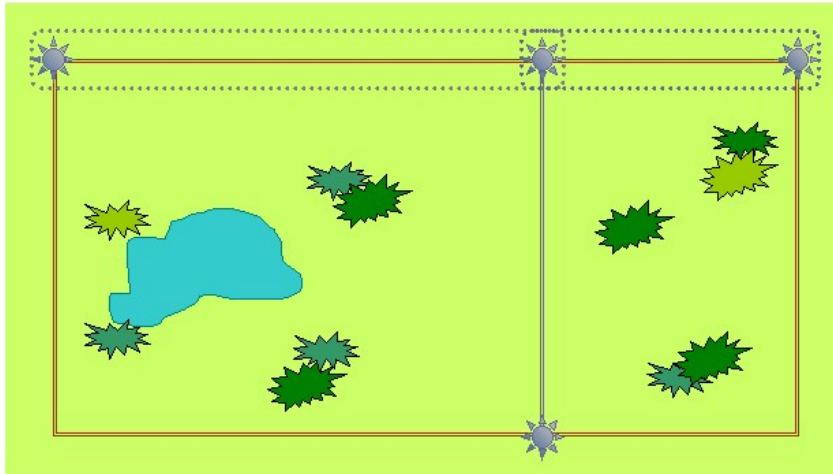


Do your answers on additional paper and just submit those pages (Hint: consider charts for some answers)

1. A 1000 L tank is draining such that the volume V of water remaining in the tank after t minutes is $V = 1000(1 - \frac{t}{30})^2$. Find the rate at which the water is flowing out of the tank after 10 min. [3KA 2C]
2. One train leaving a train station is travelling east at a rate of 40 km/h. Another train starting 100km from the station is heading towards the station from the south at 60 km/h. At what time is the distance between them a minimum? How far apart are they at this point? [5KA 2C]
3. A 5,000 m² rectangular area of a field is to be enclosed by a fence, with a moveable inner fence built across the narrow part of the field, as shown. The perimeter fence costs \$10/m and the inner fence costs \$4/m. Determine the dimensions of the field to minimize the cost.[4KA 2C 2T]



4. A professional basketball team plays in a stadium that holds 23,000 spectators. With ticket prices at \$60, the average attendance had been 18,000. When ticket prices were lowered to \$55, the average attendance rose to 20,000. Based on this pattern, how should ticket prices be set to maximize ticket revenue?[5KA 2C 2T]
5. The following table displays the number of HIV diagnoses per year in a particular country.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
Diagnoses	2512	2343	2230	2113	2178	2495	2496	2538	2518

- a) Using Desmos or another curve modelling program, determine an equation that can be used to model this data. [2KA 1C]
- b) Using this model, estimate the number of diagnoses in 1995 and in 2008. [3K 1A 1C]
- c) At what rate would the number of diagnoses be changing in 2010? [2KA 1C 1T]
- d) Halfway through 2006, the number of new HIV diagnoses was found to be 1232. Assuming this rate stays fairly constant for the remainder of the year, does this new information change the modelling equation? If so, how would this change your answer to part (c)? [3KA 2C 2T]