

Coordinate Distance Quest

Use right triangles to measure straight-line distance.

GRADE 8 • 8.GSR.8.3

8.GSR.8.3 "Apply the Pythagorean Theorem to find the distance between two points in a coordinate system in practical, mathematical problems."

NAME _____

DATE _____

DISTANCE ON A GRID

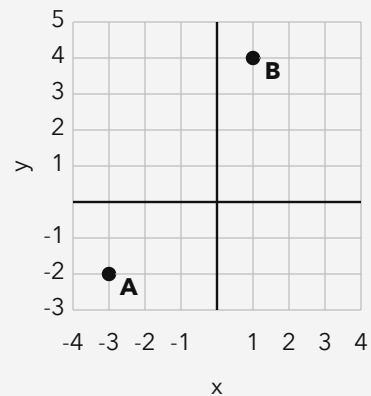
To find the straight-line distance between two points, first find the horizontal change and the vertical change. Use those changes as the legs of a right triangle: distance = $\sqrt{[(\text{change in } x)^2 + (\text{change in } y)^2]}$. Simplify the square root when possible.

WORKED EXAMPLE

Find the distance between points A and B shown on the coordinate grid.

1. Horizontal change: $1 - (-3) = 4$.
2. Vertical change: $4 - (-2) = 6$.
3. Distance = $\sqrt{(4^2 + 6^2)} = \sqrt{52}$.
4. $\sqrt{52} = 2\sqrt{13}$.

Answer: $2\sqrt{13}$ units



PRACTICE 6 problems

- 1** Find the distance between A(0, 0) and B(3, 4).

ANSWER _____

- 2** Find the distance between C(-5, 2) and D(7, 2).

ANSWER _____

- 3** Find the distance between E(-1, 6) and F(7, 0).

ANSWER _____

- 4** Find the distance between G(2, -4) and H(11, 8).

ANSWER _____

- 5** Find the distance between J(-8, -7) and K(7, 8). Give the exact distance.

ANSWER _____

- 6** Find the distance between M(-9, 1) and N(3, 6).

ANSWER _____

APPLY IT Show your work

- 1** A skate park map uses a coordinate grid measured in meters. The snack kiosk is at (-6, 1), and the bike repair station is at (2, 7). What is the shortest straight-line distance between them?

WORK SPACE

ANSWER _____

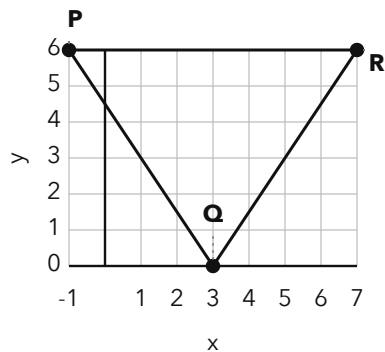
- 2** At a school robotics competition, a supply station is at (3, -5) meters and the charging station is at (-9, 0) meters. How far apart are the stations in a straight line?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Triangle PQR is shown on the coordinate grid. Use distances to determine whether the triangle is isosceles. Then find its exact perimeter. Explain your reasoning.



WORK SPACE AND ANSWER

PRACTICE 1

Find the distance between A(0, 0) and B(3, 4).

5 units

PRACTICE 2

Find the distance between C(-5, 2) and D(7, 2).

12 units

PRACTICE 3

Find the distance between E(-1, 6) and F(7, 0).

10 units

PRACTICE 4

Find the distance between G(2, -4) and H(11, 8).

15 units

PRACTICE 5

Find the distance between J(-8, -7) and K(7, 8).
Give the exact distance.

$15\sqrt{2}$ units

PRACTICE 6

Find the distance between M(-9, 1) and N(3, 6).

13 units

APPLY IT 1

10 meters The horizontal change is 8 meters and the vertical change is 6 meters. $\sqrt{(8^2 + 6^2)} = \sqrt{100} = 10$.

APPLY IT 2

13 meters The horizontal and vertical changes are 12 meters and 5 meters. $\sqrt{(12^2 + 5^2)} = \sqrt{169} = 13$.

CHALLENGE

Yes. $PQ = QR = 2\sqrt{13}$ units and $PR = 8$ units, so the exact perimeter is $8 + 4\sqrt{13}$ units.

Accept equivalent exact radical forms, such as $\sqrt{450}$ for $15\sqrt{2}$. For the challenge, students should identify two equal side lengths and add all three side lengths for the perimeter.