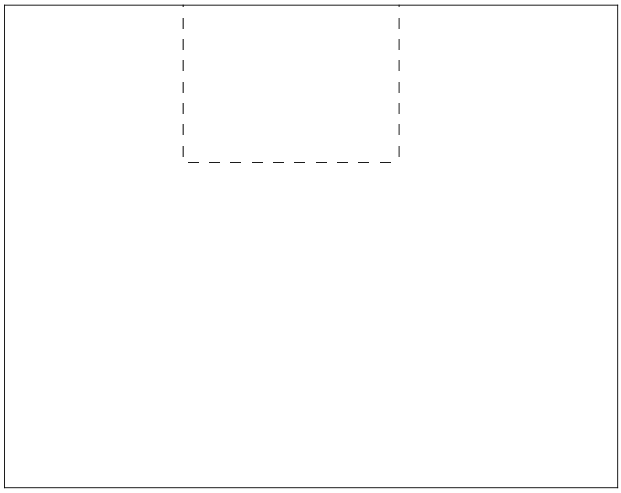
Supriya's Privacy Problem

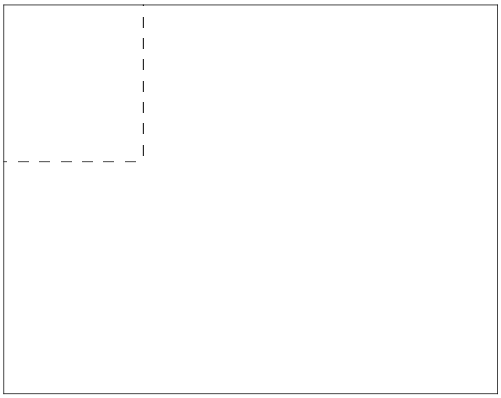
Supriya has moved into her new dorm at boarding school and has discovered that she and her roommate, well, let's just say that they "need their space." Supriya has decided to partition off part of the room to be her own. She starts by using a piece of rope, 20 feet long, to outline a rectangular area on the floor. She uses the wall of the room for one of the sides of the rectangle. Help Supriya find the dimensions of the rectangle that give her the maximum area.

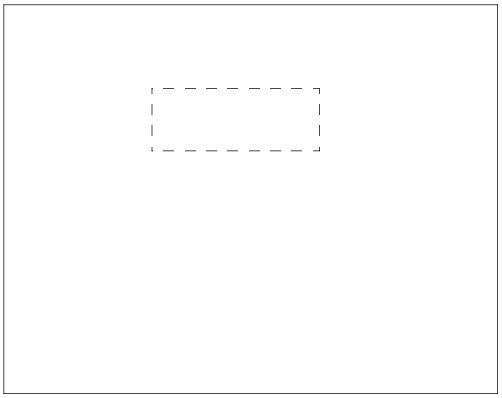
Supriya's Privacy Problem continued

Recall that Supriya was planning to use a 20-ft rope to mark off a rectangular area where she'd build partitions in her dorm room. She'd planned to use one existing wall, as shown below (the dashed line represents rope).



But Supriya thought about it a bit, and decided she'd better experiment with other possible options. She decided to investigate what kind of space she'd get if she used two existing walls, or no existing walls, as shown below.





Find the maximum areas for these two options and compare them to the one-wall option you investigated before. Write functions for all three options. Graph the functions and compare the graphs. Explain how the differences in the graphs relate to the physical situations.

Challenge for Geometers (requires Pythagorean theorem): Supriya decided to try marking off a triangular region using one existing wall as the base and the rope to make two equal sides of the triangle. What's the greatest area she can get this way? Describe the region that gives this maximum area. How does this option compare to the various rectangle options? Write a function for this option and graph it. Is the graph a parabola? Explain.