

Geometry · Coordinate Geometry Proofs · Worksheet Answer Key

Common Core G-GPE.B.4, G-GPE.B.5, G-GPE.B.6, G-GPE.B.7 · mathovore.fr

This answer key shows a complete worked solution for every problem on the coordinate geometry worksheet. Compare each step with your own work, check the slope and distance calculations, and note where a figure helps verify a result.

GeometryCommon Core: G-GPE.B.4 · G-GPE.B.5 · G-GPE.B.6 · G-GPE.B.7

Problem 1: Vertical distance

Both points have the same x-coordinate, so the segment is vertical. Its length is $|4 - (-6)| = 10$.

The length is 10 units.

Problem 2: Distance with a 3-4-5 triangle

$$d = \sqrt{(4-1)^2 + (6-2)^2} = \sqrt{9+16} = \sqrt{25} = 5.$$

The distance is 5 units.

Problem 3: Distance between two points

$$d = \sqrt{(4-(-2))^2 + (7-(-1))^2} = \sqrt{36+64} = \sqrt{100} = 10.$$

The distance is 10 units.

Problem 4: Distance as a radical

$$d = \sqrt{(1-(-3))^2 + (4-2)^2} = \sqrt{16+4} = \sqrt{20} = 2\sqrt{5}. \text{ Since } \sqrt{5} \approx 2.236, 2\sqrt{5} \approx 4.47.$$

$2\sqrt{5} \approx 4.47$ **units**

Problem 5: Midpoint of a segment

$$M = \left(\frac{2+10}{2}, \frac{8+(-4)}{2} \right) = (6, 2).$$

$$M = (6, 2)$$

Problem 6: Midpoint with fractions

$$M = \left(\frac{-5+2}{2}, \frac{3+6}{2} \right) = \left(-\frac{3}{2}, \frac{9}{2} \right).$$

$$M = \left(-\frac{3}{2}, \frac{9}{2} \right) = (-1.5, 4.5)$$

Problem 7: Missing endpoint

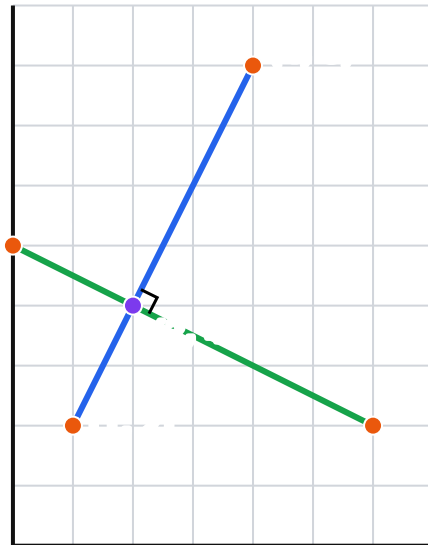
Let $B = (x, y)$. Then $\frac{-2+x}{2} = 3$ gives $x = 8$, and $\frac{4+y}{2} = -1$ gives $y = -6$.

$$B = (8, -6)$$

Problem 8: Slopes of two lines

Slope of a : $\frac{8-2}{4-1} = 2$. Slope of b : $\frac{2-5}{6-0} = -\frac{1}{2}$. The slopes are not equal, but $2 \cdot \left(-\frac{1}{2}\right) = -1$.

The lines are perpendicular.



Line a has slope 2 and line b has slope $-1/2$; they meet at a right angle.

Problem 9: Parallel line through a point

A parallel line has the same slope, 3. Point-slope form: $y - (-1) = 3(x - 4)$, so $y + 1 = 3x - 12$.

$$y = 3x - 13$$

Check: when $x = 4$, $y = 3(4) - 13 = -1$.

Problem 10: Perpendicular line through a point

The perpendicular slope is the opposite reciprocal of $-\frac{2}{3}$, which is $\frac{3}{2}$. Then $y-2=\frac{3}{2}(x-6)$, so $y=\frac{3}{2}x-9+2$.

