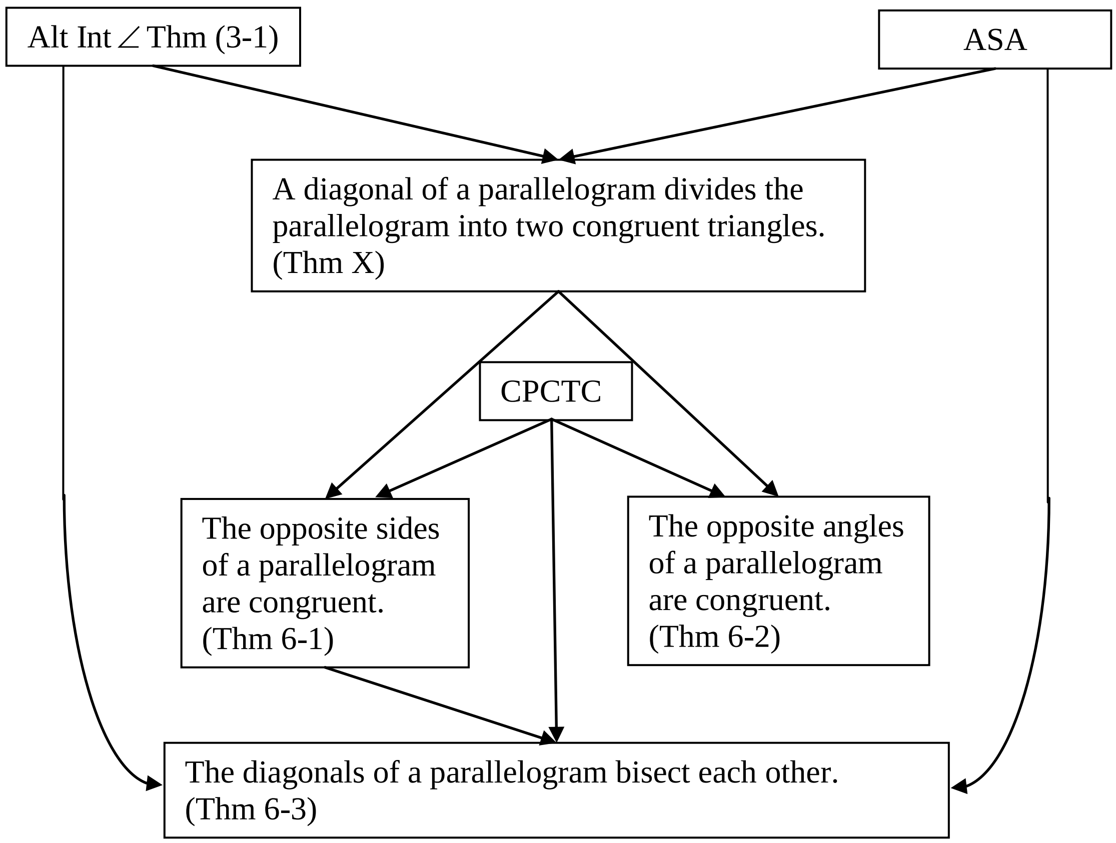
Concept map: Logical relationship of postulates & theorems used for L6.2 theorems



You will use the above concept map to prove the following key theorems about parallelograms:

Theorem X A diagonal of a parallelogram divides the parallelogram into two congruent triangles (this one is not in the book, we can name it what we want!).

Theorem 6-1 Opposite sides of a parallelogram are congruent.

Theorem 6-2 Opposite angles of a parallelogram are congruent.

Theorem 6-3 Diagonals of a parallelogram bisect each other.

Theorem 6-4 If three (or more) parallel lines cut off congruent segments on a transversal, then they do the same for every transversal.

As you can see from the concept map, these theorems are **linked together in a chain**: you use the preceding ones to prove the next. In the following pages you will prove each of the above theorems in order. If you need, use the concept map above for clues.

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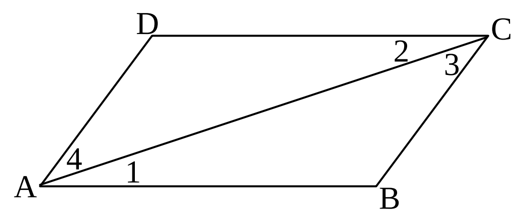
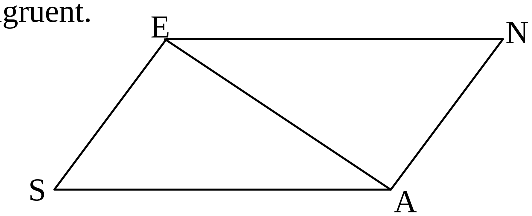
Use the concept map on page 1 for hints as you complete this sequence of linked proofs

