

Geometry · Parallel Lines, Transversals and Proofs · Worksheet

Common Core G-CO.C.9 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

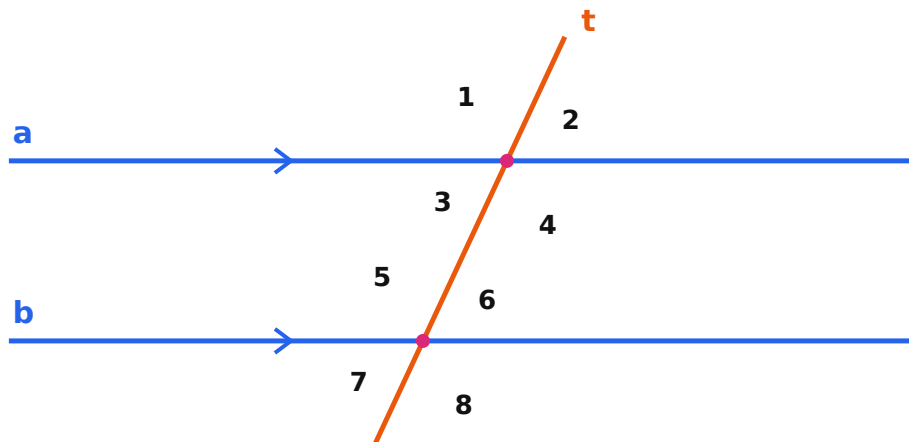
These 24 problems practice standard G-CO.C.9 with parallel lines cut by a transversal. The set covers naming angle pairs, finding missing measures, solving for x , and deciding whether lines are parallel.

The set also includes two-column proofs, perpendicular bisector problems, and six real-world word problems. Write every step so a classmate can follow your reasoning.

GeometryCommon Core: G-CO.C.9

Problem 1: Name the angle pairs

Lines a and b are cut by transversal t . Name the relationship for each pair of angles.

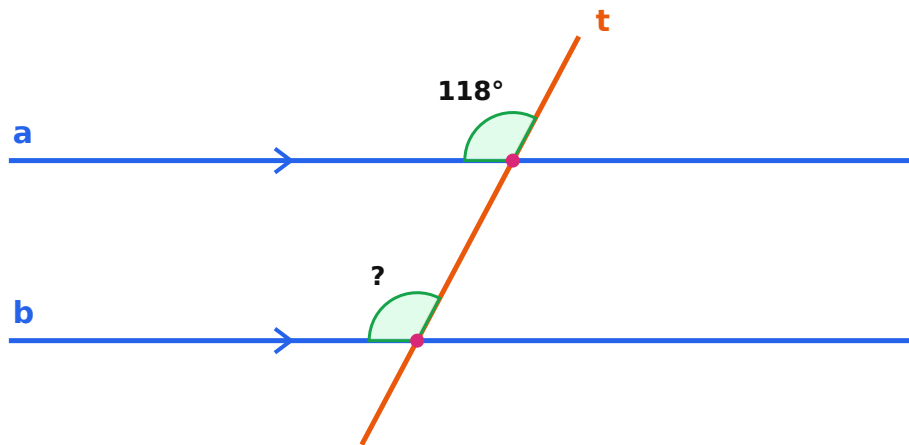


Use the numbered angles.

- a. $\angle 4$ and $\angle 5$
- b. $\angle 2$ and $\angle 6$
- c. $\angle 1$ and $\angle 8$
- d. $\angle 3$ and $\angle 5$

Problem 2: Corresponding angles

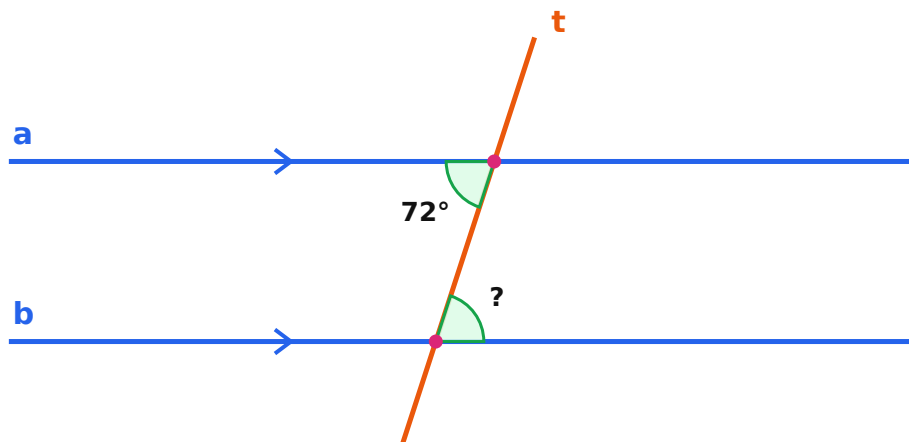
Lines a and b are parallel and $m\angle 1 = 118^\circ$. Find $m\angle 5$ and name the theorem you used.



