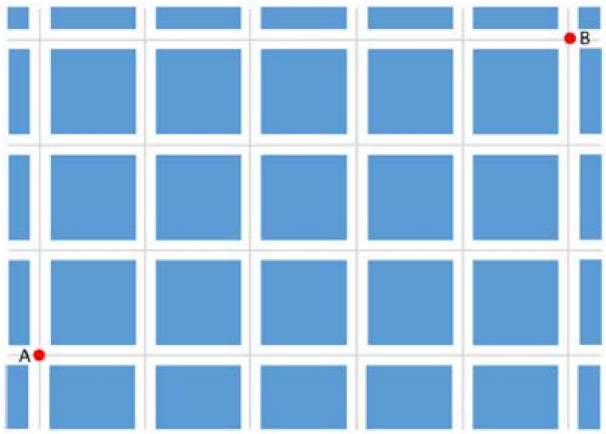
Exercise 1 Calc. : ✓

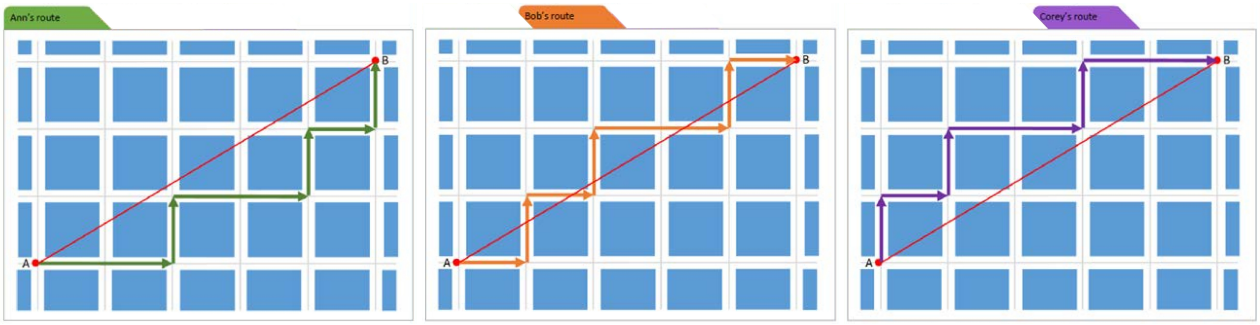
Navigation

The shortest distance between two points is a straight line. It is, however, not usually possible to navigate along a straight line in a town. Look at the map below. The grey lines are the roads and the square blue blocks are the buildings.
In this exercise you will explore different strategies for planning a route from one point to another in this town.

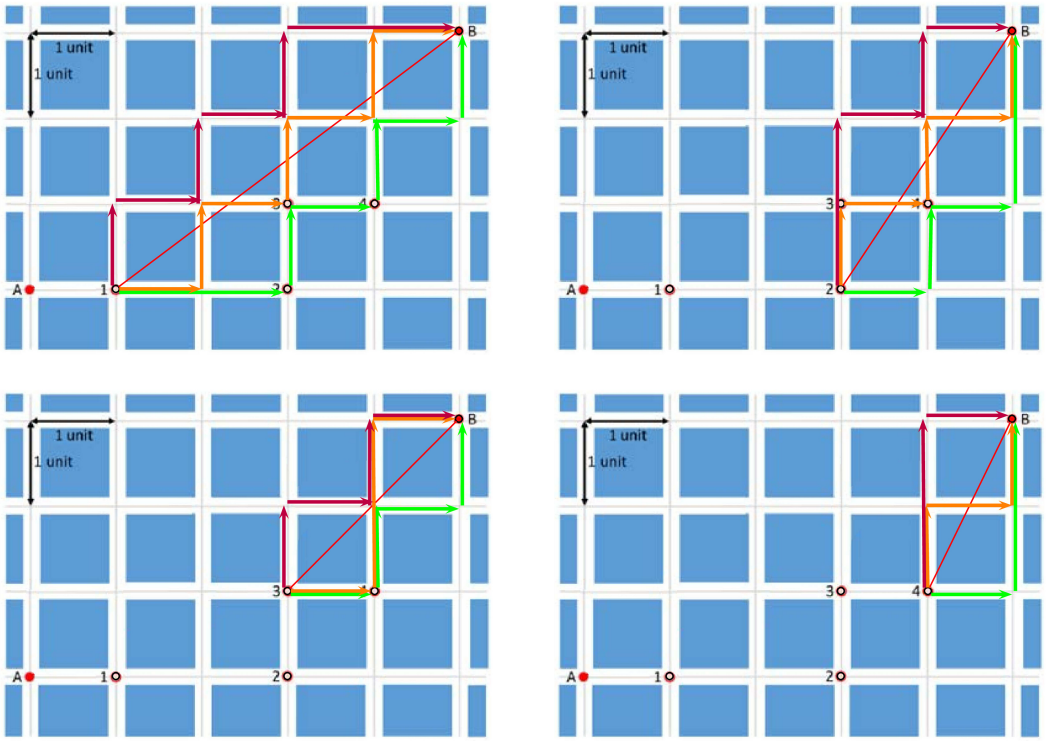


Ann, Bob and Corey have different ideas about how to determine the shortest route from A to B.

- Ann always moves right or up and stays below but as close as possible to the straight red line joining A and B (green line).
- Bob always moves right or up and tries to cross the straight red line joining A and B as often as possible (orange line).
- Corey always moves right or up and stays above but as close as possible to the straight red line joining A and B (purple line).



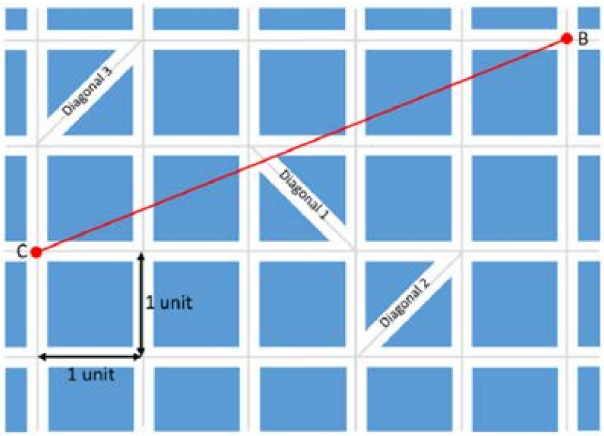
We now try those 3 strategies for different starting points marked on the map (1, 2, 3 and 4). If the point A is moved onto one of those 4 positions, the the route for each strategy for getting to B is shown and the distance recorded in the table below.
You will notice that irrespective of the starting position, Ann's route, Bob's route and Corey's route are all the same length for each route from A to B.



Position of A	Distance from A to B (in units)		
	Ann's route	Bob's route	Corey's route
1	7	7	7
2	5	5	5
3	4	4	4
4	3	3	3

1. Explain why all three strategies produce routes that are equal in length.

Three diagonal streets have been added to the map.



We know from the earlier work that without the diagonal streets, the shortest route from point C to point B will be 7 units long.

2. For each of the statements, select either **True** or **False** and provide a reason for your answer.

   (a) There exists a route from C to B that includes Diagonal 1 and is shorter than 7 units.

   (b) There exists a route from C to B that includes Diagonal 2 and is shorter than 7 units.

   (c) There exists a route from C to B that includes Diagonal 3 and is shorter than 7 units.