Name: _____ Date: _____ Score: _____ / 10

ESCONDIDO ADULT SCHOOL • HiSET MATHEMATICS PREPARATION

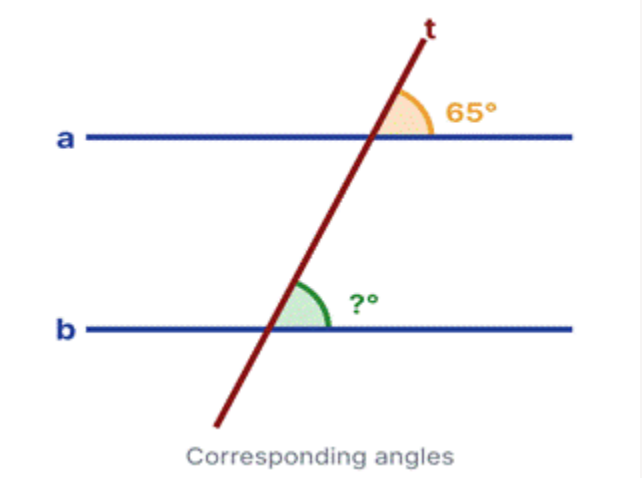
Parallel Lines & Transversals– 2

CA HiSET Standard: GEO.2 | 10 Word Problems

Directions: Solve each word problem. Show all work in the box provided. Write your final answer on the answer line. Identify the angle relationship used in each problem.

1

Two parallel railroad tracks, a and b, are crossed by a straight road t. Where the road crosses track a, the angle on the upper right side measures 65°. A road crew is painting warning lines and needs to know the matching angle where the road crosses track b. Using the corresponding angles relationship, find the measure of the unknown angle at line b. Name the angle relationship used.



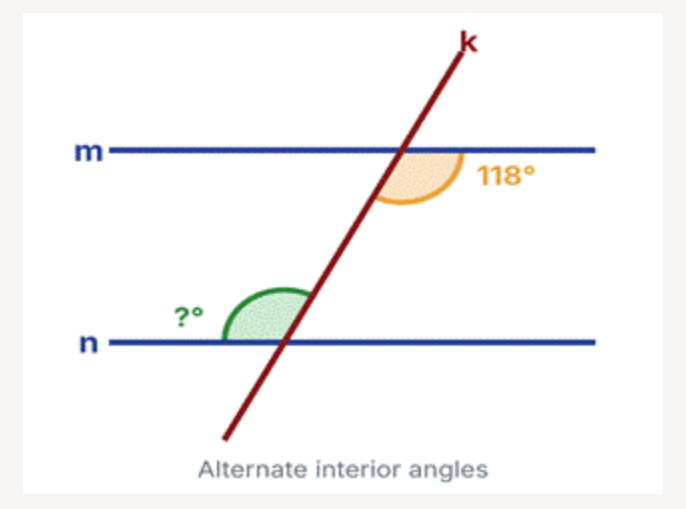
Corresponding angles

Show your work:

Answer: _____

2

A fence has two parallel rails, m and n, connected by a diagonal brace k. Where the brace meets the top rail, the angle below the rail on the right side of the brace measures 118°. A builder needs the angle above the bottom rail on the left side of the brace so she can cut the brace to fit. Find the measure of the unknown angle at line n. Name the angle relationship used.

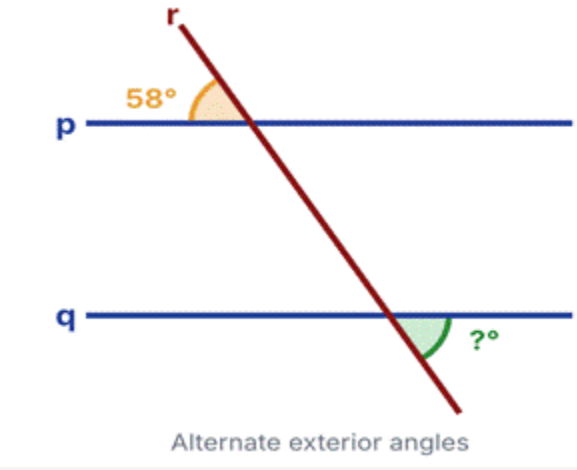


Show your work:

Answer: _____

3

The two banks of a straight river, p and q, are parallel. A bridge r crosses the river at an angle. On bank p, the angle outside the river on the left side of the bridge measures 58°. An engineer needs the angle outside the river on the right side of the bridge at bank q. Find the measure of the unknown angle at line q. Name the angle relationship used.

