

Geometry 3.2

Use theorems to determine the relationships between specific pairs of angles

Use algebra to find angle measurements

transversal

interior angles

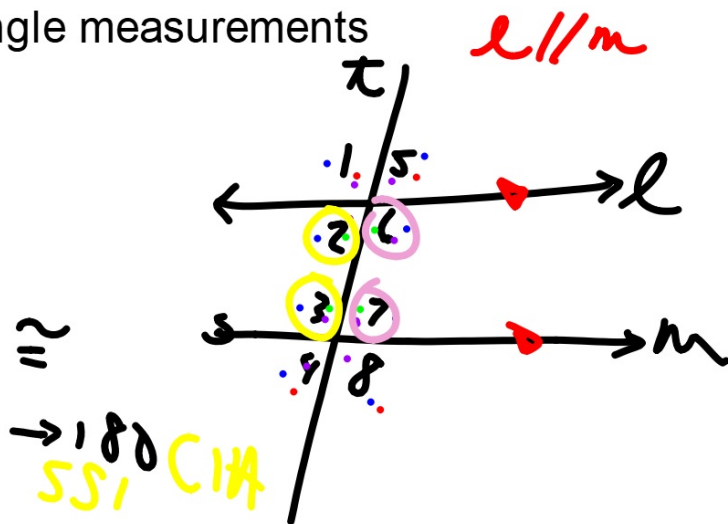
exterior angles

corresponding angles

parallel

perpendicular

activity: angle chase



P. 181

Theorems Parallel Lines and Angle Pairs

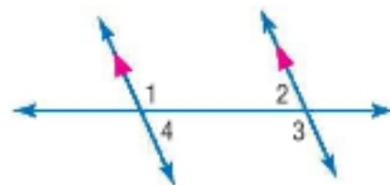
3.1 Alternate Interior Angles Theorem If two parallel lines are cut by a transversal, then each pair of alternate interior angles is **congruent**.

Examples $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$



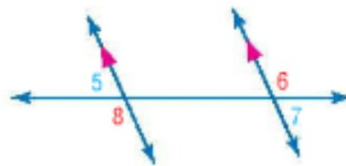
3.2 Consecutive Interior Angles Theorem If two parallel lines are cut by a transversal, then each pair of consecutive interior angles is **supplementary**.

Examples $\angle 1$ and $\angle 2$ are supplementary.
 $\angle 3$ and $\angle 4$ are supplementary.



3.3 Alternate Exterior Angles Theorem If two parallel lines are cut by a transversal, then each pair of alternate exterior angles is congruent.

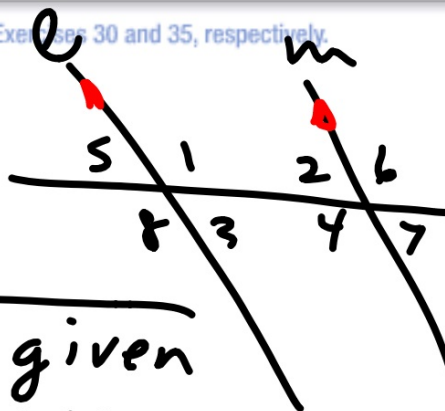
Examples $\angle 5 \cong \angle 7$ and $\angle 6 \cong \angle 8$



You will prove Theorems 3.2 and 3.3 in Exercises 30 and 35, respectively.

Given $l \parallel m$

Prove $\angle 5 \cong \angle 7$



1. $l \parallel m$
2. $\angle 5 \cong \angle 3$
3. $\angle 3 \cong \angle 7$

4. $\angle 5 \cong \angle 7$

1. given
2. VA
3. CA

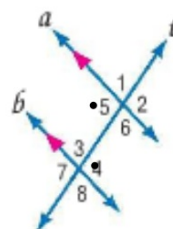
4. Trans

Proof Alternate Interior Angles Theorem

Given: $a \parallel b$

t is a transversal of a and b .

Prove: $\angle 4 \cong \angle 5$, $\angle 3 \cong \angle 6$



G $a \parallel b$

P $\angle 4 \cong \angle 5$

1. $a \parallel b$
2. $\angle 4 \cong \angle 7$
3. $\angle 7 \cong \angle 5$

4. $\angle 4 \cong \angle 5$

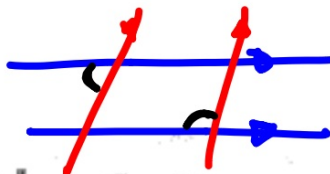
1. given

2. $\angle A$

3. $\angle A$

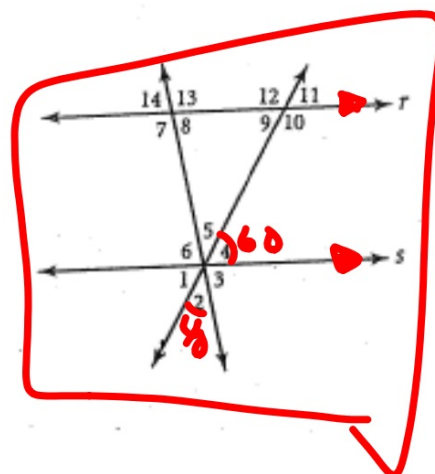
4. trans

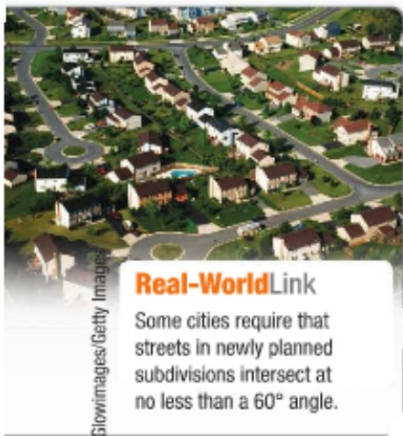
Angle chase: handout



In the figure at the right, $r \parallel s$, $m\angle 2 = 40^\circ$, and $m\angle 4 = 60^\circ$. Find the indicated measures.

