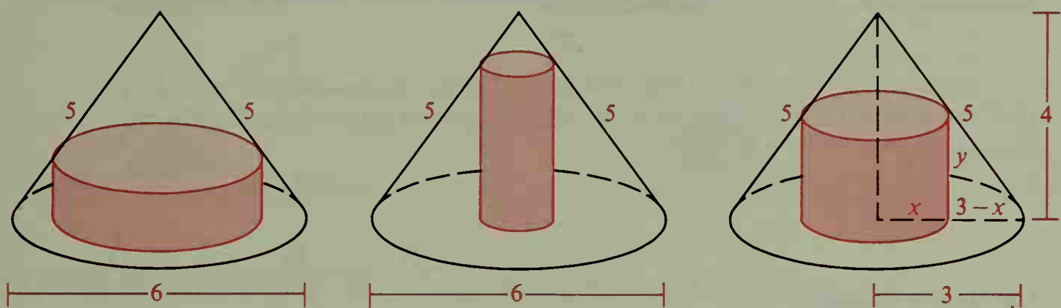
Exercises

Suppose the original triangle had sides 5, 5, and 8 instead of 5, 5, and 6.

1. Draw a diagram. Then show that $A = \frac{3x(4 - x)}{2}$.
2. Find the value of x for which the greatest area occurs.

♦ Computer Key-In

A rectangle is inscribed in an isosceles triangle with legs 5 and base 6 and the triangle is rotated in space about the altitude to the base. The resulting figure is a cylinder inscribed in a cone with diameter 6 and slant height 5, as shown below. Which of the cylinders such as these has the greatest volume?



The diagram at the right above shows a typical inscribed cylinder. Using similar triangles, we have the proportion $\frac{y}{4} = \frac{3 - x}{3}$. Thus $y = \frac{4}{3}(3 - x)$.

The volume of the cylinder is found as follows:

$$V = \pi x^2 y = \pi x^2 \cdot \tfrac{4}{3}(3 - x) \approx \tfrac{4}{3}(3.14159)x^2(3 - x)$$

The following program in BASIC evaluates V for various values of x.

```
10  PRINT "X", "VOLUME"
20  FOR X = 0 TO 3 STEP 0.25
30  LET V = 4/3 * 3.14159 * X↑2 * (3 - X)
40  PRINT X, V
50  NEXT X
60  END
```

Exercises

1. RUN the program. Make a graph that shows how the volume varies with x. For what value of x did you find the greatest volume?
2. Suppose the original triangle has sides 5, 5, and 8 instead of 5, 5, and 6. Rotate the triangle in space about the altitude to the base.
   a. Draw a diagram. Show that $V = \frac{3}{4}\pi x^2(4 - x)$.
   b. Change lines 20 and 30 of the program and RUN the revised program to find the value of x for which the greatest volume occurs.