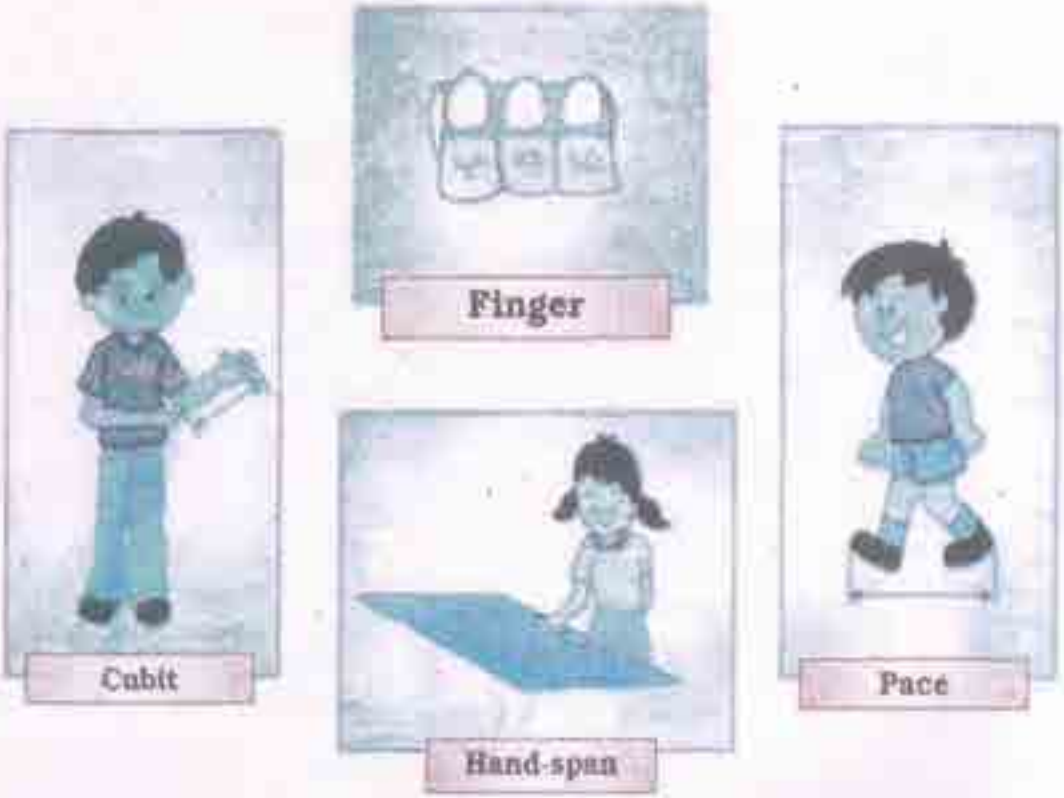
LENGTH, MASS (OR WEIGHT) AND CAPACITY

Length

(a) Non-standard units

In Class II, you have learnt about the use of body parts, namely a finger, hand-span, cubit and pace in measuring the length of various objects such as a duster, a desk, a table, a room and a playground.



These body parts are non-standard units of measuring lengths and distances as they differ from person to person.

Since the size of a body part varies from person to person, the measurement of length of an object given by two persons will be different. So, non-standard units are not considered appropriate units for measuring length.

(b) Arbitrary units

We can use objects like a rod, a pencil, a crayon etc. to measure the lengths of objects. Here, when two persons measure the length of a Playground by using a rod, they get the same result.

In the picture shown below, both the children find the same length i.e.; 3 rods.

However, if the rods used by the two persons differ in length, then their results would differ. Therefore, there is a need for some standard unit that gives the same result of measurement no matter who measures the length.

(c) Standard units of length

The standard unit of measuring length is a metre

What is a metre?

In the above pictures, everyone is measuring with a rod. This is called a metre-rod.

A metre–rod

Here is a metre-rod. It is divided into 100 equal parts. The length of each part is called a centimeter.

So, 1 metre =100 centimetres

Using this metre-rod, we can find the length of an object, the height of an object and distance between two objects.

The length of the blackboard is more than 1 metre.

The length of the plant is about 1 metre

The distance between two children is less than 1 metre.

