Solving Problems on the Coordinate Plane

Solving Problems on the Coordinate Plane: Apply, Compare, and Design

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QUICK REVIEW

For a horizontal leg, subtract the x-coordinates. For a vertical leg, subtract the y-coordinates. Add the lengths of all the legs, not just the last one. Use the map scale to convert grid units.

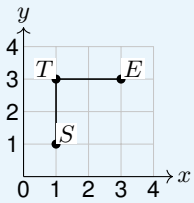
Worked example

A toy track goes from $(1, 1)$ up to $(1, 3)$, then right to $(3, 3)$. Each grid unit is 2 m. Find the track length.

1. Up: $3 - 1 = 2$ units. Right: $3 - 1 = 2$ units. The track is $2 + 2 = 4$ units.

2. At 2 m per unit, the length is $4 \times 2 = 8$ m.

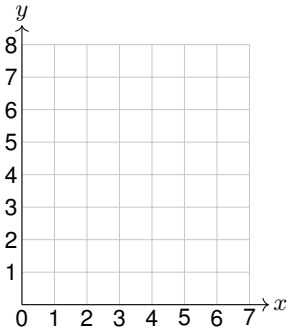
Answer: 8 m.



Practice Problems

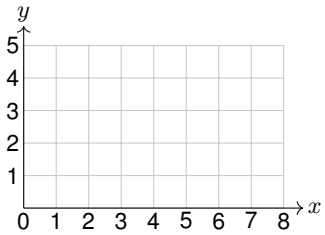
Show your thinking.

1. A delivery cart has 9 blocks of range. From $(1, 2)$ it must go right, then up, to $(6, 7)$. One grid unit is one block. Plot the route, mark where the cart stops, and give how far short it stops.

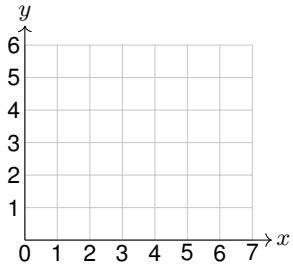


2. A rectangular garden stretches from $x = 2$ to $x = 6$ and $y = 1$ to $y = 4$, with sides on grid lines. Each grid unit is 1 m. A 2 m gate needs no fence. How much fence is needed?

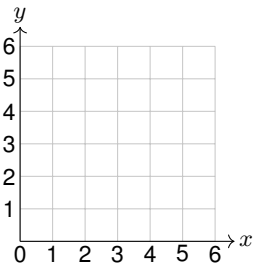
3. A stage is a rectangle on grid lines with area 12 square units. Its bottom corners are $(1, 2)$ and $(7, 2)$. Find the top corners and draw the boundary.



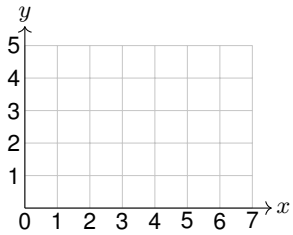
4. From $(1, 1)$ to $(6, 5)$, choose between going up then right and going right then up. The intersection $(1, 5)$ is closed. Plot both one-turn routes and give the length of the usable one.



5. A visitor at $P(5, 5)$ can walk straight to exit $W(2, 5)$ or $S(5, 1)$. Each grid unit is 2 m. Plot the three sites. Which exit is closer, and by how many meters?



6. Robot P can move only right from $(1, 4)$, and robot Q only up from $(6, 2)$. Find and plot the meeting point and both paths. Which robot moves farther, and by how many units?



Answer Key

1. It stops at $(6, 6)$, 1 block short.
2. 12 m of fencing.
3. Top corners $(1, 4)$ and $(7, 4)$.
4. Right then up; 9 units.
5. Exit W is 2 m closer.
6. They meet at $(6, 4)$. P travels 3 units farther.

Step-by-Step Solutions

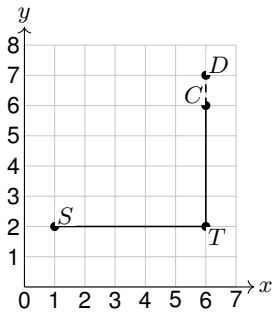
Follow each calculation, then check your own work.

Problem 1

1. The cart needs $6 - 1 = 5$ blocks right and $7 - 2 = 5$ up. The full route is 10 blocks.

2. After going right it has $9 - 5 = 4$ blocks left. Its height then reaches $2 + 4 = 6$, so it stops at $(6, 6)$.

3. The dashed part is the last $7 - 6 = 1$ block it cannot travel.



Problem 2

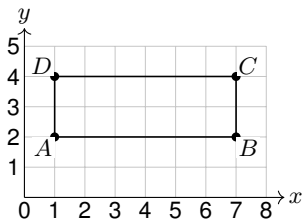
1. The side lengths are $6 - 2 = 4$ m and $4 - 1 = 3$ m.

2. The full boundary is $2 \times (4 + 3) = 14$ m. Leave out the gate: $14 - 2 = 12$ m.

Problem 3

1. The bottom edge is $7 - 1 = 6$ units long. Height is $12 \div 6 = 2$ units.

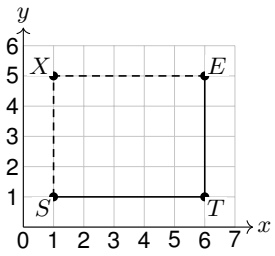
2. The top row is $2 + 2 = 4$. The top corners stay in columns 1 and 7. Close the outline at that height.



Problem 4

1. The up-first route would turn at $(1, 5)$, the closed corner. It is dashed in the plot.

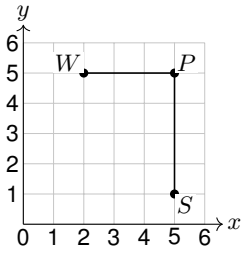
2. The right-first route turns at $(6, 1)$ and avoids the closure. Its length is $(6 - 1) + (5 - 1) = 5 + 4 = 9$ units.



Problem 5

1. The distance to W is $5 - 2 = 3$ units, or $3 \times 2 = 6$ m.

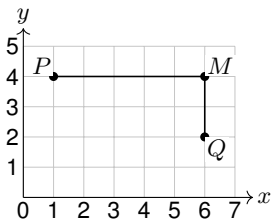
2. The distance to S is $5 - 1 = 4$ units, or $4 \times 2 = 8$ m. The gap is $8 - 6 = 2$ m.



Problem 6

1. P stays at height 4 and Q stays in column 6, so their paths cross at $(6, 4)$.

2. P travels $6 - 1 = 5$ units and Q travels $4 - 2 = 2$ units. The difference is $5 - 2 = 3$ units.



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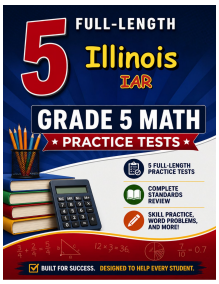

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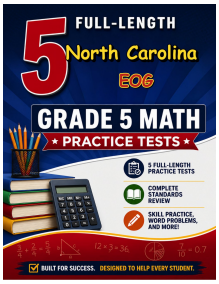

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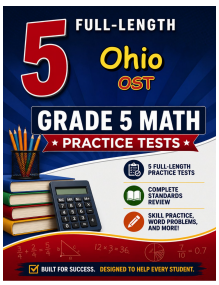

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