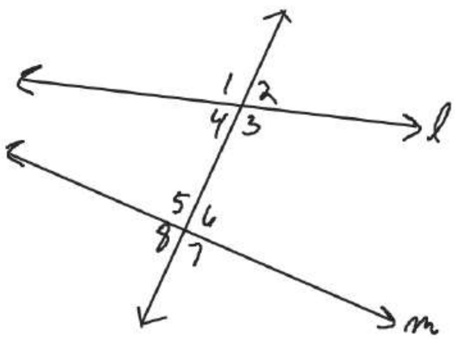
Suppose two lines are not parallel. Can corresponding angles still be congruent?



$\angle 1$ & $\angle 5$

$\angle 2$ & $\angle 6$

$\angle 8$ & $\angle 4$

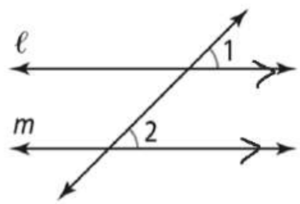
$\angle 7$ & $\angle 3$

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... $\ell \parallel m$

If Corrspdonding $\angle$'s are $\cong$ then the lines are parallel.

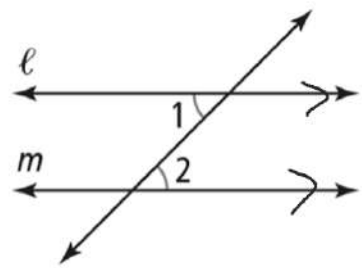
Converse of the Alternate Interior Angles Theorem

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

PROOF: SEE EXAMPLE 2.

If alternate Interior $\angle$'s are $\cong$ then the lines are parallel.

If...

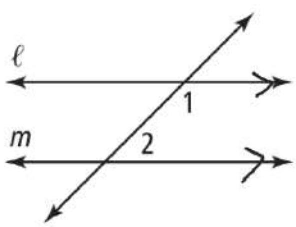


Then... $\ell \parallel m$

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

If same-Side Interior ∠'s are supp, then the lines are parallel.

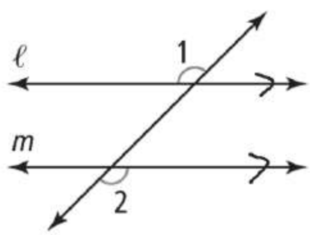
If... $m\angle 1 + m\angle 2 = 180$



Then... $\ell \parallel m$

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

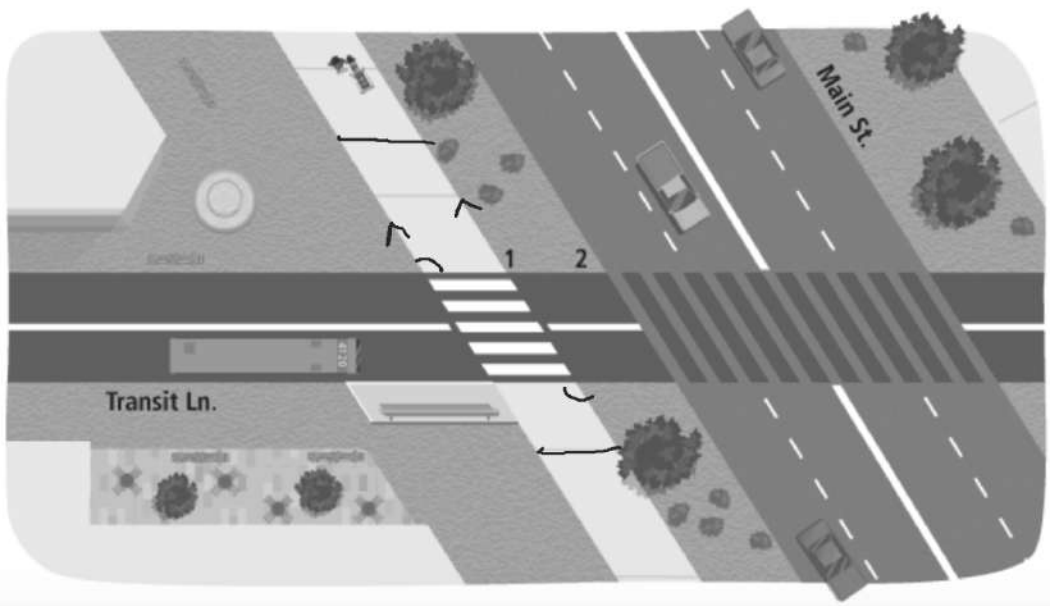
If...