Activity: Take a metre-rod. Cut a paper tape equal to the length of the metre-rod. This is now a paper tape which is 1 metre long. Use this tape and measure the following objects. Classify them in three Categories:

1. Those which measure more than 1 metre.
2. Those which measure 1 metre.
3. Those which measure less than 1 metre.

A table

A cupboard

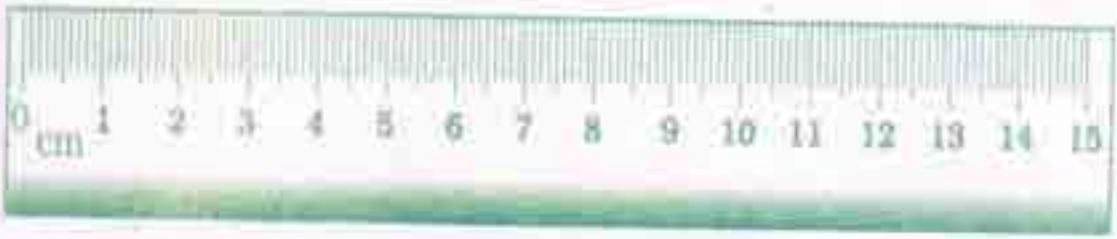
A door

A chair

Here is a metre-tape that you find at your home. It is one and a half metre long. It is divided into 150 equal parts. You can use this tape also in measuring the above objects.

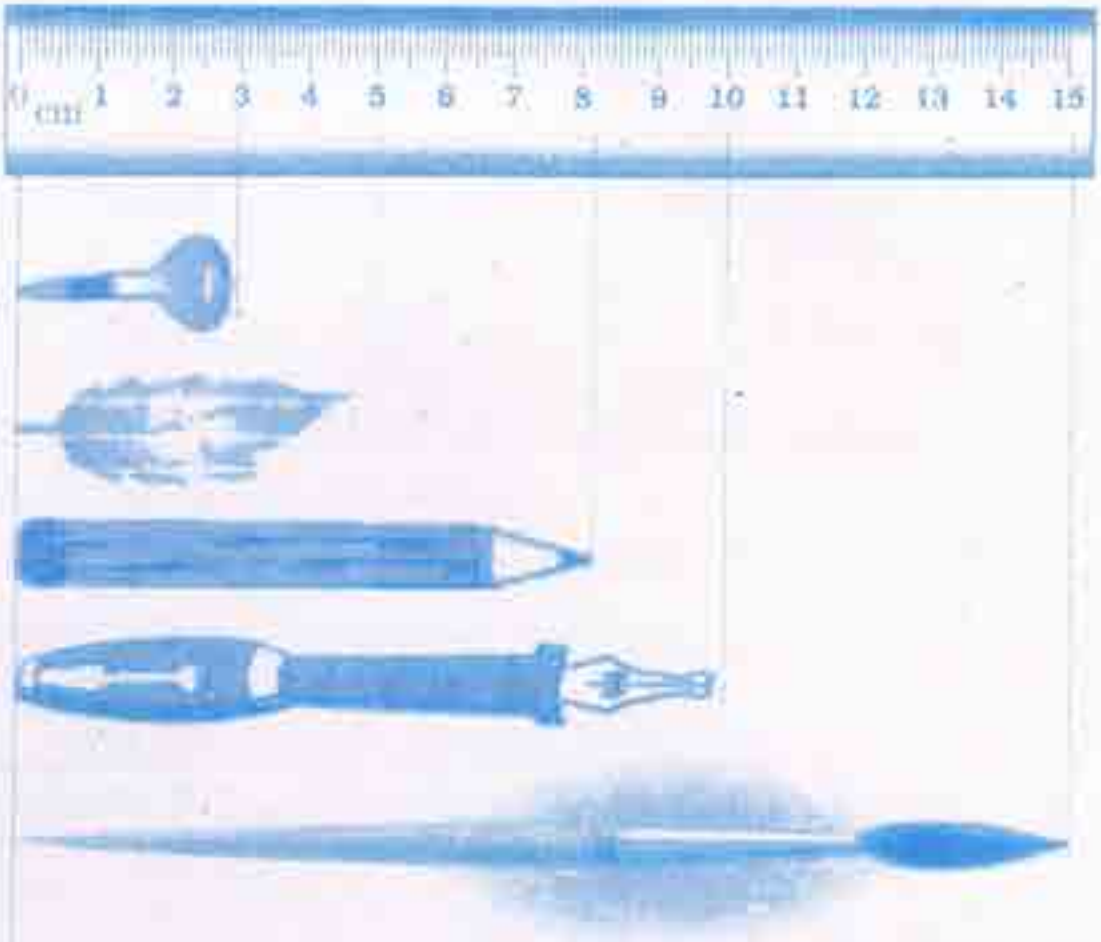
A metre-tape

Here is a scale that you find in geometry box.



15 – centimeter scale

This small scale is useful in measuring small distances and objects of smaller length and heights.



We also have 30-centimetre scale. This can also be used for measuring smaller lengths, heights and distances.

