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Your measuring glass:
Now make a guess. Do you think the volume of 10 five-rupee coins will be more than that of 10 marbles? Guess the volume of each of these:

1. A ball is nearly __________ marbles
A ball is nearly 20 marbles

2. An eraser is nearly __________ marbles.
An eraser is nearly 2 marbles.

3. A lemon is nearly __________ marbles.
A lemon is nearly 3 marbles.

4. A pencil is nearly __________ marbles.
A pencil is nearly 2 marbles.

5. A potato is nearly __________ marbles.
A potato is nearly 10 marbles.

Now make your own measuring glass using 35 marbles.
Take a glass of water and mark the level of water as 0. Then put in 5 marbles and mark the level of water as 5 M.
Again drop 5 marbles and mark the level of water as 10 M. Likewise make the markings for 15 M, 20 M, 25 M, 30 M and 35 M.

Now put each thing in the measuring glass and check your guess.
Try with different things like a matchbox, a stone, etc. and fill the table.

Name of the thing	*Its volume (nearly how many marbles?)*

Solution:

Name of the thing	*Its volume (nearly how many marbles?)*
Match box	7
Stone	5
Sharpner	2
Tomato	4

Which has More Volume?
a) What is the volume of 6 marbles? ________ mL.
Solution:
7 ml.

b) What is the volume of 16 one-rupee coins? _________ mL.
Solution:
19 ml.

Now solve these in your mind.
c) The volume of 24 marbles is _________ mL.
Solution:
28 ml.

d) The volume of 32 one-rupee coins? _________ mL.

Solution:

36 ml.

e) Mollie puts some five-rupee coins in the measuring bottle. How many coins has she put in it:

i. if 30 mL water is pushed up? __________ ii.

If 60 mL water is pushed up? __________

Solution:

i. 27 coins

ii. 54 coins

Practice time:

1. A stage (platform) is made with 5 Math-Magic books. The volume of this stage is the same as __________ cm cubes.

Solution:

Volume of 1 Math-Magic book = 540 cm cubes.

5 Math-Magic books are used to make the stage.

So, volume of the stage = Volume of 5 such Math-Magic books = 5 × 540 cm cubes = 2700 cm cubes

2. Guess the volume of these things in cm cubes.

i. A matchbox is about _________ cm cubes.

Solution:

Length = 6 cm.

Breadth = 4 cm

And height = 1 cm

Volume = length × breadth × height

= 6 × 4 × 1

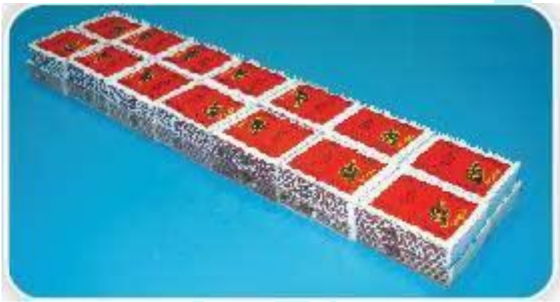
= 24 cm cubes.

ii. A geometry box is about _______ cm cubes.

Solution:
Length = 16 cm. Breadth
= 6 cm
And height = 1 cm
Volume = length × breadth × height
= 16 × 6 × 1 =
96 cm cubes.

iii. An eraser is about __________ cm cubes.
Solution:
Length = 2 cm.
Breadth = 1 cm
And height = 1 cm
Volume = length × breadth × height
= 2 × 1 × 1 =
2 cm cubes.

Matchbox Play:
Tanu is making a stage with matchboxes.
She first puts 14 matchboxes like this in the first layer.



She makes 4 such layers and her stage looks like this.

1. She used _____ matchboxes to make this stage. Solution:

Number of match boxes in one layer = 14

Hence the number of match boxes in 4 layers = 14 × 4 = 56

2. The volume of one matchbox is the same as 10 cm cubes. Then the volume of this stage is same as _____ cm cubes.

Solution:

Volume of 1 match box = 10 cubic cm

Hence the volume of 56 match box = 10 × 56 = 560 cubic cm.

3. If all these cubes are arranged in a line, how long will that line be? _____ cm.

Solution:

Now, let's assume length of matchbox is 4.5 cm.

All the matchboxes are arranged in a line.