Angle 1 is shaded; find angle 5.

Problem 3: Alternate interior angles

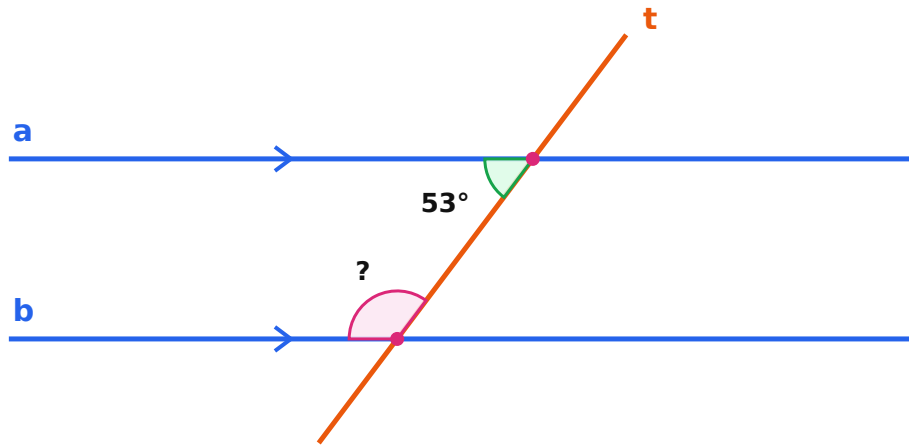
Lines a and b are parallel and $m\angle 3 = 72^\circ$. Find $m\angle 6$.



Angles 3 and 6 are shaded.

Problem 4: Same-side interior angles

Lines a and b are parallel and $m\angle 3 = 53^\circ$. Find $m\angle 5$.



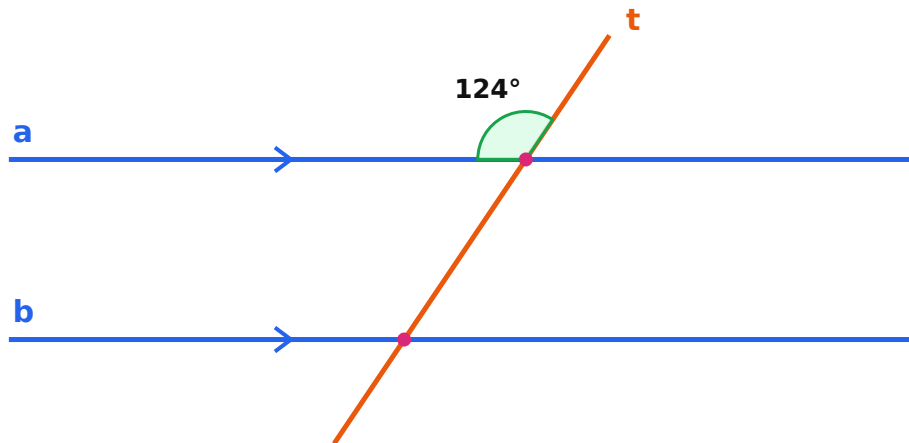
Angles 3 and 5 are shaded.

Problem 5: Alternate exterior angles

Lines a and b are parallel and $m\angle 2 = 109^\circ$. Find $m\angle 7$ and explain.

Problem 6: Find all eight angles

Lines a and b are parallel and $m\angle 1 = 124^\circ$. Find the measure of the other seven angles.



Only angle 1 is given.

