

Please consider doing the required work for these problems on separate sheet of paper.

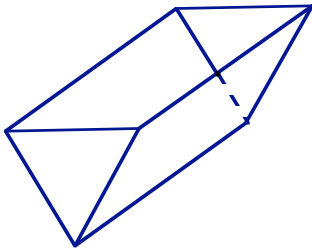
1. A farmer wishes to build a fenced-off area in his pasture with six subsections. The total area of the rectangular region is 8112 square feet. What should the dimensions of the entire area be if the farmer wants to minimize the total length of the fences.
answer = 78'X 104'



2. A large cylindrical can is to have a volume of 3.456π cubic feet. Find the radius and height of the can which uses the smallest amount of metal. **answer: radius = 1.2 height = 2.4**
3. Helen Hiwater is jogging westward along EZ Street. She is running toward the intersection with Fast Lane at 14 feet per second. Jerry Atrick is jogging toward that same intersection, going north on Fast Lane at 12 feet per second. Helen is 300 feet from the intersection at the exact same time that Jerry is 160 feet from the intersection. What is the closest the two runners will get to each other?**answer: 73.756 feet.**
4. Two Hallways, one 10 feet wide and the other 7 feet wide, intersect at right angles. How long is the longest ladder which can be carried around the corner?**answer: 23.916 feet**
5. Helen Hiwater is jogging westward along EZ Street, running toward the intersection with Fast Lane at 14 feet per second. Jerry Atrick is jogging toward that same intersection, going north on Fast Lane at 12 feet per second. Helen is 300 feet from the intersection and Jerry is 160 feet from the intersection. How fast is the distance between the two runners decreasing?**answer 18 ft/sec.**

6. A light on the ground 100 feet from a building is shining at a 6-foot tall man walking away from the streetlight and towards the building at the rate of 4 ft/sec. How fast is his shadow on the building growing shorter when he is 40 feet from the building? **answer: $-.667$ ft/sec**

7. A trough is 10 meters long and 4 meters wide. The two sides of the trough are equilateral triangles. Water is pumped into the trough at 1 cubic meter per minute. How fast is the water level rising when the water is 2 meters high? **answer: 0.043 m/min.**



8. An ice-cream cone is 9 cm deep and 4 cm across the top. A single scoop of ice cream, 4 cm in diameter is placed on top. If the ice cream is melting at a rate of 0.025 cm³/sec. At what rate is the height of the ice cream changing that has melted into the cone when the height of the melted ice cream is 3 cm. *Assume all melted ice cream drips into the cone.* **answer: 0.018 cm/sec**

9. Bugs and Daffy finished their final act on the *Bugs and Daffy Show* by dancing off the stage with a spotlight covering their every move. If they are moving along a straight path at a speed of 4 ft/sec, and the spotlight is 20 feet away from this path, at what rate is the spotlight rotating when they are 15 feet from the point on the path closest to the spotlight? **answer: 0.128 radians/sec**

Problems 10 through 12. On the course website, under “Helpful sites for the AP Exam and for Calculus,” you will find a link to Old AP Exams. This is a list of all the AP Open Response questions for the last 3 years. Identify and solve all optimization and related rates problems from these years (I think you will find 3). Additionally, I have uploaded the packets that were handed out when we studied this unit. You can find them in the assignment table under AP Exam Review Section.