LESSON - 6

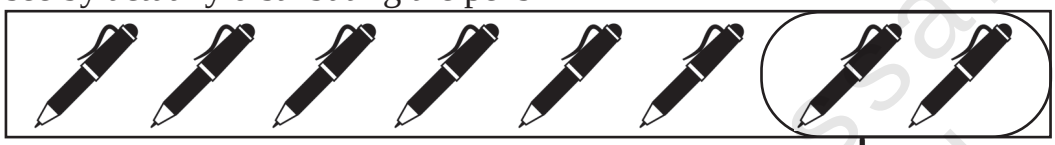
DIVISION

745TG2

Let us see by actual distribution-

Activity 1 : How many students can be distributed 8 pens with 2 pens per student?

Let us see by actually distributing the pens–

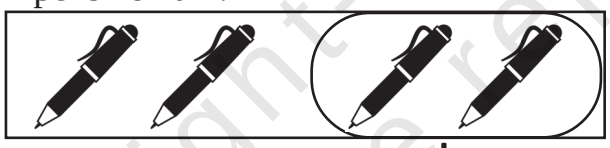


1st student was given 2 pens. So there are now 8 – 2 = 6 pens (2 pens were given away for **once**).

6 pens remain.

2nd student was given 2 pens. So there are now 6–2 = 4 pens (2 pens were given away for **twice**)

4 pens remain.



3rd student was given 2 pens. So there are now 4 – 2 = 2 pens (2 pens were given away for **thrice**)

2 pens remain

4th student was given 2 pens. So there is now 2 – 2 = 0 pen (2 pens were given away **4 times**)

Now there remains no any pen.

How many times did you subtract 2 from 8?

4 times, isn't it?

We express this process of subtraction shortly in Mathematics.

Look at the following–

$8 \div 2 = 4$ or

$$2\overline{)\,8}\;\;4$$
$$-\,8$$
$$0$$

This means finding out of how many times does 2 occur in 8?

2 occurs 4 times in 8.

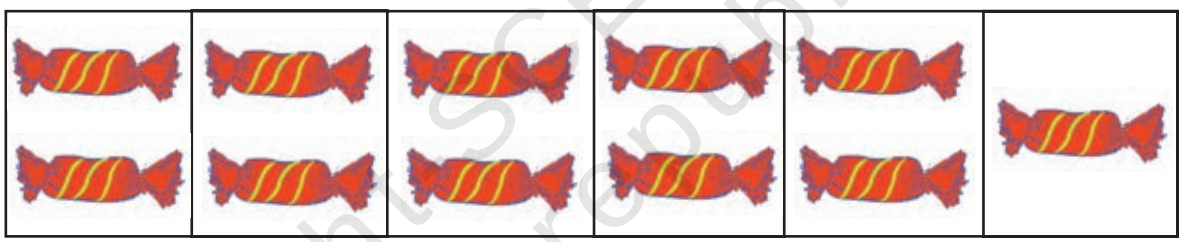
Here,

8 is dividend, 2 divisor, 4 quotient and 0 remainder.

Let us remember–

The number that has been divided is the **dividend**. The number which divides is the **divisior**. The number which has been obtained after division is the **quotient**. The number that remains after division is the **remainder**.

Activity 2 : Let us divide 11 chocolates by distributing 2 each.



1 chocolate remains after distributing to 5.

Now, find the quotient and remainder by repeated subtraction and equal distribution–

a) $20 \div 3$ b) $75 \div 10$ c) $64 \div 16$

d) $55 \div 6$ e) $59 \div 15$ f) $25 \div 5$

Then compare the answers by the process of division. Are the answers correct?

Let us form teams–

Count the number of students attending the class and write down the number on your note-book or black board.

Form 2-member teams. Is there any body left out?

Form 3 member teams.

Are all incorporated in the teams or, some members left out?

Form 4 member teams. How many students were excluded?

Now complete the following table–

Team of	Total number of students	Number of teams	No. of students left out of team
2 members			
3 members			
4 members			

How many problems of division have you got in the preceding activity? Write down each problem using numbers and sign of division. Identify dividend, divisor, quotient and remainder in case of each problem.