Problem 7: Corresponding angles with algebra

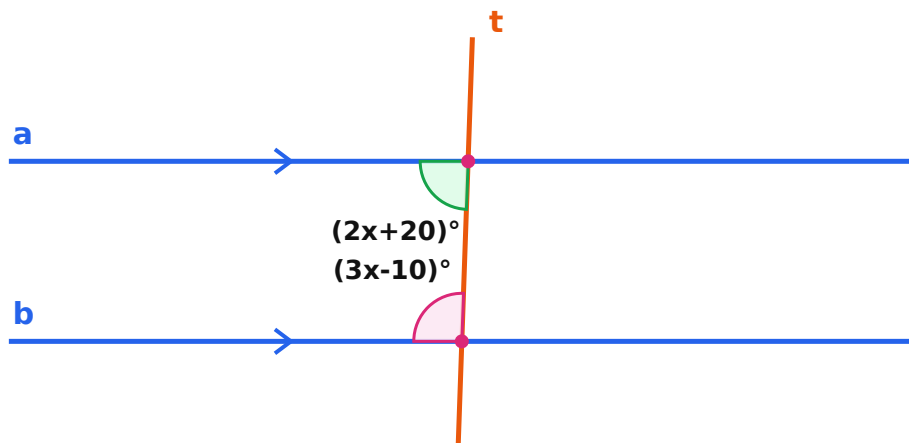
Lines a and b are parallel. $m\angle 2 = (3x+15)^\circ$ and $m\angle 6 = (5x-25)^\circ$. Find x and the measure of each angle.

Problem 8: Alternate interior with algebra

Lines a and b are parallel. $m\angle 4 = (4x-12)^\circ$ and $m\angle 5 = (2x+30)^\circ$. Find x and $m\angle 4$.

Problem 9: Same-side interior with algebra

Lines a and b are parallel. Find x and both angle measures.



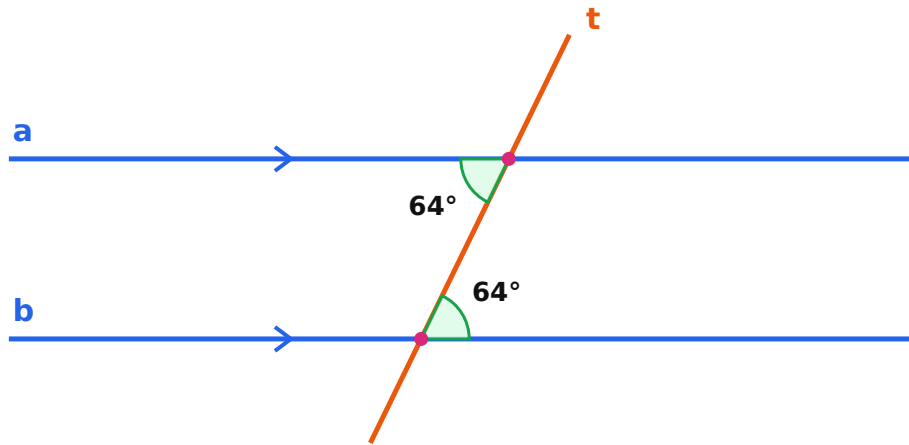
Angles 3 and 5 are same-side interior angles.

Problem 10: Same-side exterior with algebra

Lines a and b are parallel. $m\angle 1 = (4x+8)^\circ$ and $m\angle 7 = (2x+22)^\circ$. These are same-side exterior angles. Find x and each measure.

Problem 11: Are the lines parallel? (alternate interior)

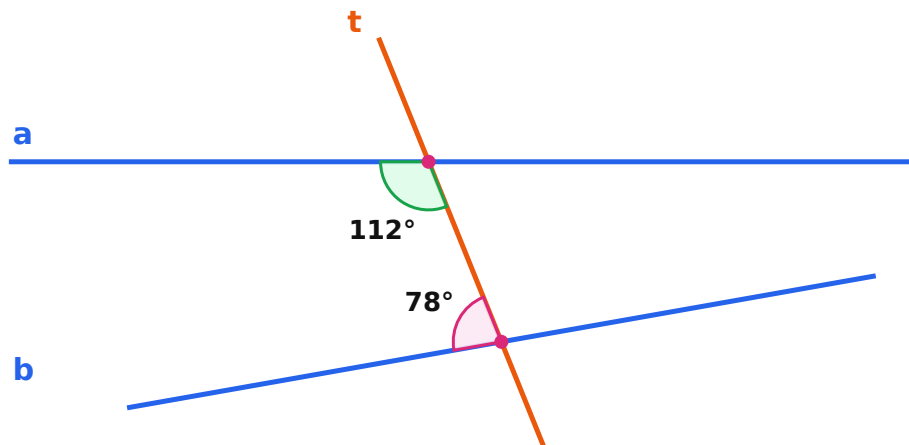
A transversal crosses lines a and b . Alternate interior angles $\angle 3$ and $\angle 6$ both measure 64° . Is $a \parallel b$? Justify.



