Unit – 3

MULTIPLES AND FACTORS

MULTIPLES

Do you remember the Multiplication tables?

1 × 2	=	2	1 times 2 is 2
2 × 2	=	4	_____
3 × 2	=	6	_____
4 × 2	=	8	_____
5 × 2	=	10	_____
6 × 2	=	12	_____
7 × 2	=	14	_____
8 × 2	=	16	_____
9 × 2	=	18	_____
10 × 2	=	20	_____

The numbers 2, 4, 6, 8, 10 are the multiples of 2.

Now, let us write the multiples of the numbers, 4, 6, 9.

Remember
For getting the multiples of 4, 6 and 9, we have to recite the multiplication tables of these numbers.

	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Multiples of 4 →	4,	8,	12,	16,	20,	24,	28,	32,	36,	40
Multiples of 6 →	6,	12,	18,	24,	30,	36,	42,	48,	54,	60
Multiples of 9 →	9,	18,	27,	36,	45,	54,	63,	72,	81,	90

Worksheet 1

1. **Write the next four multiples of the first number in each case:**

    (a)   5, 10, 15, _____, _____, _____, _____

    (b)   7, 14, 21, _____, _____, _____, _____

    (c)   10, 20, 30, _____, _____, _____, _____

    (d)   15, 30, 45, _____, _____, _____, _____

    (e)   12, 24, 36, _____, _____, _____, _____

2. **Complete the following:**

    (a)   4th multiple of 5 is _____

    (b)   5th multiple of 3 is _____

    (c)   7th multiple of 8 is _____

    (d)   6th multiple of 2 is _____

    (e)   3rd multiple of 12 is _____

3. **Write the multiples of 6 between 20 and 40.**

4. **Write the multiples of 7 which are less than 40.**

5. **Encircle the multiples of 11.**

    13   11   21   55   97   88   66   10

6. **Encircle the multiples of 8.**

    32   16   19   40   46   56   88   80

MORE ABOUT MULTIPLES

I.   We know—

2 × 3 = ⑥ → Product

Multiples of 2 : 2, 4, ⑥, 8, 10, ___, ___, ___, ___, ___

Multiples of 3 : 3, ⑥, 9, 12, 15, ___, ___, ___, ___, ___

> **6 is the product of 2 and 3 and 6 is one of the multiples of both 2 and 3.**

2 × 3 × 5 = ㉚ → Product

Multiples of 2 : 2, ___, ___, ___, 24, 26, 28, ㉚, ___, ___

Multiples of 3 : 3, ___, ___, ___, 21, 24, 27, ㉚, ___, ___

Multiples of 5 : 5, ___, ___, ___, 15, 20, 25, ㉚, ___, ___

> **30 is the product of 2, 3 and 5 and 30 is also one of the multiples of 2, 3 and 5.**

II. We also know that the—

First multiple of 2 : 2 × 1 = 2 (2 is a multiple of 2)

First multiple of 3 : 3 × 1 = _____ (3 is a multiple of 3)

First multiple of 10 : _____ (_____)

First multiple of 15 : _____ (_____)

We conclude that—

> **Every number is a multiple of itself.**

III. Look at this now.

1 × 1 = 1

1 × 2 = 2

1 × 3 = 3

1 × 20 = _____

1 × 35 = _____

We conclude that—

Every number is a multiple of 1.

Worksheet 2

1. Fill in the blanks.

(a) 3 × 6 = 18   : 18 is a multiple of _____ and _____.

(b) 7 × 8 = 56   : 56 is a multiple of _____ and _____.

(c) 9 × 15 = 135   : _____ is a multiple of 9 and 15.

(d) 21 × 6 = 126   : _____ is a multiple of _____ and 6.

(e) 3 × 5 × 7 = 105   : 105 is a multiple of _____, _____ and _____.

(f) 11 × 8 × 2 = 176   : 176 is a multiple of _____, _____ and _____.

(g) Is 24 a multiple of 24?   : _____ (Yes / No)

(h) Is 61 a multiple of 61?   : _____ (Yes / No)

(i) Is 47 a multiple of 1?   : _____ (Yes / No)

(j) 5 × 4 × 3 = 60   : _____ is a multiple of 4, 5 and _____.

(k) Is 19 a multiple of 2?   : _____ (Yes / No)

Even and Odd Numbers

Do you remember Even and Odd numbers?
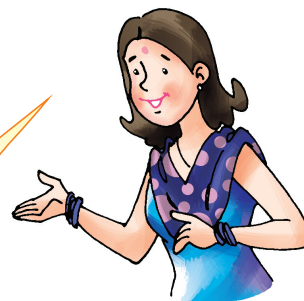
EVEN NUMBERS

Even numbers are those numbers which are multiples of 2.

2, 4, 6, 8, 10, ..., ..., ..., ..., ... are even numbers.

ODD NUMBERS

Odd numbers are those numbers which are not multiples of 2.

1, 3, 5, 7, 9, ..., ..., ..., ..., ... are odd numbers.

Worksheet 3

1. **Encircle the even numbers.**

   4   7   8   12   19   28   56   77

2. **Encircle the odd numbers.**

   76   49   3   19   24   57   69

3. **Fill in the blanks.**

   (a) 75 is an _____ number. (even/odd)

   (b) 178 is an _____ number. (even/odd)

   (c) 1,082 is an _____ number. (even/odd)

   (d) 1,493 is an _____ number. (even/odd)

   (e) A number which is a multiple of _____ is called an even number.

   (f) Smallest even number: _____

   (g) Smallest odd number: _____

COMMON MULTIPLES

Take two numbers say, 2 and 3

Multiples of 2 : 2, 4, ⓺, 8, 10, ⓬, 14, 16, ⓲, 20, ...

Multiples of 3 : 3, ⓺, 9, ⓬, 15, ⓲, 21, 24, 27, ...

The common multiples of 2 and 3 are 6, 12, 18, ..., ..., ...

Among all these common multiples, 6 is the multiple which is the smallest.

So, the Lowest Common Multiple (LCM) of 2 and 3 is 6.

Worksheet 4

1. Find the LCM in each case:

(a) 4, 6

Multiples of 4 : _____

Multiples of 6 : _____

Common multiples of 4, 6 are _____

LCM of 4, 6 : _____

(b) 6, 8, 12

Multiples of 6   : _____

Multiples of 8   : _____

Multiples of 12 : _____

Common multiples of 6, 8 and 12 are _____

LCM of 6, 8 and 12 : _____

(c) 5, 6, 10

Multiples of 5   : _____

Multiples of 6   : _____

Multiples of 10 : _____

Common multiples of 5, 6 and 10 are _____

LCM of 5, 6 and 10 : _____

2. **Find the LCM of the given numbers by listing multiples of these numbers.**

(a) 9, 18   (c) 11, 22, 44   (e) 12, 14, 84
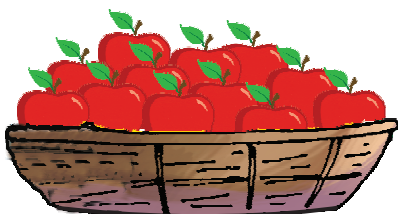
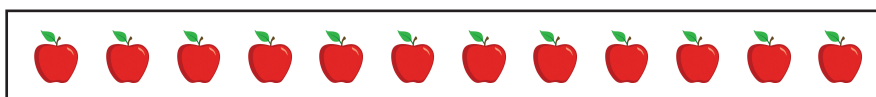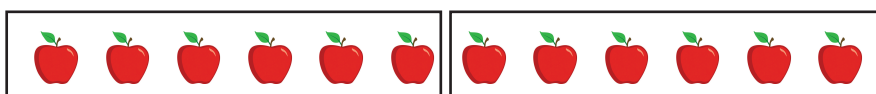(b) 2, 12   (d) 6, 7, 14   (f) 5, 8, 15

FACTORS

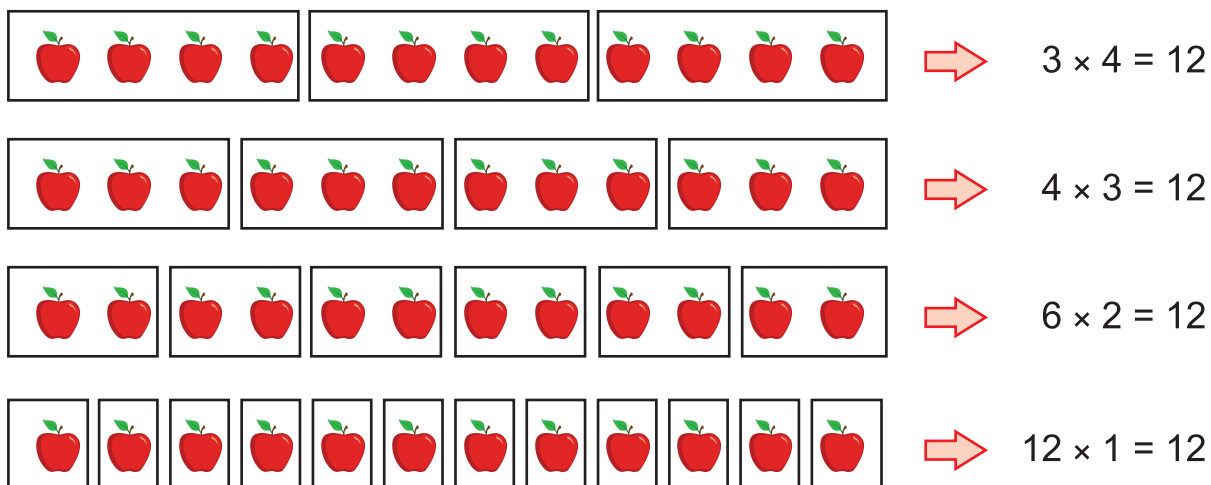Let us divide 12 apples into different groups.

Remember
- Each group should have equal number of apples.
- No apple should be left out.
- Each grouping should be different.

  $1 \times 12 = 12$

  $2 \times 6 = 12$

3 × 4 = 12

4 × 3 = 12

6 × 2 = 12

12 × 1 = 12

We find that 12 apples can be arranged in different groups having 12, 6, 4, 3, 2 and 1 apple(s) in each.

1, 2, 3, 4, 6 and 12 are called the factors of 12.

If we divide 12 by each of its factors, there will not be any remainder left.

Let us see

$$
\begin{array}{r} 12 \\ 1\overline{)12} \\ -1 \\ \hline 02 \\ -2 \\ \hline 0 \end{array}
\qquad
\begin{array}{r} 6 \\ 2\overline{)12} \\ -12 \\ \hline 0 \end{array}
\qquad
\begin{array}{r} 4 \\ 3\overline{)12} \\ -12 \\ \hline 0 \end{array}
\qquad
\begin{array}{r} 3 \\ 4\overline{)12} \\ -12 \\ \hline 0 \end{array}
\qquad
\begin{array}{r} 2 \\ 6\overline{)12} \\ -12 \\ \hline 0 \end{array}
\qquad
\begin{array}{r} 1 \\ 12\overline{)12} \\ -12 \\ \hline 0 \end{array}
$$

When a number is divided by one of its factors, there is no remainder.

Remember

In order to find the factors of a number, we divide the number by 1, 2, 3, 4, 5, 6, 7, ..., ..., ..., ...

Example 1:   Find all the factors of 24.

Solution:

```
        2 4              1 2                8                  6
   1 ) 2 4          2 ) 2 4           3 ) 2 4            4 ) 2 4
     − 2              − 2               − 2 4              − 2 4
     ─────            ─────             ─────              ─────
       0 4              0 4                 0                  0
     −   4            −   4
     ─────            ─────
         0                0
```

```
        4                4
   5 ) 2 4          6 ) 2 4
     − 2 0            − 2 4
     ─────            ─────
         4                0
```

> Same multiplication fact
> 4 × 6 = 24 and 6 × 4 = 24
> **STOP HERE!**

Therefore, factors of 24 are 1 and 24; 2 and 12; 3 and 8; 4 and 6.

Thus, 1, 2, 3, 4, 6, 8, 12 and 24 are the factors of 24.

Another method:

List all the multiplication facts of 24.

$1 \times 24 = 24$

$2 \times 12 = 24$

$3 \times 8 = 24$

$4 \times 6 = 24$ → Factors are 4 and 6

$6 \times 4 = 24$ → Factors are 3 and 8

$8 \times 3 = 24$ → Factors are 2 and 12

$12 \times 2 = 24$ → Factors are 1 and 24

$24 \times 1 = 24$

So, the factors of 24 are 1 and 24; 2 and 12; 3 and 8; 4 and 6.

or

1, 2, 3, 4, 6, 8, 12 and 24 are the factors of 24.

Remember

1 is a factor of every number. Every number is a factor of itself.

CMYK+

Worksheet 5

1. **Answer the following questions. First one is done for you.**

   (a) Is 5 a factor of 36? (No; 36 ÷ 5 = 7 and remainder = 1)

   (b) Is 7 a factor of 77?

   (c) Is 8 a factor of 62?

   (d) Is 9 a factor of 70?

   (e) Is 12 a factor of 120?

   (f) Is 15 a factor of 100?

   (g) Is 20 a factor of 140?

   (h) Is 6 a factor of 284?

2. **Fill in the blanks.**

   (a) 2 × 7 = 14 : 2 and _____ are the factors of 14.

   (b) 3 × 8 = 24 : _____ and 8 are the factors of 24.

   (c) 5 × 7 = 35 : 5 and 7 are the factors of _____.

   (d) 4 × 5 = 20 : 4 and 5 are the _____ of 20.

   (e) 7 × 8 = 56 : 7 and _____ are the _____ of 56.

3. **Write all the factors of the following numbers.**

   (a) 12   (c) 28   (e) 45   (g) 50   (i) 96   (k) 88

   (b) 32   (d) 35   (f) 60   (h) 72   (j) 84   (l) 71

COMMON FACTORS

I. Taking two numbers.

Let us take two numbers say, 8 and 12.

Factors of 8   :   1, 2, 4, 8

Factors of 12 :   1, 2, 3, 4, 6, 12

So, the common factors of 8 and 12 are 1, 2 and 4.

32

CMYK+

Among all these common factors, the factor which is the greatest is 4.

So, the Highest Common Factor (HCF) of 8 and 12 is 4.

II. Taking three numbers.

Take three numbers say, 6, 18 and 20.
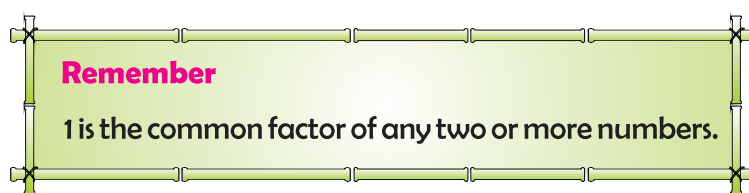
Factors of 6   :   1,   2,   3,   6

Factors of 18 :   1,   2,   3,   6,   9,   18

Factors of 20 :   1,   2,   4,   5,   10,   20

The common factors of 6, 18 and 20 are (1) and (2)

Among these two factors, 2 is the greatest.

