5.2 Parallel Lines [Compatibility Mode] - Microsoft Word

5.2. Honors Geometry

DATE: 12/20

Target 4A. Understand and apply special angle relationships when parallel lines are cut by a transversal

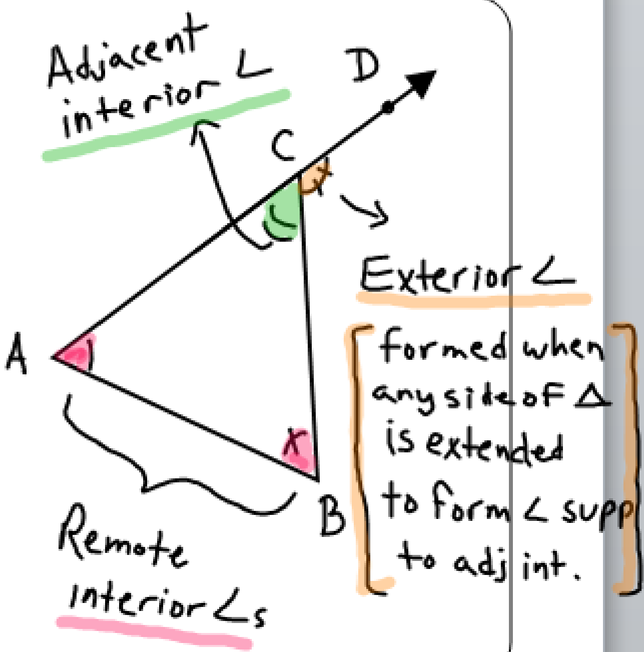
Exterior Angle Inequality Theorem

The exterior ∠ of a △ is greater in measure than either remote interior ∠. (Proof on page 216)

Given: $m\angle BCD$ (Exterior ∠)

Prove: $m\angle BCD > m\angle A$

$m\angle BCD > m\angle B$



Parallel Theorems

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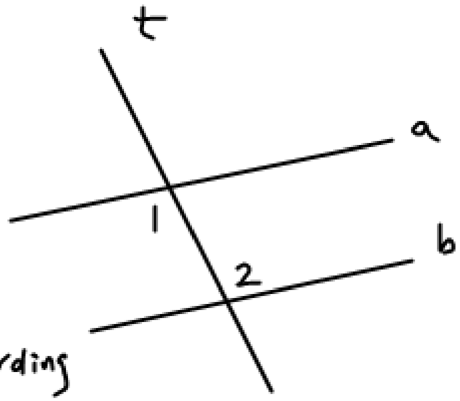
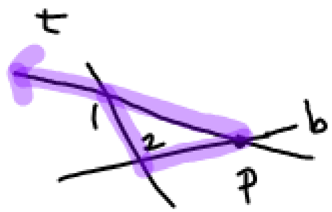
Alternate Interior Angle Theorem (indirect proof)

It states – Given: $\angle 1 \cong \angle 2$

Prove: $a \parallel b$



Proof by contradiction: Either $a \parallel b$ or $a \nparallel b$.
Assume $a \nparallel b$. Then line a and b will intersect at some pt. P (see diagram on right lower corner). According to the Exterior $\angle$ Inequality Thm, $\underline{\angle 1 > \angle 2}$. This contradicts given statement $\underline{\angle 1 \cong \angle 2}$. Our assumption is FALSE. $\therefore a \parallel b$ ✓

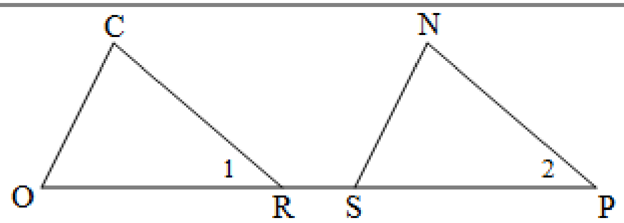


Given: $\angle O \cong \angle S$

$\overline{OS} \cong \overline{RP}$

$\overline{CO} \cong \overline{NS}$

Prove: $\overline{CR} \parallel \overline{NP}$



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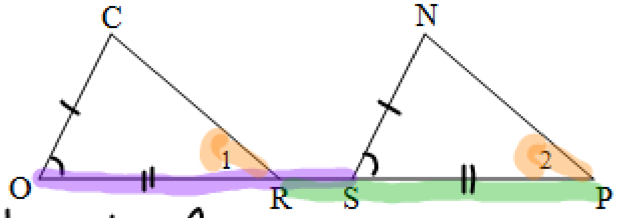
Given: $\angle O \cong \angle S$