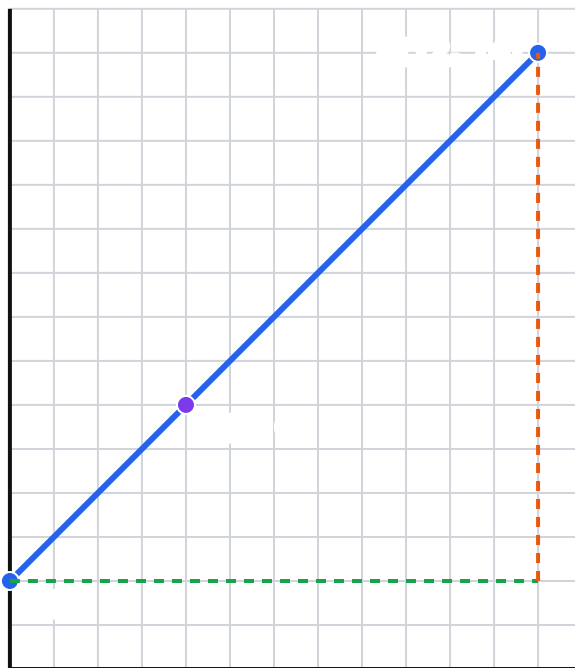
$$y=\frac{3}{2}x-7$$

Check: when $x=6$, $y=9-7=2$.

Problem 11: Point one third of the way

The fraction is $\frac{1}{1+2}=\frac{1}{3}$. The run is $12-0=12$ and the rise is $14-2=12$. Move $\frac{1}{3}(12)=4$ right and 4 up from A .

$$P=(4,6)$$



P is $\frac{1}{3}$ of the way: run $12 \div 3 = 4$, rise $12 \div 3 = 4$.

Problem 12: Ratio 3 to 2

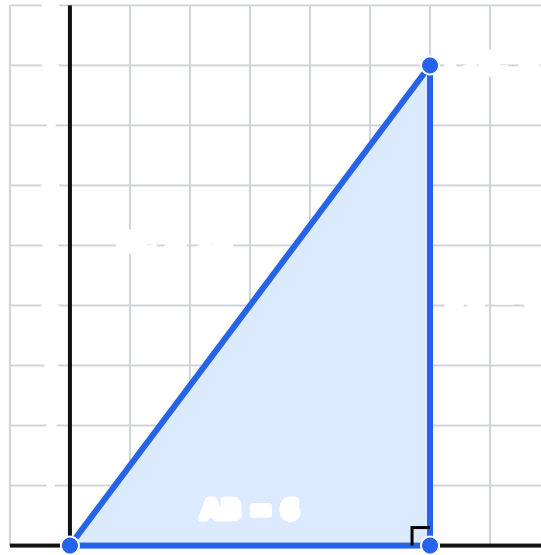
The fraction is $\frac{3}{3+2}=\frac{3}{5}$. Run: $4-(-6)=10$, so move $\frac{3}{5}(10)=6$. Rise: $-8-2=-10$, so move $\frac{3}{5}(-10)=-6$. Then $(-6+6, 2-6)=(0, -4)$.

$$(0, -4)$$

Problem 13: Perimeter of a triangle

$AB = 6$ (horizontal) and $BC = 8$ (vertical). $AC = \sqrt{6^2 + 8^2} = \sqrt{100} = 10$. Perimeter: $6 + 8 + 10 = 24$.

The perimeter is 24 units.



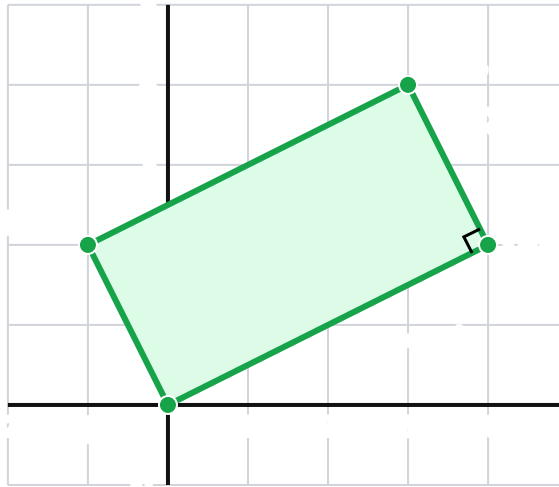
Legs 6 and 8, hypotenuse 10: perimeter 24.