So, the Highest Common Factor (HCF) of 6, 18 and 20 is 2.

> **Remember**
>
> 1 is the common factor of any two or more numbers.

Worksheet 6

1. **Find the common factors in each case:**

   (a) 10, 15

      Factors of 10 : _____

      Factors of 15 : _____

      Common factors of 10 and 15 : _____

   (b) 5, 10, 25

      Factors of 5   : _____

      Factors of 10 : _____

      Factors of 25 : _____

      Common factors of 5, 10 and 25 : _____

(c) 12, 18

Factors of 12 : _____

Factors of 18 : _____

Common factors of 12 and 18 : _____

(d) 21, 30

Factors of 21 : _____

Factors of 30 : _____

Common factors of 21 and 30 : _____

(e) 9, 24, 27

Factors of 9 : _____

Factors of 24 : _____

Factors of 27 : _____

Common factors of 9, 24 and 27 : _____

(f) 14, 17, 22

Factors of 14 : _____

Factors of 17 : _____

Factors of 22 : _____

Common factors of 14, 17 and 24 : _____

2. Find the HCF of the following:

(a) 20, 30   (d) 25, 35   (g) 9, 12, 15   (j) 5, 25, 35

(b) 19, 38   (e) 10, 16, 23   (h) 12, 16, 20   (k) 12, 20, 60

(c) 16, 28   (f) 20, 30, 40   (i) 8, 24, 36

PRIME AND COMPOSITE NUMBERS

Let us study the numbers and their factors.

Number	Factors
1	1
2	1, 2	← only 2 factors; 1 and itself
3	1, 3	← only 2 factors; 1 and itself
4	1, 2, 4
5	1, 5	← only 2 factors; 1 and itself
6	1, 2, 3, 6
7	1, 7	← only 2 factors; 1 and itself
8	1, 2, 4, 8
9	1, 3, 9
10	1, 2, 5, 10
11	1, 11	← only 2 factors; 1 and itself
12	1, 2, 3, 4, 6, 12
13	1, 13	← only 2 factors; 1 and itself
14	1, 2, 7, 14

1 is a factor of every number.

Every number is a factor of itself.

From the above, we can say that some numbers have **exactly 2 factors; 1 and the number itself.**

A number that has exactly two distinct factors (1 and the number itself) is called a **Prime Number.** For example, 2, 3, 5, 7, 11, 13, 17 ... are prime numbers.

Now,

A number that has more than two factors is called a **Composite Number.** For example, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21 ... are composite numbers.

1 is neither a prime nor a composite number.

The smallest prime number is 2.

The smallest composite number is 4.

Worksheet 7

1. **Fill in the blanks.**

   (a) Is 1 a prime number? _____ (Yes/No)

   (b) Write the smallest—

       (i) Prime number   : _____

       (ii) Composite number : _____

       (iii) Odd prime   : _____

       (iv) Even composite   : _____

       (v) Odd composite   : _____

2. **Which of the following are prime numbers?**

   10, 12, 15, 17, 19, 21, 25, 33, 35, 37

3. **Which of the following are composite numbers?**

   14, 15, 19, 20, 24, 27, 29, 30, 32

4. **Write all the prime numbers between 20 and 30.**

5. **Write all the composite numbers between 40 and 50.**

PRIME FACTORISATION

Let us take a number say, 12. It can be written in different ways.

   12 = 1 × 12

   12 = 2 × 6   All the factors are not prime.
                       (12, 6 and 4 are composite numbers.)
   12 = 3 × 4

   12 = 2 × 2 × 3   All the factors are prime only.

The prime factorisation of 12 is 2 × 2 × 3.

Factorisation in which every factor is prime, is called the
Prime Factorisation of the number.

Worksheet 8

1. Tick (✓) the correct answer.

(a) Prime factorisation of 28 is–

- 1 × 28 ☐
- 4 × 7 ☐
- 2 × 2 × 7 ☐

(b) Prime factorisation of 42 is–

- 2 × 21 ☐
- 42 × 1 ☐
- 2 × 3 × 7 ☐
- 6 × 7 ☐

(c) Prime factorisation of 36 is–

- 4 × 9 ☐
- 2 × 2 × 9 ☐
- 2 × 2 × 3 × 3 ☐

(d) Prime factorisation of 84 is–

- 42 × 2 ☐
- 2 × 2 × 3 × 7 ☐
- 4 × 21 ☐
- 2 × 7 × 6 ☐

2. State the answer in Yes or No.

(a) The prime factorisation of 15 is 3 × 5. _____

(b) The prime factorisation of 50 is 2 × 5 × 5. _____

(c) The prime factorisation of 90 is 2 × 5 × 9. _____

(d) The prime factorisation of 99 is 3 × 3 × 11. _____

(e) The prime factorisation of 63 is 7 × 9. _____

(f) The prime factorisation of 54 is 2 × 27. _____
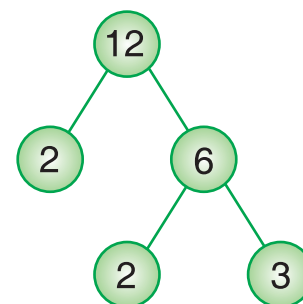
METHODS OF PRIME FACTORISATION

I. Factor Tree Method

Let us take the composite number 12.

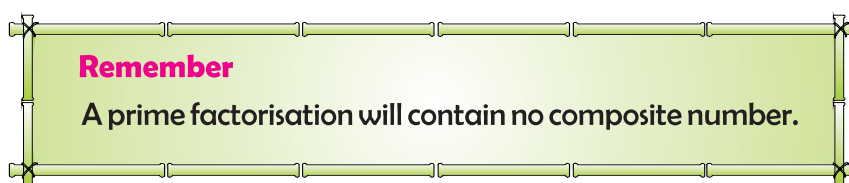We can break 12 into two factors, i.e. 2 and 6.

Here, 2 is prime but 6 is composite.

We can again break 6 into two prime factors, i.e. 2 and 3.

The prime factorisation of 12 is 2 × 2 × 3.

A factor tree of 12

> **Remember**
> A prime factorisation will contain no composite number.

II. Division Method

Let us take the composite number 36 and divide it by the smallest possible prime number.

```
2 | 36
2 | 18
3 | 9
3 | 3
  | 1
```

Divide 36 by the prime number 2 and write quotient (18) below.

Divide 18 by the prime number 2.

Divide 9 by the prime number 3.

Divide 3 by the prime number 3.

STOP, when you get 1.

The prime factorisation of 36 is 2 × 2 × 3 × 3.

> **Remember**
> We start dividing by the smallest possible prime number and keep on doing the same, till we get 1.
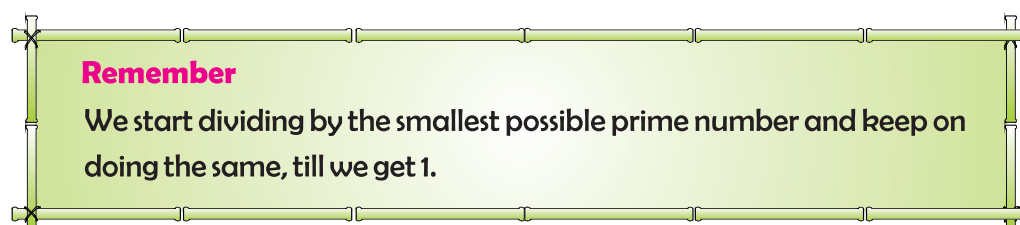
Worksheet 9

1. Fill in the blanks.
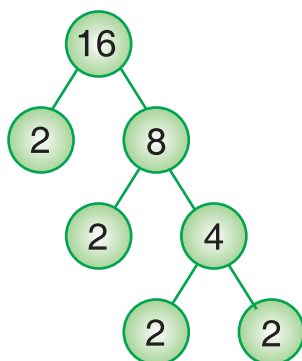
(a)

```
        16
       /    \
      2      8
            /  \
           2    4
               /  \
              2    2
```

(b)

```
        30
       /    \
      2      15
            /   \
           3     5
```

(c)

```
        70
       /    \
      2      35
            /   \
           5     7
```
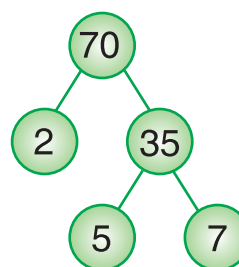
Prime factorisation of
16 is _____

Prime factorisation of
30 is _____

Prime factorisation of
70 is _____

2. Using the Factor Tree Method, find the prime factorisation of the following:

(a) 8   (c) 34   (e) 21   (g) 38

(b) 20   (d) 44   (f) 42   (h) 45

3. Using the Division Method, find the prime factorisation of the following:

(a) 27   (c) 92   (e) 64   (g) 72

(b) 34   (d) 48   (f) 45   (h) 99
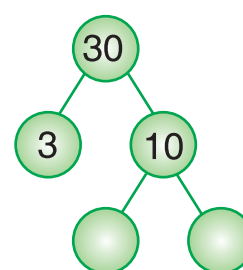
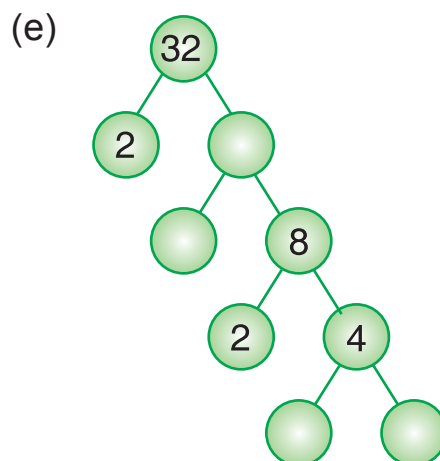**4. Fill in the missing numbers.**

(a)
```
2 | 72
2 |
2 | 18
3 |
3 |
    | 1
```

(b)
```
3 | 75
  | 25
5 |
  |
```

(c)

```
        30
       /    \
      3      10
            /  \
          ( )   ( )
```

(d)

```
2 | 56
2 |
2 |
  | 1
```

(e)

FINDING LOWEST COMMON MULTIPLE BY PRIME FACTORISATION

Take two numbers, 12 and 30.

Let us find the prime factorisation of 12 and 30.

```
2 | 12        2 | 30
2 | 6         3 | 15
3 | 3         5 | 5
  | 1           | 1
```

Prime factorisation of 12 : 2 × 2 × 3

Prime factorisation of 30 : 2 × 3 × 5

LCM of 12 and 30 : 2 × 3 × 2 × 5 = 60

| Includes the prime factorisation of both 12 and 30. | 2 and 3 both appear in the prime factorisation of 12 as well as 30. They are to be included only once while finding LCM. | 2 and 5 appear in the prime factorisation of only 12 and only 30 respectively. |

Thus, the LCM of 12 and 30 is 60.

40

Worksheet 10

1. Fill in the blanks.

(a) Prime factorisation of 15 : _____

Prime factorisation of 90 : _____

LCM of 15 and 90 = _____

(b) Prime factorisation of 18 : _____

Prime factorisation of 24 : _____

LCM of 18 and 24 = _____

(c) Prime factorisation of 25 : _____

Prime factorisation of 15 : _____

LCM of 25 and 15 = _____

(d) Prime factorisation of 27 : _____

Prime factorisation of 42 : _____

LCM of 27 and 42 = _____

2. Using prime factorisation method, find the LCM.

(a) 16 and 20   (f) 25 and 35

(b) 18 and 27   (g) 36 and 45

(c) 12 and 22   (h) 33 and 44

(d) 15 and 24   (i) 20 and 35

(e) 8 and 16   (j) 54 and 38

Brain Teasers

1. **Tick (✔) the correct answer.**

    (a) Which of the following is not a factor of 48?

        (i) 6   (ii) 7   (iii) 12   (iv) 48

    (b) Which of the following is a prime number?

        (i) 91   (ii) 57   (iii) 97   (iv) 81

    (c) The LCM of 10, 20, 25 is–

        (i) 20   (ii) 50   (iii) 100   (iv) 75

    (d) The prime factorisation of 36 is–

        (i) $4 \times 3 \times 3$ (ii) $2 \times 2 \times 9$ (iii) 12×3 (iv) $2 \times 2 \times 3 \times 3$

    (e) 48 has _____ factors.

        (i) 10   (ii) 8   (iii) 7   (iv) 6

2. **Write the first four multiples of:**

    (a) 7   (b) 9   (c) 12   (d) 1   (e) 13

3. **Fill in the blanks.**

    (a) $2 \times 3 \times 7 = 42$; 42 is a multiple of _____, _____, and _____.

    (b) Fifth multiple of 9 : _____.

    (c) Is 48 a multiple of 6? _____ (Yes/No)

    (d) Least multiple of 65 is _____.

    (e) $7 \times 3 = 21$: _____ and _____ are the factors of _____.

    (f) Is 8 a factor of 70? _____ (Yes/No)

    (g) Is 1 a prime number? _____ (Yes/No)

4. **Find the factors of the following:**

    (a) 27   (b) 90   (c) 38   (d) 40

5. Is 217 divisible by 27?

6. Using Factor Tree Method, find the prime factorisation of the following:

   (a) 30   (b) 84

7. Using Division Method, find the prime factorisation of the following:

   (a) 36   (b) 74

8. Find the LCM of:

   (a) 28 and 42   (b) 10 and 95

9. How many even numbers are there between 20 and 50?

10. Write all prime numbers between 50 and 80.

11. Write any five odd multiples of 3.

FRACTIONAL NUMBERS

Do you remember different types of fractions?

Fractions which express the value of the same part of a whole are called **Equivalent Fractions.**

e.g. $\dfrac{1}{2}, \dfrac{2}{4}, \dfrac{4}{8}, \dfrac{8}{16}$

Fractions whose numerators are greater than or equal to the denominators are called **Improper Fractions.**

e.g. $\dfrac{3}{2}, \dfrac{10}{7}, \dfrac{9}{7}, \dfrac{19}{11}, \dfrac{25}{13}$

Fractions whose numerators are smaller than denominators are called **Proper Fractions.**

e.g. $\dfrac{4}{7}, \dfrac{1}{5}, \dfrac{3}{11}, \dfrac{7}{11}$

Fractions having same denominators are called **Like Fractions.**

e.g. $\dfrac{2}{7}, \dfrac{1}{7}, \dfrac{9}{7}, \dfrac{11}{7}$

Fractions having different denominators are called **Unlike Fractions.**

e.g. $\dfrac{1}{2}, \dfrac{2}{5}, \dfrac{4}{13}, \dfrac{8}{9}$

Fractions whose numerators are equal to one are called **Unit Fractions.**

e.g. $\dfrac{1}{2}, \dfrac{1}{7}, \dfrac{1}{11}, \dfrac{1}{16}$

Improper fraction written as a combination of a whole and a proper fraction is called **Mixed Number.**

e.g. $3\dfrac{1}{10}, 8\dfrac{1}{5}, 1\dfrac{1}{2}, 2\dfrac{3}{4}$

Now solve these questions.

