

6. Division : Part 1



Revision

- (1) If 20 chocolates are divided equally between 5 children, how many does each child get ?



Let us carry out $20 \div 5$.

$$\begin{array}{r} 4 \\ 5 \overline{) 20} \\ \underline{- 20} \rightarrow 5 \times 4 \\ 00 \end{array}$$

Each child gets 4 chocolates.

- (2) If 21 flowers are divided equally between 7 children, how many flowers does each child get ?



Let us carry out $21 \div 7$.

$$\begin{array}{r} \boxed{} \\ 7 \overline{) 21} \\ \underline{- } \\ \boxed{} \end{array}$$

Each child gets flowers.

- (3) Let us arrange $15 \div 5$ in the form of dots. As 5 is the divisor, let us put 5 dots in one row and find out how many rows are needed for 15 dots.

• • • • •	First row	Three rows are formed, therefore, $15 \div 5 = 3$.
• • • • •	Second row	
• • • • •	Third row	

In the same way, solve the following problems by using dots.

(1) $8 \div 2$	(2) $16 \div 4$	(3) $18 \div 6$	(4) $24 \div 8$

The inter-relationship between division and multiplication

Shobha : Come, Rohit, let's put these rings on the stands! Let's put an equal number of rings on each stand!

Rohit : We have 12 rings in the box.

Shobha : There are three stands.

Rohit : Let us put the rings one by one on each stand.



Shobha : If 12 rings are distributed equally on three stands, how many rings should there be on each stand? Let us count.

Rohit : You are asking us to divide. $12 \div 3 = 4$. Each stand will have 4 rings. Now tell me, if each stand has four rings, how many stands do we need for 12 rings?

Shobha : This is division again! $12 \div 4 = 3$. We need 3 stands.

Tai : Why is that so? Because, you see, $3 \times 4 = 12$ and $4 \times 3 = 12$, so, $12 \div 3 = 4$ and $12 \div 4 = 3$.

Rohit : This means that we can get two divisions from one multiplication. For example, from $8 \times 4 = 32$, we get $32 \div 8 = 4$ and $32 \div 4 = 8$. Is that right?

Tai : Excellent! You are absolutely right. Keep that in mind while solving the following problems.

$$\begin{array}{ccc}
 & 7 \times 5 = 35 & \\
 \swarrow & & \searrow \\
 35 \div \square = 5 & & 35 \div \square = 7 \\
 \\
 & 5 \times 9 = 45 & \\
 \swarrow & & \searrow \\
 45 \div \square = 9 & & 45 \div \square = 5
 \end{array}$$

$$\begin{array}{ccc}
 & 6 \times 7 = 42 & \\
 \swarrow & & \searrow \\
 42 \div 7 = \square & & 42 \div 6 = \square \\
 \\
 & 8 \times \square = 56 & \\
 \swarrow & & \searrow \\
 56 \div 8 = \square & & 56 \div 7 = \square
 \end{array}$$

Dividing a two-digit number by a single-digit number

- ◆ Four farmers together bought 84 sacks of manure and wondered how to divide them equally among themselves.
- One farmer suggested the following method.

Step 1

Each farmer gets 10 sacks.

$$\boxed{10} \boxed{10} \boxed{10} \boxed{10} = 40$$

$$4 \times 10 = 40 \text{ sacks given.}$$

$$84 - 40 = 44 \text{ remain.}$$

Step 2

From the remaining 44 sacks, each farmer gets 10 sacks more.

$$\boxed{10} \boxed{10} \boxed{10} \boxed{10} = 40$$

$$40 \text{ sacks are given.}$$

$$44 - 40 = 4 \text{ remain.}$$

Step 3

Of the remaining 4 sacks, each farmer is given 1 sack.

$$\boxed{1} \boxed{1} \boxed{1} \boxed{1} = 4$$

$$4 \text{ sacks are given.}$$

$$4 - 4 = 0 \text{ remain.}$$

Therefore, each farmer gets a share of $\boxed{10} + \boxed{10} + \boxed{1} = 21$ sacks.