We write m for metre; cm for centimeter and dm for decimetre.

Thus,

10 cm = 1 dm
10 dm = 1 m
} → 100 cm = 1

Conversion of units of length

(a) From metres to decimeters

We know that 1m = 10 dm

So, 2 m = (10 × 2) dm = 20 dm	3 m = (10 × 3) dm = 30 dm
4 m = (10× 4) dm = 40 dm	7 m = (10 × 7) dm = 70 dm

From the above, we find that to convert metres into decimeters, we multiply 10 by number of metres.

(Shortcut: Place one zero to the right of the number of metres.)

Further, to convert metres and decimeters into decimeters, we first convert the metres to decimeters and then add to these the number.

4m 7dm = 4m + 7 dm
= (4× 10) dm + 7 dm
= 40 dm + 7 dm = 47 dm

9 m 5 dm = 9 m + 5 dm
= (9 × 10) dm + 5 dm
= 90 dm+ 5 dm = 95 dm

Activity 1

1. Convert into decimeters

3 metres
11 metres
21 metres
45 metres

7 metres
19 metres
30 metres
50 metres

2. Convert into decimeters

2 m 2 dm

3 m 4 dm

5 m 5 dm

6 m 7 dm

3 m 9 dm

9 m 3 dm

8 m 8 dm

4 m 4 dm

(b) From decimetres to centimetres

We know that 1 dm =10 cm.

So, 2 dm = (10 × 2) cm = 20 cm

4 dm = (10× 4)cm = 40 dm

3 dm = (10 × 3) cm = 30 dm

8 dm = (10 × 8) cm = 80 dm

From the above, we find that to convert decimetres into centimetres, we multiply 10 by the number of decimeters.

[Shortcut: Place one zero to the right of the number of decimetres.]

Further, to convert the decimetres and centimetres, we first convert the decimetres into centimetres and then add to these the number of given centimetres. Thus,

2 dm 3 cm = 2 dm + 3 cm

= (10× 2) cm + 3 dm

= 20 dm + 3 cm = 23 cm

9 dm 7 cm = 9 dm + 7 cm

= (10 × 9) cm + 7 dm

= 90 dm + 7 cm = 97 cm

Activity 2 :

1. Convert into centimetres :

3 dm
4 dm
21 dm
32 dm
43 dm

5 dm
10 dm
37 dm
45 dm
50 dm

2. Convert into centimeters:

1 dm 2 cm	41 dm 9 cm
9 dm 7 cm	10 dm 9 cm
12 dm 3 cm	21 dm 5 cm
29 dm 1 cm	30 dm 3 cm

(c) From metres to centimetres

We know that 1 m = 100 cm

So, 2m = (100 × 2) cm = 200 cm 3 m = (100 × 3) cm = 300 cm

4 m = (100× 4) cm = 400 cm 9 m = (100 × 9) cm = 900 cm

From the above, we find that to convert metres into centimetres, we multiply 100 by the number of metres .

[Shortcut: we place two zero to the right of the number of metres.]

Further, to convert metres and centimetres into centimetres, we first convert the metres into centimetres and then add to these the number of centimetres given. Thus,

2 m 17cm = 2 m + 17 cm
= (100× 2) cm + 17 cm
=200 cm + 17 cm = 217 cm

Similarly,

9 m 5 cm = 9 m + 5 cm
= (100 × 9) cm + 5 cm
=900 cm + 5 cm = 905 cm

Activity III

1. Convert into centimetres:

3 m
5 m
8 m
15 m
21 m

4 m
6 m
13 m
18 m
30 m

2. Convert into centimetres:

1 m 90 cm

9 m 10 cm

18 m 18 cm	8 m 8 cm
20 m 2 cm	37 m 7 cm
8 m 3 dm	7 m 6 dm
15 m 5 dm	10 m 1 m
12 m 2 dm	25 m 5 dm

1. Fill in the blanks:

5 m = ____ dm 6 m = ____ dm 7m = ____ dm

8m = ____ dm 40 m = ____ dm 12 m = ____ dm

5m = ☐ cm	6 m = ☐ cm	27 m = ☐ cm
9 m = ☐ cm	11 m = ☐ dm	14 m = ☐ dm
5 m = ☐ cm	16 m = ☐ cm	7 m = ☐ cm
8 m = ☐ cm	9 m = ☐ dm	11 m = ☐ cm