1. **Write next three equivalent fractions.**

   (a) $\dfrac{2}{6}$, $\dfrac{4}{12}$, $\dfrac{6}{18}$, _____ , _____ , _____ .

   (b) $\dfrac{1}{7}$, $\dfrac{2}{14}$, $\dfrac{3}{21}$, _____ , _____ , _____ .

   (c) $\dfrac{5}{9}$, $\dfrac{10}{18}$, $\dfrac{15}{27}$, _____ , _____ , _____ .

2. **Convert the following into improper fractions. The first is done for you.**

   (a) $3\dfrac{1}{5}$ $=$ $\dfrac{16}{5}$ _____ $\dfrac{(3 \times 5) + 1}{5}$

   (b) $5\dfrac{1}{7}$ $=$

   (c) $33\dfrac{1}{3}$ $=$

   (d) $2\dfrac{2}{9}$ $=$

3. **Convert the following into a mixed number. The first one is done for you.**

   (a) $\dfrac{50}{7} = 7\dfrac{1}{7}$ _____

   $$7\overline{\smash{\big)}\,50}$$
   $$\underline{-49}$$
   $$1$$

   (b) $\dfrac{11}{9}$ $=$

   (c) $\dfrac{23}{8}$ $=$

   (d) $\dfrac{78}{17}$ $=$

4. **Fill in the blanks.**

   (a) Fractions having same denominators are called _____ fractions.

   (b) A fractional number whose numerator is greater than its denominator is called an _____ fraction.

(c) $\dfrac{1}{2}$, $\dfrac{1}{7}$, $\dfrac{1}{11}$, $\dfrac{1}{4}$ and $\dfrac{1}{3}$ are called _____ fractions.

(d) $3\dfrac{1}{8}$ is a _____ number.

(e) $\dfrac{8}{9} = \dfrac{\square}{72}$

FRACTIONS IN THE LOWEST TERMS

Let us take a fraction, $\dfrac{2}{3}$.

Numerator and Denominator are called the **Terms** of a fraction.

(a) $\dfrac{2}{3} \times \dfrac{2}{2} = \dfrac{4}{6}$

(b) $\dfrac{2}{3} \times \dfrac{4}{4} = \dfrac{8}{12}$

When we multiply the numerator and denominator of a fraction by a common number, we get **higher** terms of the fraction.

(c) $\dfrac{4}{6} \div \dfrac{2}{2} = \dfrac{2}{3}$

(d) $\dfrac{8}{12} \div \dfrac{2}{2} = \dfrac{4}{6}$

When we divide the numerator and denominator of a fraction by a common factor other than 1, we get **lower** terms of the fraction.

In (c), we cannot further divide $\dfrac{2}{3}$ by a common number. It can be divided only by the common factor 1.

$$\dfrac{2}{3} \div \dfrac{1}{1} = \dfrac{2}{3}$$

So, $\dfrac{2}{3}$ is in the lowest terms.

Remember

In order to reduce a fraction into the lowest terms, we go on dividing the numerator and denominator by their common factors till we are left with a fraction having 1 as the only common factor of its numerator and denominator.

Example 1: Reduce $\dfrac{18}{24}$ in its lowest term.

Solution: $\dfrac{18}{24} \div \dfrac{2}{2} = \dfrac{9}{12} \div \dfrac{3}{3} = \dfrac{3}{4}$ is in the **Lowest Term** (because 3 and 4

have no common factor other than 1.)

↑   ↑

Dividing by Dividing by
common   common
factor 2   factor 3

SIMPLIFICATION OF FRACTION BY USING HCF

Example 2: Let us reduce $\dfrac{12}{18}$ to the lowest term.

Solution: HCF of 12 and 18 is 6.

$\dfrac{12}{18} \div \dfrac{6}{6}$ — Numerator is divided by the HCF

— Denominator is divided by the HCF

$= \dfrac{2}{3}$ is the lowest term.

Worksheet 1

1. Encircle the fraction in its lowest term. The first one is done for you.

(a) $\boxed{\dfrac{2}{5}}$, $\dfrac{4}{10}$, $\dfrac{8}{20}$, $\dfrac{6}{15}$

(d) $\dfrac{4}{5}$, $\dfrac{12}{15}$, $\dfrac{32}{40}$, $\dfrac{16}{20}$

(b) $\dfrac{4}{24}$, $\dfrac{6}{36}$, $\dfrac{1}{6}$, $\dfrac{3}{18}$

(e) $\dfrac{6}{10}$, $\dfrac{24}{40}$, $\dfrac{3}{5}$, $\dfrac{18}{30}$

(c) $\dfrac{5}{15}$, $\dfrac{2}{6}$, $\dfrac{4}{12}$, $\dfrac{1}{3}$

2. Tick (✓) those fractions which are in the lowest term.

(a) $\dfrac{6}{10}$ ☐   (c) $\dfrac{1}{8}$ ☐   (e) $\dfrac{13}{15}$ ☐   (g) $\dfrac{21}{15}$ ☐

(b) $\dfrac{5}{32}$ ☐   (d) $\dfrac{5}{8}$ ☐   (f) $\dfrac{81}{90}$ ☐   (h) $\dfrac{26}{42}$ ☐

3. Reduce into the lowest term.

(a) $\dfrac{9}{12}$ (c) $\dfrac{10}{22}$ (e) $\dfrac{28}{56}$ (g) $\dfrac{15}{45}$ (i) $\dfrac{36}{48}$

(b) $\dfrac{6}{20}$ (d) $\dfrac{18}{24}$ (f) $\dfrac{12}{60}$ (h) $\dfrac{48}{54}$ (j) $\dfrac{22}{55}$

COMPARING FRACTIONS

We know—

In **Like Fractions**, greater the numerator, greater will be the value of the fractional number.

and

In **Unlike Fractions**, with same numerator, greater the denominator, smaller will be the value of the fractional number.

$$\dfrac{3}{5} > \dfrac{1}{5}, \quad \dfrac{9}{18} < \dfrac{11}{18}$$

$$\dfrac{3}{10} < \dfrac{3}{8}, \quad \dfrac{4}{12} > \dfrac{4}{15}$$

Now, let us compare the unlike fractions, $\dfrac{3}{4}$ and $\dfrac{5}{8}$

Method 1:   First, we convert the unlike fractions, $\dfrac{3}{4}$ and $\dfrac{5}{8}$ into like fractions. For that, let us first find the Lowest Common Multiple (LCM) of denominators, i.e. 4 and 8.

LCM of 4 and 8 is 8.

$\dfrac{3}{4}$ LCM divided by the denominator 4
$8 \div 4 = 2$ $\dfrac{3 \times 2}{4 \times 2} = \dfrac{6}{8}$

$\dfrac{5}{8}$ LCM divided by the denominator 8
$8 \div 8 = 1$ $\dfrac{5 \times 1}{8 \times 1} = \dfrac{5}{8}$

Now, we compare the like fractions, $\dfrac{6}{8}$ and $\dfrac{5}{8}$.

$$\dfrac{6}{8} > \dfrac{5}{8} \text{ (because 6 > 5)}$$

48

Method 2: Quick method of comparing fractions.

Compare the fractions, $\dfrac{7}{3}$ and $\dfrac{5}{2}$.

$\dfrac{7}{3} \diagdown\!\!\!\diagup \dfrac{5}{2}$ cross multiplication

$7 \times 2 = 14$
$3 \times 5 = 15$ $\rightarrow$ $\dfrac{7}{3} < \dfrac{5}{2}$ (because 14 < 15)

Worksheet 2

1. **Compare the fractions by cross multiplication method.**

(a) $\dfrac{1}{2}$ and $\dfrac{1}{4}$

(b) $\dfrac{3}{5}$ and $\dfrac{3}{4}$

(c) $\dfrac{9}{10}$ and $\dfrac{2}{5}$

(d) $\dfrac{4}{9}$ and $\dfrac{5}{18}$

(e) $\dfrac{3}{5}$ and $\dfrac{3}{7}$

(f) $\dfrac{11}{18}$ and $\dfrac{1}{6}$

2. **Compare the fractions by taking the LCM.**

(a) $\dfrac{7}{2}$ and $\dfrac{5}{3}$

(b) $\dfrac{5}{6}$ and $\dfrac{3}{4}$

(c) $\dfrac{1}{4}$ and $\dfrac{2}{5}$

(d) $\dfrac{3}{10}$ and $\dfrac{3}{4}$

(e) $\dfrac{3}{5}$ and $\dfrac{5}{6}$

(f) $\dfrac{2}{9}$ and $\dfrac{3}{7}$

3. **Compare the following pairs of fractional numbers.**

(a) $5\dfrac{1}{2}$ and $\dfrac{5}{2}$

(b) $\dfrac{9}{7}$ and $1\dfrac{2}{7}$

(c) $\dfrac{19}{7}$ and $2\dfrac{1}{6}$

(d) $4\dfrac{3}{4}$ and $\dfrac{20}{5}$

(e) $1\dfrac{1}{2}$ and $\dfrac{5}{4}$

(f) $1\dfrac{1}{5}$ and $\dfrac{5}{4}$

ASCENDING ORDER AND DESCENDING ORDER

Let us arrange these unlike fractions in ascending order.

$$\dfrac{2}{5}, \dfrac{3}{2}, \dfrac{1}{4}, \dfrac{7}{10}$$

We convert these unlike fractions into like fractions by taking the LCM of the denominators.

49

LCM of 5, 2, 4, 10 is 20.

$$\frac{2}{5} = \frac{2 \times 4}{5 \times 4} = \frac{8}{20} \quad \text{LCM } 20 \div 5$$

$$\frac{3}{2} = \frac{3 \times 10}{2 \times 10} = \frac{30}{20} \quad \text{LCM } 20 \div 2$$

$$\frac{1}{4} = \frac{1 \times 5}{4 \times 5} = \frac{5}{20} \quad \text{LCM } 20 \div 4$$

$$\frac{7}{10} = \frac{7 \times 2}{10 \times 2} = \frac{14}{20} \quad \text{LCM } 20 \div 10$$

Now, we arrange these fractions in ascending order.

$$\frac{5}{20} < \frac{8}{20} < \frac{14}{20} < \frac{30}{20} \quad \text{which means} \quad \frac{1}{4} < \frac{2}{5} < \frac{7}{10} < \frac{3}{2}$$

or **the ascending order is** $\dfrac{1}{4}, \dfrac{2}{5}, \dfrac{7}{10}, \dfrac{3}{2}$.

Worksheet 3

1. **Arrange the following in ascending order.**

   (a) $\dfrac{5}{2}, \dfrac{1}{6}, \dfrac{3}{4}, \dfrac{3}{8}$

   (b) $\dfrac{2}{9}, \dfrac{5}{12}, \dfrac{7}{4}, \dfrac{1}{6}$

   (c) $\dfrac{11}{15}, \dfrac{9}{5}, \dfrac{13}{10}, \dfrac{7}{20}$

   (d) $1\dfrac{1}{2}, \dfrac{11}{6}, 3\dfrac{2}{5}, \dfrac{7}{3}$

2. **Arrange the following in descending order.**

   (a) $\dfrac{3}{10}, \dfrac{7}{15}, \dfrac{5}{6}, \dfrac{1}{30}$

   (b) $\dfrac{3}{14}, \dfrac{7}{5}, \dfrac{9}{7}, \dfrac{11}{10}$

   (c) $\dfrac{9}{20}, \dfrac{2}{10}, \dfrac{7}{50}, \dfrac{1}{100}$

   (d) $2\dfrac{5}{6}, \dfrac{7}{18}, 4\dfrac{1}{4}, \dfrac{10}{9}$

+CMYK+

ADDITION AND SUBTRACTION OF FRACTIONS

Let us add unlike fractions.

Example 3: $\dfrac{3}{8} + \dfrac{1}{6}$

Solution: LCM of denominators 8 and 6 is 24.

$$\dfrac{3}{8} = \dfrac{3 \times 3}{8 \times 3} = \dfrac{9}{24}$$

$$\dfrac{1}{6} = \dfrac{1 \times 4}{6 \times 4} = \dfrac{4}{24}$$

Change the unlike fractions into like fractions.

So, $\dfrac{3}{8} + \dfrac{1}{6}$

$$= \dfrac{9}{24} + \dfrac{4}{24}$$

Add the numerators. Denominator remains the same.

$$= \dfrac{9 + 4}{24}$$

$$= \dfrac{13}{24}$$

Now, let us subtract unlike fractions.

Example 4: $\dfrac{3}{5}$ from $\dfrac{7}{10}$

Solution: $\dfrac{7}{10} - \dfrac{3}{5}$

For making them like fractions, let us get LCM.

LCM of 10 and 5 is 10.

$$= \dfrac{7}{10} - \dfrac{6}{10}$$

$$= \dfrac{7 - 6}{10}$$

$$= \dfrac{1}{10} \text{ (Lowest term)}$$

Example 5: Add $\dfrac{3}{10}$, $\dfrac{7}{15}$ and $\dfrac{1}{6}$

Solution: First, convert unlike fractions into like fractions by finding the LCM of denominators.

Let us find the LCM of the denominators 10, 15, 6.

Check the Steps.

Step 2: Divide the numbers by the common factor of one or more numbers.

Step 1: Write the numbers in a line.

$$
\begin{array}{c|ccc}
2 & 10, & 15, & 6 \\
\hline
3 & 5, & \boxed{15}, & 3 \\
\hline
5 & \boxed{5}, & 5, & 1 \\
\hline
1 & 1, & 1, & 1
\end{array}
$$

15 is not divisible by 2, write 15 as it is.

Step 3: Again, dividing the numbers by the common factor of one or more numbers.

5 is not divisible by 3, write 5 as it is.

Step 4: Stop when you get all quotients equal to one.