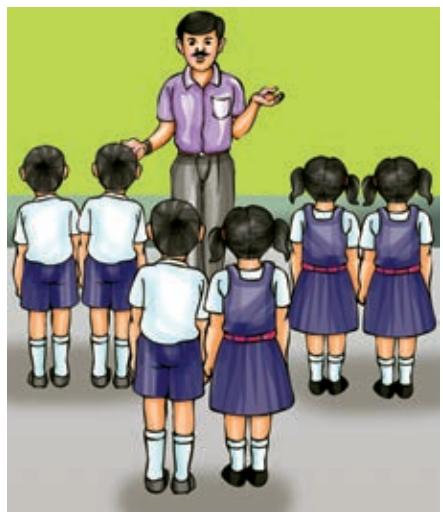
What did you learn? Suppose the number of students be 15.

If 2 member teams are formed out of 15 students, there will be 7 teams and ☐ will be left out.

Therefore for 2 member teams,

$$\underset{\downarrow}{15} = \underset{\downarrow}{2} \times \underset{\downarrow}{7} + \underset{\downarrow}{1}$$

Dividend Divisor Quotient Remainder



In case of 3-member teams,

$$\underset{\downarrow}{15} = \underset{\downarrow}{3} \times \underset{\downarrow}{5} + \underset{\downarrow}{0}$$

Dividend Divisor Quotient Remainder

In case of 4 member teams,

$$\underset{\downarrow}{15} = \underset{\downarrow}{4} \times \underset{\downarrow}{3} + \underset{\downarrow}{3}$$

Dividend Divisor Quotient Remainder

Now changing total number of students prepare tables in your note book.

Consider few sums of division

1.

$$2\overline{)\,6}\;3,\quad -6,\quad 0$$

Here,
dividend =6
divisor = 2
Quotient = 3
Remainder = 0

2.

$$3\overline{)\,9}\;3,\quad -9,\quad 0$$

Here,
dividend =9
divisor = 3
Quotient = 3
Remainder = 0

3.

$$4\overline{)\,11}\;2,\quad -8,\quad 3$$

Here,
dividend =11
divisor = 4
Quotient = 2
Remainder = 3

Note that :

In division (1)
divisor×quotient+remainder
= 2×3+0 = 6 = dividend

In division (2)
divisor×quotient+remainder
= 3×3+0 = 6 = dividend

In division (3)
divisor×quotient+remainder
= 4×2+3 = 11 = dividend

Therefore, we have

Dividend = Divisor×Quotient+Remainder

Let us do

	Divisor	Quotient	Remainder	Dividend
$3\overline{)11}$	3	3	2	11
$4\overline{)22}$				
$5\overline{)67}$				
$11\overline{)69}$				

What do you see in each case?
Dividend = Divisor× Quotient+Remainder Isn't it?

Let us do it by multiplication table

Example : (a) 16 ÷ 3 or $3\overline{)16}$

Step1:

How many times does 3 occur in 16? Note that – 3×1=3, ..., 3×5=15, 3×6=18. It is seen that 3 occurs 5 times in 16.

Step 2 :

$$\begin{array}{r} 5 \\ 3\overline{)16} \\ 15 \\ \hline 1 \end{array}$$

3 × 5 = 15

Answer : Quotient 5, Remainder 1

Example : (b) 48 ÷ 9 or $9\overline{)48}$

Step1 :

Using multiplication table find out how many times 9 occurs in 48.

Note 9×1=9 ..... 9×5 = 45, 9×6=54. It is seen that 9 occurs only 5 times in 48.

Step 2 :

$$\begin{array}{r} 5 \\ 9\overline{)48} \\ 45 \\ \hline 3 \end{array}$$

9 × 5 = 45

Answer : Quotient 5, Remainder 3

Note : In the problem16 ÷ 3, we have to recall the multiplication table for 3 and in 48 ÷ 9, the multiplication table for 9.

Divide–

$7\overline{)60}$	$4\overline{)37}$	$7\overline{)51}$	$5\overline{)25}$
$10\overline{)67}$	$8\overline{)57}$	$9\overline{)51}$	$9\overline{)64}$

Fill up the gaps–

a) 12 × 3 = ☐ b) 15 × 5 = ☐ c) 17 × 6 = ☐ d) 18 × 4 = ☐

Let us divide big numbers–

Example : (a) 805 ÷ 4

Step (i) : There is 8 in hundredth place. That is, there are 8 hundreds. When 8 hundreds are divided equally among 4 individuals, they can be given 2 hundreds each.