Angles 3 and 6 are shaded.

Problem 12: Are the lines parallel? (same-side interior)

Same-side interior angles $\angle 3$ and $\angle 5$ measure 112° and 78° . Is $a \parallel b$? Justify.



The lines are not marked parallel.

Problem 13: Value of x that makes lines parallel (corresponding)

Corresponding angles measure $(5x+4)^\circ$ and $(7x-20)^\circ$. Find x so that $a \parallel b$, then find the angle measure.

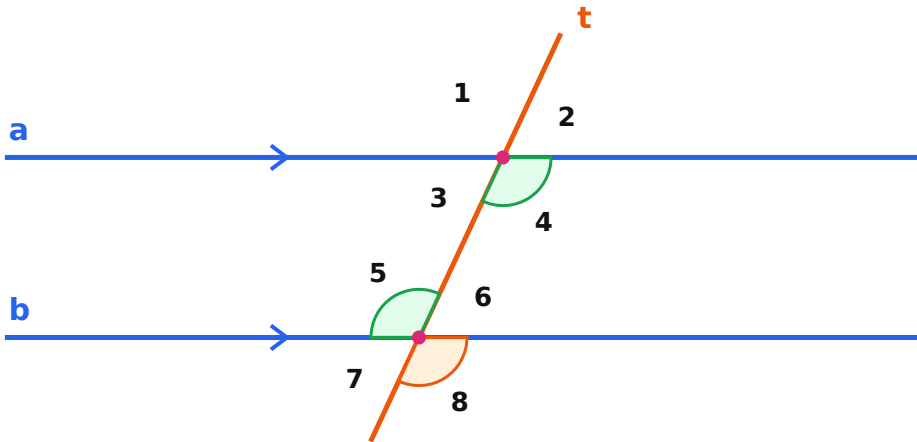
Problem 14: Value of x that makes lines parallel (alternate exterior)

Alternate exterior angles measure $(9x-7)^\circ$ and $(6x+23)^\circ$. Find x so that the lines are parallel,

then find the angle measure.

Problem 15: Complete the proof

Given $a \parallel b$, prove $m\angle 4 = m\angle 5$. Write the missing reason in each row.

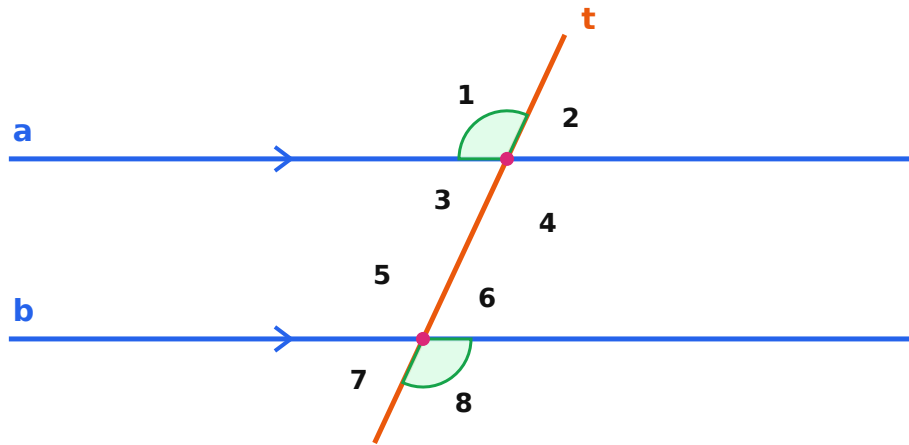


Angles 4, 5 and 8 are shaded.

Statements	Reasons
$a \parallel b$	Given
$m\angle 4 = m\angle 8$	?
$m\angle 8 = m\angle 5$	?
$m\angle 4 = m\angle 5$	?

Problem 16: Write a proof of the converse

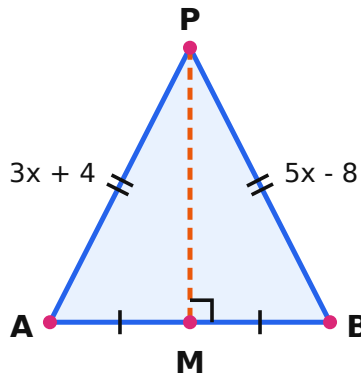
Given $m\angle 1 = m\angle 8$, write a two-column proof that $a \parallel b$.



Angles 1 and 8 are alternate exterior angles.