Then... $\ell \parallel m$

If the alternate Ext ∠'s are ≅ then the 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?

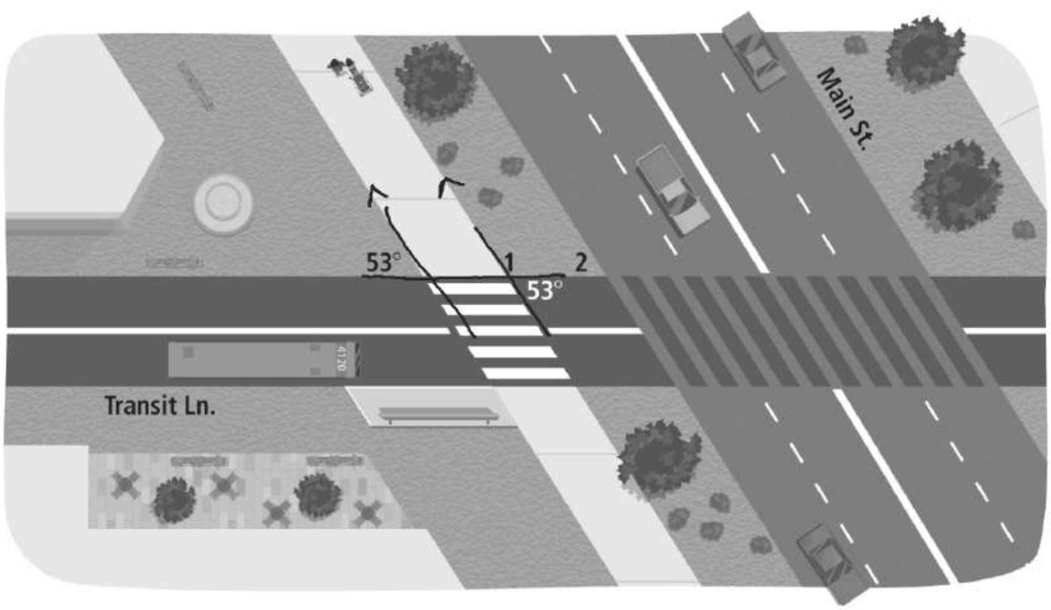


3. What is $m\angle 1$? What should $\angle 2$ measure in order to guarantee that the sidewalk is parallel to Main Street? Explain.

$m\angle 1 + 53 = 180$

$m\angle 1 = 127°$

$m\angle 2 = 53°$



Dual Parallel Line Theorem

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

PROOF: SEE EXERCISE 17.

If $a \parallel c$ and $c \parallel b$,

then $a \parallel b$

If...

Then... $a \parallel b$

Dual Perpenciular Theorem

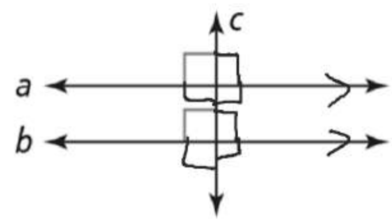
If $a \perp c$ and $b \perp c$

then $a \parallel b$

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

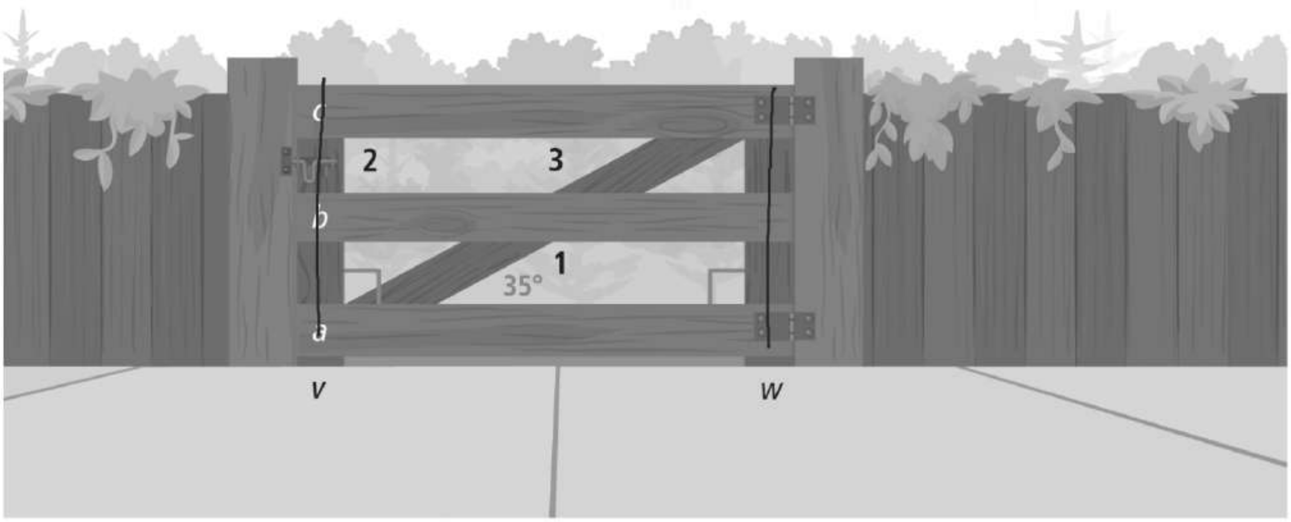
PROOF: SEE EXERCISE 18.

