

Agenda- 6-9: Triangles within Quadrilateral

- Check HW 6.8
- Guided Notes 6.9

HW

- Problem Set 6-9
- Midterm remediation Worksheets - Due 2/10

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Geometry LAB Name _____ Date _____ Section _____
 Unit 6 Day 9 Triangles within Quadrilaterals

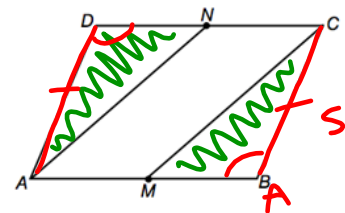
Relating Polygons

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: $\overline{AD} \cong \overline{BC}$ [P] → OPP SIDES ≅

Angles: $\angle D \cong \angle C$ [P] → OPP ∠'S ≅



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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: $\overline{AD} \cong \overline{CB}$ $\overline{AD} \parallel \overline{BC} \rightarrow$ OPP SIDES \cong

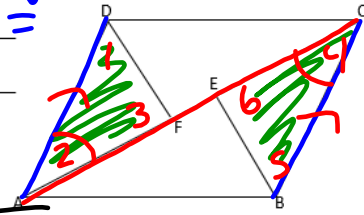
Angles: NONE

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

$\angle 2 \cong \angle 4$ FROM $\overline{AD} \parallel \overline{BC}$

Why can't you state that $\angle ADF \cong \angle CBE$? NEED DIAG \overline{DB}

D, F, E, B NON-COLLINEAR

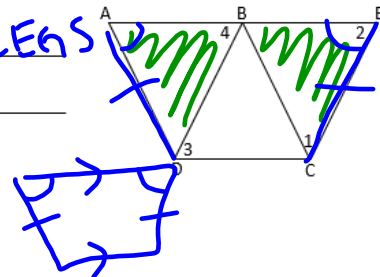


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Example 3: Highlight triangles ABD and ECB. State which angles and sides that the triangles have in common with trapezoid ECDA and why the pairs would be congruent.

Sides: $\overline{AD} \cong \overline{EC}$ ISOS TRAP \rightarrow \cong LEGS ^{IF}

Angles: $\angle A \cong \angle E$ ISOS TRAP \rightarrow \cong BASE \angle 'S



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

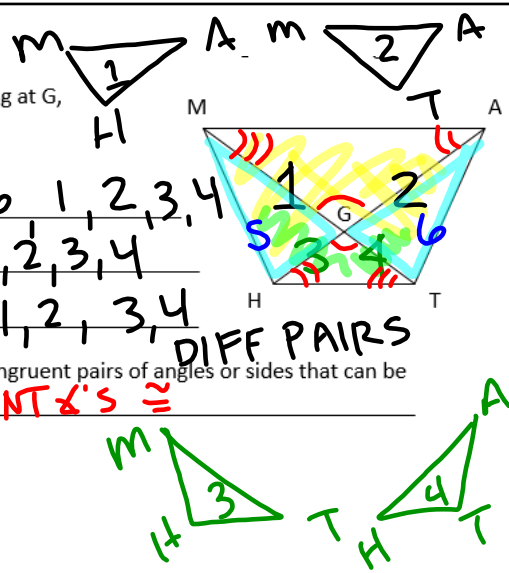
How many pairs of congruent triangles are there? 3

Which pair(s) of triangles shares the legs with the trapezoid? 5, 6, 1, 2, 3, 4

Which pair(s) of triangles shares the diagonals with the trapezoid? 1, 2, 3, 4

Which pair(s) of triangles share the base angles with the trapezoid? 1, 2, 3, 4

Although triangles MGA and TGH are not congruent, are there any congruent pairs of angles or sides that can be concluded? VERTICAL \angle 'S, ALT INT \angle 'S \cong



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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

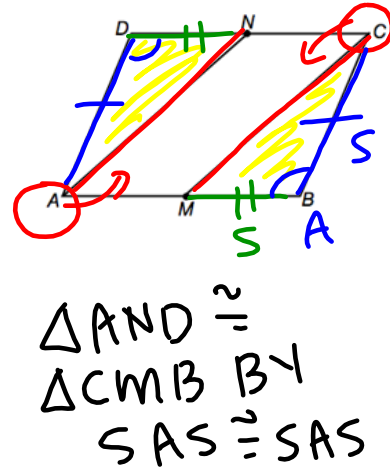
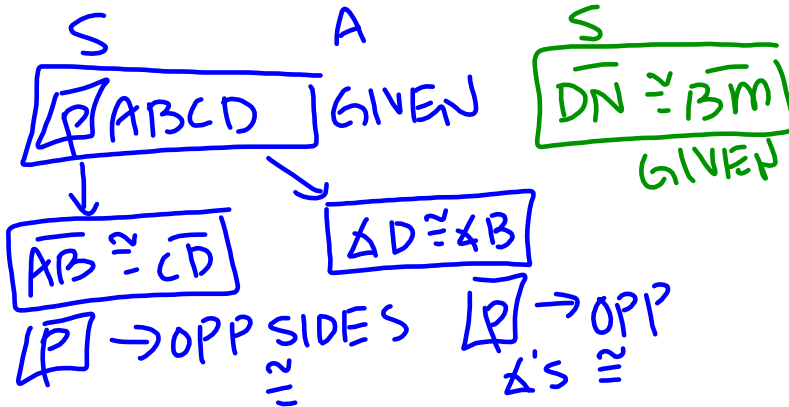
- Parallel Segments/Lines (opposite sides) \rightarrow congruent or supplementary angles
- Perpendicular Segments/lines (consecutive sides/diagonals) \rightarrow Right angles
- Segment Bisectors (diagonals) \rightarrow congruent segments
- Congruent Segments (opposite sides, consecutive sides)