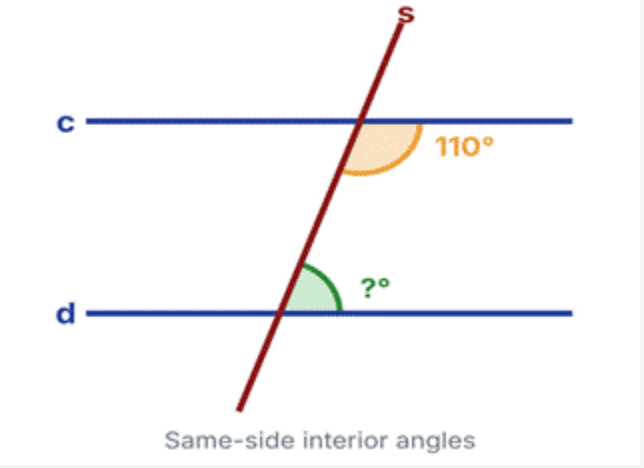


Show your work:

Answer: _____

4

In a parking lot, two parallel stripes, c and d, are crossed by a diagonal stripe s. Between the stripes, on the right side of s, the angle at stripe c measures 110°. A painter needs the angle between the stripes on the same side at stripe d. Find the measure of the unknown angle at line d. Name the angle relationship used, and explain whether the angles are equal or supplementary.

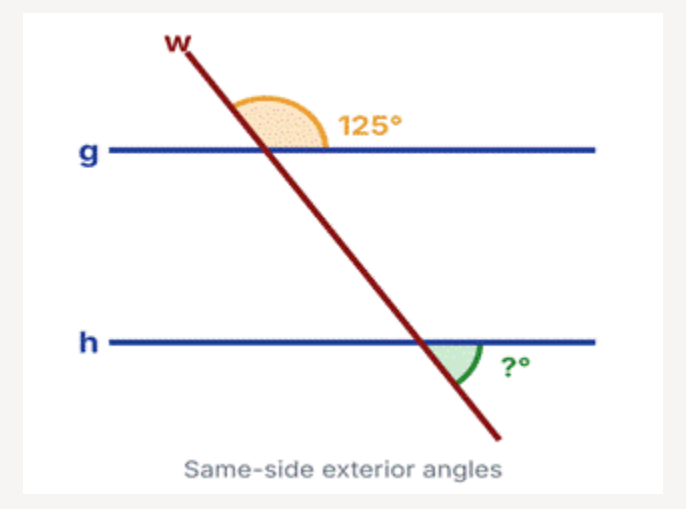


Show your work:

Answer: _____

5

Two parallel handrails, g and h, are crossed by a diagonal support post w. Above handrail g, on the right side of the post, the angle measures 125°. A welder needs the angle below handrail h on the same side of the post. Find the measure of the unknown angle at line h. Name the angle relationship used.

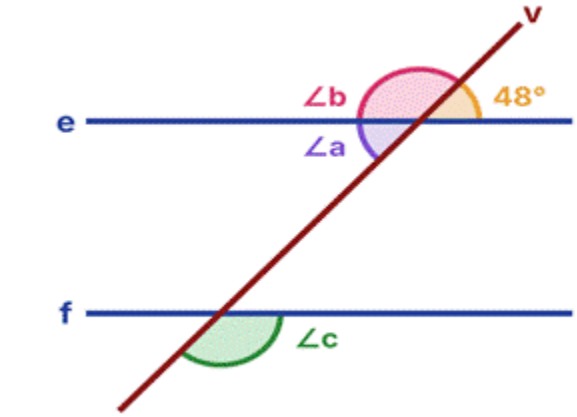


Show your work:

Answer: _____

6

Two parallel crosswalk lines, e and f, are crossed by a diagonal street v. At line e, one angle measures 48°. A city worker needs to label three more angles. (a) Find ∠a, the angle across from the 48° angle. (b) Find ∠b, the angle that forms a straight line with the 48° angle. (c) Find ∠c at line f. Name the angle relationship used for each.



