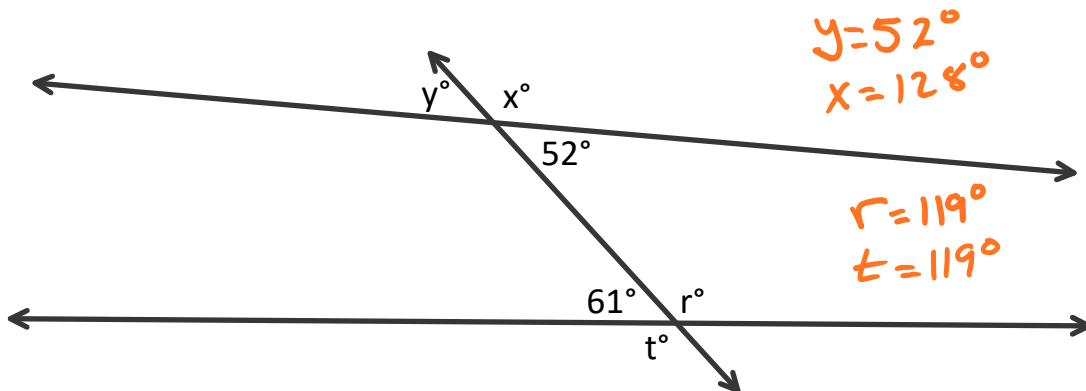


WARM UP

Given the diagram and the angle measures shown, find the values of x , y , t , and r .



ESSENTIAL QUESTION

What angle relationships can be used to prove that two lines intersected by a transversal are parallel?

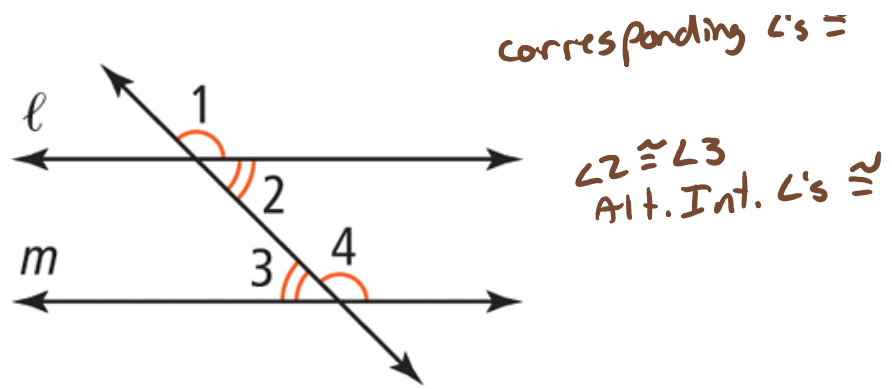
GOAL: "I CAN...

Use angle relationships to prove that lines are parallel."

EXPLORE

Given the diagram below, do you and your group believe that there is enough information to say that line ℓ is parallel to line m ?