Problem 14: Area of a tilted rectangle

$PQ = \sqrt{4^2 + 2^2} = \sqrt{20} = 2\sqrt{5}$ and $QR = \sqrt{(-1)^2 + 2^2} = \sqrt{5}$. Area $= 2\sqrt{5} \cdot \sqrt{5} = 2 \cdot 5 = 10$.

The area is 10 square units.

Check: slope of $\overline{PQ}$ is $\frac{1}{2}$ and slope of $\overline{QR}$ is -2 ; their product is -1 , so the angle at Q is right.



Side lengths $2\sqrt{5}$ and $\sqrt{5}$ give area 10.

Problem 15: Area of a triangle

$\overline{AB}$ is horizontal, so the base is $6 - (-2) = 8$. The height is the vertical distance from C to the line $y = 1$: $7 - 1 = 6$. Area = $\frac{1}{2}(8)(6) = 24$.

The area is 24 square units.

Problem 16: Classify a triangle by sides

$AB = 6$. $AC = \sqrt{3^2 + 5^2} = \sqrt{34}$. $BC = \sqrt{(-3)^2 + 5^2} = \sqrt{34}$. Two sides are equal, and $\sqrt{34} \approx 5.83 \neq 6$.

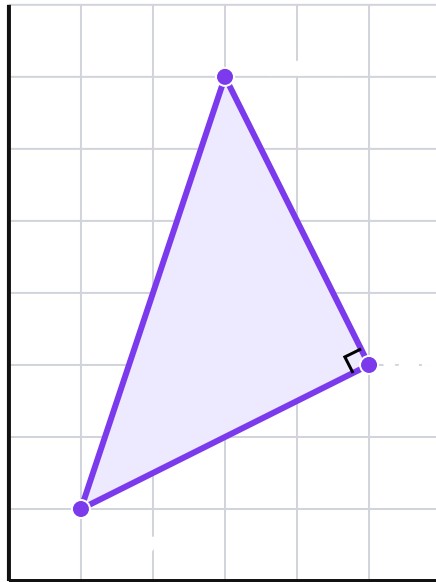
The triangle is isosceles but not equilateral.

Problem 17: Right angle with slopes

Slope of $\overline{PQ}$: $\frac{3-1}{5-1} = \frac{1}{2}$. Slope of $\overline{QR}$: $\frac{7-3}{3-5} = -2$. Product: $\frac{1}{2} \cdot (-2) = -1$, so $\overline{PQ} \perp \overline{QR}$.

$PQ = \sqrt{20}$ and $QR = \sqrt{(-2)^2 + 4^2} = \sqrt{20}$. Area = $\frac{1}{2}\sqrt{20} \cdot \sqrt{20} = 10$.

The right angle is at Q and the area is 10 square units.



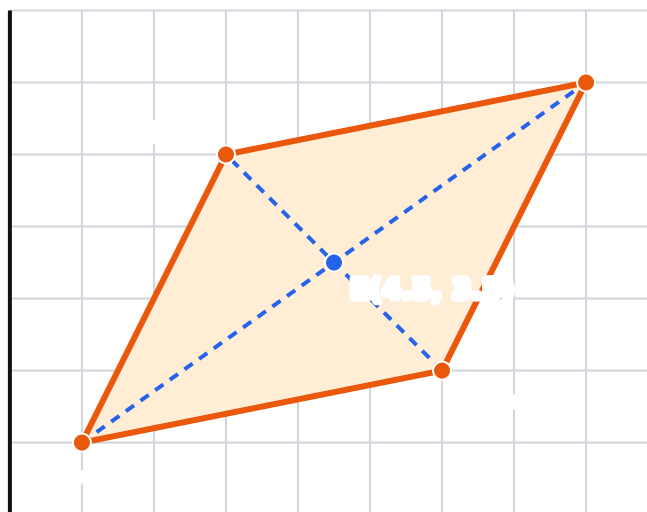
Slopes $1/2$ and -2 multiply to -1 : right angle at Q.

