

Geometry - Parallel Lines and Transversals - Answer Key

Common Core G-CO.C.9 · maths-pdf.fr/en/

Use this answer key to check the 20 problems on parallel lines. Every solution shows the formula or theorem used, each step of the work, and the final answer in bold. If an answer differs from yours, compare the steps line by line to find where the work changed.

Geometry · Common Core State Standards: **G-CO.C.9**

Exercise 1 - Vertical angles

Vertical angles are congruent.

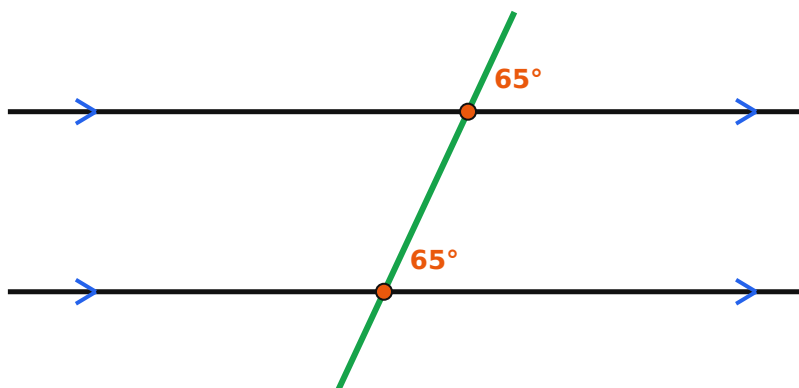
68°

Exercise 2 - Linear pair

$$180^\circ - 112^\circ = 68^\circ$$

68°

Exercise 3 - Corresponding angles



Corresponding angles are equal.

Angles 2 and 6 are corresponding angles, so they are congruent.

65°

Exercise 4 - Alternate interior angles

Angles 4 and 5 are alternate interior angles, so they are congruent.

125°

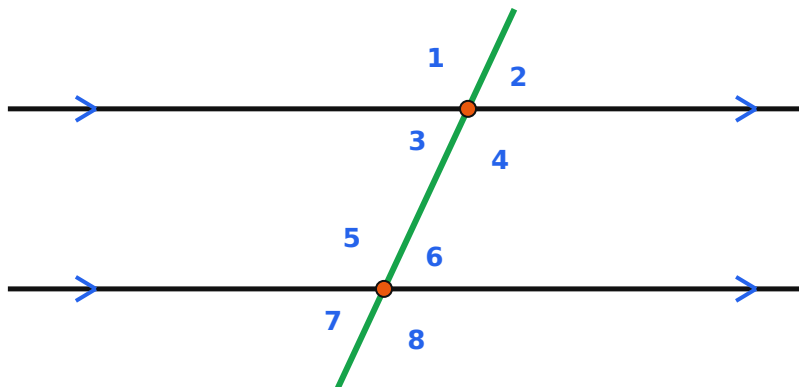
Exercise 5 - Same-side interior angles

Same-side interior angles are supplementary.

$$180^\circ - 125^\circ = 55^\circ$$

55°

Exercise 6 - Name the pair



Two parallel lines cut by a transversal form eight angles.

3 and 6 are on opposite sides of the transversal between the lines: alternate interior.

2 and 6 are in the same position at the two intersections: corresponding.

4 and 6 are between the lines on the same side: same-side interior.

1 and 8 are outside the lines on opposite sides: alternate exterior.

Exercise 7 - Alternate exterior angles

Angles 1 and 8 are alternate exterior angles, so they are congruent.

Exercise 8 - Corresponding angles with x

$$3x+10=5x-30$$

$$40=2x$$

$$x=20$$

$$3(20)+10=70^\circ$$

x = 20; both angles measure 70°

Exercise 9 - Alternate interior with x

$$4x-7=2x+25$$

$$2x=32$$

$$x=16$$

$$4(16)-7=57^\circ$$

x = 16; 57°

Exercise 10 - Same-side interior with x

$$(6x+10)+(4x+20)=180$$

$$10x+30=180$$

$$x=15$$

$$6(15)+10=100^\circ \text{ and } 4(15)+20=80^\circ$$

x = 15; 100° and 80°

Exercise 11 - Vertical angles with x

$$7x-12=4x+21$$

$$3x=33$$

$$x=11$$

$$7(11)-12=65^\circ$$

x = 11; 65° each

Exercise 12 - Are the lines parallel? (no)

Parallel lines would make corresponding angles congruent. $74^\circ \neq 76^\circ$.