LCM of 10, 15, 6 is the product of all divisors.

$$\text{LCM} = 2 \times 3 \times 5 = 30$$

We have, $\dfrac{3}{10} = \dfrac{3 \times 3}{10 \times 3} - (\text{LCM } 30 \div 10) = \dfrac{9}{30}$

$\dfrac{7}{15} = \dfrac{7 \times 2}{15 \times 2} - (\text{LCM } 30 \div 15) = \dfrac{14}{30}$

$\dfrac{1}{6} = \dfrac{1 \times 5}{6 \times 5} - (\text{LCM } 30 \div 6) = \dfrac{5}{30}$

$\dfrac{3}{10} + \dfrac{7}{15} + \dfrac{1}{6} = \dfrac{9}{30} + \dfrac{14}{30} + \dfrac{5}{30}$ Like fractions

$= \dfrac{9 + 14 + 5}{30}$

$= \dfrac{28}{30} = \dfrac{14}{15}$ (Lowest term)

52

Worksheet 4

1. Add.

(a) $\dfrac{4}{7} + \dfrac{11}{14}$

(b) $\dfrac{5}{8} + \dfrac{1}{6}$

(c) $\dfrac{1}{4} + \dfrac{2}{5} + \dfrac{7}{10}$

(d) $\dfrac{5}{2} + \dfrac{1}{8} + \dfrac{3}{4}$

(e) $\dfrac{2}{3} + \dfrac{1}{10} + \dfrac{7}{5}$

(f) $\dfrac{1}{3} + \dfrac{12}{33} + \dfrac{2}{11}$

(g) $2 + 4\dfrac{1}{3} + \dfrac{7}{5}$

(h) $4\dfrac{1}{6} + 2\dfrac{2}{5} + 1\dfrac{1}{3}$

(i) $7 + \dfrac{9}{10} + \dfrac{2}{3}$

2. Subtract.

(a) $\dfrac{1}{2} - \dfrac{3}{8}$

(b) $\dfrac{9}{10} - \dfrac{3}{5}$

(c) $\dfrac{11}{12} - \dfrac{2}{3}$

(d) $\dfrac{2}{3} - \dfrac{2}{8}$

(e) $4\dfrac{1}{4} - \dfrac{3}{8}$

(f) $3\dfrac{4}{5} - 2\dfrac{1}{10}$

(g) $4 - \dfrac{3}{8}$

(h) $2\dfrac{1}{5} - 1\dfrac{1}{2}$

Word Problems

Let us study some examples.

Example 6: Rohan ate $\dfrac{1}{4}$ of a cake on Monday and $\dfrac{1}{2}$ of the cake on Tuesday. What fraction of the cake did he eat on these two days?

Solution: To find the total cake eaten, we add the two fractions.
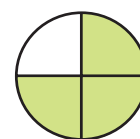
Fraction of cake eaten on Monday   Fraction of cake eaten on Tuesday   Fraction of cake eaten on two days

$\dfrac{1}{4}$ + $\dfrac{1}{2}$ = $\dfrac{3}{4}$

$$\dfrac{1}{4} + \dfrac{1}{2} = \dfrac{1}{4} + \dfrac{2}{4}$$

$$= \dfrac{1+2}{4} = \dfrac{3}{4} \qquad \boxed{\text{LCM} = 4}$$

Rohan ate $\dfrac{3}{4}$ of the whole cake on these two days.

Example 7: Meenu has a 10 metres long ribbon. She used $6\frac{1}{5}$ metres of it. How much ribbon is left with her?

Solution: We subtract the two lengths to find the length of ribbon left.

Total length of ribbon $= 10$ m $= \dfrac{10}{1}$ m

Ribbon used $= 6\dfrac{1}{5}$ m $= \dfrac{31}{5}$

Ribbon left $= \dfrac{10}{1} - \dfrac{31}{5}$

$= \dfrac{10 \times 5}{1 \times 5} - \dfrac{31}{5}$ $\boxed{\text{LCM} = 5}$

$= \dfrac{50}{5} - \dfrac{31}{5}$

$= \dfrac{19}{5} = 3\dfrac{4}{5}$ **m**

Meenu has $3\dfrac{4}{5}$ m ribbon left with her.

Worksheet 5

1. Solve the following word problems.

(a) Anjali spent $\dfrac{1}{5}$ of her pocket money on comics and $\dfrac{3}{4}$ on sweets. How much of her pocket money did she spend altogether?

(b) In a high jump contest, Ramesh jumped $3\dfrac{8}{9}$ m and Rakesh jumped $4\dfrac{1}{3}$ m. Who jumped more height and by how much more?

(c) During examination, Sonal studied for $3\dfrac{1}{2}$ hours. She studied science for $1\dfrac{1}{4}$ hours and mathematics for rest of the hours. How much time did she study mathematics?

+CMYK+

(d) Mr Gupta had $15\dfrac{2}{5}$ litres of petrol in his car. He went for a drive. By the time he reached home, he had only $2\dfrac{1}{3}$ litres of petrol left. How much petrol was used?

(e) Ms Kumar bought $2\dfrac{2}{5}$ kg potatoes, 2 kg onions and $1\dfrac{2}{5}$ kg tomatoes. Find the total weight of vegetables Ms Kumar bought.

(f) Neha used $1\dfrac{1}{2}$ m red ribbon, $\dfrac{3}{4}$ m yellow ribbon and 1 m white ribbon for her project. Find the total length of ribbon she used for her project.

MULTIPLICATION OF FRACTIONAL NUMBERS

I. Multiplication of a fractional number and a whole number.

We begin by taking a few examples.
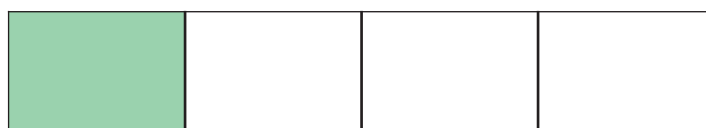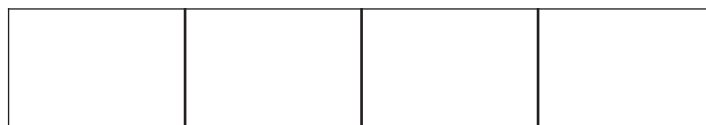
Example 8: Multiply 3 and $\dfrac{1}{4}$.

Solution: It means we have to find what is 3 times $\dfrac{1}{4}$. We know multiplication is repeated addition.

Therefore, $3 \times \dfrac{1}{4} = \dfrac{1}{4} + \dfrac{1}{4} + \dfrac{1}{4} = \dfrac{1+1+1}{4} = \dfrac{3}{4}$.

Thus, $3 \times \dfrac{1}{4} = \dfrac{3 \times 1}{4} = \dfrac{3}{4}$.

We can look at it in the following manner also.

Let us take a rectangular strip of paper divided into four equal parts.

$\dfrac{1}{4}$

55

+CMYK+

$$\frac{1}{4} + \frac{1}{4}$$

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$$

Therefore, $3 \times \frac{1}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$.

Or   we can use the quick method $3 \times \frac{1}{4} = \frac{3 \times 1}{4}$.

Now, let us multiply $\frac{2}{5}$ by 2

$2 \times \frac{2}{5} = \frac{2 \times 2}{5} = \frac{4}{5}$ (By using the quick method of multiplication of fractional numbers)

Example 9:   Multiply $\frac{1}{4}$ and 3.

Solution: Let us consider a rectangle divided into three equal parts.

We further divide each part into four equal parts.

There are 12 parts in all.

$\frac{1}{4}$ of these 12 parts will be three equal parts (shaded portion).

Thus, $\frac{1}{4}$ of 3 will be $\frac{3}{4}$ (three out of four equal parts)

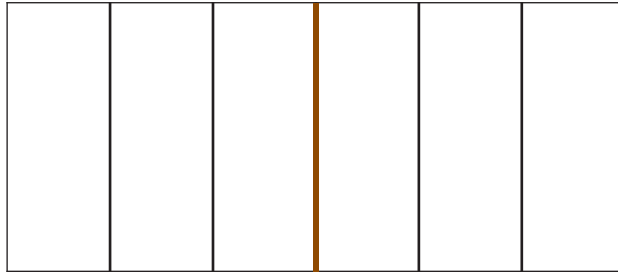Thus, $\frac{1}{4}$ of 3 = $\frac{3}{4}$

       or

$\frac{1}{4} \times 3 = \frac{1 \times 3}{4} = \frac{3}{4}$.
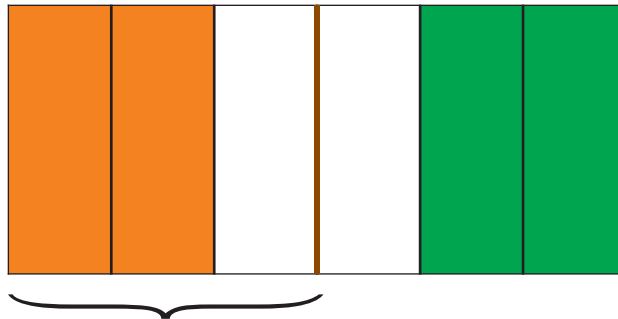
Combining the two results we get–

$$3 \times \frac{1}{4} = \frac{1}{4} \times 3 = \frac{3}{4}.$$

Example 10: Find $\dfrac{1}{3}$ of 2

Solution: Consider a rectangle of sides 2 units and 1 unit. Divide it into two parts. Divide each of the parts into three equal parts.

Now, we want to find out one-third of these two parts. We can divide the whole rectangle into three parts as shown below. Orange part is $\dfrac{1}{3}$ of the whole rectangle.

Orange part is $\dfrac{2}{3}$ of this one part (i.e. $\dfrac{2}{3}$ of 1)

So, we get $\dfrac{1}{3}$ of 2 is $\dfrac{2}{3}$.

i.e. $\dfrac{1}{3} \times 2 = \dfrac{2}{3}.$

Example 11: Multiply $\dfrac{3}{5}$ and 4.

Solution: $4 \times \dfrac{3}{5} = \dfrac{4 \times 3}{5}$ ——— Product of whole number and numerator of a fractional number.

$$= \dfrac{12}{5}$$

$$= 2\dfrac{2}{5}$$

Remember

In order to get the product of a whole number and a fractional number, we multiply the whole number and numerator of the fractional number. Denominator remains the same.

Worksheet 6

1. Multiply.

(a) $\dfrac{1}{3} \times 2$ (e) $10\dfrac{1}{10} \times 15$ (i) $49 \times 7\dfrac{1}{7}$

(b) $\dfrac{5}{8} \times 9$ (f) $6 \times \dfrac{4}{15}$ (j) $3\dfrac{5}{8} \times 32$

(c) $4\dfrac{1}{2} \times 4$ (g) $100 \times 3\dfrac{1}{10}$ (k) $45 \times 2\dfrac{1}{9}$

(d) $9\dfrac{1}{3} \times 27$ (h) $52 \times 2\dfrac{1}{13}$ (l) $50 \times \dfrac{17}{15}$

II. Multiplication of a fractional number by another fractional number.

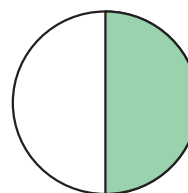**Example 12:** Find $\dfrac{1}{2}$ of $\dfrac{1}{2}$.

Solution: Krishan asks his mother to give him half of a *chappati*. After finishing this, he asks her to give him half of the remaining half. How much does he get in the second serving?

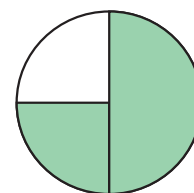Clearly, he gets $\frac{1}{4}$ of the *chappati* in the second serving.

Thus, $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$.

In other words,

$$\frac{1}{2} \text{ of } \frac{1}{2} = \frac{1}{2} \times \frac{1}{2} = \frac{1 \times 1}{2 \times 2} = \frac{1}{4}.$$
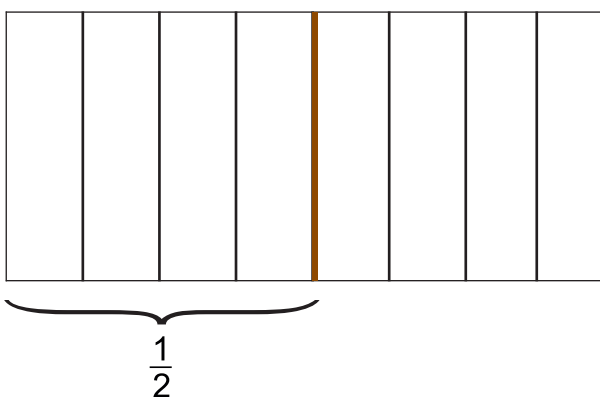

First serving   Second serving

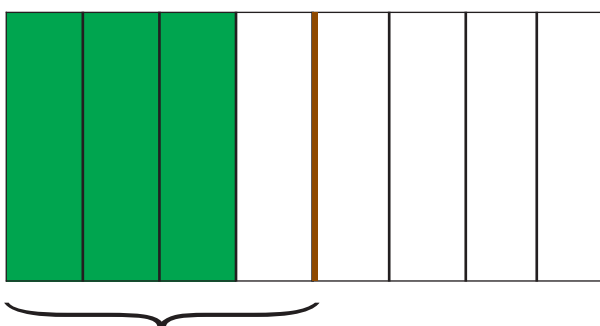**Example 13:** Find $\frac{3}{4}$ of $\frac{1}{2}$.

Solution: Consider a rectangle. Take its half. Divide each of the parts into four equal parts.

$\frac{1}{2}$

We want to find out $\frac{3}{4}$ of $\frac{1}{2}$. So, we shade three parts out of four parts of the half.

The shaded portion is $\frac{3}{8}$ of the whole.

i.e. $\frac{3}{4}$ of $\frac{1}{2}$ is $\frac{3}{8}$.

$$\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}.$$

Example 14:   Let us multiply $\frac{2}{5}$ by $\frac{3}{7}$.

Solution: $\frac{2}{5} \times \frac{3}{7} = \frac{2 \times 3}{5 \times 7}$ Multiplying the numerators separately.

Multiplying the denominators separately.

$$= \frac{6}{35}$$

Example 15:   Multiply $1\frac{4}{5}$ by $9\frac{1}{3}$.

Solution: $1\frac{4}{5} \times 9\frac{1}{3} = \frac{9}{5} \times \frac{28}{3}$ Improper fractions

$$= \frac{9 \times 28}{5 \times 3}$$

$$= \frac{3 \times 28}{5 \times 1}$$ Dividing 9 and 3 by their common factor 3.

$$= \frac{84}{5} = 16\frac{4}{5}$$

Example 16:   Multiply $\frac{1}{10}$, $\frac{2}{3}$ and $\frac{5}{8}$.

Solution: $\frac{1}{10} \times \frac{2}{3} \times \frac{5}{8} = \dfrac{1 \times \cancel{2}^{\,1} \times \cancel{5}^{\,1}}{{}_{2}\cancel{10} \times 3 \times \cancel{8}_{4}}$

$$= \frac{1 \times 1 \times 1}{2 \times 3 \times 4}$$

$$= \frac{1}{24}$$

60

> **Remember**
>
> In order to multiply two fractional numbers, we multiply the numerators and the denominators separately.

