

Lesson 3.06 Parallel Lines Cut by a Transversal

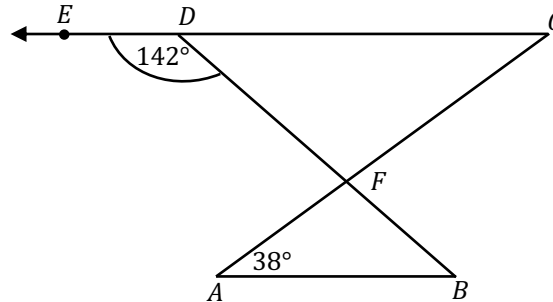
Students will be able to:

- Content Objective: Prove and apply theorems of parallel lines.
- Language Objective: Write a two column proof proving that two lines are parallel.



Warm Up

In the diagram below, $\overline{AB} \parallel \overline{CD}$, \overline{BD} and \overline{AC} intersect at F , $m\angle A = 38^\circ$, and $m\angle BDE = 142^\circ$. Which statement is true?

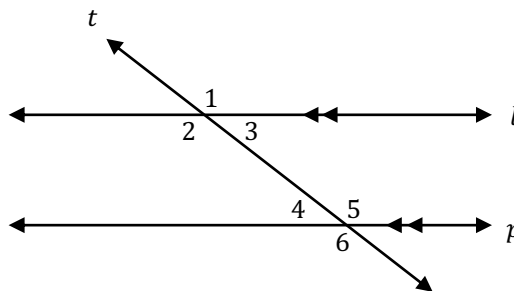


- 1) $m\angle C = 19^\circ$
- 2) $m\angle DFC = 142^\circ$
- 3) $\triangle CDF$ is acute isosceles
- 4) $m\angle CFD = 104^\circ$



Vocabulary Review

Shown below are parallel lines l and p intersected by transversal t .



Match each term below to the correct angles based on the diagram above.

- | | |
|-----------------------------------|----------------------------|
| 1. ____ Alternate Interior Angles | a. $\angle 2$ & $\angle 3$ |
| 2. ____ Same Side Interior Angles | b. $\angle 1$ & $\angle 2$ |
| 3. ____ Corresponding Angles | c. $\angle 3$ & $\angle 4$ |
| 4. ____ Linear Pair | d. $\angle 1$ & $\angle 6$ |
| 5. ____ Alternate Exterior Angles | e. $\angle 2$ & $\angle 6$ |
| 6. ____ Vertical Angles | f. $\angle 3$ & $\angle 5$ |



Graphic Organizer

Congruent

- Vertical Angles
- Alternate Interior Angles
- Alternate Exterior Angles
- Corresponding Angles

Supplementary

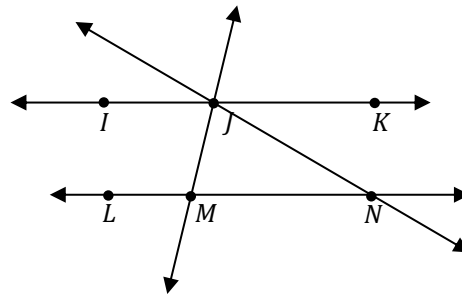
- Same Side Interior Angles (Consecutive Angles)
- Same Side Exterior Angles
- Linear Pair



Skill 1: Identifying True Statements

Lorenzo is given the diagram below, where \overleftrightarrow{IJK} and \overleftrightarrow{LMN} are intersected by lines \overleftrightarrow{MJ} and \overleftrightarrow{NJ} forming scalene $\triangle MJN$. Which statement must be true for Lorenzo to prove that $\overleftrightarrow{IJK} \parallel \overleftrightarrow{LMN}$?

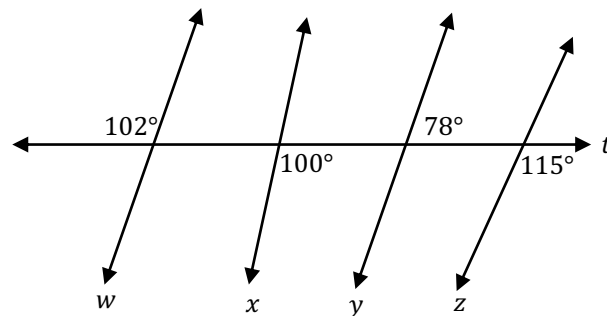
- 1) $\angle IJM \cong \angle NMJ$
- 2) $\angle LMJ \cong \angle IJM$
- 3) $\angle IJM \cong \angle MNJ$
- 4) $\angle JNL \cong \angle NJM$



Exercise 1: Identifying True Statements

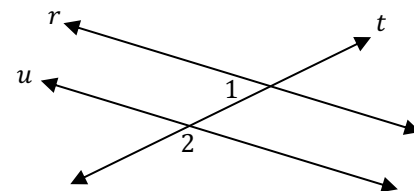
In the diagram below, lines $w, x, y,$ and z intersect line t . Which statement is true?