Problem 17: Perpendicular bisector with algebra

Line ℓ is the perpendicular bisector of $\overline{AB}$, and P is on ℓ . Find x and PA .



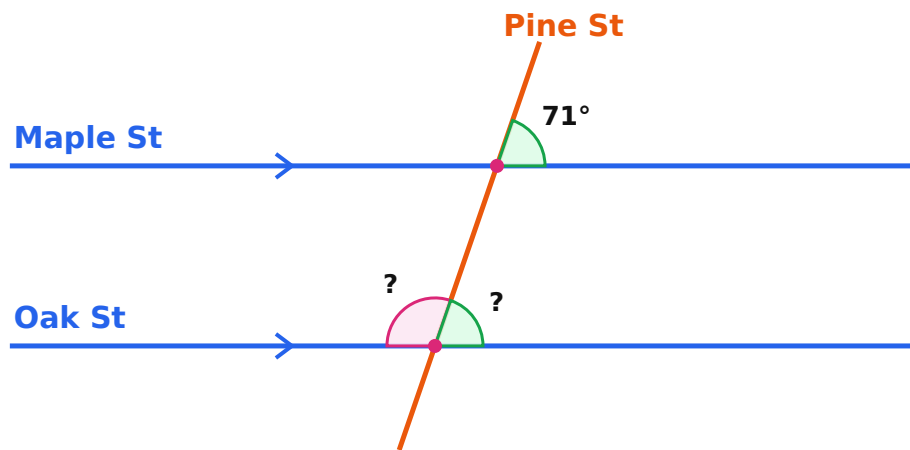
P is on the perpendicular bisector, so $PA = PB$.

Problem 18: Distance to endpoints

Line ℓ is the perpendicular bisector of $\overline{AB}$ at M . Point P is on ℓ , $AM = 12$ and $PM = 9$. Find PA and PB .

Problem 19: Streets problem

Maple Street and Oak Street are parallel. Pine Street crosses both. At Maple Street the northeast angle between Pine and Maple measures 71° . Find (a) the northeast angle at Oak Street and (b) the northwest angle at Oak Street.



North is up. Find the two unknown angles at Oak Street.

Problem 20: Railroad crossing

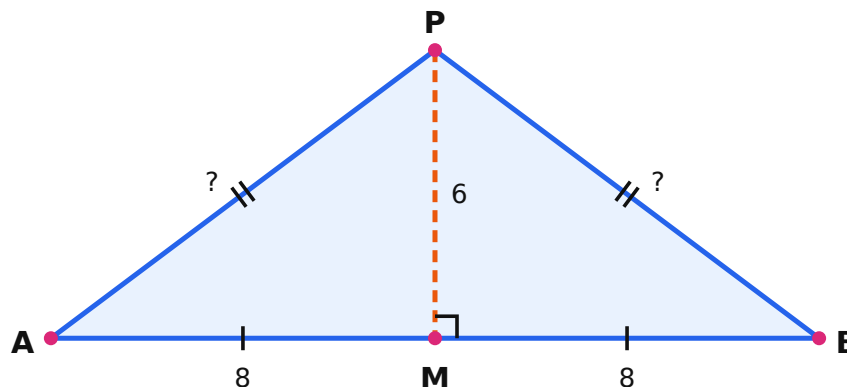
Two rails of a railroad are parallel. A service road crosses both rails. Alternate interior angles measure $(3x+2)^\circ$ and $(2x+37)^\circ$. (a) Find x . (b) Find the measure of each angle. (c) Find the measure of a same-side interior angle to one of them.

Problem 21: Bookshelf brace

Aisha wants to check whether two shelves in a bookcase are parallel. A diagonal brace crosses both, and the corresponding angles measure 83° and 85° . Are the shelves parallel? Explain.

Problem 22: Bus stop

Two houses, A and B, are 16 blocks apart on a straight road. A bus stop P is placed on the perpendicular bisector of $\overline{AB}$, 6 blocks away from the road. How far is the stop from each house?



AB = 16 blocks and PM = 6 blocks.

Problem 23: Multi-step angle problem

Lines a and b are parallel. $m\angle 1 = (6x-12)^\circ$ and $m\angle 5 = (4x+18)^\circ$. Priya needs $m\angle 4$ and $m\angle 6$. Find x , then both measures.

Problem 24: Notebook paper

The printed lines on a sheet of notebook paper are parallel. Ethan draws a line across two of them. Two same-side interior angles measure $(6y+4)^\circ$ and $(3y+14)^\circ$. Find y and both angle measures.