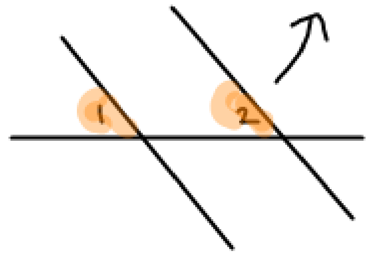
$\overline{OS} \cong \overline{RP}$

$\overline{CO} \cong \overline{NS}$

Prove: $\overline{CR} \parallel \overline{NP}$



Corresponding ∠s



Corr ∠s ≅ ⇒ || lines

Statements	Reasons
① $\angle O \cong \angle S$, $\overline{OS} \cong \overline{RP}$, $\overline{CO} \cong \overline{NS}$	① Given
② $\overline{RS} \cong \overline{RS}$	② Reflexive property
③ $\overline{OR} \cong \overline{SP}$	③ Subtraction property
④ $\triangle COR \cong \triangle NSP$	④ SAS
⑤ $\angle 1 \cong \angle 2$	⑤ CPCTC
⑥ $\overline{CR} \parallel \overline{NP}$	⑦ Corr ∠s ≅ ⇒ ‖ lines

Set up the correct equation based on the given information.
Then, determine if a||b.

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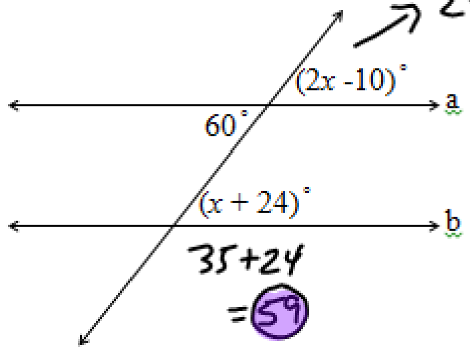
Then, determine if a||b.



$2 \cdot 35 - 10 = 60$

$35 + 24 = 59$

Correct Equation:

$60 = 2x - 10$ why? vertical ∠s ≅!

$+10 \qquad +10$

$70 = 2x$

$35 = x$

∴ Corr ∠s are ≠.

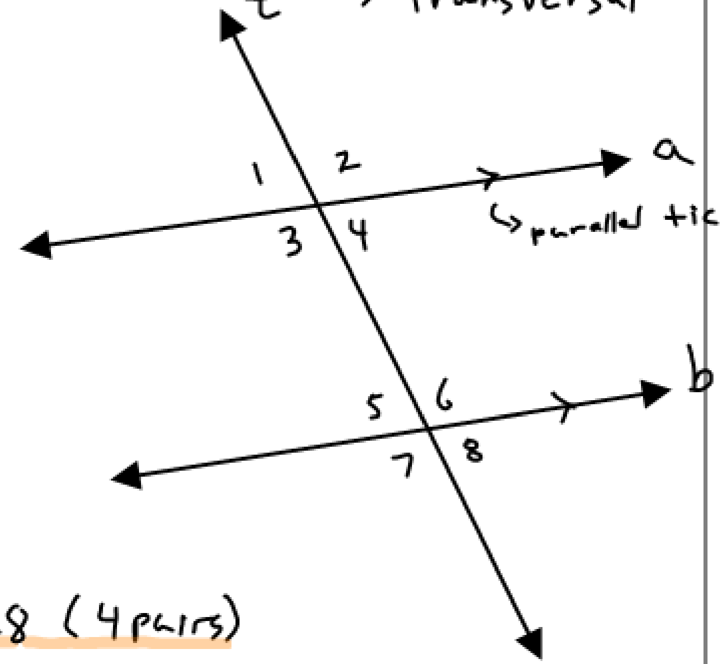
∴ a∦b

Parallel Theorems

Based on our Nspire investigation, we concluded

$\parallel \rightarrow$ parallel symbol

t → transversal



- Alternate interior ∠s ≅ ⟺ lines ∥ (a∥b)

Ex: ∠3 & ∠6, ∠4 & ∠5 (2 pairs)

- Alternate exterior ∠s ≅ ⟺ lines ∥ (a∥b)

Ex: ∠1 & ∠8, ∠2 & ∠7 (2 pairs)

- Corresponding ∠s ≅ ⟺ lines ∥ (a∥b)

Ex: ∠1 & ∠5, ∠2 & ∠6, ∠3 & ∠7, ∠4 & ∠8 (4 pairs)

- Same-side interior ∠s supplementary ⟺ lines ∥ (a∥b)

Ex: ∠3 & ∠5, ∠4 & ∠6

- Same-side exterior ∠s supplementary ⟺ lines ∥ (a∥b)

Ex: ∠1 & ∠7, ∠2 & ∠8