Then the total length of the line made by all 56 matchboxes = 4.5 cm × 56 = 252 cm

4. Which has more volume — your Math-Magic book or Tanu's platform? Solution:

The volume of Math-Magic book is 540 cm cubes, whereas volume of the platform is 560 cm cubes.

Thus, Tanu's platform has more volume as compared to Math-Magic book.

5. With your friends, collect many empty matchboxes of the same size. Measure the sides and write here.

Solution:

6. Use 56 matchboxes to make platforms of different heights. Fill this table.

	How high is it?	How long is it?	How wide is it?
Platform 1			
Platform 2			
Platform 3			

The volume of each platform is equal to ________matchboxes. Solution:

	How high is it?	How long is it?	How wide is it?
Platform 1	2 matchboxes	7 matchboxes	4 matchboxes
Platform 2	4 matchboxes	14 matchboxes	1 matchbox
Platform 3	1 matchbox	8 matchboxes	7 matchboxes

The volume of each platform is equal to 56 matchboxes.

Practice time:

Mohan arranged his matchboxes like this.

1. How many matchboxes did he use to make it? What is its volume in matchboxes? ________ Matchboxes.

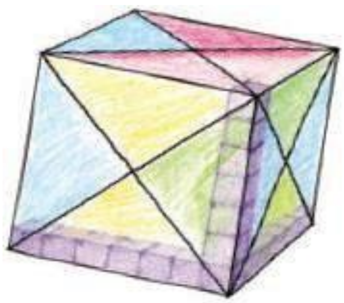
Solution:

Mohan used 30 matchboxes.

Thus, total volume of the arrangement in terms of matchboxes = 16 + 9 + 4 + 1 = 30

How big is Your Cube?

1. a) How long is the side of your cube? _______



Solution:

7 cm

b) How many centimetre cubes can be arranged along its:

Length? __________

Width? __________ Height?

__________ Solution:

Length = 7 cm

Width = 7 cm

Height = 7 cm

c) Answer Thimpu's questions:

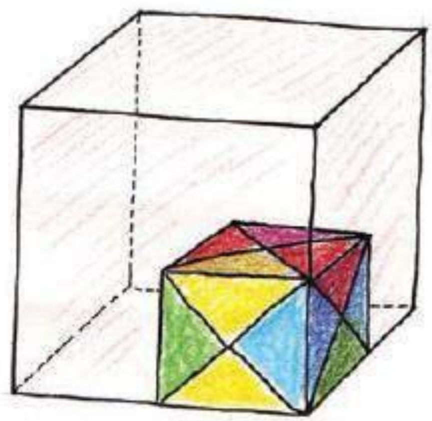
To make the first layer on the table how many cm cubes will I use? ____ Solution:
49 cm

How many such layers will I need to make a paper cube? ________ Solution:
7 such layers

d) So the total cm cubes = __________ Solution:
Total cm cubes = 7 × 7 × 7 = 343 cm cubes

e) The volume of the paper cube is same as __________ cm cubes. The volume of the paper cube is same as 343 cm cubes.

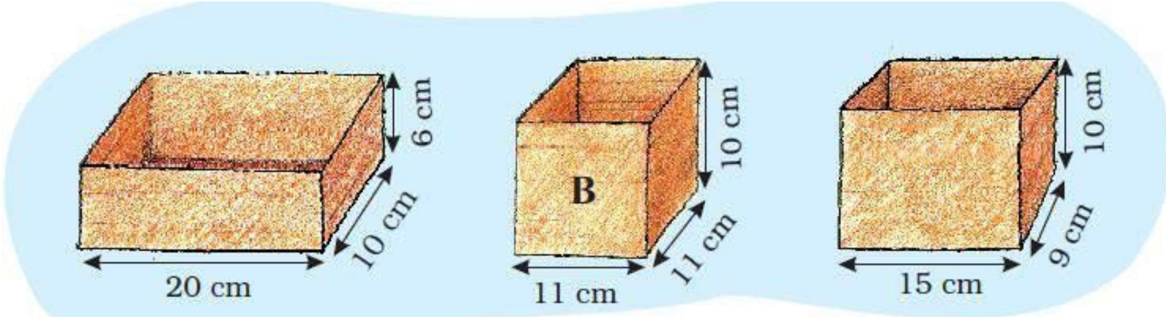
2. Anan made a big cube having double the side of your paper cube.