Therefore,

	H	T	U
	2		
4)	8	0	5
	8	↓	
		0	

4 × 2 = 8

Step (ii) : There is 0 is tenth place. In other words, there is nothing to distribute among the 4 indiviuals. Therefore there will be 0 in tenth place.

	H	T	U
	2	0	
4)	8	0	5
	8	↓	
		0	
		0	

$4 \times 0 = 0$

Step (iii) : There is 5 in the unit's place. 5 being distributed among 4 individuals, each will get 1 only. Therefore, there will be 1 in unit's place of the quotient and 1 will remain as remainder.

	H	T	U
	2	0	1
4)	8	0	5
	8	↓	
		0	↓
		0	

5
4
1 → Remainder

$4 \times 1 = 4$

So, Quotient = 201, Remainder = 1

Example : (b) 538 ÷ 15

Setp (i) : In case of the problem 538 ÷ 15, there are 5 hundreds. 5 hundreds connot be distributed as hundred among 15 individuals.

Therefore, in hundredth place of the quotient there will be placed either 0 or nothing to be placed.

	H	T	U
	0		
15)	5	3	8

Step (ii) : Considering from left of 538, there are 53 tens and 53 tens can be distributed among 15 individuals because 15 × 3 = 45.

Therefore,

	H	T	U
	0	3	
15)	5	3	8
	4	5	↓
		8	8

Step (iii) : Now, remaining 8 tens combined with 8 units make 88 units. If 88 units are distributed among 15 individuals, they will receive 5 each and 13 will be left out.

	H	T	U	
	0	3	5	
15)	5	3	8	
	4	5	↓	
		8	8	
		7	5	
		1	3	Remainder

Hence, Quotient = 35 and Remainder = 13.

Let us solve :

1) Electric bill of Rehana's family is Rs. 900 for 45 days. What amount of money is charged per day?
2) Rongpi picked 320 oranges from the garden for selling in the market. He put the oranges in some baskets with 25 oranges per basket and took all the baskets to the market. How many oranges were left at home?
3) While organising a cricket match Ajmer and others made 3 stamps of equal length from a bamboo pole of length 220 centimeters. How much will be the length of each stamp and how many centimeters will be left out?

Let us divide a big number by expanding it in terms of its place values–

(a) Division of 9450 by 25

9450 = 9000+400+50

To divide 9450 by 25 means to divide (9000+400+50) by 25

Now,

```
      360
25 ) 9000
   - 75↓
   -----
     150
     150
   -----
       0
       0
   -----
```

Also,

```
      16
25 ) 400
   - 25↓
   -----
     150
     150
   -----
       0
```

Similarly,

```
       2
25 ) 50
     50
   ----
      0
```

So,

$9450 \div 25 = 360 + 16 + 2 = 378$

It can be done in the following way as well.

```
      378
25 ) 9450
   - 75↓
   -----
     195
   - 175
   -----
      200
    - 200
    -----
        0
```

Therefore,
Quotient = 378, Remainder = 0
Are the answers from the two methods not the same?

(b) Division of 4984 by 37

According to place value, 4984 can be expressed as 4984 = 4000+900+84
(Try to explain why should we write 84 in stead of 80+4)
Now, to divide 4984 by 37 is the same as to divide (4000+900+84) by 37.

Let us perform the division separately–

```
      1 0 8
   ┌─────────
37 ) 4 0 0 0
     - 3 7
     ---↓---
       3 0
     -   0
     -------↓
       3 0 0
     - 2 9 6
     ---------
           4
```

Since 4 is left as remainder, it will be added to 900. That is, 900+4=904

Now,

```
      2 4
   ┌─────
37 ) 9 0 4
     - 7 4
     -----↓
       1 6 4
     - 1 4 8
     -------
         1 6
```

In a similar way, 16 (Remainder) + 84 = 100

Therefore,

```
      2
   ┌─────
37 ) 1 0 0
     - 7 4
     -------
         2 6
```

Thus, The quotient of 4984 ÷ 37 will be the sum of the quotients obtained by dividing separately as shown above

So, 4984 ÷ 37 = 108 + 24 + 2 = 134

and the remainder = 26

or

```
      1 3 4
   ┌───────
37 ) 4 9 8 4
     - 3 7
     -----↓↓
       1 2 8
     - 1 1 1
     -------↓
       1 7 4
     - 1 4 8
     -------
         2 6
```

Answer : Quotient = 134, Remainder = 26

Divide according to place values–

a) 9425 ÷ 25 b) 1830 ÷ 18 c) 2706 ÷ 22

Solve in your team :

1) A tea planter brought 3,780 cuttings of tea for plantation. If he plants 36 cuttings in each row, in how many rows can he plant his cuttings?

