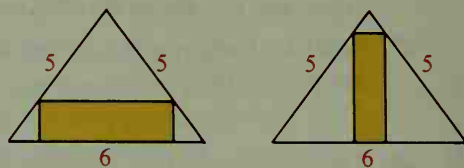


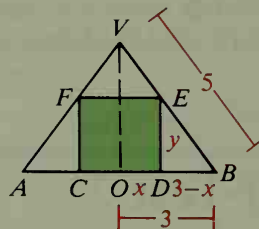
### ◆ Calculator Key-In

Each diagram shows a rectangle inscribed in an isosceles triangle with legs 5 and base 6. There are many more such rectangles. Which one has the greatest area?



To solve the problem, let  $CDEF$  represent any rectangle inscribed in isosceles  $\triangle ABV$  with legs 5 and base 6. If we let  $OD = x$  and  $ED = y$ , then the area of the rectangle is  $2xy$ . Our goal is to express this area in terms of  $x$  alone. Then we can find out how the area changes as  $x$  changes.

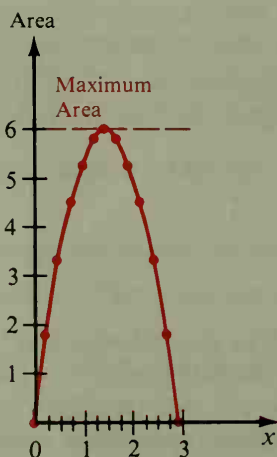
1. In right  $\triangle VOB$ ,  $OB = 3$  and  $VB = 5$ . Thus  $VO = 4$  by the Pythagorean Theorem.
2.  $\triangle EDB \sim \triangle VOB$  (Why?)
3.  $\frac{ED}{VO} = \frac{DB}{OB}$  (Why?)
4.  $\frac{y}{4} = \frac{3 - x}{3}$  (By substitution in Step 3)
5.  $y = \frac{4}{3}(3 - x)$  (Multiplication Property of  $=$ )



$$6. \text{ Area of rectangle: } A = 2xy = 2x \cdot \frac{4}{3}(3 - x) = \frac{8x(3 - x)}{3}$$

Use the formula in Step 6 and a calculator to find the area for many values of  $x$ . Calculate  $3 - x$  first, then multiply by  $x$ , then multiply by 8, and divide by 3.

$x$	Area
0	0
0.25	1.83333
0.5	3.33333
0.75	4.5
1	5.33333
1.25	5.83333
1.5	6
1.75	5.83333
2	5.33333
2.25	4.5
2.50	3.33333
2.75	1.83333
3	0



The table was used to make a graph showing how the area varies with  $x$ . Both the table and the graph suggest that the greatest area, 6 square units, occurs when  $x = 1.5$ .