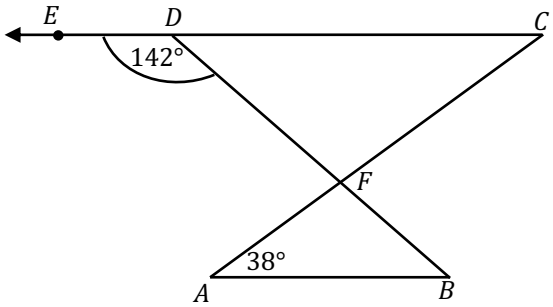
Lesson 3.06 Parallel Lines Cut by a Transversal

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

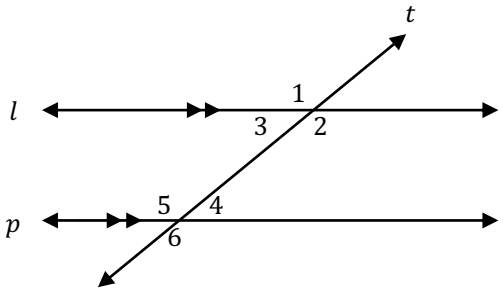
In the diagram below, $\overline{AB} \parallel \overleftrightarrow{CDE}, \overline{BD}$ and $\overline{AC}$ intersect at F, $m\angle A = 38°$, and $m\angle BDE = 142°$. Which statement is true?



1) $m\angle C = 19°$
2) $m\angle DFC = 142°$
3) ΔCDF is acute isosceles
4) $m\angle CFD = 104°$

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.

2. _____ Alternate Interior Angles
2. _____ Same Side Interior Angles
2. _____ Corresponding Angles
2. _____ Linear Pair
2. _____ Alternate Exterior Angles
2. _____ Vertical Angles

a. $\angle 2$ & $\angle 3$
b. $\angle 1$ & $\angle 2$
c. $\angle 3$ & $\angle 4$
d. $\angle 1$ & $\angle 6$
e. $\angle 2$ & $\angle 6$
f. $\angle 3$ & $\angle 5$

Graphic Organizer

Congruent	Supplementary
• Vertical Angles • Alternate Interior Angles • Alternate Exterior Angles • Corresponding Angles	• Same Side Interior Angles (Consecutive Angles) • Same Side Exterior Angles • Linear Pair

Skill 1: Identifying True Statements

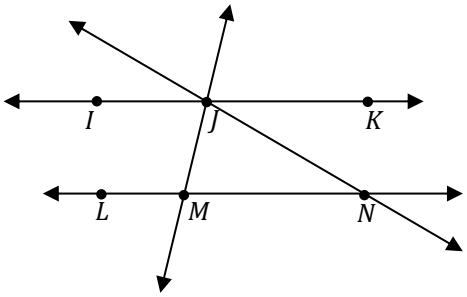
Lorenzo is given the diagram below, where $\overleftrightarrow{IJK}$ and $\overleftrightarrow{LMN}$ are intersected by lines $\overleftrightarrow{MJ}$ and $\overleftrightarrow{NJ}$ forming scalene ΔMJN. Which statement must be true for Lorenzo to prove that $\overleftrightarrow{IJK} \parallel \overleftrightarrow{LMN}$?

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

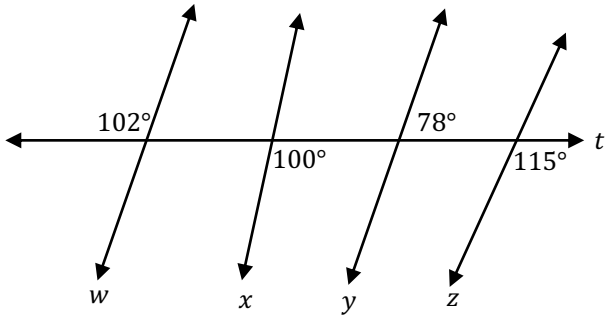
In the diagram below, lines w, x, y, and z intersect line t. Which statement is true?

1) $w \parallel x$

2) $x \parallel y$

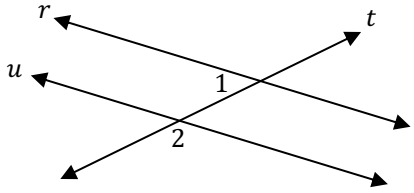
3) $y \parallel z$

4) $w \parallel y$



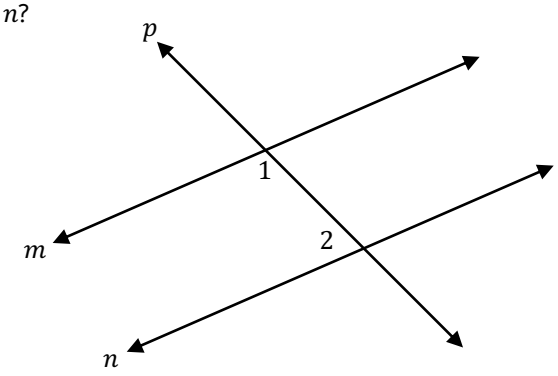
Skill 2: Parallel Lines & Algebra

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 $m \parallel n$?



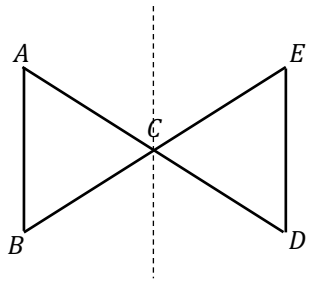
Theorems for Proving Parallel Lines

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, ΔABC 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 ΔABC to ΔEDC? 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 $m \parallel n$.

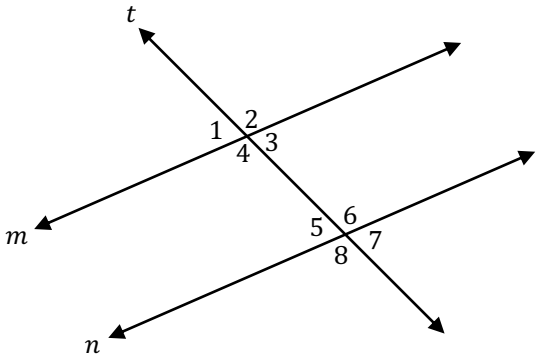
   a. $\angle 1$ & $\angle 3$

   b. $\angle 4$ & $\angle 8$

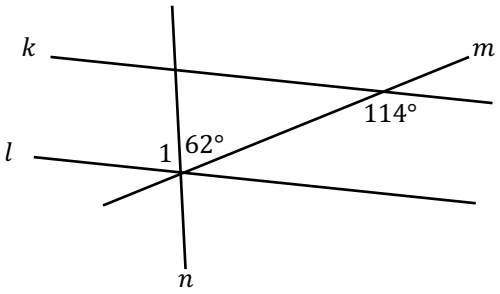
   c. $\angle 1$ & $\angle 7$

   d. $\angle 3$ & $\angle 6$

   e. $\angle 2$ & $\angle 7$



2. 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 $m\angle 1 = 28°$, find $m\angle 2$. Explain your reasoning.