If...



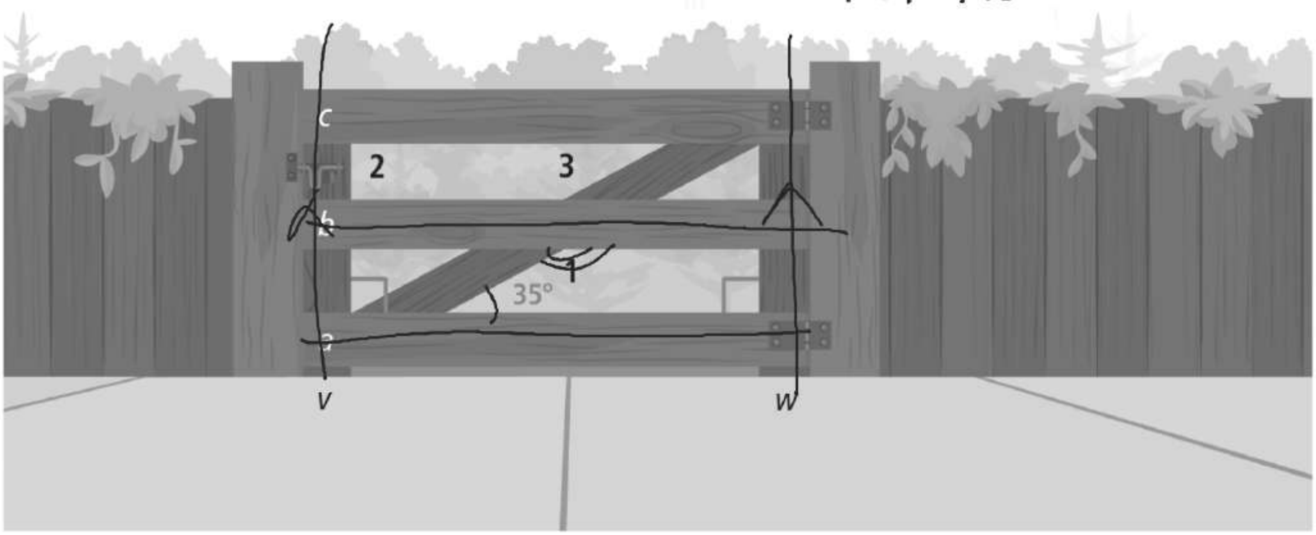
Then... $a \parallel b$

A. When building a gate, how does Bailey know that the vertical boards *v* and *w* are parallel?



B. What should ∠1 measure to ensure board *b* is parallel to board *a*?

$m\angle 1 = 145^{\circ}$



4. a. Bailey also needs board *c* to be parallel to board *a*. What should ∠2 measure? Explain.

Enter your answer

$m\angle 3 = 35$

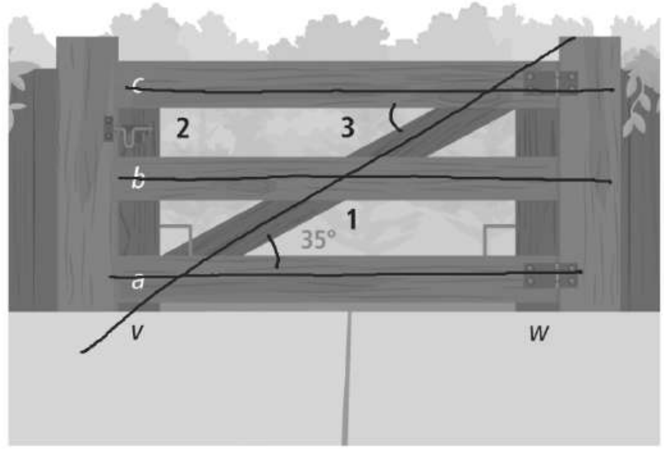
Converse of Alternate Int ∠'s.