Worksheet 7

1. Multiply the following fractional numbers.

(a) $\dfrac{2}{3} \times \dfrac{4}{5}$

(b) $\dfrac{4}{7} \times \dfrac{1}{3}$

(c) $\dfrac{3}{8} \times \dfrac{5}{11}$

(d) $\dfrac{2}{5} \times \dfrac{15}{16}$

(e) $3\dfrac{1}{4} \times \dfrac{8}{9}$

(f) $7\dfrac{1}{2} \times 8\dfrac{1}{3}$

(g) $2\dfrac{2}{5} \times \dfrac{2}{15}$

(h) $\dfrac{6}{7} \times 3\dfrac{1}{2}$

(i) $\dfrac{1}{10} \times \dfrac{2}{3} \times \dfrac{5}{8}$

(j) $1\dfrac{2}{5} \times \dfrac{4}{21}$

(k) $5\dfrac{5}{6} \times 2\dfrac{1}{7}$

(l) $\dfrac{4}{5} \times \dfrac{7}{8} \times \dfrac{24}{35}$

PROPERTIES OF MULTIPLICATION OF FRACTIONAL NUMBERS

Multiplication of two fractional numbers.

What is $\dfrac{2}{3} \times \dfrac{1}{5}$ **?**

$$= \dfrac{2}{3} \times \dfrac{1}{5}$$

$$= \dfrac{2 \times 1}{3 \times 5} = \dfrac{2}{15}$$

Let us interchange the places of fractional numbers.

$$\dfrac{1}{5} \times \dfrac{2}{3} = \dfrac{1 \times 2}{5 \times 3} = \dfrac{2}{15}$$

We observe that the product in both the cases is same.

So, $\dfrac{2}{3} \times \dfrac{1}{5} = \dfrac{1}{5} \times \dfrac{2}{3}$

> If two fractional numbers are multiplied in either order, the product remains the same.

Multiplication of a fractional number by 1.

What is $\dfrac{3}{5} \times 1$?

$$\dfrac{3}{5} \times 1 = \dfrac{3 \times 1}{5}$$

$$= \dfrac{3}{5}$$

> If a fractional number is multiplied by one, the product is the fractional number itself.

Multiplication of a fractional number by 0.

What is $\dfrac{7}{11} \times 0$?

$$\dfrac{7}{11} \times 0 = \dfrac{7 \times 0}{11}$$

$$= 0$$

> If a fractional number is multiplied by zero, the product is zero.

Multiplication of three fractional numbers.

What is $\dfrac{1}{2} \times \dfrac{1}{5} \times \dfrac{3}{4}$?

$$\frac{1}{2} \times \frac{1}{5} \times \frac{3}{4} \qquad\qquad \frac{1}{2} \times \frac{1}{5} \times \frac{3}{4}$$

$$= \left(\frac{1}{2} \times \frac{1}{5}\right) \times \frac{3}{4} \qquad\qquad = \frac{1}{2} \times \left(\frac{1}{5} \times \frac{3}{4}\right)$$

Groupings are changed

$$= \frac{1}{10} \times \frac{3}{4} \qquad\qquad = \frac{1}{2} \times \frac{3}{20}$$

$$= \frac{3}{40} \qquad\qquad\qquad = \frac{3}{40}$$

Same Product

If three fractional numbers are multiplied in any order, the product remains the same.

Worksheet 8

1. Fill in the blanks.

(a) $\dfrac{1}{2} \times \dfrac{4}{5} = \boxed{} \times \dfrac{4}{5}$

(b) $\dfrac{7}{13} \times \boxed{} = \boxed{} \times \dfrac{9}{17}$

(c) $\dfrac{7}{9} \times \boxed{} = 0$

(d) $1\dfrac{1}{2} \times \boxed{} = 1\dfrac{1}{2}$

(e) $\left(\dfrac{1}{2} \times \dfrac{1}{3}\right) \times \dfrac{1}{5} = \boxed{} \times \left(\dfrac{1}{3} \times \dfrac{1}{5}\right)$

(f) $\dfrac{5}{6} \times 1 = \boxed{}$

(g) $2\dfrac{5}{7} \times \boxed{} = 0$

(h) $\boxed{} \times 1 = \dfrac{15}{28}$

(i) $\dfrac{11}{17} \times 0 = \boxed{}$

(j) $\dfrac{2}{5} \times \boxed{} \times \dfrac{5}{6} = \dfrac{3}{7} \times \dfrac{5}{6} \times \boxed{}$

Word Problems

Let us study some word problems.

Example 17: Rahul has $\dfrac{3}{4}$ kg of toffees. He gives $\dfrac{2}{3}$ of it to his sister. How much toffee was given to his sister?

Solution: Quantity of toffees Rahul has $= \dfrac{3}{4}$ kg

Quantity of toffees given to his sister $= \dfrac{2}{3}$ of $\dfrac{3}{4}$ kg

$$= \dfrac{2}{3} \times \dfrac{3}{4} \text{ kg}$$

$$= \dfrac{{}^{1}2 \times 3^{1}}{{}_{1}3 \times 4_{2}} \text{ kg}$$

$$= \dfrac{1 \times 1}{1 \times 2} = \dfrac{1}{2} \text{ kg}$$

Rahul's sister gets $\dfrac{1}{2}$ kg toffees.

Example 18: In a class of 20 students, $\dfrac{3}{4}$ are girls. Find the number of girls in that class.

Solution: Total students $= 20$

Number of girls $= \dfrac{3}{4}$ of 20

$$= \dfrac{3}{4} \times 20$$

$$= \dfrac{3 \times 20^{5}}{{}_{1}4}$$

$$= \mathbf{15}$$

There are 15 girls in the class.

64

Worksheet 9

1. **Solve the following word problems.**

   (a) Gita has eight marbles. She gave $\frac{1}{4}$ of them to her younger brother. How many marbles did her brother get?

   (b) One plum cake weighs $\frac{3}{4}$ kg. If Mr Ramesh buys five such cakes, how many kilograms of cake did he buy?

   (c) The cost of one kilogram apples is ₹ $25\frac{1}{2}$. What is the cost of $1\frac{1}{2}$ kilogram apples?

   (d) Mr Gupta puts $3\frac{1}{4}$ litres of petrol in his car. If he uses $\frac{1}{3}$ of it, how many litres of petrol did he use?

   (e) Neha spends $\frac{3}{5}$ hours a day in morning exercises. How many hours does she spend in morning exercises in one week?

   (f) The thickness of Mathematics book of Class-V is $1\frac{1}{4}$ cm. What will be the thickness of a pile of 16 such books?

RECIPROCAL FRACTION

Observe the following fractions carefully.

Multiply the two fractions, $\frac{2}{3}$ and $\frac{3}{2}$.

$$\frac{2}{3} \times \frac{3}{2} = \frac{2 \times 3}{3 \times 2}$$

$$= \frac{6}{6}$$

$$= 1$$

Now, let us multiply 2 and $\dfrac{1}{2}$.

$$\text{i.e.} \quad 2 \times \dfrac{1}{2}$$

$$= \dfrac{2}{1} \times \dfrac{1}{2}$$

$$= \dfrac{2 \times 1}{1 \times 2}$$

$$= \dfrac{2}{2} = 1$$

In both the cases, the two fractions are called **reciprocals** of each other.

When you multiply reciprocals, the product is one.

Remember

• In order to get the reciprocal of a given fraction, we interchange the numerator and the denominator.
• Reciprocal of zero does not exist.

Worksheet 10

1. **Find the reciprocals of the following:**

(a) $\dfrac{2}{3}$

(b) $\dfrac{5}{12}$

(c) $\dfrac{1}{12}$

(d) $\dfrac{1}{18}$

(e) 1

(f) 8

(g) $5\dfrac{2}{3}$

(h) $33\dfrac{1}{3}$

(i) $3\dfrac{5}{8}$

2. **State whether these are reciprocals of each other.**

(a) $\dfrac{1}{2}$, 2

(b) $\dfrac{3}{2}$, $\dfrac{3}{2}$

(c) $\dfrac{5}{9}$, $\dfrac{9}{5}$

(d) $\dfrac{4}{11}$, $\dfrac{3}{11}$

(e) $5\dfrac{1}{3}$, $\dfrac{16}{3}$

(f) $\dfrac{2}{3}$, $1\dfrac{1}{2}$

3. **Fill in the blanks.**

(a) $\dfrac{1}{8} \times \underline{\quad} = 1$

(b) $\dfrac{1}{3} \times 3 = \underline{\quad}$

(c) $\dfrac{5}{11} \times \underline{\quad} = 1$

(d) $\underline{\quad} \times \dfrac{6}{13} = 1$

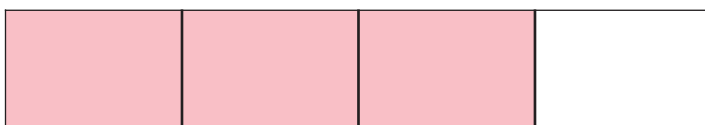(e) $\underline{\quad} \times 3\dfrac{1}{3} = 1$

(f) $7\dfrac{1}{3} \times \underline{\quad} = 1$

66

DIVISION OF FRACTIONAL NUMBERS

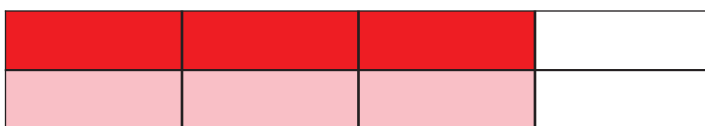**I. Division of a fractional number by a whole number.**

Example 19: Divide $\dfrac{3}{4}$ by 2.

Solution: Look at the figure.

This represents $\dfrac{3}{4}$.

Now, let us divide $\dfrac{3}{4}$ into two equal halves.

But this represents $\dfrac{3}{8}$.

Therefore, $\dfrac{3}{4} \div 2 = \dfrac{3}{8}$.

We can also look at it in another manner.

$$\dfrac{1}{4} \div 2 = \dfrac{1}{8} = \dfrac{1}{4} \times \dfrac{1}{2}.$$

So, dividing $\dfrac{1}{4}$ by 2 actually means multiplying $\dfrac{1}{4}$ with the reciprocal of 2, i.e. $\dfrac{1}{2}$.

We follow the same rule for dividing a whole number by a fractional number and for dividing a fractional number by a fractional number.

Example 20: Divide $\dfrac{5}{8}$ by 7.

Remember

To divide, first change division sign to multiplication sign and multiply by the reciprocal of the divisor.

Solution: $\dfrac{5}{8} \div 7$

Here, dividend = $\dfrac{5}{8}$, divisor = 7

$$\dfrac{5}{8} \div 7 = \dfrac{5}{8} \times \dfrac{1}{7}$$

Change division to multiplication

Reciprocal of the divisor

$$= \dfrac{5 \times 1}{8 \times 7} = \dfrac{5}{56}$$

Example 21: Divide $5\dfrac{1}{5}$ by 10.

Solution: $5\dfrac{1}{5} \div 10$

$$= \dfrac{26}{5} \div 10$$

$$= \dfrac{26}{5} \times \dfrac{1}{10}$$

Multiplying by the reciprocal of divisor, 10

$$= \dfrac{26 \times 1}{5 \times 10} = \dfrac{26}{50} = \dfrac{13}{25}$$

II. Division of a whole number by a fractional number.

Example 22: Divide 3 by $\dfrac{2}{5}$.

Solution: $3 \div \dfrac{2}{5}$

Here, dividend = 3, divisor = $\dfrac{2}{5}$

$$3 \div \dfrac{2}{5} = \dfrac{3}{1} \div \dfrac{2}{5}$$

$$= \dfrac{3}{1} \times \dfrac{5}{2}$$

Multiplying by the reciprocal of divisor, $\dfrac{2}{5}$

$$= \dfrac{3 \times 5}{1 \times 2} = \dfrac{15}{2}$$

$$= 7\dfrac{1}{2}$$

68

III. Division of a fractional number by another fractional number.

Example 23: Divide $\dfrac{3}{8}$ by $\dfrac{4}{5}$.

Solution: Here, $\dfrac{3}{8} \div \dfrac{4}{5}$

$$= \dfrac{3}{8} \times \dfrac{5}{4} \quad \text{—— Multiplying by the reciprocal of divisor, } \dfrac{4}{5}$$

$$= \dfrac{15}{32}$$

Worksheet 11

1. **Divide.**

(a) $\dfrac{1}{5} \div 3$

(b) $2\dfrac{4}{5} \div 6$

(c) $2\dfrac{3}{5} \div 4$

(d) $18 \div \dfrac{3}{4}$

(e) $20 \div 3\dfrac{1}{3}$

(f) $100 \div 33\dfrac{1}{3}$

(g) $\dfrac{4}{5} \div \dfrac{7}{9}$

(h) $2\dfrac{2}{3} \div 1\dfrac{1}{6}$

(i) $10\dfrac{1}{3} \div 4\dfrac{1}{2}$

(j) $8\dfrac{1}{4} \div 3\dfrac{5}{8}$

(k) $2\dfrac{1}{10} \div 1\dfrac{2}{5}$

(l) $6\dfrac{3}{5} \div 4\dfrac{7}{12}$

PROPERTIES OF DIVISION OF FRACTIONAL NUMBERS

Division of a fractional number by 1.

What is $\dfrac{3}{5} \div 1$?

$$\dfrac{3}{5} \div 1 = \dfrac{3}{5} \times 1 = \dfrac{3}{5} \quad \text{—— Multiplying by the reciprocal of one, that is one itself.}$$

Similarly, $\dfrac{11}{15} \div 1 = \dfrac{11}{15} \times 1 = \dfrac{11}{15}$

> A fraction divided by one is the fraction itself.

Division of 0 by a fractional number.

What is $0 \div \dfrac{5}{6}$ **?**

$$= 0 \times \dfrac{6}{5} = 0 \quad\text{——————}\quad \text{Multiplying by the reciprocal of } \dfrac{5}{6}$$

Similarly, $0 \div \dfrac{3}{7} = 0 \times \dfrac{7}{3} = 0$

> Zero divided by any fraction is zero.

Division of a fractional number by itself.

What is $\dfrac{7}{9} \div \dfrac{7}{9}$ **?**

$$\dfrac{7}{9} \div \dfrac{7}{9} = \dfrac{7}{9} \times \dfrac{9}{7} \quad\text{——————}\quad \text{Multiplying by the reciprocal of } \dfrac{7}{9}$$

$$= \dfrac{63}{63} = 1$$

Similarly, $\dfrac{6}{11} \div \dfrac{6}{11} = \dfrac{6}{11} \times \dfrac{11}{6} = \dfrac{66}{66} = 1$

> A fraction divided by itself is one.

Worksheet 12

1. **Fill in the blanks.**

   (a) $\dfrac{4}{5} \div \dfrac{4}{5} = \boxed{}$

   (b) $\dfrac{9}{11} \div 1 = \boxed{}$

   (c) $3\dfrac{1}{3} \div 1 = \boxed{}$

   (d) $9\dfrac{1}{3} \div 9\dfrac{1}{3} = \boxed{}$

   (e) $6\dfrac{3}{5} \div \boxed{} = 6\dfrac{3}{5}$

   (f) $\dfrac{5}{7} \div \boxed{} = 1$

   (g) $\boxed{} \div 3\dfrac{1}{3} = 0$

   (h) $0 \div \dfrac{1}{5} = \boxed{}$

   (i) $\dfrac{6}{7} \div \boxed{} = \dfrac{6}{7}$

Word Problems

Let us study some word problems.