- Another farmer suggested another method :

Step 1

Each farmer is given 20 sacks.

$$\boxed{20} \boxed{20} \boxed{20} \boxed{20} = 80$$

$$4 \times 20 = 80 \text{ sacks given.}$$

$$84 - 80 = 4 \text{ sacks remain.}$$

Step 2

Of the remaining 4 sacks, each farmer is given 1 sack.

$$\boxed{1} \boxed{1} \boxed{1} \boxed{1} = 4$$

$$4 \times 1 = 4 \text{ sacks given.}$$

$$4 - 4 = 0 \text{ remain.}$$

Therefore, each farmer gets a share of $\boxed{20} + \boxed{1} = 21$ sacks

- ◆ Equal shares can also be made by carrying out a division as follows :

$$\begin{array}{r} 4 \overline{)84} \end{array}$$

$$\begin{array}{r} 2 \\ 4 \overline{)84} \\ \underline{-8\downarrow} \\ 04 \end{array}$$

$$\begin{array}{r} 21 \\ 4 \overline{)84} \\ \underline{-8\downarrow} \\ 04 \\ \underline{-4} \\ 00 \end{array}$$

The dividend is 84, or 8T and 4U. The divisor is 4.

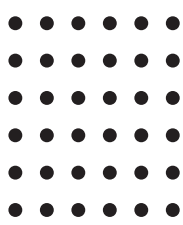
Let us first distribute the tens. Let us see if 8T can be divided by 4. Let us say the 4 times table. Four twos are eight. So, we can directly distribute 2T each. Let us subtract those. Each gets 2T, so, let us write 2 above the line in the tens place of the quotient. We subtract 8T from 8T. 0T remain.

Next, let us distribute the 4 units. 4 times 1 is 4, so we subtract 4 times 1 from 4. Each gets 1U. Let us write 1 above the line in the units place of the quotient.

After subtracting 4 units, 0 remain. The quotient is 21.

- ◆ The teacher gave Rohit, Shobha and Madhavi 36 little bindis to stick on a piece of paper. She asked them to put an equal number of bindis in each row and then to count how many rows were formed.

Rohit's work



$$\begin{array}{r} 6 \\ 6 \overline{) 36} \\ \underline{- 36} \\ 00 \end{array} \rightarrow 6 \times 6$$

Rohit said, "I stuck 6 bindis in one row so I got 6 rows. It means that $36 \div 6 = 6$."

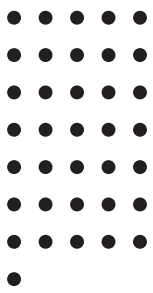
Shobha's work



$$\begin{array}{r} 9 \\ 4 \overline{) 36} \\ \underline{- 36} \\ 00 \end{array} \rightarrow 4 \times 9$$

Shobha said, "I put 4 bindis in 1 row and 9 rows were formed. It means $36 \div 4 = 9$."

Madhavi's work



$$\begin{array}{r} 7 \\ 5 \overline{) 36} \\ \underline{- 35} \\ 01 \end{array} \rightarrow 5 \times 7$$

Madhavi said, "I put 5 bindis in 1 row, so 7 full rows were formed and 1 bindi remained."

Now you try to form rows of 8 bindis each, using 36 bindis.

- ◆ Grandfather bought a packet of sweets and asked Rasika, Rohan and Rashmi to share them equally.

Rohan : Let me first count the sweets. 1, 2, ..., 57, 58. There are 58 sweets.

Rasika : Grandfather, you told us to share the sweets equally. It means you are asking us to do a division.

Rashmi : Shall we distribute 1 sweet each at a time?

Rasika : No, that will take too long. Let us distribute 10 each first. 10 sweets each for 3 of us means that 30 sweets have been distributed. $58 - 30 = 28$ sweets left.

Rohan : Of these 28, let us distribute 9 sweets each to the three of us. 9 threes 27. $28 - 27 = 1$ sweet left over.

Rashmi : That means $10 + 9 = 19$ sweets each. But there's still one sweet left over!

- Rasika** : Grandfather, why don't you take the remaining sweet? Then, we will not fight over it.
- Grandfather** : Correct! You have carried out the division well. However, to divide big numbers quickly, we use the arrangement given below.



$$\begin{array}{r} 3 \overline{) 58} \end{array}$$

$$\begin{array}{r} 1 \\ 3 \overline{) 58} \\ - 3 \downarrow \\ \hline 28 \end{array}$$

$$\begin{array}{r} 19 \\ 3 \overline{) 58} \\ - 3 \downarrow \\ \hline 28 \\ - 27 \\ \hline 01 \end{array}$$

58 is the dividend and 3 is the divisor.

To divide 5T between 3, say the 3 times table. 3 ones are 3. 3 twos are six, $6 > 5$, which means we can divide by 3 once. Each gets 1T. 3T are subtracted from 5T and 2T remain.