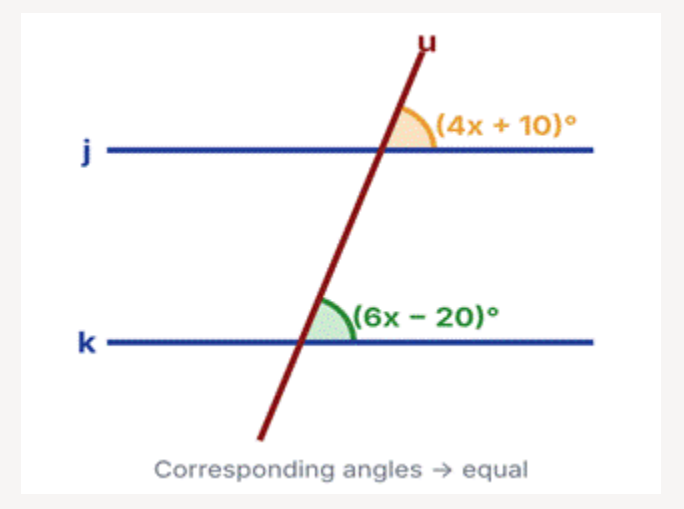
Find ∠a, ∠b, and ∠c

Show your work:

Answer: _____

7

Lines j and k are parallel and are cut by transversal u. The corresponding angles measure (4x + 10)° and (6x − 20)°. A city planner is designing two parallel bike lanes crossed by a diagonal path and needs the exact angle for the path. Solve for x and find the measure of each angle.

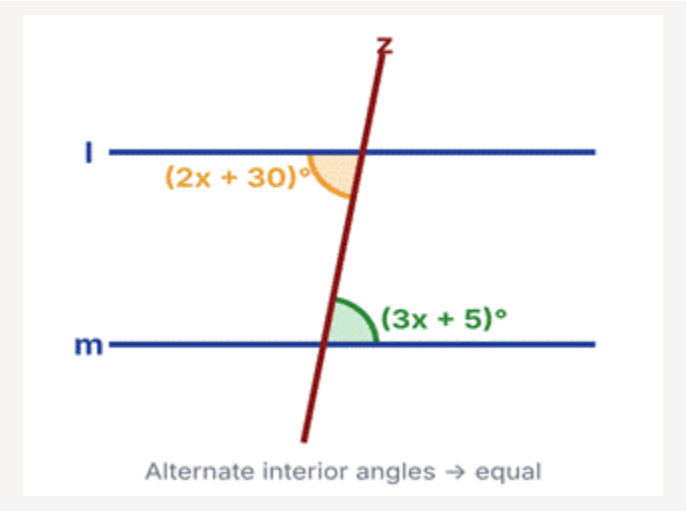


Show your work:

Answer: _____

8

Lines l and m are parallel and are cut by transversal z. The alternate interior angles measure (2x + 30)° and (3x + 5)°. A carpenter is building a bookshelf with two parallel shelves joined by a slanted divider. Solve for x and find the measure of each angle.

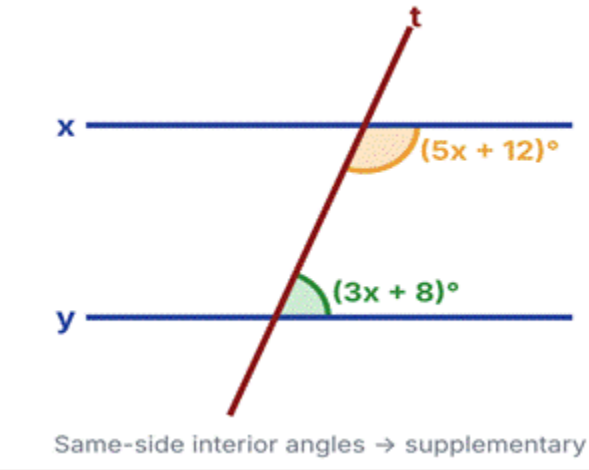


Show your work:

Answer: _____

9

Lines x and y are parallel and are cut by transversal t. Two same-side interior angles measure (5x + 12)° and (3x + 8)°. A sign maker is designing a sign with two parallel stripes crossed by a diagonal bar. Solve for x and find the measure of each angle. (Remember: same-side interior angles are supplementary.)