Example 24: John has $\dfrac{3}{4}$ metre long ribbon. He wants to cut it into three equal pieces. What is the length of each piece?

Solution:

Length of ribbon $= \dfrac{3}{4}$

Number of pieces $= 3$

Length of each piece $= \dfrac{3}{4} \div 3 = \dfrac{3}{4} \times \dfrac{1}{3}$

$= \dfrac{1}{4}$ metre

Length of each piece is $\dfrac{1}{4}$ metre.

Worksheet 13

1. **Solve the following word problems.**

(a) A piece of ribbon is $5\dfrac{3}{5}$ metres long. If it is cut into 14 equal pieces, what is the length of each piece?

(b) The product of two fractions is 9. If one of the fraction is $2\dfrac{1}{7}$, find the other fraction.

(c) It takes $\dfrac{1}{2}$ minute to cook one *dosa*. How many *dosas* can be cooked in $\dfrac{1}{4}$ hour?

(d) Sheetal has $1\dfrac{3}{4}$ kg of sweets. She distributes $\dfrac{1}{4}$ kg to each of her friend and finishes all the sweets. To how many friends did she distribute the sweets?

(e) A pile of Class-V Mathematics books has thickness of $14\dfrac{2}{5}$ cm. If each book is $1\dfrac{1}{5}$ cm thick, find how many books make up the pile.

Value Based Question

It was lunch time. Teena and Meena gathered for lunch. They were to eat home-made pizza first. As they were about to start eating, they noticed that their friend Reema had not brought lunch and was hungry. So they decided to equally share the pizza with her. All of them were happy to share the food and enjoyed their lunch.

1. What fraction of pizza did each friend get?

2. What are the things that you like to share with your friends?

Brain Teasers

1. **Tick (✔) the correct answer.**

   (a) $\dfrac{1}{3} - \dfrac{1}{9}$ is–

   (i) $\dfrac{1}{9}$ (ii) $\dfrac{2}{9}$ (iii) $\dfrac{1}{3}$ (iv) $\dfrac{1}{2}$

   (b) A fraction is greater than one, if—

   (i) Numerator = Denominator   (ii) Numerator < Denominator

   (iii) Numerator > Denominator   (iv) Numerator = 1

   (c) $\dfrac{2}{3}$ of an hour = _____ minutes.

   (i) 40 minutes   (ii) 50 minutes   (iii) 60 minutes   (iv) 20 minutes

(d) What number should be added to $\dfrac{8}{9}$ to get $\dfrac{9}{8}$?

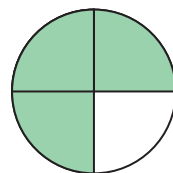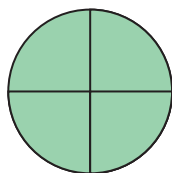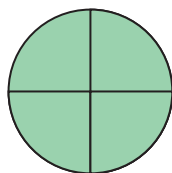   (i) $\dfrac{9}{8}$ (ii) 1   (iii) $\dfrac{17}{72}$ (iv) $\dfrac{19}{72}$

(e) What fraction is the shaded portion?

    (i) 2   (ii) $1\dfrac{1}{2}$ (iii) $1\dfrac{3}{4}$ (iv) $2\dfrac{3}{4}$

2. Find the sum.

(a) $7 + 1\dfrac{1}{2} + \dfrac{9}{5}$ (b) $2\dfrac{1}{2} + 1\dfrac{1}{4} + 2\dfrac{4}{5}$

3. Subtract.

(a) $4\dfrac{1}{2}$ from 6   (b) $2\dfrac{1}{2}$ from $7\dfrac{3}{5}$

4. Find the value of $2\dfrac{3}{5} + 3\dfrac{1}{2} - 2\dfrac{1}{8}$

5. Sheetal needs $1\dfrac{1}{2}$ metres red ribbon, $\dfrac{3}{4}$ metres yellow ribbon and one metre black ribbon to make a doll. Find the total length of ribbon needed.

6. Renu's mother bought five litres of milk. $2\dfrac{1}{2}$ litres milk was used for making sweets, $\dfrac{3}{4}$ litres for making tea. How many litres of milk is left?

7. Reduce into lowest terms.

(a) $\dfrac{8}{12}$ (b) $\dfrac{35}{63}$ (c) $\dfrac{44}{99}$ (d) $\dfrac{6}{10}$

8. Arrange in ascending order.

(a) $\dfrac{3}{4}, \dfrac{7}{10}, \dfrac{1}{2}, \dfrac{5}{8}$ (b) $1\dfrac{5}{6}, \dfrac{11}{9}, \dfrac{5}{16}, 3$

9. **Find the product.**

(a) $\dfrac{4}{12} \times \dfrac{21}{18} \times \dfrac{35}{25}$

(b) $1\dfrac{1}{4} \times 2\dfrac{3}{5} \times 2\dfrac{4}{5}$

10. **Solve these division sums.**

(a) $9\dfrac{5}{8} \div 2\dfrac{1}{4}$

(b) $52 \div 2\dfrac{3}{5}$

11. **State which of the following statements are true.**

(a) The reciprocal of $\dfrac{9}{7}$ is $1\dfrac{2}{7}$. _____

(b) The multiplicative inverse of 1 is 1. _____

(c) $\dfrac{1}{2} \div \dfrac{1}{4}$ means how many quarters in $\dfrac{1}{2}$. _____

(d) The product of a fractional number and one is one. _____

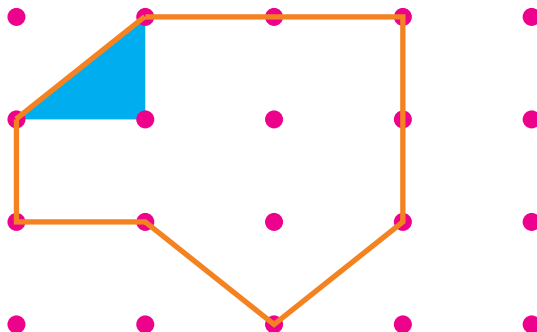(e) $\dfrac{4}{9} \div \dfrac{4}{9} = \dfrac{81}{16}$ _____

(f) $0 \div \dfrac{2}{3} = \dfrac{2}{3}$ _____

12. **A family consumes $2\dfrac{1}{2}$ litres of milk every day. What is the total consumption of milk by the family in the month of April?**

13. **Mala has 36 toffees. She gives $\dfrac{4}{9}$ of them to her friend. How many toffees are left with her?**

14. **If the shaded portion has a value of $\dfrac{1}{3}$, what is the value of the whole shape?**

+CMYK+

Unit – 5

DECIMALS

INTRODUCTION

The system of numeration that we have studied is known as the **Hindu Arabic System of Numeration**. With a slight variation in the number names, it is also the **International System of Numeration.**

This system of numeration is known as the **Decimal System of Numeration**, the reason being, that we use ten symbols–1, 2, 3, 4, 5, 6, 7, 8, 9, 0 (digits) to write any number, howsoever large it may be.

This very concept is extended to write fractions in the form of decimals, in this Unit.

CONCEPT OF DECIMAL

Arrange number 7 in the place value chart.

Hundreds	Tens	Ones
		7

If we multiply 7 by 10, we get 70.

Hundreds	Tens	Ones
	7	0

7 has jumped one column to the left.

If we divide 70 by 10, we get 7.

Hundreds	Tens	Ones
		7

7 has jumped back one column to the right.

We observe that when we multiply 7 by 10, 7 jumps one column to LEFT and when we divide 7 tens (70) by 10, 7 jumps one column to the RIGHT.

Let us divide 7 again by 10.

7 will jump one more column to the RIGHT.

So, we add one more column called TENTHS in the place value chart. Since $\frac{7}{10}$ is a fraction with a value less than 1, we separate $\frac{7}{10}$ by a point called the **decimal point**.

75

+CMYK+

Hundreds	Tens	Ones	Decimal	Tenths
(100)	(10)	(1)	point (.)	(1/10)

$7 \div 10 = \dfrac{7}{10}$

$\dfrac{7}{10}$ = .7 or 0.7 $\rightarrow$ **We read it as point 7 or decimal seven or zero decimal seven.**
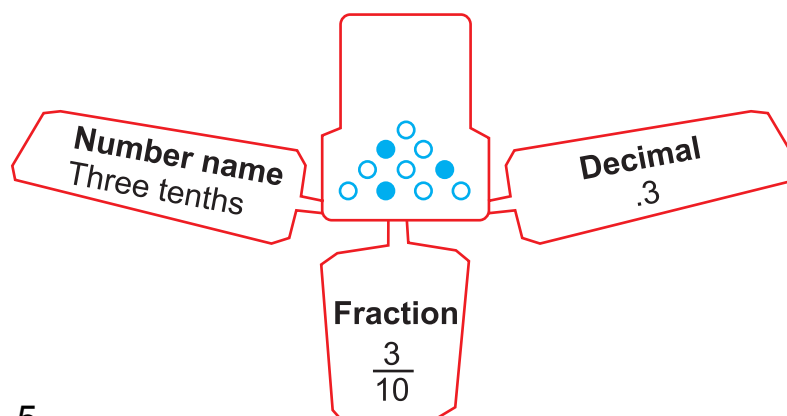
Remember

Decimal takes less space in writing. It is easier to compare two fractional numbers using decimals.

DECIMALS USED TO REPRESENT TENTHS
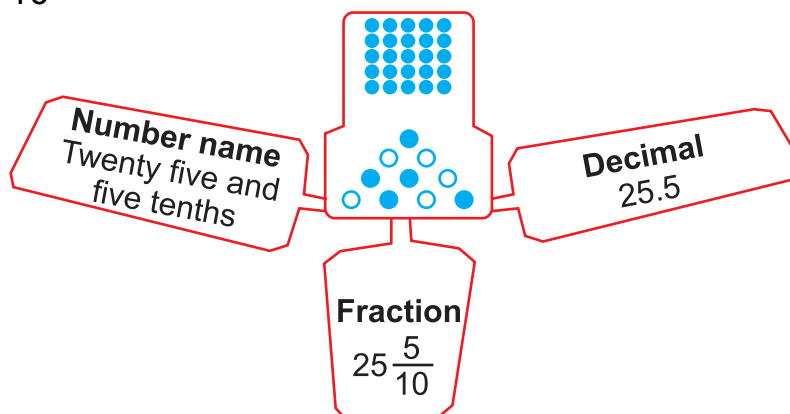
Let us study some examples.

Example 1: $\dfrac{3}{10}$

Solution:

Number name
Three tenths

Decimal
.3

Fraction
$\dfrac{3}{10}$

Example 2: $25\dfrac{5}{10}$

Solution:

Number name
Twenty five and five tenths

Decimal
25.5

Fraction
$25\dfrac{5}{10}$

Worksheet 1

1. Write as decimals.

(a) $\dfrac{3}{10}$ (c) $\dfrac{9}{10}$ (e) $\dfrac{7}{10}$ (g) $\dfrac{6}{10}$

(b) $\dfrac{5}{10}$ (d) $\dfrac{8}{10}$ (f) $\dfrac{1}{10}$ (h) $\dfrac{4}{10}$

2. Write as fractions.

(a) 0.2   (c) 0.7   (e) 0.5   (g) 0.8

(b) 0.4   (d) 0.6   (f) 0.9   (h) 0.3

3. Read and write the number names. First one is done for you.

(a) 7.5   Seven and five tenths

(b) 9.4

(c) 18.2

(d) 65.8

(e) 225.7

(f) 315.8

(g) 1238.7

(h) 2987.3

(i) 1087.3

4. Write in decimal form. First one is done for you.

(a) Eight tenths   0.8

77

(b) Five tenths _____

(c) Six and two tenths _____

(d) Fifty three and seven tenths _____

(e) Eighty two and three tenths _____

(f) One hundred thirty five and five tenths _____

(g) Five hundred eighty five and three tenths _____

(h) Two hundred twenty seven and seven tenths _____

5. Fill in the blanks.

Picture	Number Name	Fraction	Decimal
(a)	Two tenths	$\dfrac{2}{10}$	0.2
(b)	Seven tenths	_____	_____
(c)	_____	$\dfrac{9}{10}$	_____
(d)	Five tenths	_____	_____
(e)	_____	_____	0.1
(f)	_____	$\dfrac{3}{10}$	_____

INTRODUCTION (HUNDREDTH AND THOUSANDTH)

Let us study the place value of 7 in these numerals.

Thousands (1000)	Hundreds (100)	Tens (10)	Ones (1)	Decimal point (.)	Tenths (1/10)	
4	3	7	8			7 tens = 7 × 10
	4	3	7			7 ones = 7 × 1
		4	3	.	7	7 tenths = 7 ÷ 10

If 7 moves one more column to the RIGHT, its place value becomes–

$$7 \div 100 = \frac{7}{100} = 7 \text{ hundredths.}$$

Thousands (1000)	Hundreds (100)	Tens (10)	Ones (1)	Decimal point (.)	Tenths (1/10)	Hundredths (1/100)
			0	.	0	7

If 7 moves one more column further to the RIGHT, its place value becomes–

$$7 \div 1000 = \frac{7}{1000} = 7 \text{ thousandths.}$$

Hundreds (100)	Tens (10)	Ones (1)	Decimal point (.)	Tenths (1/10)	Hundredths (1/100)	Thousandths (1/1000)
		0	.	0	0	7

> Fractions with denominators 10, 100 and 1000 are called **Decimal Fractions.**

DECIMAL PART AND WHOLE NUMBER PART

A decimal number consists of two parts—

    (1)   Whole number part

    (2)   Decimal part

These two parts are separated by a dot ⊙

Let us take a decimal number say, 35.015

35 ·	**0 1 5**
Whole number part	**Decimal part**

While reading a decimal number, the whole number part is read as a whole and the decimal number part in separate digits.

Let us read some decimal numbers.

      3.5   = Three point five

    61.83   = Sixty one point eight three.

  928.009 = Nine hundred twenty eight point zero zero nine

Do you know?

$275\dfrac{87}{100}$ is called a **Mixed Fraction.**

We read it as Two hundred seventy five and eighty seven hundredths.

Worksheet 2

1. Read the following decimals loudly.

    (a) 5.3   (c) 182.135   (e) 1.839   (g) 2001.201

    (b) 71.8   (d) 172.001   (f) 91.99   (h) 100.100

2. **Write the number names. The first one is done for you.**

   (a) 63.85 = Sixty three and eighty five hundredths.