2) 12 fishermen earned Rs. 9,960 by selling fishes. How much did they earn individually?

3) The wage of a man for 12 days is Rs. 5760. What is his daily wage?

Find the following by copying in your note-book (in 3/4 member teams)

$7\overline{)3468}$ $11\overline{)1021}$ $13\overline{)5832}$

$25\overline{)8420}$ $57\overline{)602}$ $70\overline{)9220}$

Let us adopt a technique :

How to divide by 10, 100, 1000?

Division by 10

i) 4065 ÷ 10

```
        406
10 ) 4065
   - 40
     ---
      06
    -  0
      --
       65
     - 60
       --
        5
```

Quotent = 406

Remainder = 5

ii) 3194 ÷ 10

```
        319
10 ) 3194
   - 30
     ---
      19
    - 10
      --
       94
     - 90
       --
        4
```

Quotent = 319

Remainder = 4

Look at the remainders. When divided by 10, we get the digit in unit's place as the remainder and the number with the remaining digits as the quotient.

Isn't it so easy?

Do yourself some more.

a) 35 ÷ 10 b) 421 ÷ 10 c) 1200 ÷ 10 d) 5010 ÷ 10

Division by 100

iii) 769 ÷ 100

```
          7
100 ) 7 6 9   | 769
    - 7 0 0   |
      6 9     |
```

Here, Quotient = 7
Remainder = 69

iv) 9123 ÷ 100

```
          9 1
100 ) 9 1 2 3   | 9123
    - 9 0 0     |
        1 2 3   |
      - 1 0 0   |
          2 3   |
```

Here, Quotient = 91
Remainder = 23

Observe the remainders. When divided by 100, the number formed by the digits in unit's and ten's places is obtained as the remainder. The number formed by digits in the remaining places. (that is, the number with digits in ten's and thousand's places) is obtained as the quotient. Isn't it so simple? Try yourself doing some more.

a) 405 ÷ 100 b) 111 ÷ 100 c) 344 ÷ 100 d) 5200 ÷ 100

Division by 1000

v) 2318 ÷ 1000

```
          2
1000 ) 2 3 1 8
     - 2 0 0 0
       3 1 8
```

Here, Quotient = 2
Remainder = 318

vi) 8201 ÷ 1000

```
          8
1000 ) 8 2 0 1
     - 8 0 0 0
       2 0 1
```

Here, Quotient = 8
Remainder = 201

Observe the remainders. When divided by 1000, the number formed by the digits in units, ten's and hundred's places is obtained as the remainder. The number formed by the remaining digits is obtained as the quotient. See, how simple it is! You also try with some other.

a) 5200 ÷ 1000 b) 4030 ÷ 1000 c) 85670 ÷ 1000

Let us calculate the quotients and remainders orally–

i) 21 ÷ 10 Quotient [ ] and remainder [ ]

ii) 761 ÷ 10 Quotient [ ] and remainder [ ]

iii) 3477 ÷ 10 Quotient [347] and remainder [7]

iv) 400 ÷ 100 Quotient [ ] and remainder [ ]

v) 338 ÷ 100 Quotient [ ] and remainder [ ]

vi) 5712 ÷ 100 Quotient [57] and remainder [12]

vii) 31245 ÷ 1000 Quotient [31] and remainder [245]

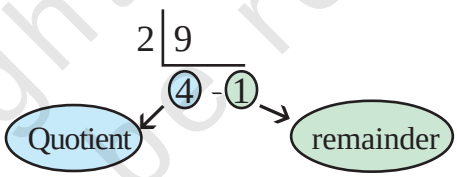
viii) 2221 ÷ 1000 Quotient [ ] and remainder [ ]

ix) 36789 ÷ 1000 Quotient [ ] and remainder [ ]

Division by short method

The problems of division can be done by following short method also. Let us try–

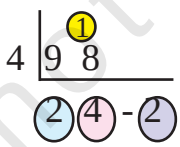
Example : a) **9 ÷ 2**



Mind that, 9 = 2 × 4 + 1

Let us try this with big numbers.