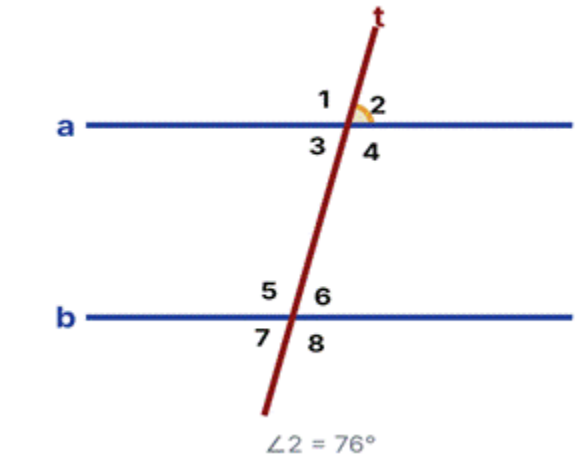


Show your work:

Answer: _____

10

Two parallel lines, a and b, are cut by transversal t, forming eight angles numbered 1 through 8. ∠2 measures 76°. (a) Find the measure of each of the other seven angles. (b) Name the relationship between ∠2 and ∠7. (c) Name the relationship between ∠4 and ∠6, and show that they add up to 180°.

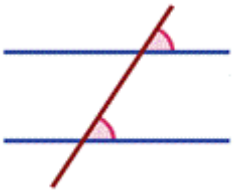


Show your work:

Answer: _____

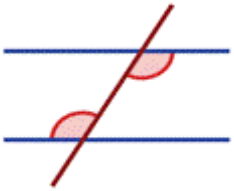
Angle Relationships — Reference Sheet

When two parallel lines are cut by a transversal:



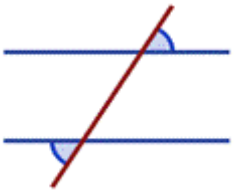
Corresponding Angles
Same position at each intersection

Equal



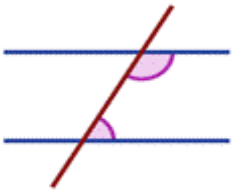
Alternate Interior Angles
Between the lines, on opposite sides of the transversal

Equal



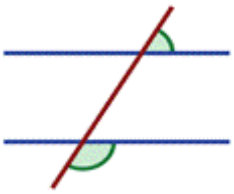
Alternate Exterior Angles
Outside the lines, on opposite sides of the transversal

Equal



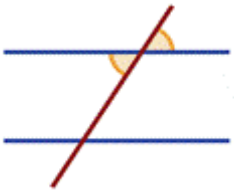
Same-Side Interior Angles
Between the lines, on the same side of the transversal

Supplementary (add to 180°)



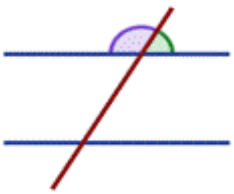
Same-Side Exterior Angles
Outside the lines, on the same side of the transversal

Supplementary (add to 180°)



Vertical Angles
Across from each other at one intersection

Equal



Linear Pair
Next to each other, forming a straight line

Supplementary (add to 180°)

ANSWER KEY — Instructor Copy

1 Corresponding angles are equal when lines are parallel.
The unknown angle at line b = 65°

2 Alternate interior angles are equal when lines are parallel.
The unknown angle at line n = 118°

3 Alternate exterior angles are equal when lines are parallel.
The unknown angle at line q = 58°

4 Same-side interior angles are supplementary (add to 180°) when lines are parallel.
Unknown angle at line d = 180° − 110° = 70°

5 Same-side exterior angles are supplementary (add to 180°) when lines are parallel.
Unknown angle at line h = 180° − 125° = 55°

6 (a) ∠a = 48° — Vertical angles are equal.
(b) ∠b = 180° − 48° = 132° — Linear pair (supplementary).
(c) ∠c = 132° — Alternate exterior angles with ∠b are equal. (Also: ∠c and the 48° angle are same-side exterior: 48° + 132° = 180°.)

7 Corresponding angles are equal: 4x + 10 = 6x − 20
30 = 2x → x = 15
Each angle = 4(15) + 10 = 70° ✔ Check: 6(15) − 20 = 70°

8 Alternate interior angles are equal: 2x + 30 = 3x + 5
25 = x → x = 25
Each angle = 2(25) + 30 = 80° ✔ Check: 3(25) + 5 = 80°

9 Same-side interior angles are supplementary: (5x + 12) + (3x + 8) = 180
8x + 20 = 180 → 8x = 160 → x = 20
Angles: 5(20) + 12 = 112° and 3(20) + 8 = 68° ✔ Check: 112° + 68° = 180°

10 (a) ∠2 = ∠3 = ∠6 = ∠7 = 76°; ∠1 = ∠4 = ∠5 = ∠8 = 180° − 76° = 104°
(b) ∠2 and ∠7 are alternate exterior angles (equal, 76°).
(c) ∠4 and ∠6 are same-side interior angles (supplementary): 104° + 76° = 180°