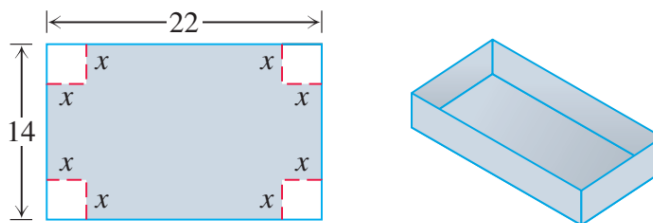## Exercise 67

A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 14 in. by 22 in. by cutting out equal squares of side x at each corner and then folding up the sides as in the figure. Express the volume V of the box as a function of x.

Solution

Volume is the product of length, width, and height.

$$V = lwh$$

$$= (22 - x - x)(14 - x - x)(x)$$

$$= (22 - 2x)(14 - 2x)(x)$$

$$= 4(11 - x)(7 - x)(x)$$

$$= 4x(77 - 11x - 7x + x^2)$$

$$= 4x(77 - 18x + x^2)$$

$$= 308x - 72x^2 + 4x^3$$