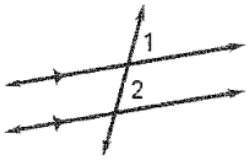
Parallel Lines and Transversals

Goals • Prove and use results about parallel lines and transversals.
• Use properties of parallel lines to solve problems.

POSTULATE 15: CORRESPONDING ANGLES POSTULATE

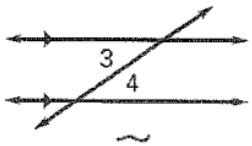
If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent



$\angle 1 \cong \angle 2$

THEOREM 3.4: ALTERNATE INTERIOR ANGLES

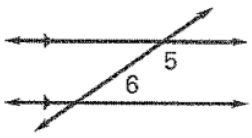
If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent



$\angle 3 \cong \angle 4$

THEOREM 3.5: CONSECUTIVE INTERIOR ANGLES

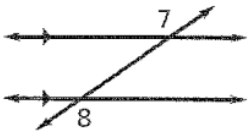
If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary



$m\angle 5 + m\angle 6 = 180°$

THEOREM 3.6: ALTERNATE EXTERIOR ANGLES

If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent



$\angle 7 \cong \angle 8$

THEOREM 3.7: PERPENDICULAR TRANSVERSAL

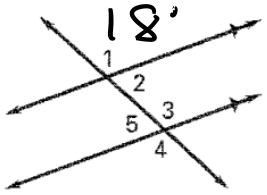
If a transversal is perpendicular to one of two parallel lines, then it is perpendicular to the other.

$j \perp k$

Example 1 *Using Properties of Parallel Lines*

Given that $m\angle 1 = 118°$, find each measure. Tell which postulate or theorem you use.

a. $\angle 2$ b. $\angle 3$ c. $\angle 5$ d. $\angle 4$



Solution

a. $m\angle 2 = 180° - m\angle 1 = 62°$ LP post

b. $m\angle 3 = m\angle 1 = 118°$ corresponding $\angle$s congruent

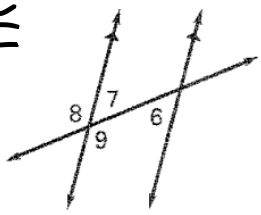
c. $m\angle 5 = m\angle 2 = 62°$ alt int $\angle$s congruent

d. $m\angle 4 = m\angle 1 = 118°$ OR alt ext $\angle$s congruent

$m\angle 4 = m\angle 3 = 118$ - VA

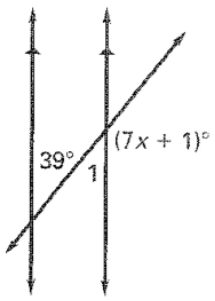
Checkpoint Given that $m\angle 6 = 53°$, find the angle measure. Tell which postulate or theorem you use.

1. $\angle 7 = 53°$ - alt int $\angle$s $\cong$
2. $\angle 8 = 127°$ - LP postulate
3. $\angle 9 = 127°$ - VA $\cong$



Example 3 *Using Properties of Parallel Lines*

Use properties of parallel lines to find the value of x.



Solution

$m\angle 1 = 39°$ alt int $\angle$s $\cong$

$m\angle 1 + (7x + 1)° = 180°$ LP postulate

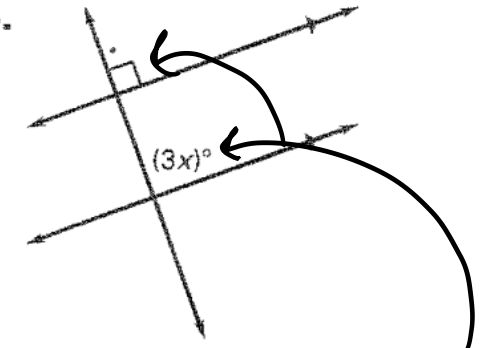
$39° + (7x + 1)° = 180°$ Substitute.

$7x = 140$ Subtract.

$x = 20$ Divide.

Checkpoint Use properties of parallel lines to find the value of x.

4.

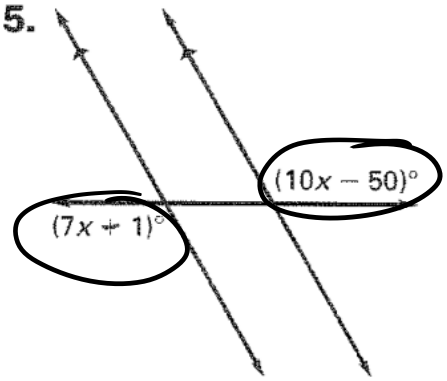


corresponding

$90 = 3x$

$30 = x$

5.



alt ext ∠s

$7x + 1 = 10x - 50$

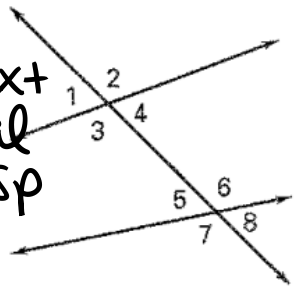
$1 = 3x - 50$

$51 = 3x$

$17 = x$

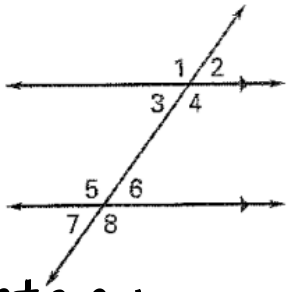
Practice

Name the relationship between the pair of angles.



1. $\angle 1$ and $\angle 5$ corresponding
2. $\angle 2$ and $\angle 7$ alt ext
3. $\angle 3$ and $\angle 6$ alt int ∠s
4. $\angle 8$ and $\angle 5$ vertical
5. $\angle 4$ and $\angle 6$ consecutive interior
6. $\angle 8$ and $\angle 4$ corresp

State the postulate or theorem that justifies the statement.



7. $\angle 3 \cong \angle 7$ corresp ∠s post
8. $\angle 3 \cong \angle 6$ alt int ∠s ≅
9. $\angle 2 \cong \angle 7$ alt ext ∠s ≅
10. $m\angle 4 + m\angle 6 = 180°$ consec int supplementary