Activity Lab

Technology

Comparing Perimeters and Areas

For Use With Lesson 1-9

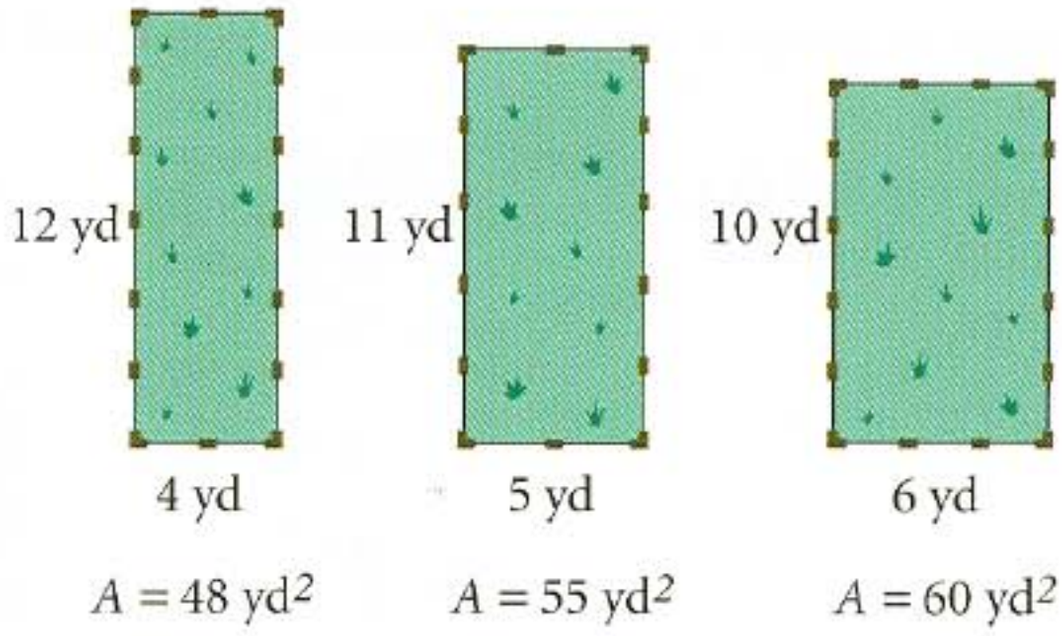
You can use a graphing calculator or spreadsheet technology to find maximum and minimum values for area and perimeter problems.

You have 32 yards of fencing. You want to make a rectangular pen for the calf you are raising as a 4-H project. What dimensions will give the maximum area? What is the maximum area?

Go Online
PHSchool.com
For: Graphing calculator procedures
Web Code: aue-2104

Investigate

Draw some possible rectangular pens and find their areas.



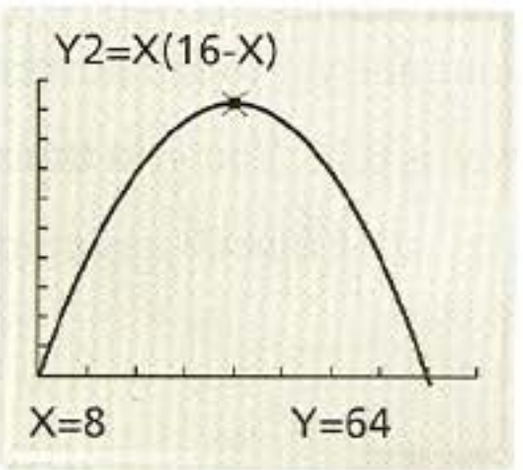
Create a graphing calculator table to find area. Let X represent values for the base. The height then is $16 - X$, and the area is $X(16 - X)$. Enter $Y1 = 16 - X$ and $Y2 = X(16 - X)$. Set the table so that X starts at 1 and changes by 1.

X	Y_1	Y_2
4	12	48
5	11	55
6	10	60
7	9	63
8	8	64
9	7	63
10	6	60

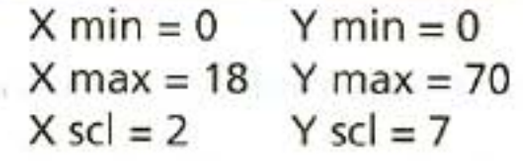
X=4

Scroll down the table. Area is maximum when X (or b) is 8. When $b = 8$, $h = 8$ and $A = 64$.

You can confirm this result by graphing $Y1 = X(16 - X)$. Trace on the graph to find the maximum area.



A square pen with sides of 8 yd will give maximum area for your calf. The maximum area is 64 yd^2.



EXERCISES

1. **Make a Conjecture** For a fixed perimeter, what rectangular shape will result in a maximum area?
2. Consider that the pen is not restricted to polygon shapes. Determine the area of a circular pen if the circumference is 32 yd. How does this result compare with the maximum square area of 64 yd^2 found in the investigation?
3. You want to make a rectangular garden with an area of 900 ft^2. You want to use a minimum amount of fencing to keep the cost low.
   a. List some possible dimensions for the rectangular garden. Find the perimeter of each rectangle.
   b. Create a graphing calculator table. Use integer values of the base b, and the corresponding values of the height h, to find values for P, the perimeter. What dimensions will give you a garden with the minimum perimeter?