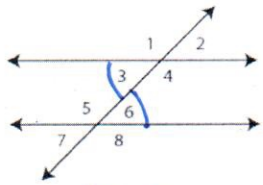
Objective:

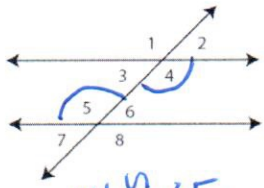
- By the end of you will be able to identify properties of parallel lines cut by a transversal to find angle measures and construct proofs using these properties.

Alternate Interior Angles:

opposite inside



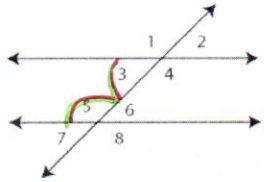
$\angle 3 \cong \angle 6$



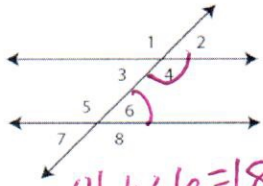
$\angle 4 \cong \angle 5$

Alternate interior angles are congruent.

Same-Side Interior Angles:



$\angle 3 + \angle 5 = 180°$

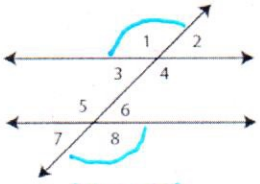


$\angle 4 + \angle 6 = 180°$

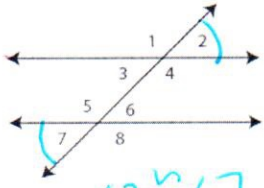
Same-side Interior angles are supplementary.

Alternate Exterior Angles:

opposite outside



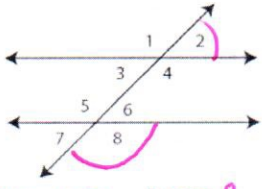
$\angle 1 \cong \angle 8$



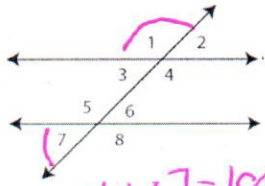
$\angle 2 \cong \angle 7$

Alternate Exterior angles are congruent.

Same-Side Exterior Angles:



$\angle 2 + \angle 8 = 180°$

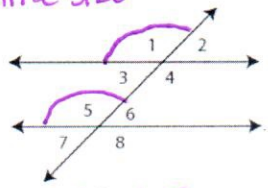


$\angle 1 + \angle 7 = 180°$

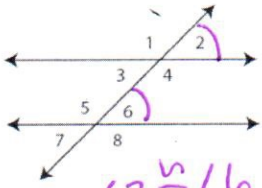
Same-side exterior angles are supplementary.

Corresponding Angles:

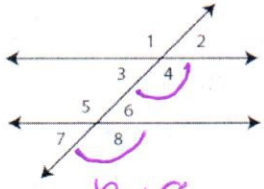
matching same size



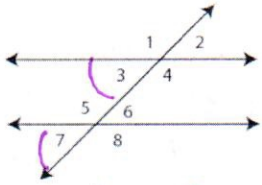
$\angle 1 \cong \angle 5$



$\angle 2 \cong \angle 6$



$\angle 4 \cong \angle 8$

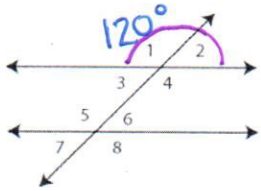


$\angle 3 \cong \angle 7$

Corresponding angles are congruent.

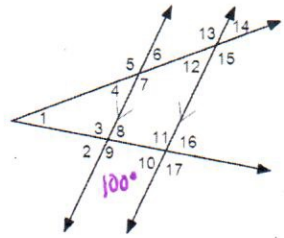
1. **Given that lines that appear parallel are parallel, find the measures of all missing angles.**

$m\angle 1 = 120°$	$m\angle 2 =$ 60°
$m\angle 3 =$ 60°	$m\angle 4 =$ 120°
$m\angle 5 =$ 120°	$m\angle 6 =$ 60°
$m\angle 7 =$ 60°	$m\angle 8 =$ 120°



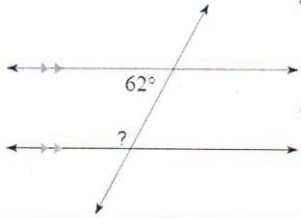
2. **Find the measures of all missing angles.**

$m\angle 9 = 100°$	$m\angle 14 = 70°$
$m\angle 3 =$ 100°	$m\angle 7 =$ 110°
$m\angle 10 =$ 80°	$m\angle 6 =$ 70°
$m\angle 17 =$ 100°	$m\angle 8 =$ 80°



Find the missing angle. State the theorems or postulate that justify your answers.

3.



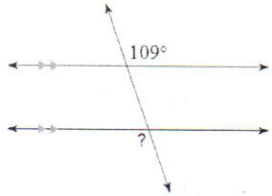
same side interior

$62 + ? = 180°$

$-62 \quad -62$

$? = 118°$

4.

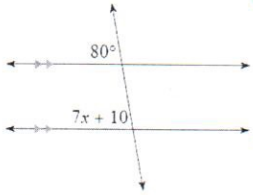


alternate exterior angles

$? = 109°$

Solve for x. State the theorems or postulates that *justify* your answers.

5.



corresponding angles

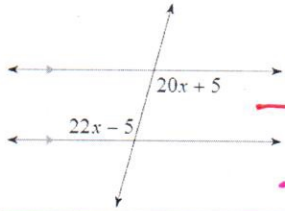
$7x + 10 = 80$

$-10 \quad -10$

$\frac{7x}{7} = \frac{70}{7}$

$x = 10$

6.



alternate interior angles

$22x - 5 = 20x + 5$

$+5 \quad +5$

$22x = 20x + 10$

$-20x \quad -20x$

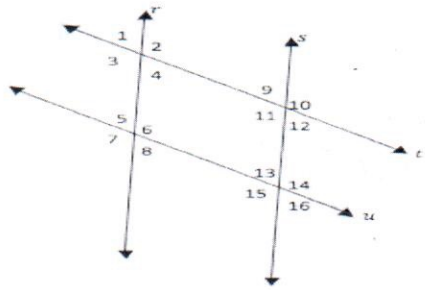
$\frac{2x}{2} = \frac{10}{2}$

$x = 5$

Given that that $r \parallel s$ and $t \parallel u$, prove the following:

7. Prove that $\angle 7 \cong \angle 10$.

statement	reason
① r ∥ s and t ∥ u	① given
② $\angle 7 \cong \angle 6$	② Vertical Angle Thm
③ $\angle 6 \cong \angle 14$	③ corr. angles
④ $\angle 14 \cong \angle 10$	④ corr. angles
⑤ $\angle 7 \cong \angle 10$	⑤ substitution



8. Prove that $\angle 7$ and $\angle 9$ are supplementary.

statement	reason
① r ∥ s and t ∥ u	① given
② $\angle 7 \cong \angle 2$	② AEA
③ $\angle 2 + \angle 9 = 180°$	③ same side int. angles
④ $\angle 7 + \angle 9 = 180°$	④ substitution prop.

9. Prove that $m\angle 5 + m\angle 10 = 180°$

statement	reason
① r ∥ s and t ∥ u	① given
② $\angle 5 \cong \angle 1$	② corresponding angles
③ $\angle 1 \cong \angle 9$	③ corr. angles
④ $\angle 9 + \angle 10 = 180°$	④ Linear pairs
⑤ $\angle 5 + \angle 10 = 180°$	⑤ Substitution prop.