   (b) 15.72   (e) 45.05   (h) 100.97   (k) 15.674

   (c) 11.07   (f) 987.62   (i) 8257.85   (l) 67.005

   (d) 9.24   (g) 125.09   (j) 9.782   (m) 768.135

3. **Write in decimal form. The first one is done for you.**

   (a) Fifty seven and seven hundredths.   57.07

   (b) Sixty and one hundredths.   _____

   (c) Twenty four and twelve hundredths.   _____

   (d) Seventy six and five hundredths.   _____

   (e) Two and four hundred seventy six thousandths.   _____

   (f) Four and sixty seven hundredths.   _____

   (g) Thirty two and fifty four thousandths.   _____

   (h) Five thousand six hundred seventy two and four
        hundred seventy eight thousandths.   _____

4. **Write the whole number part and decimal number part in each of the following:**

Decimal	Whole number part	Decimal number part
(a) 75.231	75	231
(b) 2.537	_____	_____
(c) 9.27	_____	_____
(d) 125.32	_____	_____
(e) 62.104	_____	_____
(f) 0.43	_____	_____
(g) 41.0	_____	_____

5. Write the decimals in words. The first one is done for you.

(a) 468.103 = Four hundred sixty eight point one zero three.

(b) 7.8   (d) 65.92   (f) 647.003   (h) 1.943

(c) 39.3   (e) 352.184   (g) 1482.309   (i) 81.88

6. Show each of the following decimals on a Place Value Chart.

(a) 8.4   (c) 0.9921   (e) 3.333   (g) 5.7679

(b) 19.34   (d) 9.009   (f) 0.075   (h) 182.95

7. Write as decimals.

(a) $15\dfrac{3}{10}$ (c) $101\dfrac{12}{100}$ (e) $11\dfrac{11}{100}$ (g) $76\dfrac{2}{1000}$

(b) $7\dfrac{8}{100}$ (d) $9\dfrac{153}{1000}$ (f) $46\dfrac{1}{10}$ (h) $5\dfrac{55}{100}$

Easy Way to Convert Fractions to Decimals

Let us take a number, $\dfrac{67}{100}$

Step 1:   See denominator. It is 100 | No. of zeroes is two |

Step 2:   In numerator, count **two** digits from the right and move towards left, then, put a point (**.**)

Left $\leftarrow$ 0.67 $\rightarrow$ Right

Thus, $\dfrac{67}{100}$ = .67

In the same way,

$$\frac{27}{1000} = .027$$

| Three zeroes |

Count three digits and put a decimal. Since there are only two digits, we will put a zero and then, a decimal.

Worksheet 3

1. Write in decimal form. First one is done for you.

(a) $\frac{9}{100}$ = .09 or 0.09

(b) $\frac{3}{100}$

(c) $\frac{12}{100}$

(d) $\frac{23}{100}$

(e) $\frac{178}{100}$

(f) $\frac{3572}{100}$

(g) $\frac{7}{1000}$

(h) $\frac{92}{1000}$

(i) $\frac{34}{1000}$

2. Write as fractions. First one is done for you.

(a) 0.67 = $\frac{67}{100}$

(b) 0.42
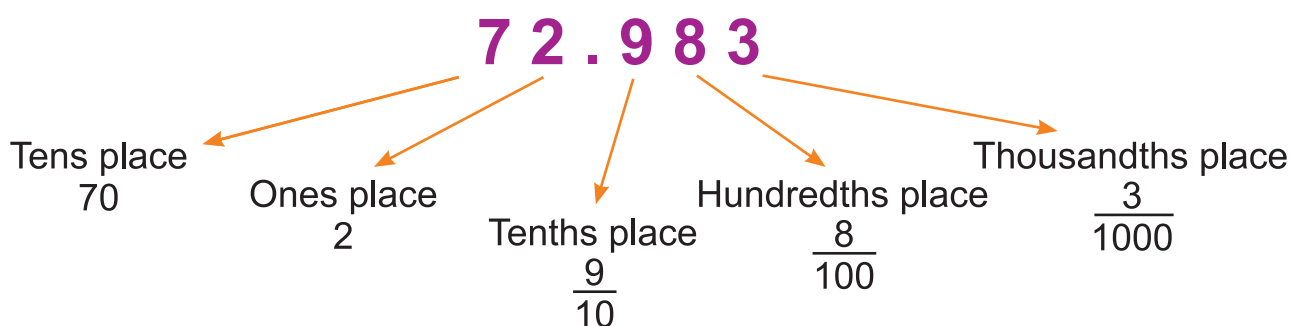
(c) 0.39

(d) 0.05

(e) 0.03

(f) 0.09

(g) 0.731

(h) 0.908

(i) 0.017

EXPANDED FORM OF A DECIMAL

Observe the place values of all the digits in 72.983

$$7\,2\,.\,9\,8\,3$$

Tens place 70

Ones place 2

Tenths place $\frac{9}{10}$

Hundredths place $\frac{8}{100}$

Thousandths place $\frac{3}{1000}$

The number 72.983 can be written as:

7 tens / 70 + 2 ones / 2 + 9 tenths / $\frac{9}{10}$ + 8 hundredths / $\frac{8}{100}$ + 3 thousandths / $\frac{3}{1000}$

This is the expanded form of 72.983

83

Similarly, the expanded form of 528.497

= 5 hundreds + 2 tens + 8 ones + 4 tenths + 9 hundredths + 7 thousandths

$$= 500 + 20 + 8 + \frac{4}{10} + \frac{9}{100} + \frac{7}{1000}$$

Worksheet 4

1. Fill in the blanks. First one is done for you.

(a) 17.25 : 2 is in the __tenths__ place.

(b) 892.416 : 4 is in the _____ place.

(c) 57.63 : 3 is in the _____ place.

(d) 908.007 : 7 is in the _____ place.

(e) 57.98 : 5 is in the _____ place.

(f) 139.081 : 0 is in the _____ place.

2. Complete each of the following. The first one is done for you.

(a) $19.892 = 10 + 9 + \frac{8}{10} + \frac{9}{100} + \frac{2}{1000}$

(b) 15.217 = _____

(c) 62.306 = _____

(d) 149.356 = _____

(e) 762.027 = _____

(f) 30.108 = _____

3. Write in the expanded form. The first one is done for you.

(a) $92.73 = 9 \text{ tens} + 2 \text{ ones} + 7 \text{ tenths} + 3 \text{ hundredths} = 90 + 2 + \frac{7}{10} + \frac{3}{100}$

(b) 14.657   (d) 24.405   (f) 453.762

(c) 803.316   (e) 127.253   (g) 15.006

4. Write the decimal form for each of the following:

(a) $5 + \dfrac{2}{10} + \dfrac{3}{100} + \dfrac{7}{1000}$ = ⬚

(b) $70 + 3 + \dfrac{9}{10} + \dfrac{8}{1000}$ = ⬚

(c) $6 + \dfrac{4}{100} + \dfrac{5}{1000}$ = ⬚

(d) $200 + 5 + \dfrac{3}{100} + \dfrac{6}{1000}$ = ⬚

LIKE AND UNLIKE DECIMALS

See these decimals:

Decimal Numbers	Whole Number Part	Decimal Part
36.2	36	2
4.85	4	85
61.059	61	059

Digits in the decimal part are called **Decimal Places**.

See us. We have the same number of decimal places. We are called **Like Decimals**.

0.38
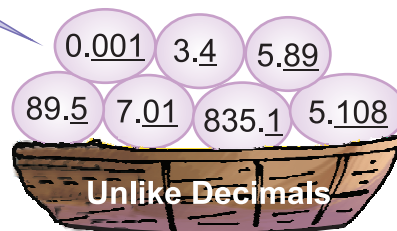17.86   0.05
110.83   58.11   965.03
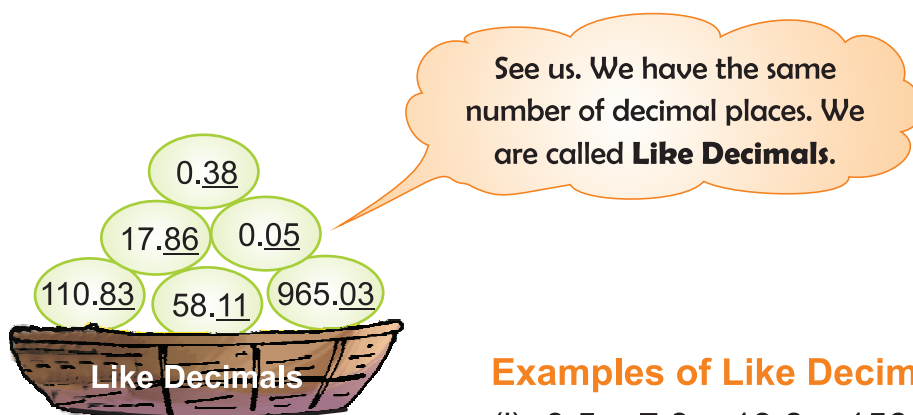
Like Decimals

Examples of Like Decimals

(i) 0.5 , 7.3 , 19.8 , 156.2 , 9.1

(ii) 1.043 , 81.861 , 9.500 , 361.841 , 8.018

See us. We have different number of decimal places. We are called **Unlike Decimals**.

0.<u>001</u>　3.<u>4</u>　5.<u>89</u>

89.<u>5</u>　7.<u>01</u>　835.<u>1</u>　5.<u>108</u>

Unlike Decimals

Examples of Unlike Decimals

(i) 0.<u>1</u> , 15.<u>38</u> , 0.1<u>53</u>

(ii) 59.<u>8</u> , 6.<u>81</u> , 0.<u>008</u>

CONVERTING UNLIKE DECIMALS INTO LIKE DECIMALS

Example 3:　　Let us take a pair of unlike decimals say, 0.7 and 0.361.

Solution:　　　　**0.<u>7</u>**　　　and　　　**0.<u>361</u>**

| It has one decimal place. | It has three decimal places. |

We can easily convert unlike decimals into like decimals without changing their values.

0.361　　0.700

Two zeroes placed to the right of 7.

Adding zeroes to the right of a decimal number does not change its value.

Now, 0.361 and 0.700 are like decimals as both have three decimal places.

Example 4:　Convert 0.6, 30.8 and 5.418 to like decimals.

Solution:　　　　0.6,　　　30.8 ,　　5.<u>418</u> ——— Unlike decimals

Check the number having maximum number of decimal places.

　　　　　　　　0.6<u>00</u> ,　　3.08<u>0</u> ,　　5.418 ——— Like decimals

Add zeroes and convert into decimal numbers with three decimal places.

86

Worksheet 5

1. **Encircle the pairs of like decimals.**

   (a) 3.5, 1.68   (d) 1.382, 21.671   (g) 431.6, 431.67

   (b) 11.27, 7.831   (e) 93.21, 93.217   (h) 0.5, 0.50

   (c) 16.8, 7.3   (f) 0.101, 0.010   (i) 85.31, 85.310

2. **Convert into a group of like decimals.**

   (a) 1.8, 31.629, 17.26, 5.01   (d) 0.105, 0.5, 0.05, 0.50

   (b) 405.3, 45.38, 45.03, 45.8   (e) 6.72, 6.271, 6.2, 0.006

   (c) 85.785, 201.3, 9.1, 16.65   (f) 143.85, 68.095, 8.09, 71.1

ORDERING OF DECIMAL NUMBERS

Do you remember how we compared whole numbers?

In the same way, we can also compare decimal numbers.

Remember

- First, we compare the whole number part.

  4̲3̲.8 > 3̲.89

- then, we compare the digits in the tenths place.

  81.8̲3 > 81.7̲92

- next, we compare the digits in the hundredths place.

  6.72̲5 < 6.74̲

- lastly, we compare the digits in the thousandths place.

  13.804̲ < 13.809̲

Worksheet 6

1. **Compare the following pairs of decimal numbers.**

   (a) 0.37 ◯ 0.47

   (b) 182.6 ◯ 181.32

   (c) 0.9 ◯ 0.10

   (d) 6.96 ◯ 6.69

   (e) 126.60 ◯ 126.6

   (f) 342.81 ◯ 342.801

   (g) 4.123 ◯ 4.13

   (h) 75.826 ◯ 75.825

   (i) 71.780 ◯ 71.708

   (j) 6.820 ◯ 6.82

2. **Arrange in ascending order.**

   (a) 6.035, 6.53, 6.005, 6.359

   (b) 19.071, 19.170, 19.701, 19.017

   (c) 400.27, 400.072, 400.72, 400.7

   (d) 2.118, 2.811, 2.818, 2.881

3. **Arrange in descending order.**

   (a) 218.81, 281.82, 281.81, 218.9

   (b) 11.064, 11.604, 11.406, 11.1

   (c) 30.03, 30.031, 30.301, 30.3

   (d) 0.045, 0.040, 0.544, 0.005

Brain Teasers

1. **Tick (✔) the correct answer.**

   (a) The decimal number formed by interchanging the digit in the tenths place and tens place of 68.49 is–

   (i) 86.49   (ii) 68.94   (iii) 86.94   (iv) 48.69

(b) The smallest decimal number amongst the following is–

    (i) 0.001   (ii) 0.01   (iii) 0.0001   (v) 0.1

(c) Product of digits in the tenths place and thousandths place of 15.246 is–

    (i) 12   (ii) 10   (iii) 24   (iv) 8

(d) The smallest decimal number formed by using the digits 1, 0 and 8 is–

    (i) .108   (ii) .81   (iii) .018   (iv) .081

(e) Which mathematical symbol should be inserted between 5 and 6 so as to get a number greater than 5 but less than 6?

    (i) +   (ii) –   (iii) .   (iv) =

2. Look at the given number and answer the questions that follow:

        287.149

(a) What digit is in tens place?

(b) What digit is in tenths place?

(c) What is the place of 9?

3. Write as decimal number.

(a) $5\dfrac{3}{10}$ (c) $39\dfrac{18}{100}$ (e) $187\dfrac{7}{10}$

(b) $6\dfrac{91}{100}$ (d) $7\dfrac{394}{1000}$ (f) $99\dfrac{999}{1000}$

4. Write as fractions or mixed numbers.

(a) 0.42   (c) 0.86   (e) 20.108

(b) 0.005   (d) 12.82

5. Write the number names.

(a) 15.82   (b) 76.891

6. Present the following numbers on a place value chart.

(a) 6.82   (b) 14.257

7. **Write in the expanded form.**

   (a) 4.82   (b) 16.57   (c) 108.003

8. **Write the fraction for 0.0002.**

9. **Change the following into like decimals.**

   (a) 4.8; 43.659; 0.48; 0.4; 436.82

   (b) 7.7; 7.77; 777.7; 7.777; 0.77

10. **Arrange the group of decimals in descending order.**

   (a) 0.3; 0.333; 3.3; 33.3

   (b) 567.38; 576.83; 576.9; 567.3

11. **Write decimal numbers to match the statements. The first one is done for you.**

   (a) 8 in the hundredths place, 6 in the tenths place, 3 in the ones place and 1 in tens place. | 13.68 |

   (b) 9 in the ones place, 4 in the tens place, 6 in the hundredths place and 0 in the tenths place.