Example : b) **98 ÷ 4**



Here, 98 = 90+8

When 9 tens or 90 is divided by 4, the quotient will be 2 tens and 1 ten will be left as remainder which together with 8 will make 18. Dividing 18 by 4, we will get 4 as quotient and finally 2 as remainder.

Hence, the quotient = 24, the remainder = 2

Example : c) **2390 ÷ 5**

$$\begin{array}{r|l} 5 & 2\ 3\ 9\ 0 \\ \hline & \textcircled{4}\ \textcircled{7}\ \textcircled{8} \end{array}$$

(3 and 4 above the dividend)

Here, 2390 = 2000 + 300 + 90

2 thousands cannot be divided by 5 as thousand, so we consider 23. If 23 hundreds is divided by 5 the quotient will be 4 hundreds and 3 hundreds will be left as remainder. 3 hundreds or 30 tens together with next 9 tens will become 39 tens. When 39 tens are divided by 5 we will get 7 tens as quotient and 4 tens will be left as remainder. That is, 40 will be left as remainder. Now dividing 40 by 5, we get 8 as quotient.

In the same way–

d) **5796 ÷ 16**

$$\begin{array}{r|l} 16 & 5796 \\ \hline & 362\text{-}4 \end{array}$$

Here,

quotient = 362

remainder = 4

Try yourself

e) **4473 ÷ 7**

$$\begin{array}{r|l} 7 & 4473 \\ \hline & \ldots\ldots \end{array}$$

Here,

quotient = ☐

remainder = ☐

f) **1125 ÷ 12**

$$\begin{array}{r|l} 12 & 1125 \\ \hline & \ldots\ldots \end{array}$$

Here,

quotient = ☐

remainder = ☐

(g) Form teams amongst yourselves. Write down the dividend, divisor, quotient and remainder (you can use short method also).

	Dividend	Divisor	Quotient	Remainder
$2\overline{)12}$	12			
$3\overline{)131}$				
$5\overline{)703}$				
$6\overline{)3612}$				
$7\overline{)7045}$	7045	7		
$11\overline{)1131}$				
$12\overline{)3732}$				

Whose answer is correct?

Both of Rahul and Paramjit divided 2746 by 13 separately. Paramjit got the quotient as 211 and the remainder 3. Rahul got quotient equal to 210 and remainder 3. They become confused at their answers being not identical. Do you have similar experience? Do you remember the method to verify whether the answer is true or not?

Remember that whether the division is true or not can be verified by using the following rule–

Dividend = Divisor × Quotient + Remainder

i.e.,

Divisor × Quotient + Remainder = Dividend

Let us memorise : The relation among divisor, quotient, remainder and dividend is known as Division Algorithm.

Now, let us examine who has correctly done the division, Rahul or Paramjit.

As done by Paramjit–

Dividend = 2746
Divisor = 13
Quotient = 211
Remainder = 3

So, Divisor × Quotient + Remainder
= 13 × 211 + 3
= 2743 + 3
= 2746
= Dividend

As done by Rahul–

Dividend = 2746
Divisor = 13
Quotient = 210
Remainder = 3

So, Divisor × Quotient + Remainder
= 13 × 210 + 3
= 2730 + 3
= 2733
Not equal to the dividend.

Now do you understand, who in correct? Paramjit is correct because the answer he got is correct according to Division Algorithm.

Solve the following problems :

a) The price of 17 coconuts is Rs. 544. What is the price of a pair of coconuts?

b) The price of one dozen of pencils is Rs. 48. What is the price per pencil?

c) The distance from Guwahati to a station in Mumbai is 2640 km. What is the time taken by a train to reach Mumbai from Guwahati if it moves at a speed of 60 km. per hour?

d) Divide the greatest number that can be formed by four digits by 13. What are the dividend, divisor and quotient? Using the relation Dividend = Divisor × Quotient + Remainder, verify the correctness of your answer.

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