

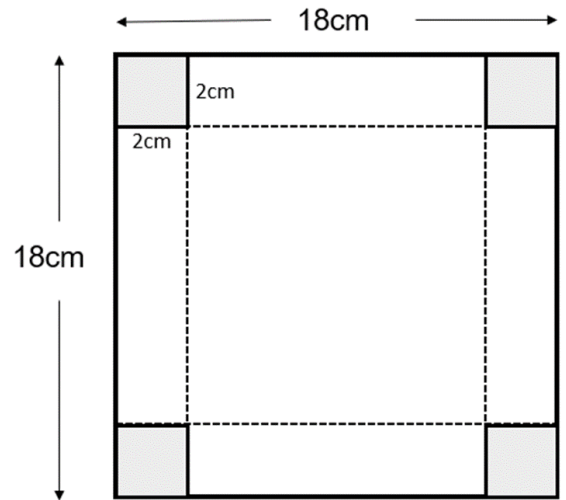
Maximum Volume

You can make an open box (a box with no lid) as follows:

Take a square piece of paper 18cm by 18cm

Cut 2cm squares from each corner.

Fold along the dotted lines to make an open box.



We can work out the volume of the box:

$$\begin{aligned} \text{Volume} &= \text{length} \times \text{width} \times \text{height} \\ &= 14 \times 14 \times 2 = 392\text{cm}^3 \end{aligned}$$

If we had cut different size squares from the corners of the paper, the volume of the open box would have been different.

If we had cut 5cm squares from the corners, the volume would have been 320cm^3 :

$$\text{Volume} = 8 \times 8 \times 5 = 320\text{cm}^3$$

Cutting 5cm squares from the corners of the paper give a *smaller* volume than cutting 2cm squares from the corners.



Complete the table below for different sizes of square cuts.

Size of cut (cm)	Volume of open box (cm ³)
1	
2	392
3	
4	
5	320
6	
7	
8	
9	

Which size of square cut from the corners will give the maximum volume of the open box?

If the original piece of paper had been 15 cm x 15cm, what size square cut from the corners would give the maximum volume for the open box?

Can you predict the size of cut which will give the maximum volume for any square piece of paper?

Can you prove your prediction?

