A **1.** A packaging company makes boxes using cardboard 25.0 cm long and 20.0 cm wide. Determine the size of squares to be cut from the corners for each of these boxes. Determine the dimensions of each box.

a) a box with volume 500 cm^3

b) a box with the maximum possible volume

2. Repeat exercise 1 for pieces of cardboard that are 25.0 cm square.

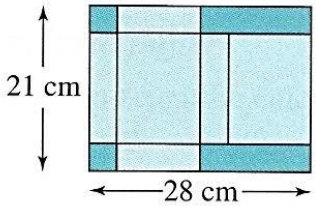
B **3.** A packaging company is making another style of box from cardboard 28.0 cm long and 21.0 cm wide. This box has a top that comes from the same piece of cardboard. The diagram (below left) shows how it is made.

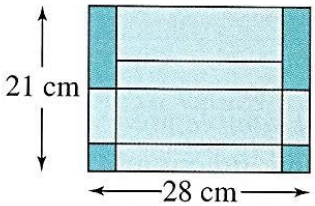
a) Let x centimetres represent the side length of each square cut from the corners. Write the volume of the box as a cubic function of x.

b) Graph the function in part a. Use a graphing calculator if you have one.

c) What size of square is cut from the corners to have a box with volume 375 cm^3? What are the dimensions of the box?

d) What size of square is cut from the corners to have a box with the maximum volume? What are the dimensions of this box?





4. The diagram (above right) shows another way to make a box with a top from the same piece of cardboard. Repeat exercise 3 for this box.

1. a) 1.28-cm squares, 22.44 cm by 17.44 cm by 1.28 cm;
6.78-cm squares, 11.44 cm by 6.44 cm by 6.78 cm
b) 3.68-cm squares, 17.64 cm by 12.64 cm by 3.68 cm
2. a) 0.93-cm squares, 23.13 cm by 23.13 cm by 0.93 cm;
8.71-cm squares, 7.58 cm by 7.58 cm by 8.71 cm
b) 4.17-cm squares, 16.67 cm by 16.67 cm by 4.17 cm
3. a) $V = x(21 - 2x)(14 - x)$
c) 1.75-cm squares, 17.50 cm by 12.25 cm by 1.75 cm;
6.66-cm squares, 7.68 cm by 7.34 cm by 6.66 cm
d) 3.96-cm squares, 13.08 cm by 10.04 cm by 3.96 cm
4. a) $V = x(28 - 2x)(10.5 - x)$
c) 1.75-cm squares, 24.50 cm by 8.75 cm by 1.75 cm;
6.66-cm squares; 14.68 cm by 3.84 cm by 6.66 cm
d) 3.96-cm squares, 20.08 cm by 6.54 cm by 3.96 cm