$\angle 1 \cong \angle 4$. . . ~

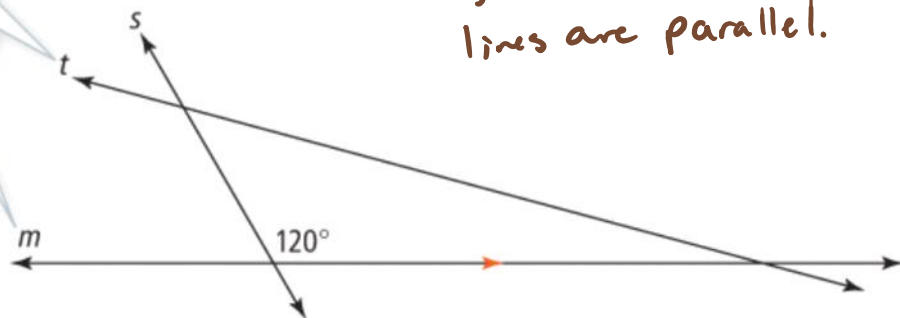


EXAMPLE 1 Understand Angle Relationships

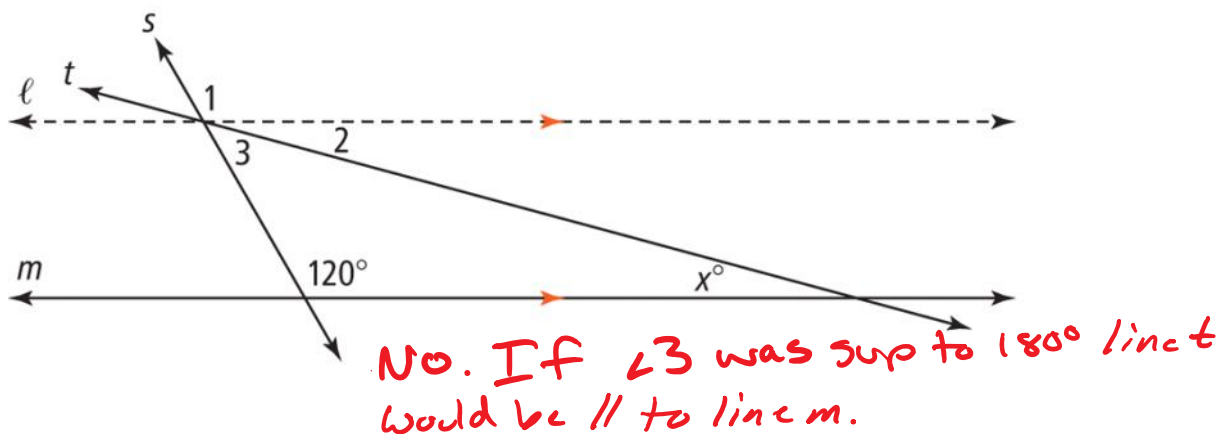
Suppose two lines are not parallel. Can corresponding angles still be congruent?

Lines t and m are not parallel.

No, Corr. L's are only \cong when lines are parallel.



1. Could $\angle 3$ be supplementary to a 120° angle? Explain.

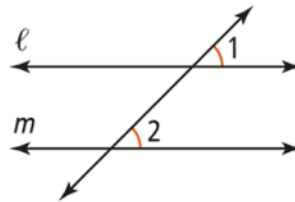


Converse of the Corresponding Angles Theorem

If two lines and a transversal form corresponding angles that are congruent, then the lines are parallel.

PROOF: SEE EXERCISE 8.

If...



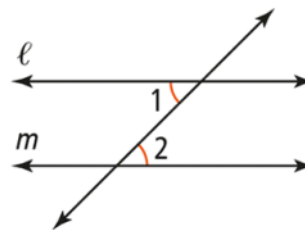
Then... $l \parallel m$

Converse of the Alternate Interior Angles Theorem

If two lines and a transversal form alternate interior angles that are congruent, then the lines are parallel.

PROOF: SEE EXAMPLE 2.

If...

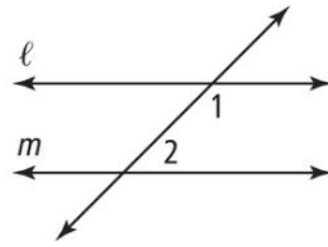


Then... $l \parallel m$

Converse of the Same-Side Interior Angles Postulate

If two lines and a transversal form same-side interior angles that are supplementary, then the lines are parallel.

If... $m\angle 1 + m\angle 2 = 180$

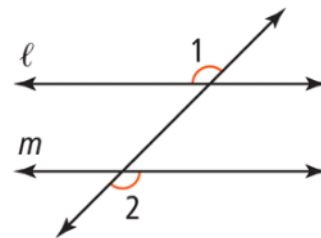


Then... $l \parallel m$

Converse of the Alternate Exterior Angles Theorem

If two lines and a transversal form alternate exterior angles that are congruent, then the lines are parallel.

If...