Problem 18: Prove a parallelogram

Midpoint of $\overline{AC}$: $\left(\frac{1+8}{2}, \frac{1+6}{2}\right) = (4.5, 3.5)$. Midpoint of $\overline{BD}$: $\left(\frac{6+3}{2}, \frac{2+5}{2}\right) = (4.5, 3.5)$.

The diagonals share a midpoint, so they bisect each other and ABCD is a parallelogram.

Check: from A to B and from D to C the move is 5 right and 1 up.



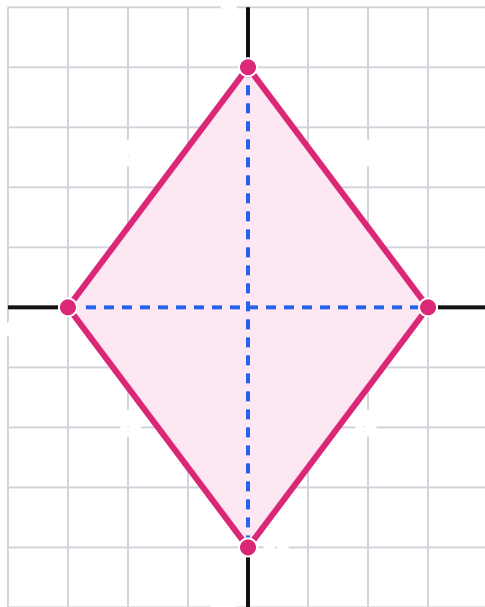
Both diagonals have midpoint $(4.5, 3.5)$, so ABCD is a parallelogram.

Problem 19: Prove a rhombus

Each side has a 3 by 4 change: $AB = \sqrt{3^2 + 4^2} = 5$, $BC = 5$, $CD = 5$, $DA = 5$. Four equal sides make a rhombus.

The diagonals lie on the x-axis and the y-axis, so they are perpendicular and cut the figure into four right triangles with legs 3 and 4. Each has area $\frac{1}{2}(3)(4) = 6$, so the area is $4 \cdot 6 = 24$.

It is a rhombus with area 24 square units.



All four sides of ABCD measure 5 and the diagonals are perpendicular.

Problem 20: Walk to the library

(a) $SL = \sqrt{12^2 + 5^2} = \sqrt{169} = 13$ blocks, and $13 \times 0.1 = 1.3$ miles.

(b) $\left(\frac{2+14}{2}, \frac{3+8}{2}\right) = (8, 5.5)$.

(a) 1.3 miles. (b) The bench is at (8, 5.5).

Problem 21: Ranger station on a trail

Move $\frac{2}{5}(15) = 6$ right and $\frac{2}{5}(20) = 8$ up: $R = (6, 8)$.

Whole trail: $\sqrt{15^2 + 20^2} = \sqrt{625} = 25$ units. The remaining $\frac{3}{5}$ is 15 units, or $15 \times 0.1 = 1.5$ miles. Check: $RC = \sqrt{9^2 + 12^2} = 15$.

$R = (6, 8)$; the station is 1.5 miles from the campsite.

Problem 22: Garden fence cost

$AB = 8$ ft and $BC = 6$ ft.

(a) $2(8+6) = 28$ ft.

(b) $28 \times 4.50 = 126$.

(c) $8 \times 6 = 48$ square feet.

(d) $AC = \sqrt{8^2 + 6^2} = 10$ ft.

(a) 28 ft. (b) \$126.00. (c) 48 square feet. (d) 10 ft.