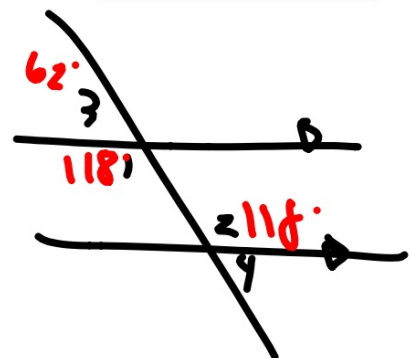
- | | |
|------------------------|------------------------|
| 6. $m\angle 1$ _____ | 7. $m\angle 3$ _____ |
| 8. $m\angle 5$ _____ | 9. $m\angle 6$ _____ |
| 10. $m\angle 7$ _____ | 11. $m\angle 8$ _____ |
| 12. $m\angle 9$ _____ | 13. $m\angle 10$ _____ |
| 14. $m\angle 11$ _____ | 15. $m\angle 12$ _____ |
| 16. $m\angle 13$ _____ | 17. $m\angle 14$ _____ |





Real-World Example 2 Use Theorems about Parallel Lines

COMMUNITY PLANNING Redding Lane and Creek Road are parallel streets that intersect Park Road along the west side of Wendell Park. If $m\angle 1 = 118$, find $m\angle 2$.



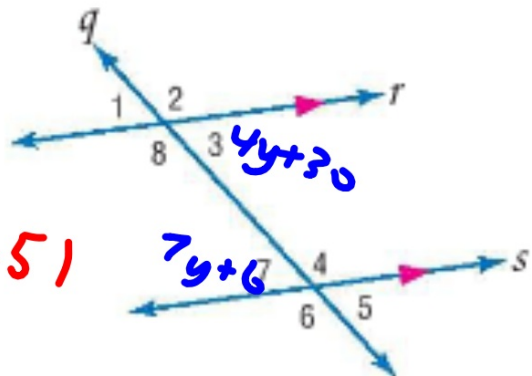
$$+ = 180$$

ALGEBRA Use the figure at the right to find the indicated variable. Explain your reasoning.

- $$\begin{array}{r} 2x - 17 = 85 \\ +17 \quad +17 \\ \hline \end{array}$$

$$\frac{2x}{x} = 102$$

- $g = 8$

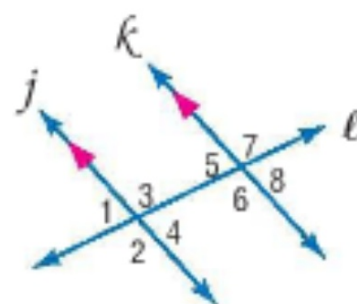


$x = 5,$

$$\begin{array}{r} 7y + 6 = 4y + 30 \\ -4y - 6 \quad -4y - 6 \\ \hline 3y = 24 \end{array}$$

3A. If $m\angle 2 = 4x + 7$ and $m\angle 7 = 5x - 13$, find x .

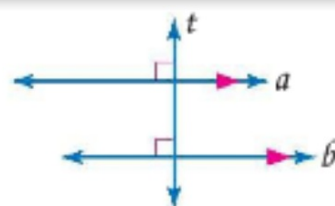
3B. Find y if $m\angle 5 = 68$ and $m\angle 3 = 3y - 2$.



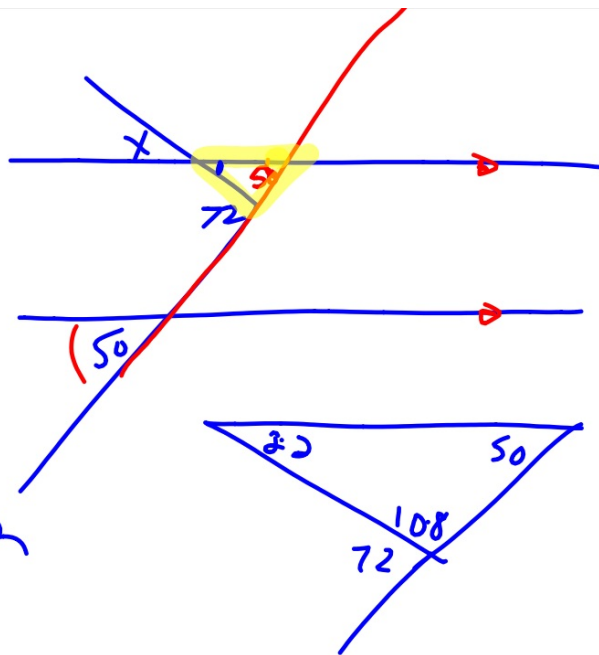
Theorem 3.4 Perpendicular Transversal Theorem

In a plane, if a line is perpendicular to one of two parallel lines, then it is perpendicular to the other.

Examples If line $a \parallel$ line b and line $a \perp$ line t , then line $b \perp$ line t .



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$$x = 22$$

WB 1-9, 11, 12
3.2 prac.

Quiz 3.1-3.2
Wed