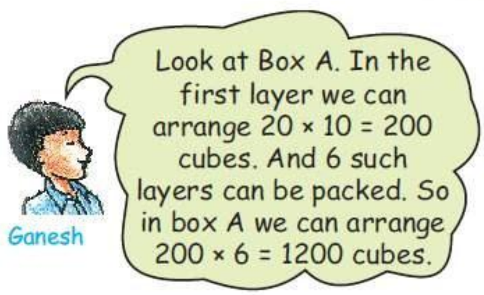


How many of your paper cubes will fit in it? Try doing it by collecting all the cubes made in your class.
Solution:
Length of the side of paper cube = 7 cm
Length of the side of Anan's cube = 2 × 7 cm = 14 cm
We can fit 4 paper cubes, each of side 7 cm in the first layer of the big cube.
As the length of each side of the big cube is 14 cm, there will be a total of 2 layers with each layer containing 4 paper cubes.
So, number of paper cubes in 2 layers = 2 × 4 = 8 Thus,
8 paper cubes will fit inside the Anan's big cube.

Packing Cubes:

Ganesh and Dinga want to pack 4000 centimetre cubes in boxes. These are to be sent to a school. There are three different boxes available for packing.





1. What is your guess? Who is right?

Solution:

I guess that the cubes will fit in all the 3 boxes put together. Dinga is right.

2. How can Ganesh and Dinga test their guesses before packing the cubes in the boxes? Discuss with your friend.

Solution:

In the first layer of box B, we can keep 11 × 11 = 121 cubes.

There are 10 such layers.

So, in box B, we can arrange 10 × 121 = 1210 cubes In the first layer of box C, we can keep 15 × 9 = 135 cubes.

There are 10 such layers.
So, in box C, we can arrange 10 × 135 = 1350 cubes
In all the three boxes we can arrange 1200 + 1210 + 1350 = 3760 cubes
Therefore, 3760 centimetre cubes in total can be packed in three boxes.
Use Ganesh's method and write:
3. _____ centimetre cubes can be arranged in box B.
1210 Centimetre cubes can be arranged in box B.

4. _____ centimetre cubes can be arranged in box C.
1350 Centimetre cubes can be arranged in box C.

5. So _____ centimetre cubes in all can be packed in the three boxes. So
3760 centimetre cubes in all can be packed in the three boxes.

Trek to Gangotri:
The students of Class XII are going on a trek to Gangotri. They have to pack their bags for six days and keep them light. They also have to take things that do not take too much space. So they will look for things that have both less volume and less weight. After all, they will carry their own bags while climbing the mountains!
They even dry the onions and tomatoes to make them light. One kg of onions or tomatoes becomes 100 g when the water inside dries up. The list of food each person will need for:

? **Rice**: 100 g

? **Flour (*Atta*)**: 100 g

? **Pulses (*Dal*)**: $\frac{1}{3}$ the weight of rice and flour

? **Oil**: 50g

? **Sugar**: 50g

? **Milk powder**: 40g (for tea, porridge, and hot drink)

? **Tea**: Around 10g

? **Dalia**: 40g for breakfast.

? **Salt**: 5 g

? **Dried onions:** 10 g

? **Dried tomatoes:** 10 g

1. For 6 days, each person will need

a) Rice and flour – ______ g

Rice and flour – 1200 g

Flour required per person per day = 100 g

Total rice and flour required for each person for a single day = 200 g

Thus, for 6 days, rice and flour required per person = 200 g × 6 = 1200 g

b) Pulses – ______ g

Pulses – 400 g

Pulses required per person per day =1/3 rd weight of rice and flour Pulses required per person for days = 1200 g × 13 =400 g

c) Dried onions – ______ g

Dried onions – 60 g

Dried onions required per person per day = 10 g

For 6 days, dried onions required per person = 6 × 10 g = 60 g

2. How much of fresh tomatoes should be dried for 6 days for 10 people?

Solution:

For 1 g dried tomato, we need 10g fresh tomatoes.

Hence, for 10 g dried tomatoes, we need 10 × 10 g = 100 g fresh tomatoes. Thus, for 6 days, we need to dry 6 × 100 g = 600 g of fresh tomatoes.

3. What is the total weight of food (for 6 days) in each person s bag? Solution:

Item	Weight for 6 days
Rice and flour	1200g
Pulses	400g
Dried onions	60g
Oil	300g
Sugar	300g
Milk powder	240g
Tea	60g
Dalia	240g
Salt	30g
Dried tomatoes	60g
Total weight	2890g

How Heavy am I?