CHECK ANSWER

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

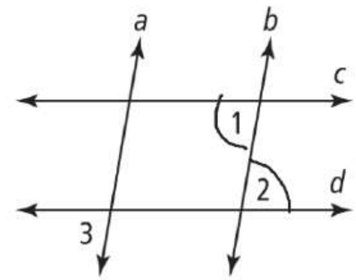
Enter your answer

b∥c Dual ∥ line theorem

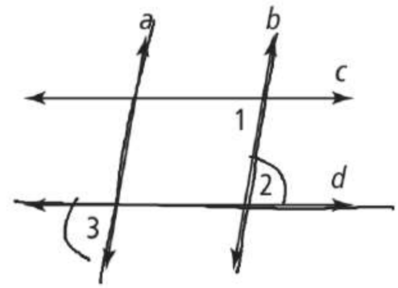


If $\angle 1 \cong \angle 2$, which theorem proves that $c \parallel d$?

Converse Alternate Int $\angle$'s



6. If $m\angle 2 = 4x - 6$ and $m\angle 3 = 2x + 18$, for what value of x is $a \parallel b$? Which theorem justifies your answer?



Enter your answer.

$x = 12$

Converse Alt Ext ∠'s

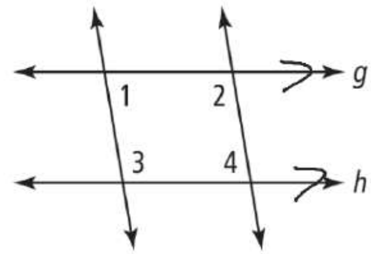
$m\angle 2 = m\angle 3$

$4x - 6 = 2x + 18$

$2x = 24$

$x = 12$

7. Using the Converse of the Same-Side Interior Angles Postulate, what equation shows that $g \parallel h$?

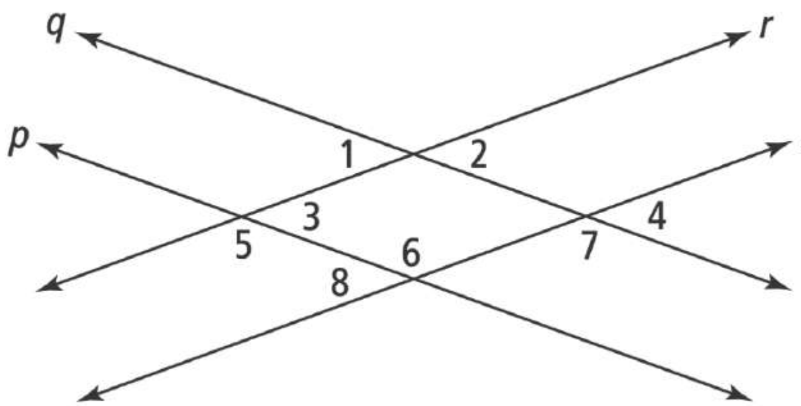


Enter your answer.

$m\angle 1 + m\angle 3 = 180$

$m\angle 2 + m\angle 4 = 180$

For Exercises 12–15, use the given information. Which lines in the figure can you conclude are parallel? State the theorem that justifies each answer. SEE EXAMPLES 1 AND 3



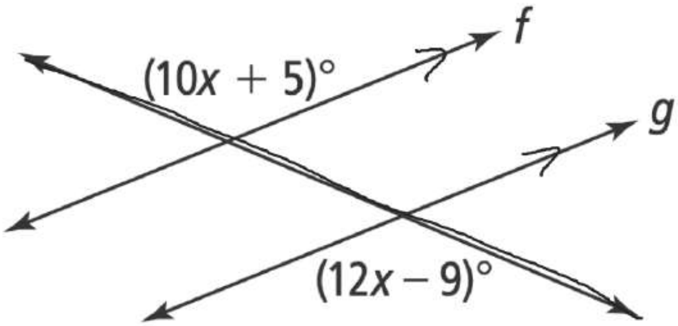
12. $\angle 2 \cong \angle 3$

13. $\angle 6 \cong \angle 7$

14. $\angle 1 \cong \angle 4$

15. $m\angle 5 + m\angle 8 = 180°$

For what value of x is $f \parallel g$? Which theorem justifies your answer? **SEE EXAMPLE 4**



$10x+5=12x-9$

$5=2x-9$

$14=2x$

$x=7$

Converse of Alternate Ext $\angle$'s.