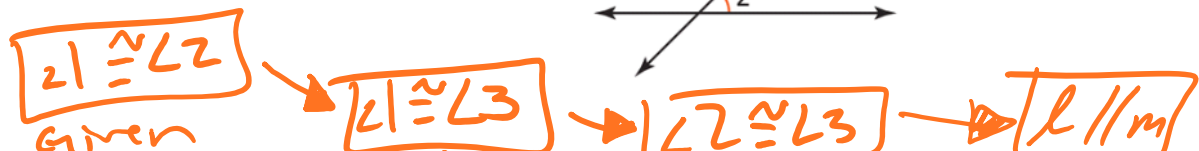
Then... $l \parallel m$

EXAMPLE 2

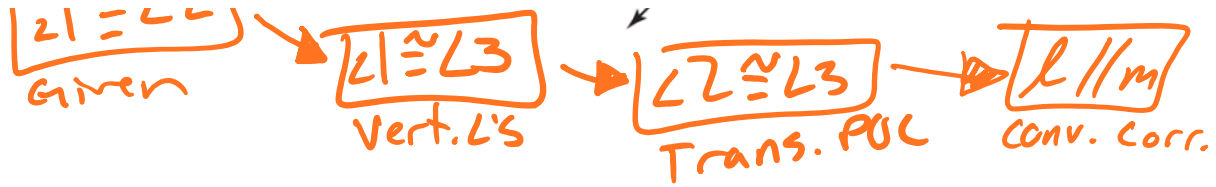
Write a flow proof to prove the Converse of the Alternate Interior Angles Theorem.

Given: $\angle 1 \cong \angle 2$

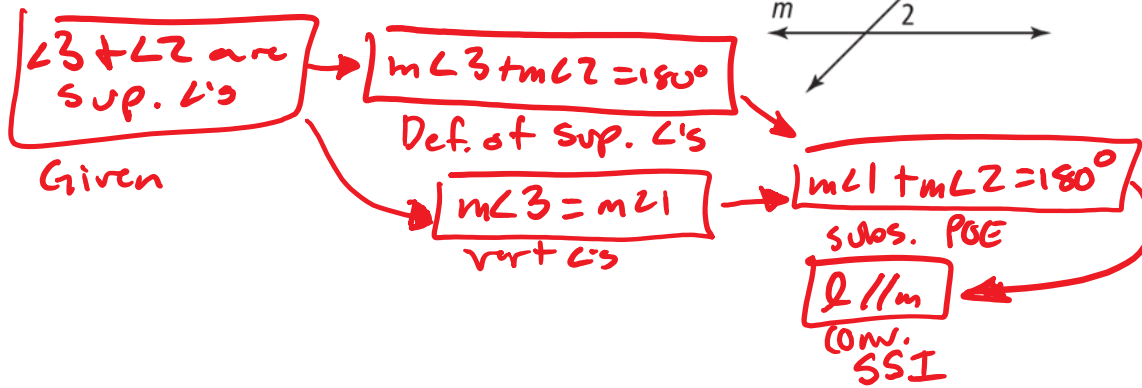
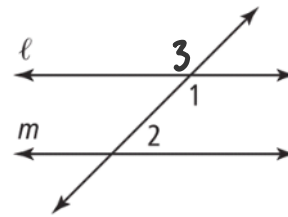
Prove: $l \parallel m$



Prove: $l \parallel m$



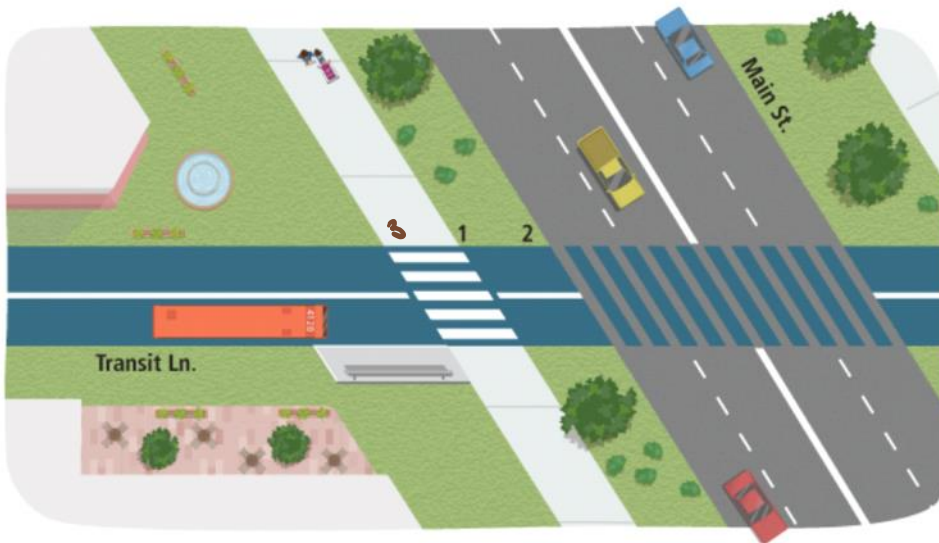
Given that angle 3 is supplementary to angle 2, prove l is parallel to m .