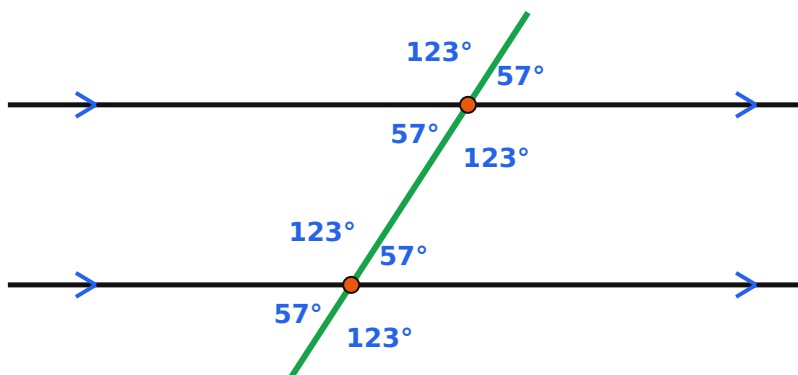
No, the lines are not parallel

Exercise 13 - Are the lines parallel? (yes)

Congruent alternate interior angles prove that the lines are parallel (converse).

Yes, the lines are parallel

Exercise 14 - All eight angles



Each angle is 57° or 123°.

Angles that equal 57°: the angle itself, its vertical angle, and the corresponding and alternate angles of those.

The rest form a linear pair with a 57° angle: $180^\circ - 57^\circ = 123^\circ$.

Four angles measure 57° and four measure 123°

Exercise 15 - Perpendicular bisector

Points on the perpendicular bisector are equidistant from A and B.

$$2x+5=4x-11$$

$$16=2x$$

$$x=8$$

$$PA=2(8)+5=21$$

$$\mathbf{x = 8; PA = 21}$$

Exercise 16 - Perpendicular bisector equation

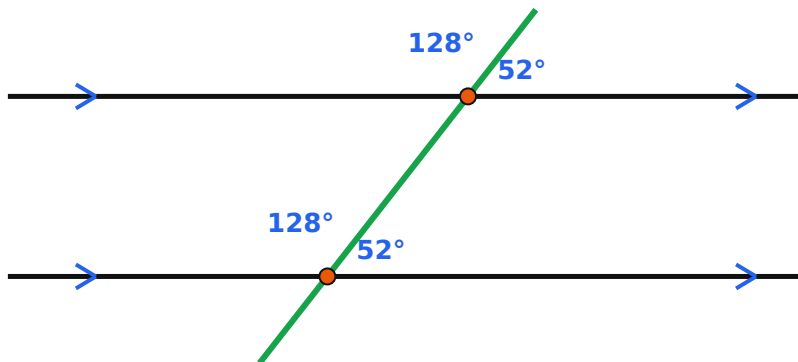
$$\text{Midpoint: } \left(\frac{-2+6}{2}, \frac{1+5}{2} \right) = (2,3).$$

$$\text{Slope of AB: } \frac{5-1}{6-(-2)} = \frac{1}{2}, \text{ so the perpendicular slope is } -2.$$

$$y-3=-2(x-2) \text{ gives } y=-2x+7.$$

$$\mathbf{y = -2x + 7}$$

Exercise 17 - Crossing streets



Maple (top), Oak (bottom) and the avenue.

Corresponding angles are congruent, so the angle at Oak Street is 52°.

The obtuse angle forms a linear pair with it: $180^\circ - 52^\circ = 128^\circ$.

52° and 128°

Exercise 18 - Railing

Same-side interior angles are supplementary.

$$180^{\circ} - 64^{\circ} = 116^{\circ}$$

116°

Exercise 19 - Shelf bracket

$$3x + 12 = 5x - 8$$

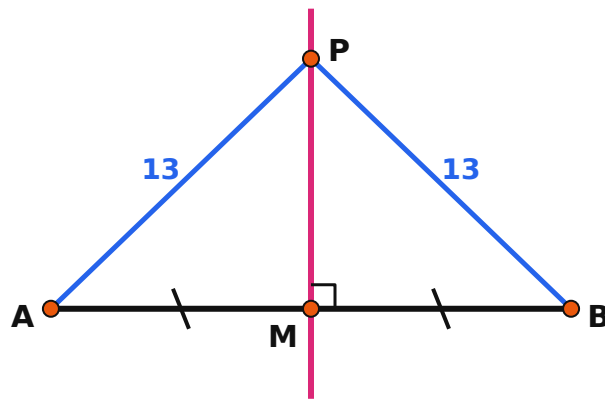
$$20 = 2x$$

$$x = 10$$

$$3(10) + 12 = 42^{\circ}$$

$x = 10$; 42°

Exercise 20 - Equal distance



$$PA = PB = 13, AM = 5, PM = 12.$$

Points on the perpendicular bisector are equidistant from A and B, so $PB = 13$ miles.

Triangle PMA is a right triangle with $AM = 5$ and $PA = 13$: $PM = \sqrt{13^2 - 5^2} = \sqrt{144} = 12$.

$PB = 13$ miles; $PM = 12$ miles