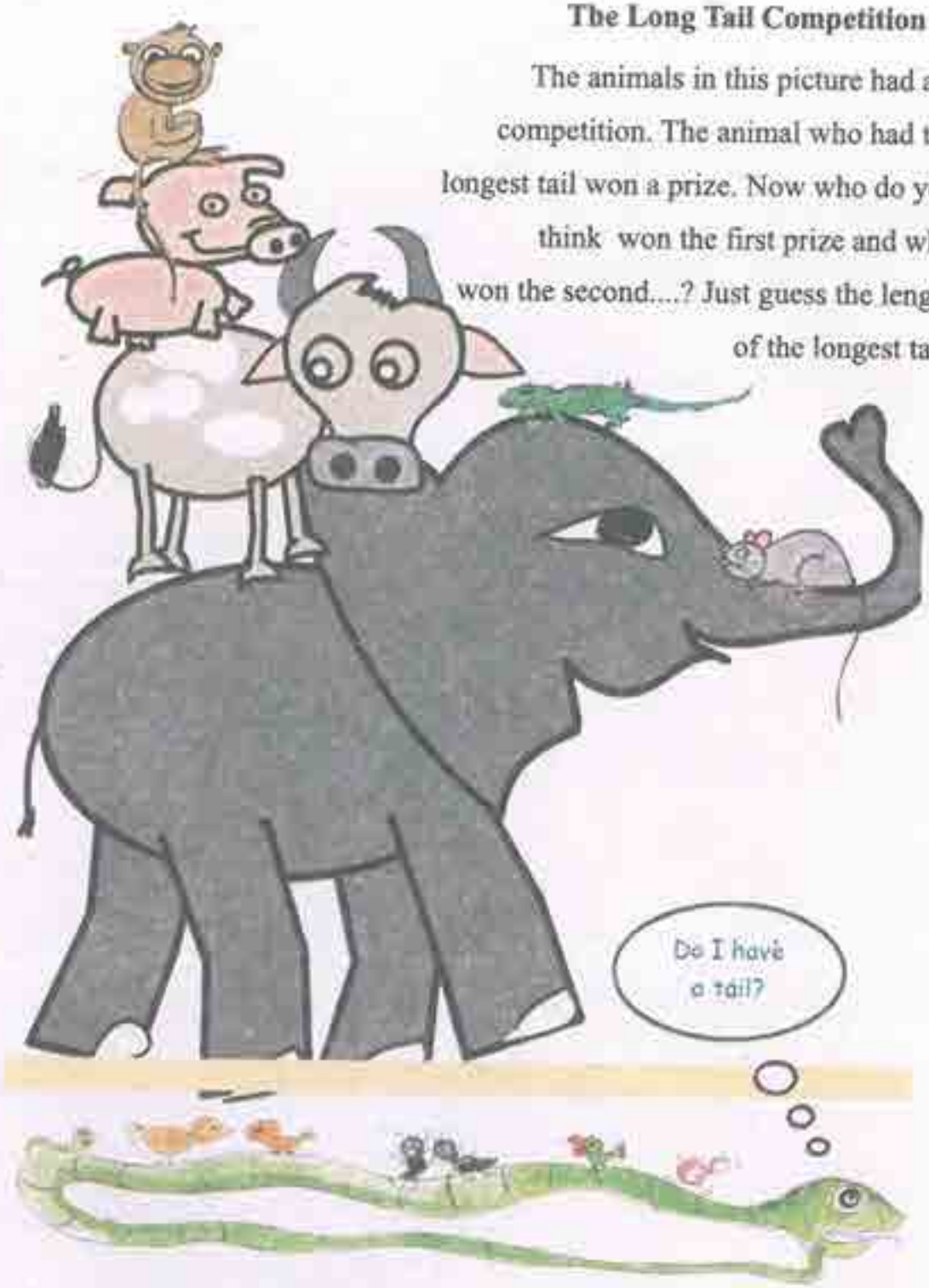
1 m 5dm = ☐ dm	1 m 7 dm = ☐ dm
1 m 9 dm = ☐ dm	1 m 10 cm = ☐ dm
1 m 15 cm = ☐ cm	5 m 19 cm = ☐ cm
2 m 3 dm = ☐ dm	4 m 6 dm = ☐ dm
7 m 7 dm = ☐ dm	3 m 40 cm = ☐ cm
5 m 15 cm = ☐ cm	1 m 70 cm = ☐ cm

2. Put a tick (✓)on the correct relationships:

1 m = 100 dm	1 m = 100 cm
1 dm = 100 m	1 dm = 10 cm
1 dm = 100 cm	1 cm = 100 dm
1 cm = 10 dm	1 cm = 100 m