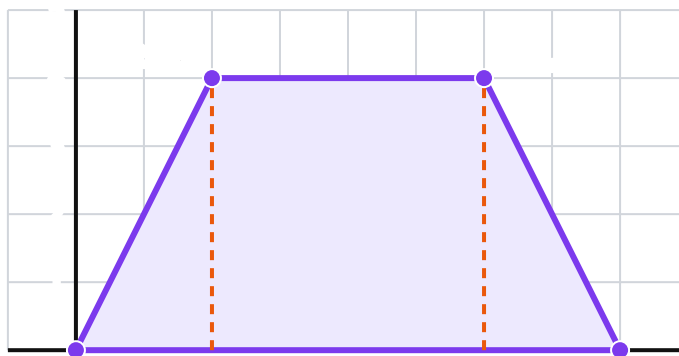
Problem 23: Isosceles trapezoid park

Slopes: AB is 0 and DC is 0, so $AB \parallel DC$. Slope $AD = \frac{4}{2} = 2$ and slope $BC = \frac{-4}{2} = -2$, so the other pair is not parallel. Exactly one pair of parallel sides makes a trapezoid.

Legs: $AD = \sqrt{2^2 + 4^2} = \sqrt{20}$ and $BC = \sqrt{(-2)^2 + 4^2} = \sqrt{20}$. Equal legs make it isosceles.

Area: a 4 by 4 rectangle (16) plus two right triangles with legs 2 and 4 (each 4) is 24 square units. Each square unit is $10 \times 10 = 100$ square yards, so the area is $24 \times 100 = 2,400$ square yards.

It is an isosceles trapezoid with area 2,400 square yards.



Split into a 4 by 4 rectangle and two triangles with legs 2 and 4: $16 + 4 + 4 = 24$.

Problem 24: Split a triangle

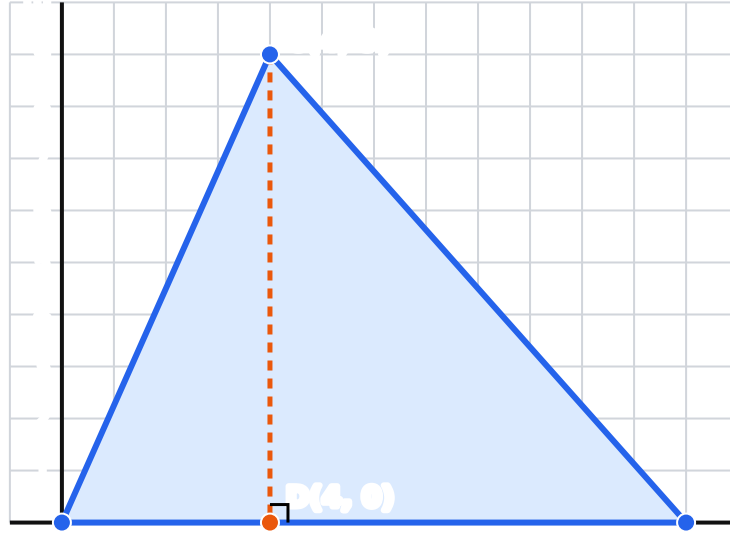
(a) Fraction $\frac{1}{3}$ of the run 12 is 4, so $D = (4,0)$.

(b) $\overline{AB}$ lies on the x-axis (horizontal) and $\overline{CD}$ lies on the line $x = 4$ (vertical), so they are perpendicular.

(c) Base 12, height $CD = 9$: area $\frac{1}{2}(12)(9) = 54$.

(d) $AD = 4$, $CD = 9$, $AC = \sqrt{4^2 + 9^2} = \sqrt{97} \approx 9.85$. Perimeter $4 + 9 + 9.85 = 22.85$.

(a) $D = (4, 0)$. (c) 54 square units. (d) about 22.85 units.



$D = (4, 0)$ puts CD on the vertical line $x = 4$, perpendicular to AB .

Problem 25: Drone flight

(a) $PL = \sqrt{(8 - (-4))^2 + (14 - (-2))^2} = \sqrt{144 + 256} = \sqrt{400} = 20$ units, and $20 \times 10 = 200$ yards.

(b) $\left(\frac{-4+8}{2}, \frac{-2+14}{2}\right) = (2, 6)$.

(a) 200 yards. (b) The photo point is (2,6).