1. Guess how many children of your weight will be equal to the weight of an elephant of 5000 kg.

Solution:

Weight of a child of my age = 30 kg

Weight of an elephant = 5000 kg

Total number of children weighing 5000 kg = 5000/30 = 167

2. At birth, a baby elephant weighs around 90 kg. How much did you weigh when you were born? Find out. How many times is a baby elephant heavier than you were at birth? Solution:

Weight of a baby elephant = 90 kg

My weight at birth = 3 kg

Number of times a baby elephant was heavier than me at birth = 90/3 = 30 So, the baby elephant was 30 times heavier than me at birth.

3. If a grown up elephant eats 136 kg of food in a day then it will eat around __________ kg in a month. Guess about how much it will eat in a year.

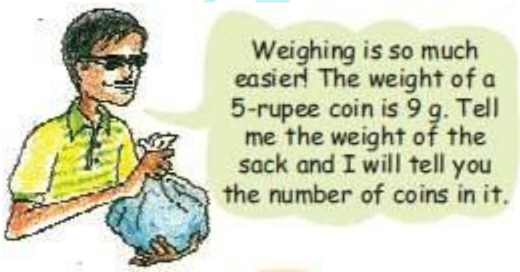
Solution:

Food eaten by a grown up elephant in 1 day = 136 kg

Food eaten by a grown up elephant in 30 days = 30 × 136 = 4080 kg In a year, it will eat around 50,000 kg of food.

Shahid Saves the Bank!

Shahid works in a bank. He sits at the cash counter. Whenever there are too many coins he does not count them. He just weighs them



1. How many coins are there in a sack of 5 rupee coins if it weighs:

a) 18 kg? ______ Solution:

1 kg = 1000 g Weight of a 5 rupee coin = 9 g

Weight of 18 kg sack in grams = 18 × 1000 = 18000 g
Number of 5 rupee coins in 18 kg sack = 18000 ÷ 9 = 2000 coins

b) 54 kg? ______
Solution:
Weight of 54 kg of sack in grams = 54 × 1000 = 54000 g
Number of 5 rupee coins in 54 kg sack = 54000 ÷ 9 = 6000 coins

c) 4500 g? ______
Solution:
(c) Weight of sack = 4500 g
Number of 5 rupee coins in 4500 g sack = 4500 ÷ 9 = 500 coins

d) 2 kg and 250 g? ______
Solution:
Weight of 2 kg 250 g sack = 2 × 1000 g + 250 g = 2000 g + 250 g = 2250 g Number of 5 rupee coins in 2250 g sack = 2250 ÷ 9 = 250 coins

e) 1 kg and 125 g? ______
Solution:
Weight of 1 kg 125 g sack = 1 × 1000 g + 125 g = 1000 g + 125 g = 1125 g Number of 5 rupee coins in 1125 g sack = 1125 ÷ 9 = 125 coins

2. A 2 rupee coin weighs 6 g. What is the weight of a sack with:
a) 2200 coins? _____ Kg _____ g Solution:
1 kg = 1000 g Weight of a 2 rupee coin = 6 g
Weight of sack with 2200 coins = 2200 × 6 = 13200 g = 13 × 1000 g + 200 g = 13 kg 200 g

b) 3000 coins? _____ Kg Solution:
Weight of the sack with 3000 coins = 3000 × 6 = 18000 g
Thus, 18000 g = 18 × 1000 g = 18 kg

3. If 100 one rupee coins weigh 485 g then how much will 10000 coins weigh? _____ Kg _____ g Solution:
Weight of 100 one-rupee coins = 485 g

So, weight of a single one-rupee coin = 485/100 = 4.85 g
Thus, weight of 10000 one-rupee coins = 10000 × 4.85 = 48500 g
So, 48500 g = 48 × 1000 g + 500 g = 48 kg 500 g

Find out and discuss:

1. How do people who cannot see make out different notes and coins?

Solution:

The people who cannot see, make out different notes and coins, by remembering the shapes and sizes of different notes and coins.

2. What should we look for to check if a 100-rupee note is real or fake?

Solution:

To check if a 100 rupee note is real or fake, we should see the size, quality of paper, and printing or the style in which the numbers are written on the note.