The Long Tail Competition

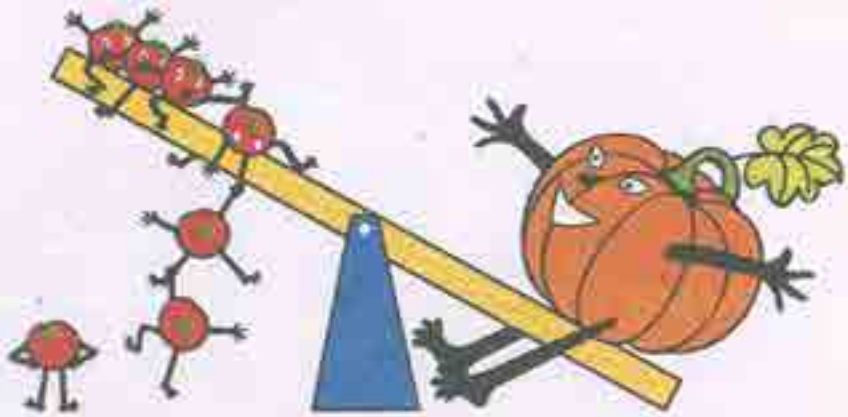
The animals in this picture had a competition. The animal who had the longest tail won a prize. Now who do you think won the first prize and who won the second....? Just guess the length of the longest tail.



Pumpkin Tomato '*Panga*'

This is the playground where tomatoes come to play every day. They love playing on the see-saw. One day a big pumpkin comes and sits on one side of the see-saw. When he does not get up for a long time, the tomatoes decide to sit on the other side and lift the pumpkin up so that he falls off.

The little tomatoes start climbing on to the other side...1, 2, 3, 4, 5 ..... 25. Huh! The pumpkin is still sitting and laughing. So, the big tomatoes decide



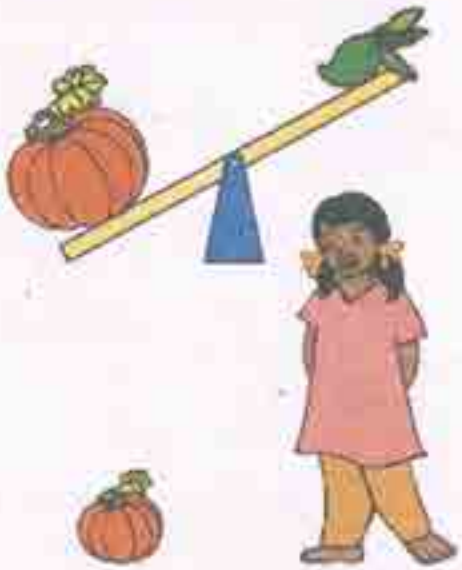
to help. The little ones get down and make way for the fat ones. 1, 2, 3, 4.... 20. Yeah! The pumpkin is up in the air. It shouts — Bring me down, bring me down please!

'Panga' is a colloquial word which gives the sense of a problem or a quarrel. It has been used deliberately because children can find it amusing.

How many small tomatoes do you think could lift the pumpkin up?

- Ten
- Twenty
- Forty

❖ How many big mangoes can balance the pumpkin?



❖ How many pumpkins can balance you on the see-saw?

❖ Name some of your classmates who you think weigh

(a) Almost the same as you

_____

(b) More than you

_____

(c) Less than you

_____

❖ How many books can you lift on one hand keeping your arm straight?

Double her Weight

Kunjamma's parents have a different way of celebrating Independence Day because Kunjamma was born that day. They buy sweets double of Kunjamma's weight and distribute them among poor people.

When Kunjamma was born, she was 3 kg. Today is Independence Day and Kunjamma is 5 years old. She is 28 kg now.

❖ Now guess her weight and the amount of sweets her parents distribute every Independence Day.

Kunjamma's age	*Kunjamma's weight*	*Amount of sweets*
At birth	3 kg	3 + 3 = 6 kg
1 year old	9 kg	_____
2 years old	_____	13 +13 = 26 kg
3 years old	17kg	_____
4 years old	_____	_____
5 years old	28kg	_____

You can ask your parents how much a 2-year old or 4-year old child could weigh.

Yum-yum Rice

Shugoto heard about a new dish on the radio. He wants to try making it. When he notes down how to make it, he gets confused.