EXAMPLE 3 Determine Whether Lines Are Parallel

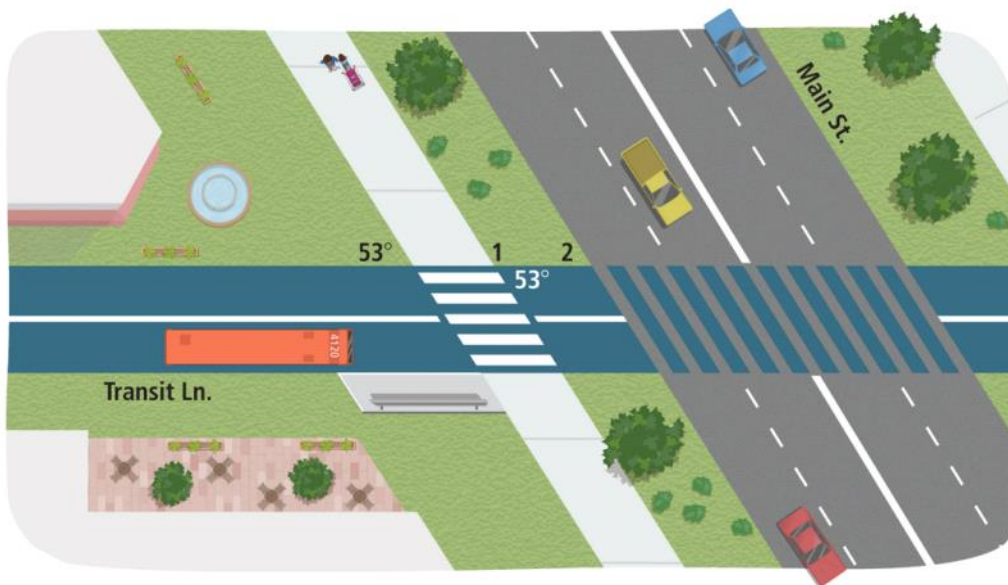
The edges of a new sidewalk must be parallel in order to meet accessibility requirements. Concrete is poured between straight strings. How does an inspector know that the edges of the sidewalk are parallel?

$\angle 1$ must be \cong to $\angle 3$



3. What is $m\angle 1$? What should $\angle 2$ measure in order to guarantee that the sidewalk is parallel to Main Street? Explain.

$m\angle 1 = 127^\circ$,
because it's
sup. to the
 53° .
 $m\angle 2 = 53^\circ$
because it
must be
sup. to $\angle 1$.



THEOREM 2-8

If two lines are parallel to the same line, then they are parallel to each other.

PROOF: SEE EXERCISE 17.

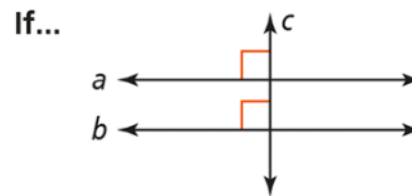


Then... $a \parallel b$

THEOREM 2-9

If two lines are perpendicular to the same line, then they are parallel to each other.

PROOF: SEE EXERCISE 18.

