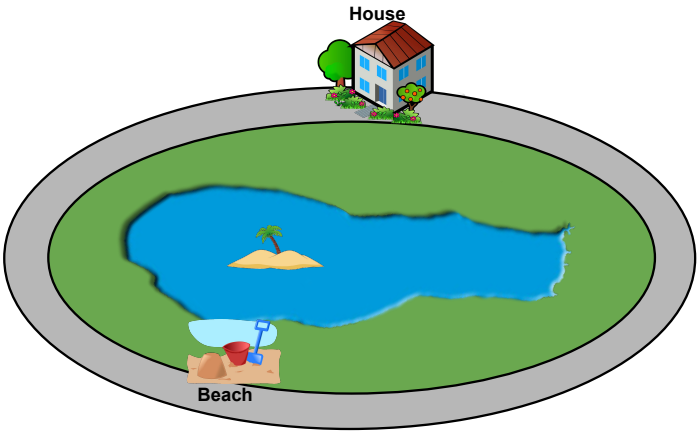
Problem of the Week
Problem A and Solution
Biking Around the Lake

Problem

Jessie lives on Island Lake. There is a road all the way around the lake called Ring Road. There is one road from town to the lake, called Town Road (not shown in the picture). The distance around Island Lake is 10 km.

Measuring the distance clockwise, the distance from Jessie's house to the intersection of Ring Road and Town Road is 3 km, and the distance from the beach to that intersection is 9 km.

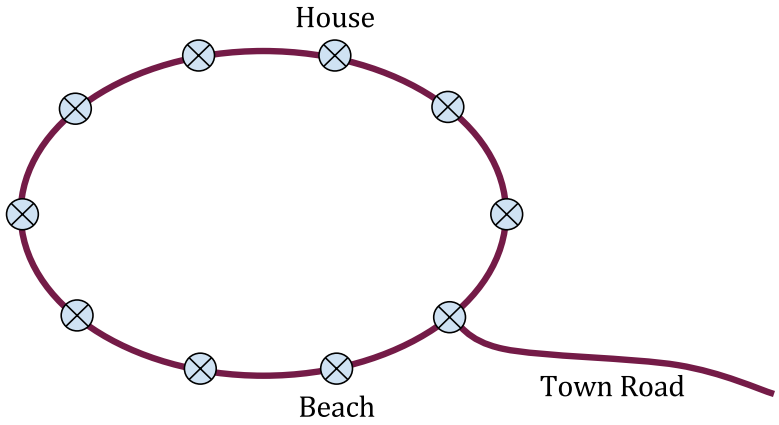


Jessie is biking to the beach, to meet her friend Brody who is already there. She wants to take the shortest route to the beach. Jessie rides 2 km, then remembers she promised to bring a water bottle for Brody. She cycles back to her house, picks up the water bottle, then bikes to the beach to meet her friend.

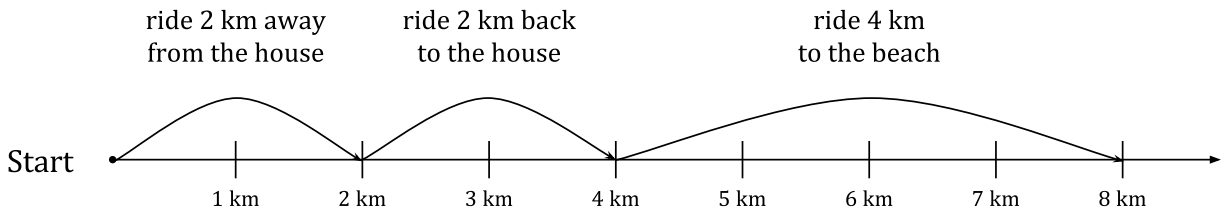
How many kilometres did Jessie travel to reach her final destination?

Solution

The first thing we need to do is determine the shortest distance from Jessie's house to the beach. It would be helpful to identify exactly where Town Road is relative to the location of the house and the beach. We could do this by creating a diagram that includes Town Road, and shows 10 equidistant markers on Ring Road. Since the distance around Ring Road is 10 km, the distance between adjacent markers is 1 km. Now, we can determine distances between points on Ring Road by counting markers. After deciding where the intersection for Ring Road and Town Road is on the diagram, add Jessie's house and the beach. We can measure 3 km counter-clockwise from the intersection to identify the location of the house, and measure 9 km counter-clockwise from the intersection to the location of the beach.



From this diagram, it is clear that it would be shorter for Jessie to ride clockwise on Ring Road to get from her house to the beach. Counting the markers, it is 4 km from her house to the beach if she rides clockwise on Ring Road, and it is 6 km if she rides counter-clockwise to the beach. Now we can make a number line to track how far Jessie rode.



In total, Jessie has ridden $2 + 2 + 4 = 8$ km.

Teacher's Notes

We used a diagram in the solution of this problem. A diagram does not need to be an exact representation of the problem, nor does it even need to be a scaled representation. A diagram needs to include all known, and important information in an organized way that will help us find a solution. In this case, the important information is the relative location of the house to Town Road, the relative location of the beach to Town Road, and the length of Ring Road. Details such as the fact that Ring Road surrounds a lake and the exact shape of the road are irrelevant. A diagram is an *abstraction* of the actual problem. The process of creating a mathematical model from a real-world situation is an essential part of advanced mathematics and computer science.

Once we have created a good diagram, we can use *deductive reasoning* to determine the distance between Jessie's house and the beach. As students continue to study mathematics, they will be introduced to *Euclidean geometry*. They will be asked to solve problems where they are required to determine an unknown value given some starting information about angles, lines, triangles, circles, and other polygons. Creating a useful diagram is often the first step to solving these types of problems. Students will practice using deductive reasoning to find the answers. Both of these skills can be applied to solving many other problems.