

**Exercise 1.** A farmer has 600 m of fencing with which he plans to enclose a rectangular pasture adjacent to a long existing wall. She plans to build one fence parallel to the wall, two to form the ends of the enclosure, and a fourth (parallel to the ends of the enclosure) to divide it equally. What is the maximum area that can be enclosed?

**Exercise 2.** Find the maximum possible area of a rectangle with diagonals of length 16.

**Exercise 3.** A right circular cone (with no base) is to be constructed from a circular disk of metal by removing a wedge from the disk and then connecting the two newly exposed edges. If the disk has a radius of 5 m, what is the largest possible volume of the resulting cone?

**Exercise 4.** A small island is 2 km off shore in a large lake. A woman on the island can row her boat 10 km/h and can run at a speed of 20 km/h. If she rows to the closest point of the straight shore, she will land 6 km from a village on the shore. Where should she land to reach the village most quickly by a combination of running and rowing?