This is what he notes down —

(1) Pour 2 spoons of water in the pot

(2) Boil the water and add

- 1 pinch of *daal*
- half kg red chilli powder
- 1 bowl salt

(3) Now put a spoon of rice

(4) Add 2 peas and 8 glasses of mustard seeds

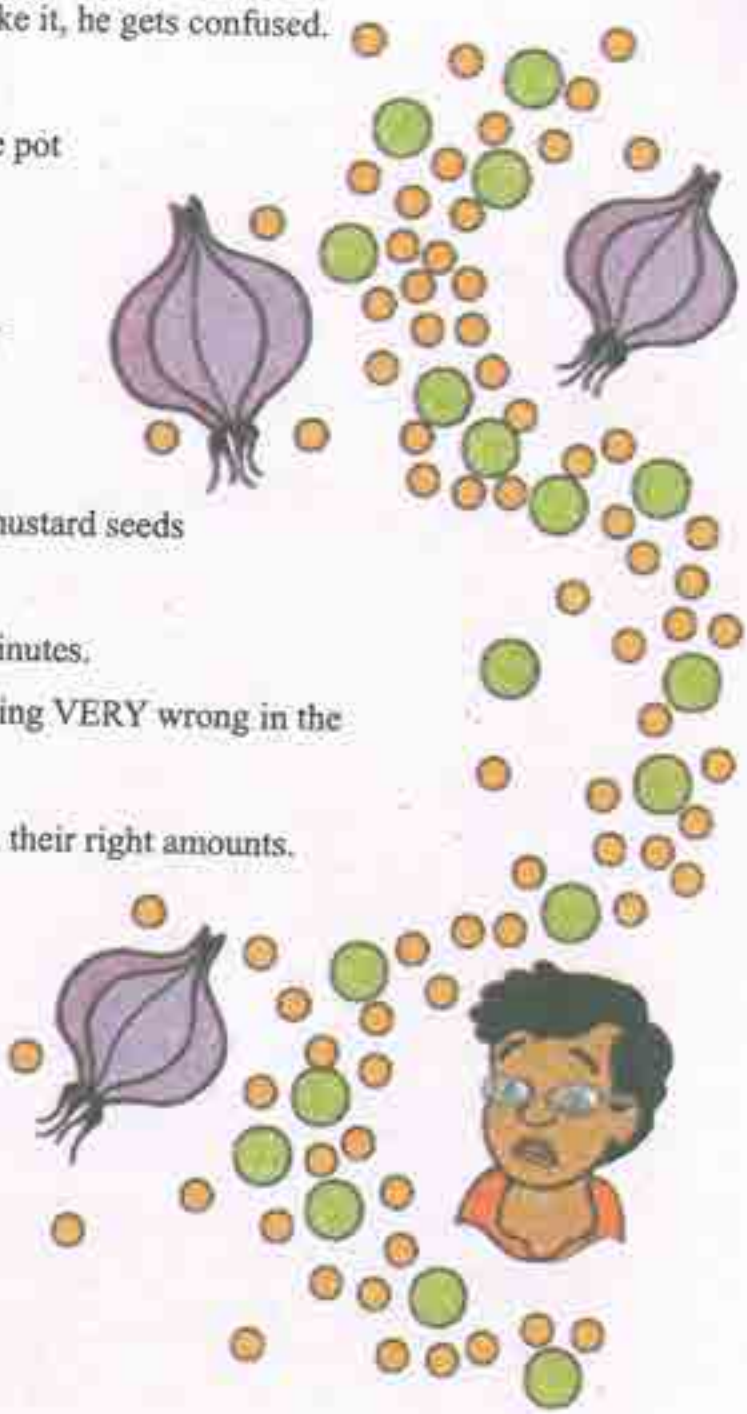
(5) Finally add 1 kg of onions

Mix everything and boil for 15 minutes.

But Shugoto feels there is something VERY wrong in the amounts of everything!!!

❖ Help him match the things with their right amounts.

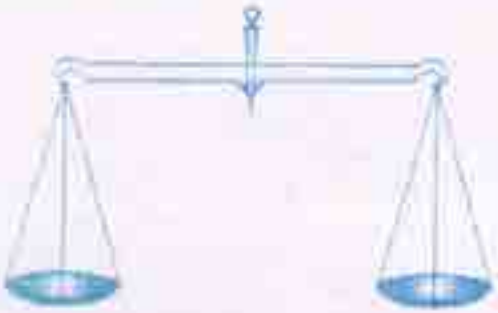
1 kg	rice
half kg	*daal*
_____	peas
_____	water
_____	onions
_____	salt
_____	mustard seeds
_____	red chilli powder



Mass (or weight)

(a) Standard units of mass

We buy several things such as wheat, rice, sugar etc. from shops. We also buy vegetables from a vegetable-shop. In every, case, the shopkeeper measures (or weighs) the things with the help of balance and blocks (also called weights).



A balance

Weight

As we measures lengths in metres (m), decimetres (dm) and centimetres (cm), we measures mass (or weight) in kilograms (kg) and grams (g).

