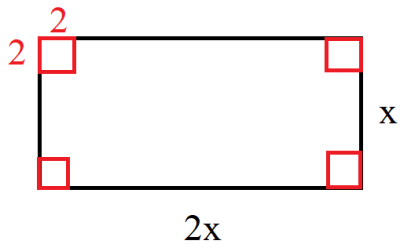
Exercise 70

For the following exercises, use the written statements to construct a polynomial function that represents the required information.

A rectangle is twice as long as it is wide. Squares of side 2 feet are cut out from each corner. Then the sides are folded up to make an open box. Express the volume of the box as a function of the width (x).

Solution

Draw a schematic of the rectangle with edges cut out.



The new area is $(2x-4)(x-4) = 2x^2 - 8x - 4x + 16 = 2x^2 - 12x + 16$, and the height of the box is 2. Therefore, the volume of the open box is

$$\begin{aligned} V(x) &= (\text{area})(\text{height}) \\ &= (2x^2 - 12x + 16)(2) \\ &= 4x^2 - 24x + 32. \end{aligned}$$