1. Conjecture: A diagonal of a parallelogram divides it into two congruent triangles.
   Given: Parallelogram ABCD with diagonal $\overline{AC}$
   Prove: $\Delta ABC \cong \Delta CDA$

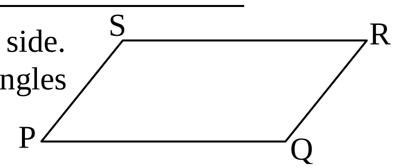


2. Conjecture: The opposite sides of a parallelogram are congruent.
   Given: Parallelogram SANE
   Prove: $\overline{SA} \cong \overline{NE}$ & $\overline{SE} \cong \overline{NA}$



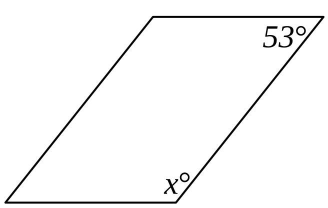
Which of the theorems from the front page did we just prove?

Definition: ***Consecutive angles*** are angles of a polygon that share a side. In the parallelogram PQRS to the right, $\angle P$ & $\angle S$ are consecutive angles as are $\angle S$ & $\angle R$.

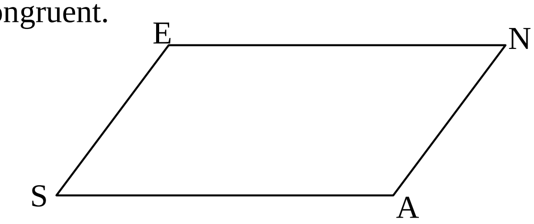


3. Consecutive angles of a parallelogram are supplementary. Explain why.

4. Application: pg 297, #1 (For the given parallelogram, find the value of *x*)



5. <u>Conjecture</u>: The opposite angles of a parallelogram are congruent.
   <u>Given</u>: Parallelogram SANE
   <u>Prove</u>: $\angle SAN \cong \angle NES$ & $\angle ESA \cong \angle ANE$



Which of the theorems from the front page did we just prove?

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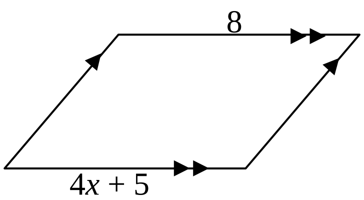
6. <u>Application</u>: pg 297, #7 (Find the value of *x*)



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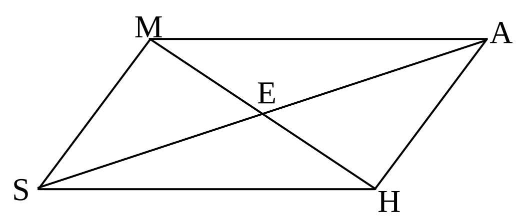
7. <u>Conjecture</u>: The diagonals of a parallelogram bisect each other.
   <u>Given</u>: Parallelogram SHAM with diagonals $\overline{SA}$ & $\overline{MH}$ intersecting at pt. *E*.
   <u>Prove</u>: Diagonals $\overline{SA}$ & $\overline{MH}$ bisect each other.



Which of the theorems from the front page did we just prove?

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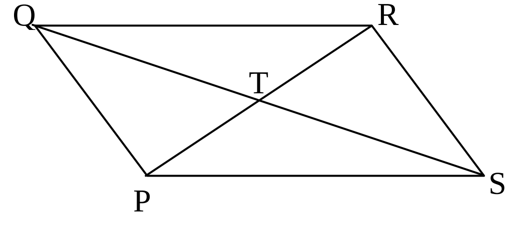
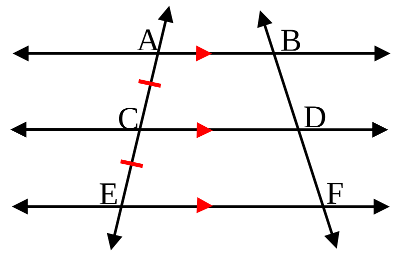
8. <u>Application</u>: pg 298, #17 (Find the values of *x* and *y* in ▱*PQRS*)

   $PT = 2x$
   $TR = y + 4$
   $QT = x + 2$
   $TS = y$



Theorem 6-4 states:



If three (or more) parallel lines cut off congruent segments on a transversal, then they do the same for every transversal.

$\overline{BD} \cong \overline{DF}$

9. Application: pg 298, #22 (Find *ED* and *FD* in the following figure)