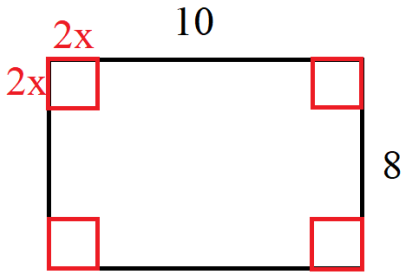
Exercise 76

For the following exercises, write the polynomial function that models the given situation.

Consider the same rectangle of the preceding problem. Squares of $2x$ by $2x$ units are cut out of each corner. Express the volume of the box as a polynomial in terms of x.

Solution

Draw a schematic of the cut-out box.



The area of the box's base is the new length times the new width.

$$\begin{aligned} A &= [10 - 2(2x)][8 - 2(2x)] \\ &= (10 - 4x)(8 - 4x) \\ &= 80 - 72x + 16x^2 \end{aligned}$$

Multiply it by the box's height to get the volume.

$$\begin{aligned} V = Ah &= (80 - 72x + 16x^2)x \\ &= 16x^3 - 72x^2 + 80x \end{aligned}$$