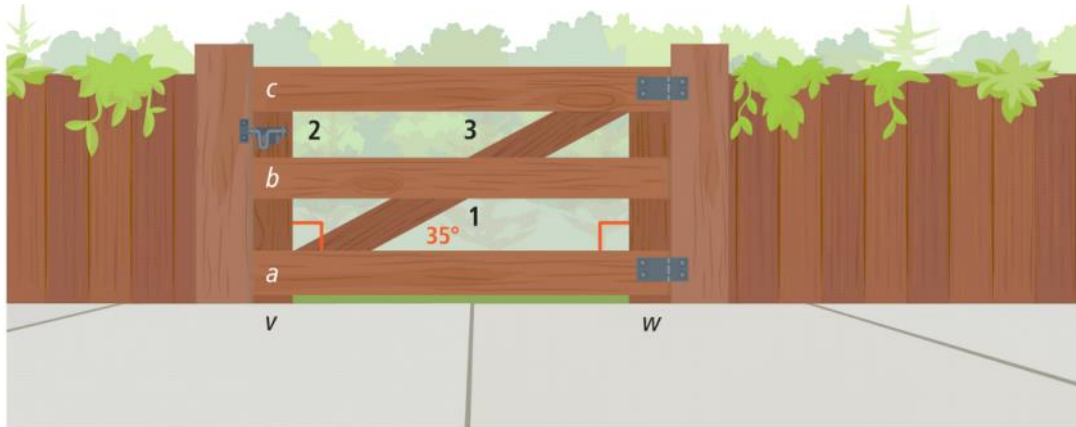


Then... $a \parallel b$

EXAMPLE 4

- A. When building a gate, how does Bailey know that the vertical boards v and w are parallel?
 B. What should $\angle 1$ measure to ensure board b is parallel to board a ?

$v \parallel w$ because both are \perp to board A.



$m\angle 1$ must be 145° to ensure \parallel .

4. a. Bailey also needs board c to be parallel to board a . What should $\angle 2$ measure? Explain.

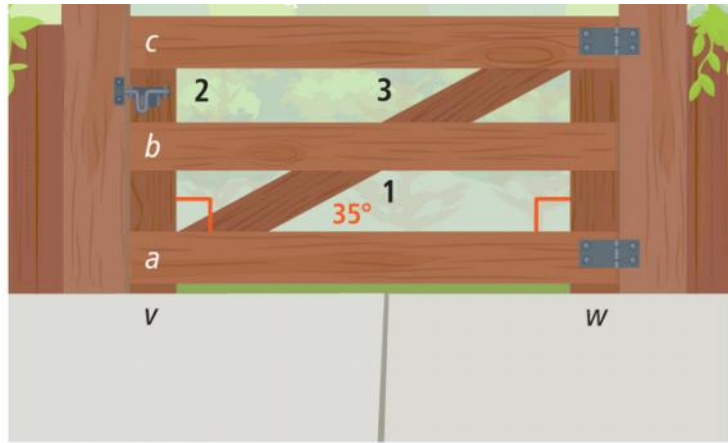
$m\angle 2$ must be 90° since $a \perp v$.

- b. Is $b \parallel c$? Explain.

$b \parallel c$ because $b \parallel a$ and $c \parallel a$

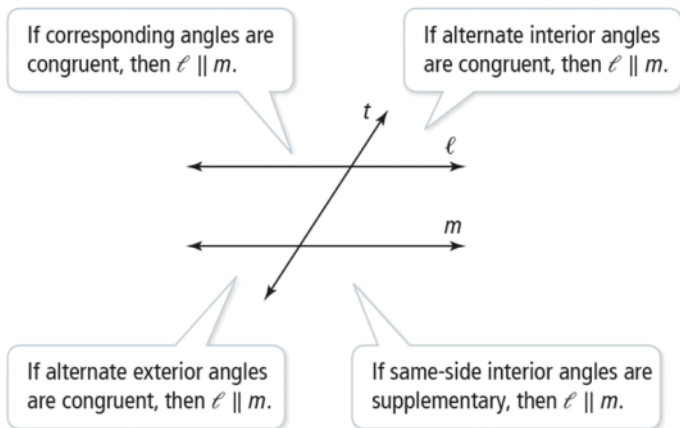


$b \parallel c$ because
 $b \parallel a$ and $c \parallel a$
 $\therefore b \parallel c$.
 Trans. POPL



Criteria for Parallel lines

DIAGRAM



HOMework

Pg. 83

9, 10, 12-15, 19, 24