1 kilogram (kg) = 1000 grams (g).

Note: Kilogram is the bigger unit of mass and gram is the smaller unit of mass.

Things like a bag of cement, rice, wheat, sugar are weighed in kilograms whereas smaller quantities of items like toffees, popcorn, grapes are weighed in grams.

Activities

1. (a) Identify five objects that weigh more than 1 kilogram (kg).
   (b) Identify three objects that weigh about 1 kilogram (kg).
   (c) Identity four objects that weigh less than 1 kilogram (Kg).

2. By putting 1 kg weight in the left pan of the balance and two 500g weights in the right pan of the balance, make sure that

1 kg = two 500 g

Similarly, by putting 1 kg weight in the left pan of the balance, and five 200 g weights in the right pan of the balance, make sure that

Similarly,

200 g = 100 g + 100 g
= two 100 g
500 g = 100 g + 100 g + 100 g
= 100 g + 100 g
= five 100 g

3. Let us answer the following questions:

   a) How many 100 g blocks together weigh equal to one 200 g block?

   b) How many 100 g blocks together weigh equal to one 500 g block?

4. Collect any four objects, each of which may weigh

   (a) more than 1 kg.

   (b) about 500 g.

   (c) less than 200 g.

5. How much more is to be added to the following, to make it equal to 1 kg (1000g)?

   (a) 500 g

   (b) 800 g

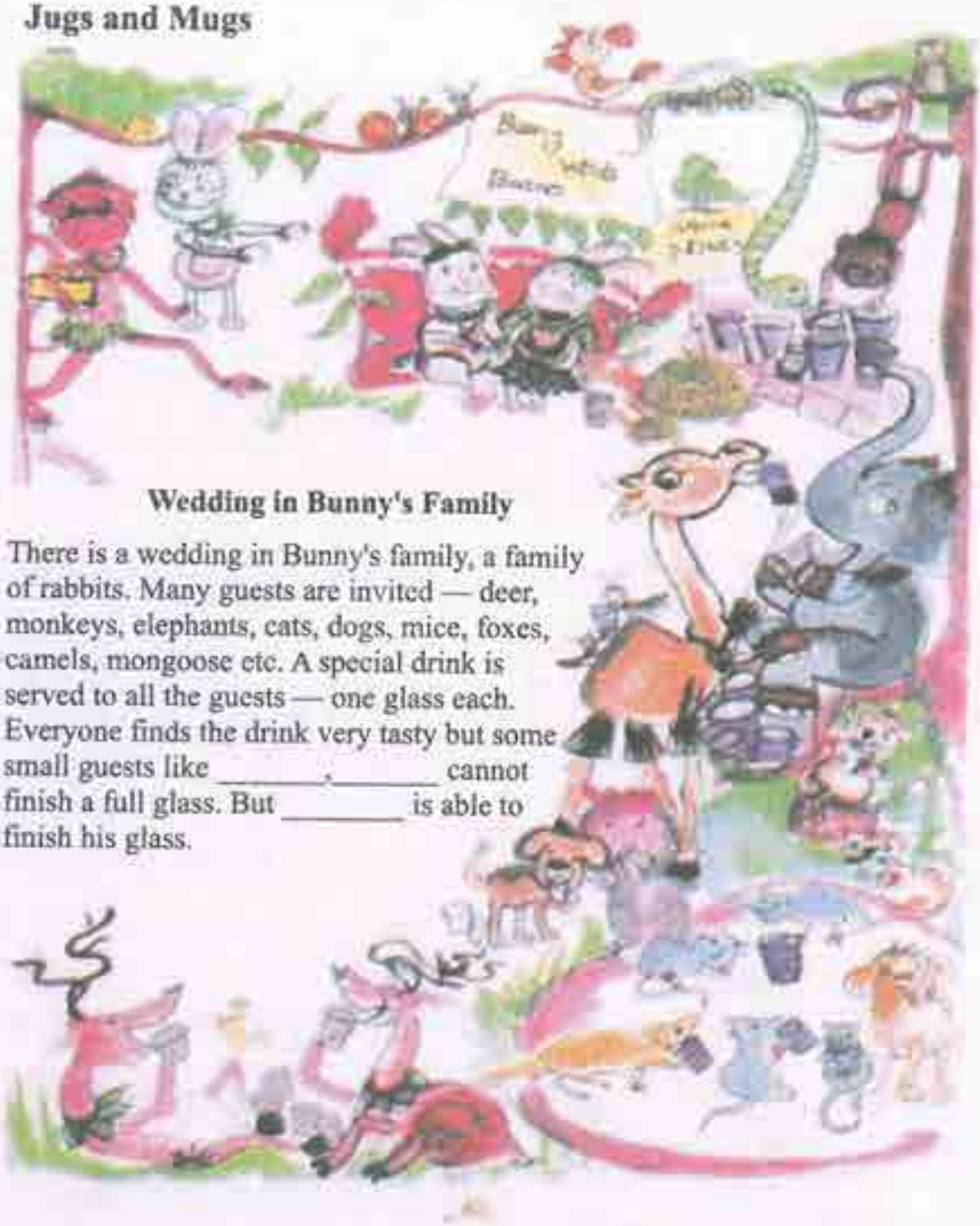
   (c) 700 g

   (d) 300 g

   (e) 400 g

   (f) 200 g

Jugs and Mugs



Wedding in Bunny's Family

There is a wedding in Bunny's family, a family of rabbits. Many guests are invited — deer, monkeys, elephants, cats, dogs, mice, foxes, camels, mongoose etc. A special drink is served to all the guests — one glass each. Everyone finds the drink very tasty but some small guests like _____,_____ cannot finish a full glass. But _____ is able to finish his glass.

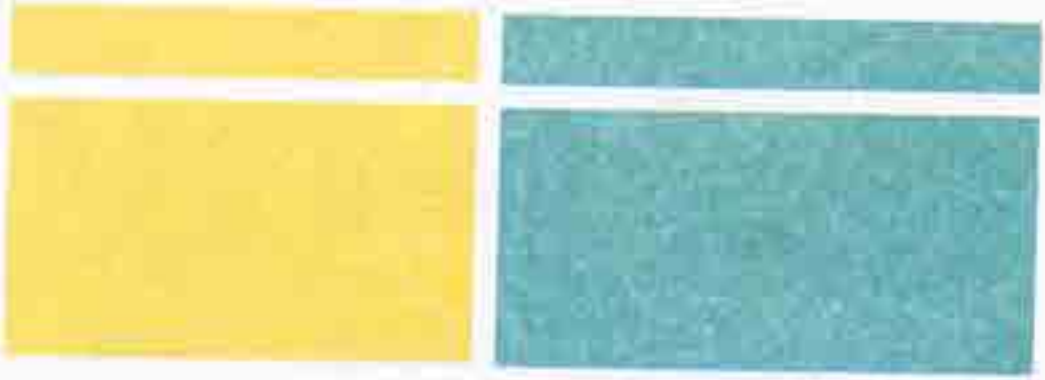
Some others like _____, _____, ask for more than one glass.

Now the trouble begins !!!

