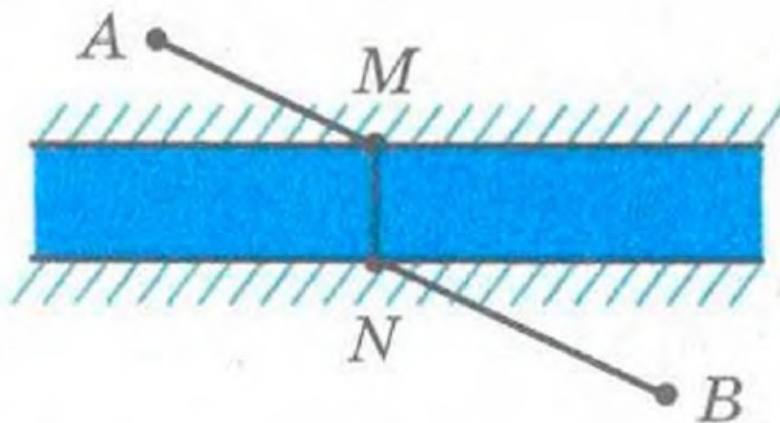


# Mirroring

1. Alice lives in village  $A$  and her grandma lives in village  $B$ , both on the same side of the river  $l$  that runs on a straight line. Alice wants to visit her grandma and bring her some water, which means she has to get to the river first and then go to the grandma's village. Given locations of line  $l$  and points  $A, B$ , find the shortest route for Alice.
2. Alice lives in downtown Pittsburgh and her grandma lives in North Oakland. Alice wants to visit her grandma and bring her some water, which means she has to get to the river first and then go to the grandma's village. As you know there are several rivers she may choose from. Assuming that rivers run on a straight line and given locations those lines  $l_1, l_2$  and exact locations of houses, find the shortest route for Alice.
3. Where one should build a bridge  $MN$  over the river such that the path between two cities  $A$  and  $B$  is minimized?



4. Given line  $l$  and points  $A, B$  on the same side of the line, find point  $P$  on the line such that  $l$  is a bisector of angle between lines  $AP$  and  $BP$ .
5. Prove that among all triangles with fixed base and height to this base, isosceles triangle has the minimum perimeter.
6. Given line  $l$  and points  $A, B$  on the opposite sides of the line, find point  $P$  on the line such that  $|AP - BP|$  is maximized.
7. Inside given angle point  $O$  is fixed. Find points  $A$  and  $B$  on sides of the angle such that perimeter of  $\triangle OAB$  is minimized.