

CCT Weekly-MATHEMATICS

Unit I - MISSION TO MINIMISE

A *cuboidal box* is a three-dimensional figure, with varying length, breadth, and height whereas in a *cubical box*; length, breadth, and height are all equal to each other.

The space *enclosed* by a three-dimensional figure is known as it is *volume*.

Volume of a cuboid having length l , breadth b and height h is $(l \times b \times h)$ unit³.

Volume of a cube having side l is $(l \times l \times l)$ unit³

It is *Jatin's* birthday today!

He has 100 cube-shaped chocolates of side 2cm.

As a return gift for his friends, Jatin wants to pack the *least* number of chocolates in a box, each box containing same number of chocolates. He must make boxes for this purpose, keeping in mind that he has 12 friends.



Jatin takes four colourful paper sheet, each measuring $12\text{cm} \times 12\text{cm}$.

His task is to make four cuboidal or cubical boxes (without lid) of different volumes, by folding and then decide as to which dimensions should he choose for making the gift boxes.

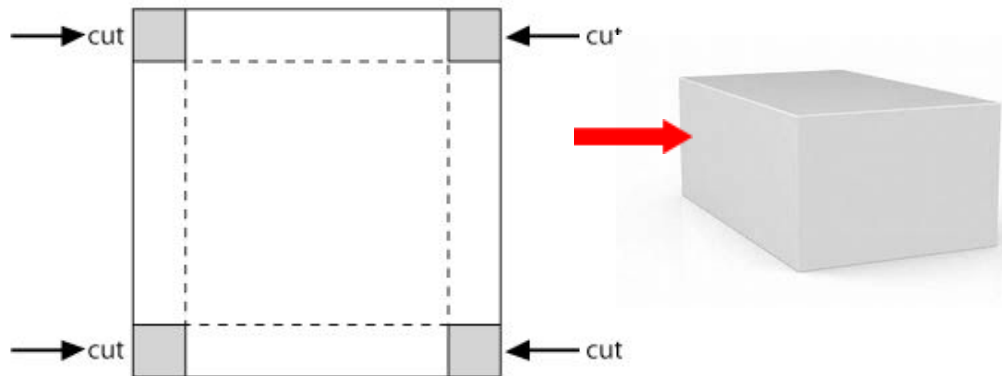
Let us build a box from Jatin's $12\text{cm} \times 12\text{cm}$ square sheet.

You can do this by cutting out *congruent squares* at all the corners of the sheet.

Let us begin by drawing $1\text{cm} \times 1\text{cm}$ squares on each corner of the sheet.

Next, cut out all four squares from the corners.

Fold up the sides along the dotted lines (as shown in the figure) and paste them together.



(The folds are indicated by the dotted lines in the diagram.)

Question 1:- What are the dimensions of the base of box 1?

- a) $10\text{cm} \times 10\text{cm}$
- b) $10\text{cm} \times 1\text{cm}$
- c) $10\text{cm} \times 2\text{cm}$
- d) $12\text{cm} \times 10\text{cm}$

Now take another rectangular sheet of *same size* and cut $2\text{cm} \times 2\text{cm}$ squares out of each corner and make another box by folding up the sides.

Question 2:- What are the dimensions of the base of box 2?

- a) $9\text{cm} \times 9\text{cm}$
- b) $8\text{cm} \times 1\text{cm}$
- c) $8\text{cm} \times 8\text{cm}$
- d) $9\text{cm} \times 2\text{cm}$

Now make two more boxes out of the remaining sheets of paper by cutting out squares of $3\text{cm} \times 3\text{cm}$ and $4\text{cm} \times 4\text{cm}$ from each corner.

Use the following table to make your observations:

Box	Side of square cut out from corners of the sheet	Length of box	Breadth of box	Height of the box	Volume of the box
1	1cm	...	...	...	...
2	2cm	...	...	...	...
3	...	...	...	...	...
4	...	...	...	...	...

Question 3:- If you keep on cutting out larger and larger squares from the corners of a sheet, which of the four boxes will have the minimum volume?

- a) BOX 1
- b) BOX 2
- c) BOX 3
- d) BOX 4



Question 4:- How many chocolates will he need to prepare one return-gift box?

- a) 8
- b) 64
- c) 32
- d) 10

Question 5:- How many chocolates will he be left with after packing all the return-gifts?

- a) 10
- b) 12
- c) 8
- d) 4

CCT Weekly Practice (Mathematics)

Answer Key

1. (a)

Each side of sheet = 12cm

Corner cut out from both sides = 1cm = height of cuboid

Each side of base of cuboid = $12 - 1 - 1 = 10\text{cm}$

$\therefore$ Dimensions of base of cuboid = **10cm $\times$ 10cm**

2. (c)

Each side of sheet = 12cm

Corner cut out from both sides = 2cm = height of cuboid

Each side of base of cuboid = $12 - 2 - 2 = 8\text{cm}$

$\therefore$ Dimensions of base of cuboid = **8cm $\times$ 8cm**

3. (d)

Box	Side of square cut out from corners of the sheet	Length of box	Breadth of box	Height of the box	Volume of the box
1	1cm	10cm	10cm	1cm	100cm ³
2	2cm	8cm	8cm	2cm	128cm ³
3	3cm	6cm	6cm	3cm	108cm ³
4	4cm	4cm	4cm	4cm	64cm³

4. (a)

Volume of one cubical chocolate = $2 \times 2 \times 2 = 8 \text{ cm}^3$

As Jatin wants to pack the *least* number of chocolates in a box, each box containing same number of chocolates

$\therefore$ Box chosen = Box 4 (of volume **64cm³**)

Number of chocolates required for 1 box = $\frac{\text{Volume of Box 4}}{\text{Volume of one chocolate}} = \frac{64}{8} = 8$

5. (d)

As Jatin needs 12 gift-boxes for 12 friends

$\Rightarrow$ Number of chocolates needed = $12 \times 8 = 96$

And Jatin has 100 chocolates

$\therefore$ Number of chocolates remaining = $100 - 96 = 4$

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