There are some big guests who go on gulping down glass after glass...!

Bunny wants to guess who drank how much.

Help him fill the table. Have fun!



Water In, Water Out?

Have you ever thought
like Laddu?
About how many glasses of
water do you drink in a day?

Summer day : glasses

Winter day : glasses

Can you guess how much
water goes out of you?

Capacity

(a) Standard units of capacity

We all know that liquids are kept in vessels. Big vessels hold more liquid than the small vessels. Litre is the standard unit of measurement of liquids, Milk is sold in litres. Kerosene oil, petrol, diesel and many other kinds of liquid are sold in litres. Litre-measures are of different shapes. Some such shapes are shown below.

1 Litre 1 Litre 1 Litre 1 Litre 1 Litre

Each of these measures holds 1 litre of liquid. Note that we also have much bigger measures which can hold 2litres, 5litres and 10 litres of liquid.

Smaller quantities of liquid are measured in Millilitres. To measure smaller quantities of liquid, we also have smaller measures such as shown below:

100 ml 200 ml 500 ml 100 ml 200 ml 500 ml

We write l for litres; and ml for millilitres.

We have 1 litre (l) = 1000 millilitres (ml).

Bottles and Buckets

Get a 1 litre bottle (can be an empty bottle of water, oil etc.). Now collect some bottles and a mug, jug, glass, bowl, etc. at your house. Use the 1 litre bottle to check which of these holds more than 1 litre and which one holds less than 1 litre. Make a small drawing if you like.

Less than 1 litre	*More than 1 litre*
bowl	big cooking pot

- Now look at the buckets in your house.
- Guess how many litres of water they can hold.
- Use a 1 litre bottle and check if your guess is right for all the buckets.

Bucket	My guess	My measure
Bucket 1		
Bucket 2		
Bucket 3		

Match the Right Pairs

About 12 litres

(to measure milk)

Less than ½ litre

(water tank)

About 5 litres

(bucket)

1000 litres

(eye drops bottle)

½ litre

(water *suraahi*)