Distance on the Coordinate Plane

Horizontal and vertical coordinate distance: Applications and decisions

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

For points on one horizontal or vertical line, subtract the coordinates that change and take the absolute value. The distance is a nonnegative count of grid steps. This works whether the coordinates are on the same side of 0 or on opposite sides.

Worked example

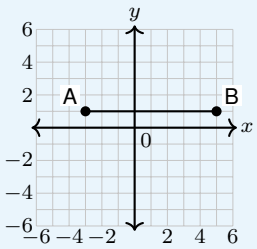
Plot A$(-3, 1)$ and B$(5, 1)$, then find AB.

1. Place both points along the line $y = 1$, at $x = -3$ and $x = 5$.

2. Change in x is $5 - (-3) = 8$; distance $= |8| = 8$ units.

3. Reversing the subtraction gives $|-3 - (5)| = 8$ too.

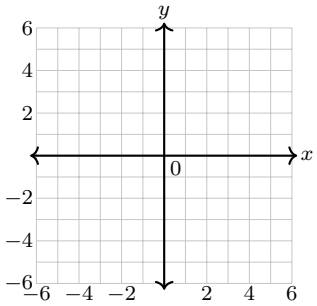
Answer: 8 units.



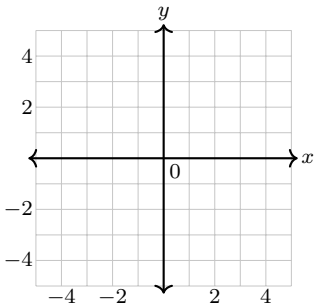
Practice Problems

Show your thinking.

1. A gate is at $(3, 2)$. Wells A and B are at $(-5, 2)$ and $(-1, 2)$. Plot them. Which well is within 6 grid units of the gate?

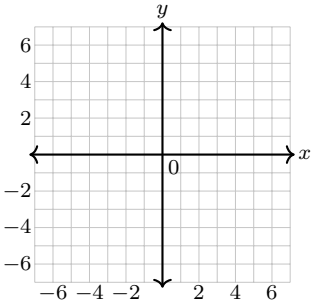


2. Plot a robot route from $(-3, -2)$ up to $(-3, 4)$, then right to $(2, 4)$. Find the total distance without cutting diagonally.



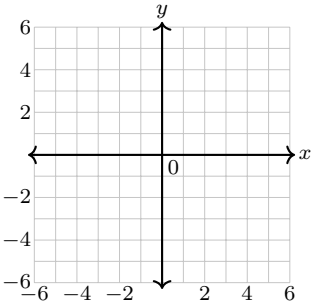
3. A vertical shaft goes from $(-2, -4)$ to $(-2, 0)$. Install a stop halfway between them. Give its coordinates and check the two distances.

4. From $(1, -2)$, design and draw one horizontal path and one vertical path, each 4 units long. Both endpoints must stay in quadrant IV.



5. A planner says any 4-unit horizontal path starting at $(-2, 2)$ crosses the y-axis. Give a counterexample with its endpoint and length.

6. Plot two fence segments on $x = 3$: one from $y = -1$ to 3, and one from $y = 2$ to 5. Count the overlapping section only once. How much fence is needed?



Answer Key

1. Well B only, at 4 units.
2. 11 grid units.
3. $(-2, -2)$; 2 units from either end.
4. Horizontal end $(5, -2)$; vertical end $(1, -6)$.
5. End at $(-6, 2)$. Length 4 units; no crossing.
6. 6 grid units.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Plot the three points along $y = 2$. Only x changes.
2. Well A to gate: $|3 - (-5)| = 8$ units, beyond the limit.
3. Well B to gate: $|3 - (-1)| = 4$ units, within the limit.

Problem 2

1. Mark both ends and the corner at $(-3, 4)$. The first leg stays at $x = -3$.
2. Vertical leg: $|4 - (-2)| = 6$ units. Horizontal leg along $y = 4$: $|2 - (-3)| = 5$ units.
3. Add the two lengths: $6 + 5 = 11$ grid units.

Problem 3

1. The shaft stays on $x = -2$ and is $|0 - (-4)| = 4$ units long.
2. Half of 4 is 2. From $y = -4$ go up to $-4 + 2 = -2$.
3. Both $|-2 - (-4)| = 2$ and $|0 - (-2)| = 2$ units, so the stop is halfway.

Problem 4

1. Horizontal: $x = 1 + 4 = 5$ or $x = 1 - 4 = -3$. Only $5 > 0$ works; keep $y = -2$.
2. Vertical: $y = -2 + 4 = 2$ or $y = -2 - 4 = -6$. Only $-6 < 0$ works; keep $x = 1$.
3. Mark the ends and join each to $(1, -2)$. Distances: $|5 - 1| = 4$ and $|-6 - (-2)| = 4$.

Problem 5

1. Go left 4 along $y = 2$: $x = -2 - 4 = -6$.
2. The whole path has x from -6 to -2, so none of it reaches $x = 0$.
3. Check the distance: $|-6 - (-2)| = 4$ units.

Problem 6

1. Mark the four endpoints on $x = 3$. The lengths are $|3 - (-1)| = 4$ and $|5 - 2| = 3$ units.
2. The overlap from $y = 2$ to 3 is $3 - 2 = 1$ unit.
3. Count the overlap once: $4 + 3 - 1 = 6$ grid units.

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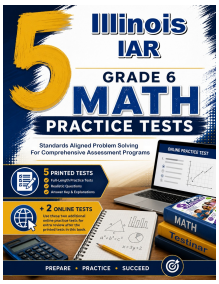

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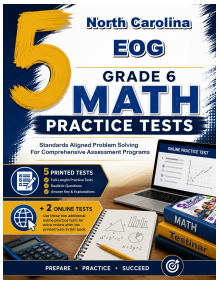

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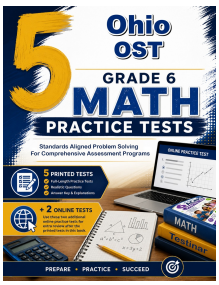

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