Trapezoids

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

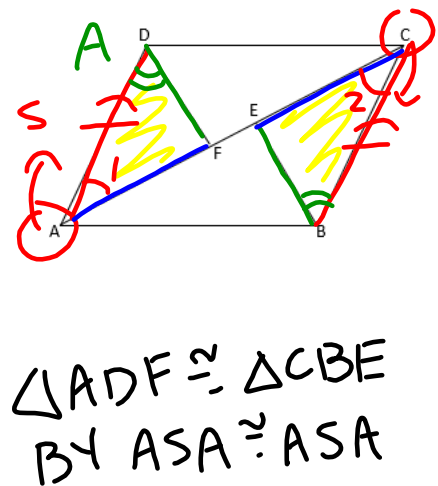
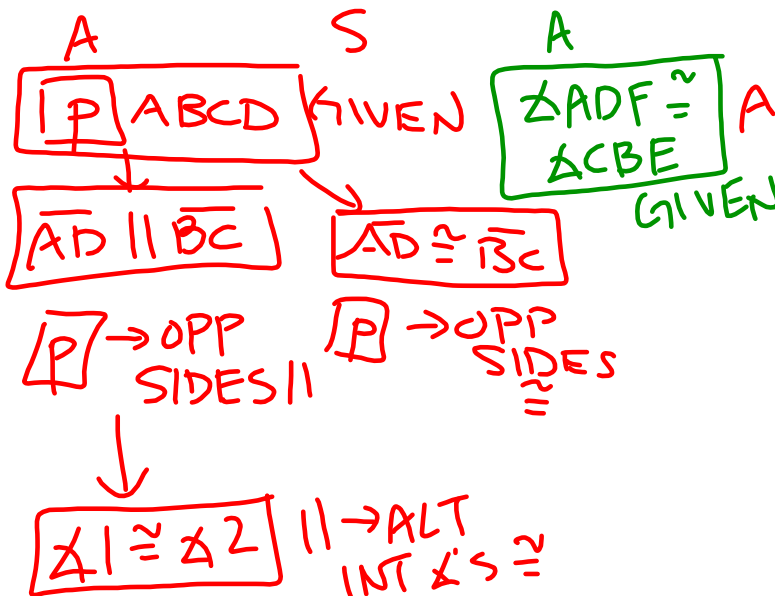
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5. Given: $ABCD$ is a parallelogram and $\overline{DN} \cong \overline{BM}$.
 Prove: $\triangle AND \cong \triangle CMB$



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



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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) $\triangle ABD \cong \triangle EBC$
 2) Triangle BDC is isosceles

CPCTC \rightarrow \triangle

\overline{B} MDPT \overline{AE} GIVEN
 $\overline{AB} \cong \overline{EB}$
 MIDPOINT \rightarrow 2 \cong SEGMENTS

ISOS TRAP ECDA GIVEN
 $\angle A \cong \angle E$
 ISOS TRAP \rightarrow \cong BASE \angle 'S
 $\overline{AD} \cong \overline{EC}$
 ISOS TRAP \rightarrow \cong LEGS

$\triangle ABD \cong \triangle EBC$ BY SAS \cong SAS
 $\overline{BD} \cong \overline{BC}$ CPCTC
 \cong \triangle 'S \rightarrow CORR SIDES \cong
 $\triangle BDC$ IS ISOS BY DEFN

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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; $\angle 1 \cong \angle 2$
 Prove: FRED is a parallelogram

- Since TREK is given as a trapezoid, then \overline{RE} is PARALLEL to \overline{TFDK} .
- Since it is given that $\angle 1 \cong \angle 2$, then $\overline{FR} \parallel \overline{ED}$ because \cong CORRESPONDING \angle 'S \rightarrow \parallel LINES.
- Therefore, FRED is a parallelogram because BOTH PAIRS OF OPPOSITE SIDES ARE \parallel .

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