREK is given as a trapezoid, then $\overline{RE}$ is _____ to $\overline{TFDK}$.
- Since it is given that $\measuredangle 1 \cong \measuredangle 2$, then $\overline{FR} \parallel$ _____ because _____.
- Therefore, FRED is a parallelogram because _____.

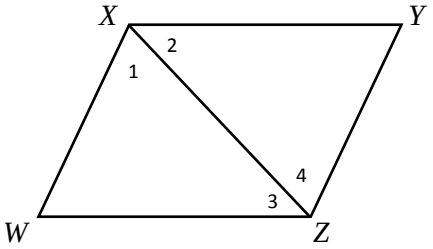
PROBLEM SET 6-9 LAB

1. Given $\square WXYZ$, write a plan to prove $\triangle WXZ \cong \triangle YZX$ using:

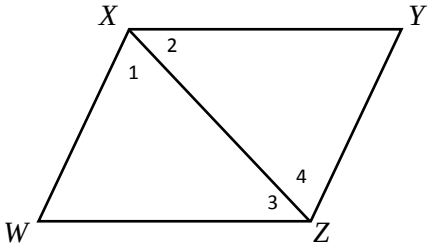


A. SSS $\cong$

B. SAS $\cong$ where you use $\measuredangle W$ and $\measuredangle Y$



C. ASA $\cong$ where you use $\overline{XZ}$

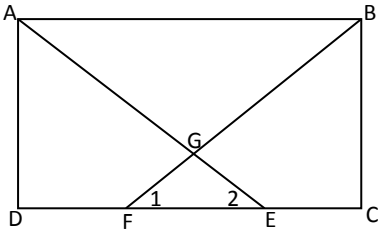


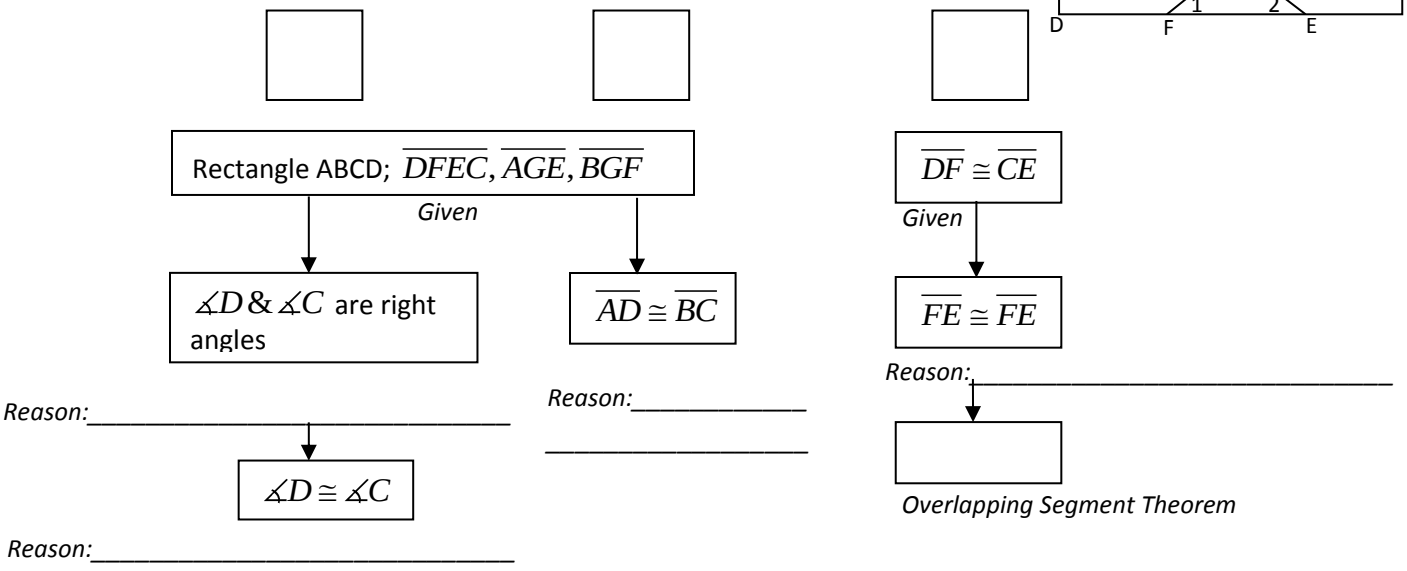
2. Fill in the blanks and boxes for the following proof:

Given: Rectangle ABCD, $\overline{DFEC}, \overline{AGE}, \overline{BGF}$, and $\overline{DF} \cong \overline{CE}$.

Prove: a) $\Delta ADE \cong \Delta BCF$

b) $\measuredangle 1 \cong \measuredangle 2$





$\Delta ADE \cong \Delta BCF$ by _____ then $\measuredangle 1 \cong \measuredangle 2$ by _____