- 1) $w \parallel x$
- 2) $x \parallel y$
- 3) $y \parallel z$
- 4) $w \parallel y$



Skill 2: Parallel Lines & Algebra

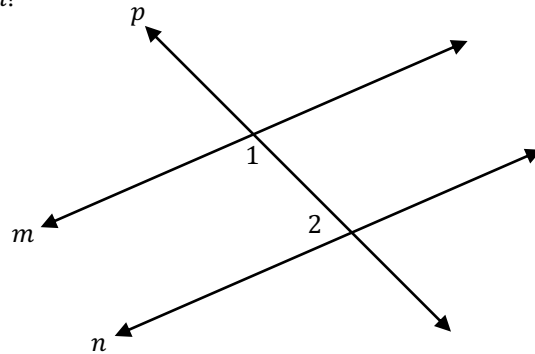
As shown in the diagram below, lines r and u are cut by transversal t . If $m\angle 1 = 2x + 7$ and $m\angle 2 = 4x + 5$, lines r and u are parallel when x equals what value?





Exercise 2: Parallel Lines & Algebra

Lines m and n are intersected by line p , as shown below forming $\angle 1$ and $\angle 2$. If $m\angle 1 = 8x - 23$ and $m\angle 2 = 2x + 13$, which value of x would make $m \parallel n$?



Theorems for Proving Parallel Lines

Lines are parallel if:

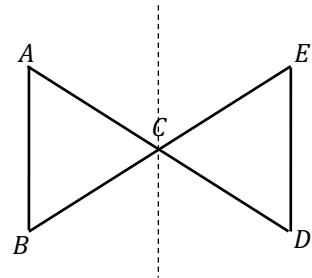
1. Alternate interior angles are congruent
2. Corresponding angles are congruent
3. Same side interior angles are supplementary



Write It Out

In the diagram below, $\triangle ABC$ is isosceles with base angles $\angle A$ and $\angle B$, and $\angle A \cong \angle E$.

a. Prove $\overline{AB} \parallel \overline{ED}$.



Statement	Reason

b. What single rigid motion would map $\triangle ABC$ to $\triangle EDC$? Are these triangles congruent? Explain.

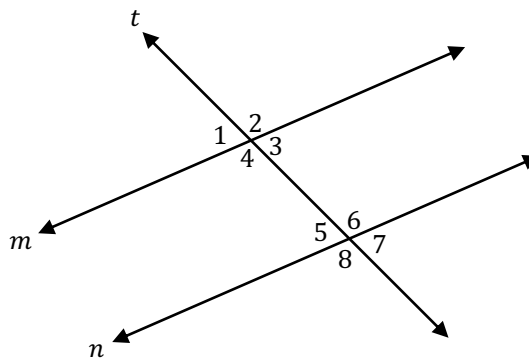


3.06- Problem Set

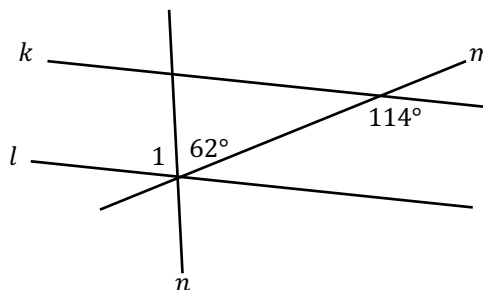
Name: _____

1. Identify whether each pair of angles are congruent or supplementary based on the given diagram below where $m \parallel n$.

- $\angle 1$ & $\angle 3$
- $\angle 4$ & $\angle 8$
- $\angle 1$ & $\angle 7$
- $\angle 3$ & $\angle 6$
- $\angle 2$ & $\angle 7$



7. In the diagram below, lines k and l are cut by transversals m and n forming the angles shown. What does the measure of angle 1 have to be for k and l to be parallel? Show the work that leads to your answer.



3. In the diagram below, $r \parallel s$ and $\overline{TU} \perp \overline{VW}$ at U forming $\angle 1$ and $\angle 2$. If $m\angle 1 = 28^\circ$, find $m\angle 2$. Explain your reasoning.