Let us convert them into units for division. 20 units from 2T and the 8 units already there, that gives us 28 units for distribution. 3 nines are 27, 3 tens are 30 and $30 > 28$. Therefore, while dividing 28 units between three, each gets 9 units at the most. Let us subtract 27 units from 28 units. 1 unit remains. The quotient is 19.

Rohan : Grandpa, you have given us an easy method.
It makes division quicker.

Exercise

Carry out the divisions. Write down the divisor, dividend, quotient and remainder.

- (1) $5 \overline{) 75}$ (2) $4 \overline{) 52}$ (3) $3 \overline{) 44}$ (4) $8 \overline{) 92}$ (5) $6 \overline{) 85}$ (6) $7 \overline{) 92}$

Remember : While dividing, the divisor is subtracted from the dividend the greatest possible number of times. That is why the remainder is always smaller than the divisor.
This method is used while dividing a large number and when the table of the divisor up to 10 is not enough.

- ◆ Bunty has to give laddoos to four neighbours. There are 21 laddoos in the jar.



Bunty took four plates and put the laddoos one by one in each. He could put 5 laddoos in each plate and 1 was left over.

This means that while dividing 21 laddoos into four equal parts, we get 5 laddoos in each part and 1 laddoo remains.

This division can be shown by arranging the numbers vertically as follows.

$$\begin{array}{r} 4 \overline{)21} \end{array}$$

The dividend 21 has 2T and 1U.

2T cannot be divided into four parts in that form.

$$\begin{array}{r} 0 \\ 4 \overline{)21} \\ \underline{-0\downarrow} \\ 21 \end{array}$$

Therefore, let us give each person 0T. Write a 0 in the tens place in the quotient.

Now, 20 units from 2T and 1 unit already present make 21 units. Let us divide these 21 units by 4.

$$\begin{array}{r} 05 \\ 4 \overline{)21} \\ \underline{-0\downarrow} \\ 21 \\ \underline{-20} \\ 01 \end{array}$$

4 fives are 20, 4 sixes are 24, $24 > 21$, so each gets 5 units at the most. Let us subtract 20 from 21.

$$21 - 20 = 1.$$

The remainder is 1 unit and the quotient is 5 units.

Exercise

Divide the following.

(1) $33 \div 5$

(2) $41 \div 8$

(3) $51 \div 7$

(4) $80 \div 9$

Dividing zero by a non-zero number

Bharat, Sarla and Julie stood near a guava tree. Bharat said, "I'll put a bag around my neck and climb up to get the ripe guavas. Let us all share them." He climbed up the tree and Sarla and Julie waited below.

Julie : If Bharat picks 6 guavas, we'll get 2 each.

Sarla : If he gets ten, we'll get 3 each, and there will be one left. Let's give him that one.
(Bharat climbed down from the tree. He looked disappointed.)

Julie : How many guavas did you pick ?

Bharat : There wasn't a single guava ripe enough to eat. My bag is empty.

Sarla : Since you picked 0 guavas, we will get 0 guavas each. That's alright. At least we learned that 0 divided by 3 is 0!

Julie : If we had to divide zero guavas between 7 or 8 people, we would still have zero guavas each.



When zero is divided by any other number, that is, by any non-zero number, the quotient is always zero.

◆ If there are zero laddoos on a plate, no matter how many children there are, each child will get zero laddoos.

$$\begin{array}{r} 0 \\ 9 \overline{)0} \\ \underline{-0} \\ 0 \end{array}$$

$$\begin{array}{r} 0 \\ 7 \overline{)0} \\ \underline{-0} \\ 0 \end{array}$$



◆ Divide $80 \div 4$.

$$\begin{array}{r} 20 \\ 4 \overline{)80} \\ \underline{-8\downarrow} \\ 00 \\ \underline{-0} \\ 00 \end{array}$$

First let us divide the tens equally between 4. Each gets 2T.
0T remain.

0 units are to be divided among 4 people. 0 divided by any other number is 0. Therefore, let us write 0 in the units place in the quotient. The quotient is 20. If the 0 is not written in the units place of the quotient, instead of 20, it will be read as 2 which would be wrong.

This shows that when 80 objects are equally divided among 4 people, each person gets 20 objects.

Exercise

Divide the following.

(1) $50 \div 5$

(2) $90 \div 9$

(3) $60 \div 3$

(4) $40 \div 2$