   (c) 7 in the thousandths place, 0 in the hundredths place, 1 in the tenths place, 5 in the ones place and 3 in the tens place.

   (d) 7 in the tenths place, 6 in the tens place, 4 in the hundredths place, 2 in the hundreds place and 0 in the ones place.

Unit – 6

ADDITION AND SUBTRACTION OF DECIMAL NUMBERS

ADDITION OF DECIMAL NUMBERS

We can add decimal numbers in the same way as we add whole numbers.

Let us add like decimals, 1.56 and 5.32

$$
\begin{array}{r}
1.56 \\
+\ 5.32 \\
\hline
\mathbf{6.88} \\
\hline
\end{array}
$$

Decimal point placed in sum also.

- Arrange the digits in the place value columns.
- The decimal point should come one below the other in column.
- Add the addends just as we add whole numbers.

Now, let us add unlike decimals, 18.786 and 48.96

18.786 + 48.96<u>0</u>

Converting into like decimals

$$
\begin{array}{r}
18.786 \\
+\ 48.960 \\
\hline
\mathbf{67.746} \\
\hline
\end{array}
$$

Decimal point placed in sum also.

- Arrange the digits in the place value columns.
- Decimal point should come one below the other.
- Add the addends.

Worksheet 1

1. Add the following decimal numbers.

(a)
```
   0.35
+ 0.42
```

(c)
```
   59.623
+ 41.208
```

(e)
```
   3.843
+ 7.025
```

(b)
```
   1.74
+ 8.15
```

(d)
```
   91.04
  136.24
+  2.81
```

(f)
```
  483.905
   16.240
+  93.809
```

2. Arrange in columns and add.

(a) 0.35 + 0.62

(b) 8.496 + 2.564

(c) 25.08 + 5.8

(d) 14.9 + 64.941

(e) 3.19 + 27.974 + 8.8

(f) 31.001 + 13.01 + 131.1

(g) 7.8 + 31.856 + 0.956

(h) 191.38 + 12.904 + 76.1

PROPERTIES OF ADDITION OF DECIMAL NUMBERS

We know that   5.6 + 3.8 = 9.4

or   3.8 + 5.6 = 9.4

The sum remains the same.

Order of addends is changed.

> If we change the order of the addends, the sum remains the same.

Let us add 1.2, 2.4 and 1.1

Groupings changed

(1.2 + 2.4) + 1.1   1.2 + (2.4 + 1.1)

= 3.6 + 1.1   = 1.2 + 3.5

= 4.7   = 4.7

Sum is same

> The sum remains the same, even after changing the groupings of the addends.

We know   7.2 + 0 = 7.2

                    0 + 8.915 = 8.915

> If zero is added to any decimal number or a decimal number is added to zero, the sum is the number itself.

Worksheet 2

1. Complete the following:

(a) 2.3 + 5.9 = ⬚ + 2.3

(b) 18.69 + ⬚ = ⬚ + 4.35

(c) 9.8 + 16.21 + 8.36 = 16.21 + ⬚ + 8.36

(d) 0 + 9.105 = ⬚

(e) 15.05 + ⬚ = 15.05

(f) ⬚ + 0 = 79.8

(g) (4.11 + 8.06) + 3.1 = 4.11 + (⬚ + ⬚)

(h) ⬚ + 3.81 = 15.2 + ⬚

Word Problems

Let us study the following word problem.

Example 1: A man travelled 31.455 km by train, 12.25 km by bus and 1.325 km by scooter in one day. Find the total distance travelled by him in one day.

Solution: Distance travelled by train   =   31.455 km

Distance travelled by bus   =   12.250 km

Distance travelled by scooter =   + 1.325 km
_____
Total distance travelled   =   45.030 km

The man travelled a total distance of 45.030 km.

Worksheet 3

1. **Solve the following word problems.**

    (a) Mr Kumar purchased a *saree* for ₹ 485.55, a shirt for ₹ 269.40 and a tie for ₹ 65.25. Find the total money spent by Mr Kumar.

    (b) The height of Ram is 1.75 metres. His brother Shyam is 0.5 metres taller than Ram. What is the height of Shyam?

    (c) A shopkeeper had 32.5 kg apples, 25.25 kg mangoes and 9.75 kg pears. What is the total weight of fruits he had?

    (d) A milkman sold 26.55 litres milk on the first day, 35.755 litres milk on the second day and 42.5 litres milk on the third day. Find the total quantity of milk sold on three days.

    (e) Anjali spent ₹ 25 on icecream, ₹ 17.50 on chips and ₹ 12.50 on a pen. Find the total money spent by Anjali.

SUBTRACTION OF DECIMAL NUMBERS

We can subtract decimal numbers in the same way as we subtract whole numbers.

Let us subtract like decimals, 16.53 from 28.94

$$
\begin{array}{r}
28.94 \\
-\ 16.53 \\
\hline
\mathbf{12.41} \\
\hline
\end{array}
$$

- Arrange the digits in the place value columns.
- The decimal point should come one below the other in column.
- Subtract just as we subtract whole numbers.

Decimal point placed in difference also.

Now, let us subtract unlike decimals, 28.56 from 36.486

36.486 − 28.560 ⎯ Converting into like decimals

$$
\begin{array}{r}
36.486 \\
-\ 28.560 \\
\hline
\mathbf{7.926} \\
\hline
\end{array}
$$

- Arrange digits in the place value columns.
- Decimal point one below the other.
- Subtract subtrahend and minuend.

Decimal point placed in difference also.

94

Worksheet 4

1. **Subtract.**

(a)
```
  3.8
− 2.6
──────

──────
```

(b)
```
  98.86
− 26.62
────────

────────
```

(c)
```
  143.289
− 68.114
──────────

──────────
```

(d)
```
  36.81
− 23.73
────────

────────
```

(e)
```
  153.288
− 68.113
──────────

──────────
```

(f)
```
  300.007
− 125.235
──────────

──────────
```

2. **Arrange in columns and subtract.**

(a) 6.3 from 9.5

(b) 71.86 from 95.97

(c) 315.28 from 486.195

(d) 19.378 from 26.4

(e) 45.6 from 55.352

(f) 22.05 from 319.019

(g) 71.084 from 90.04

(h) 174.5 from 200.17

PROPERTIES OF SUBTRACTION OF DECIMAL NUMBERS

$$3.85 - 0 = 3.85$$

$$11.635 - 0 = 11.635$$

When we subtract zero from a decimal number, we get the decimal number itself.

Worksheet 5

1. **Complete the following:**

(a) 2.65 − 0 = ☐

(b) 29.38 − ☐ = 29.38

(c) 11.8 − ☐ = 11.8

(d) 19.5 − 0 = ☐

(e) 413.5 − ☐ = 413.5

(f) 25.593 − ☐ = 0

Word Problems

Let us study the following word problem.

Example 2: My mother had 11.55 metres long cloth. She used 5.75 metres cloth for stitching a frock. Find the length of the remaining cloth.

Solution:

Length of cloth mother had	=	11.55 m
Length of cloth used for frock	=	– 5.75 m
Length of remaining cloth	=	5.80 m

5.80 m cloth is left.

Worksheet 6

1. **Solve the following word problems.**

   (a) Raju got ₹ 60 as pocket money from his father. He spent ₹ 16.50 on icecream. How much money is left with him?

   (b) Mrs Renu bought 2.750 litres of milk. She used 1.5 litres milk for making curd. Find the quantity of milk left.

   (c) Rahul weighs 52.525 kg. His brother weighs 4.5 kg less than Rahul. Find the weight of his brother.

   (d) Amit travelled a distance of 15.55 km. If he travelled 12.400 km by bus and the rest by scooter, find the distance covered by scooter.

   (e) Neha saw a doll in the show-case of a shop. The cost of the doll was ₹ 175. She wanted to buy it, but she had ₹ 4.50 less than the cost of the doll. How much money did Neha have?

Value Based Question

Inter school Art Competition was being organised in Ria's school. Her teacher divided the children into groups of three each. Ria, Smita and Meena were in one group. Ria was made the team leader. They all decided to bring satin ribbons of different colours for making a showpiece. Ria decided Smita would bring 4.5 m of red ribbon,

Meena would bring 3.65 m of yellow ribbon and she herself would get 5.08 m of blue ribbon. All three then brought the required material and made a beautiful showpiece. Ria's team won the competition and all three girls were very happy.

1. What was the total length of the ribbons brought by the team?

2. Mention any two situations where you have worked as a team in the school.

3. How do you feel working in a team?

Brain Teasers

1. **Tick (✔) the correct answer.**

    (a) How much is 40 more than 12.25?

    (i) 27.75   (ii) 28.25   (iii) 27.25   (iv) 28.75

    (b) The digit in the hundredths place in the sum of 3.42, 6.2 and 2.473 is–

    (i) 3   (ii) 0   (iii) 2   (iv) 9

    (c) $109.93 + \boxed{} = 349.109$

    (i) 239.179   (ii) 240.179   (iii) 249.279   (iv) 239.279

(d) The difference between the greatest and the smallest numbers in the given set of numbers is–

7.018, 7.108, 7.810, 7.081

(i) 0.090   (ii) 0.792   (iii) 0.729   (iv) 0.027

(e) 0.1 + 0.001 – 0.01 = _____ .

(i) 0.091   (ii) 0.910   (iii) 0.901   (iv) 0.019

2. **Find the sum or difference of the following:**

(a) 111.1 + 11.11 + 1.111

(b) 200.8 – 178.865

(c) 43 – 28.625

(d) 85 + 8.583 + 85.1

3. **The sum of two decimal numbers is 0.9. If one of them is 0.675, find the other.**

4. **A tower is painted in red, white and black. If 25.5 m is painted red, 15.75 m in black and 10.25 in white, find the height of the tower.**

5. **The sum of three decimal numbers is 95.3. If two decimal numbers are 43.82 and 26.058 respectively, find the third number.**

6. **Complete the following magic square so that the decimal numbers from left to right and top to bottom add up to 4.5.**

	1.1	
1.3	1.5	1.7
1.4		

Unit – 7

MULTIPLICATION AND DIVISION OF DECIMAL NUMBERS

MULTIPLICATION OF DECIMAL NUMBERS

I. Multiplication of a decimal number by a whole number.

Multiply 0.2 × 3

2 × 3 = 6 —— Multiply the numbers ignoring the decimal point.

So,   0.2 × 3 = 0.6

Number of decimal places in 0.2 is one. So, we keep only one decimal place in the product.

In the same way,

Let us multiply 4.18 by 5

418 × 5 = 2090 —— Multiply the numbers ignoring the decimal point.

So,   4.18 × 5 = 20.90

Same number of decimal places in the product as in the multiplicand.

Worksheet 1

1. **Find the product.**

   (a) 0.3 × 3   (d) 0.005 × 15   (g) 71.8 × 248

   (b) 0.3 × 4   (e) 2.4 × 23   (h) 7.37 × 56

   (c) 0.412 × 2   (f) 16.3 × 17   (i) 1.001 × 96

2. **If 3,485 × 16 = 55,760, find–**

   (a) 348.5 × 16   (c) 3.485 × 16

   (b) 34.85 × 16   (d) 0.3485 × 16

99

+CMYK+

II. Multiplication of one decimal number by another decimal number.

Let us multiply 4.2 by 0.56

$$4.2 = \frac{42}{10}$$

$$0.56 = \frac{56}{100}$$

$$\text{Now, } 4.2 \times 0.56 = \frac{42}{10} \times \frac{56}{100}$$

$$= \frac{42 \times 56}{10 \times 100}$$

$$= \frac{2352}{1000}$$

$$= 2.352$$

Remember

In order to multiply two decimal numbers,
- multiply the numbers ignoring the decimal points.
- make the decimal places in the product equal to the sum of decimal places in the multiplicand and multiplier.

Worksheet 2

1. Find the product of the following:

(a) 0.2 × 0.3   (d) 8.1 × 5.3   (g) 8.24 × 19.7

(b) 0.5 × 0.4   (e) 3.4 × 23.6   (h) 13.62 × 35.1

(c) 3.1 × 0.04   (f) 10.15 × 10.04   (i) 10.05 × 0.6

2. If 1,135 × 72 = 81,720, find the value of:

(a) 113.5 × 7.2   (d) 1.135 × 7.2

(b) 11.35 × 7.2   (e) 1.135 × 0.72

(c) 11.35 × 0.72   (f) 0.1135 × 0.72

100

III. Multiplication of a decimal number by 10, 100, 1000

Remember

In order to multiply a decimal number by 10, 100 or 1000, we just shift the decimal point in the product to the right by as many places as there are zeroes in the multiplier.

Let us study these questions.

6.92 × 1**0** = 69.2

Multiplier having one zero

Decimal point shifts one place to the right.

3.481 × 1**00** = 348.1

Multiplier having two zeroes

Decimal point shifts two places to the right.

16.846 × 1**000** = 16846.0

Multiplier having three zeroes

Decimal point shifts three places to the right.

Worksheet 3

1. **Find the product orally.**

   (a) 0.2 × 10

   (b) 1.18 × 10

   (c) 13.293 × 10

   (d) 16.25 × 100

   (e) 4.02 × 100

   (f) 19.32 × 100

   (g) 71.821 × 1000

   (h) 45.01 × 1000

   (i) 0.1 × 100

   (j) 7.538 × 100

2. **Complete the following:**

(a) $1.5 \times \boxed{} = 15$

(b) $2.61 \times \boxed{} = 261$

(c) $14.326 \times \boxed{} = 14326$

(d) $0.8 \times \boxed{} = 80$

(e) $0.5 \times \boxed{} = 500$

(f) $10.3 \times \boxed{} = 10300$

(g) $3.08 \times \boxed{} = 30.8$

(h) $0.001 \times \boxed{} = 1$

PROPERTIES OF MULTIPLICATION OF DECIMAL NUMBERS

Multiplication of two decimal numbers in either order.

$1.2 \times 3.8 = 4.56$

$3.8 \times 1.2 = 4.56$

Product is the same

If two decimal numbers are multiplied in either order, the product remains the same.

Multiplication of a decimal number by one.

$3.29 \times 1 = 3.29$

$19.3 \times 1 = 19.3$

Product of a decimal number and one is the decimal number itself.

Multiplication of a decimal number by zero.

$2.4 \times 0 = 0$

$13.182 \times 0 = 0$

Product of a decimal number and zero is always zero.

Worksheet 4

1. **Complete the following:**

(a) $5.8 \times 6 = \boxed{} \times 5.8$

(b) $0.8 \times 0 = \boxed{}$

(c) $9.3 \times \boxed{} = \boxed{} \times 3.4$

(d) $13.26 \times \boxed{} = 13.26$

(e) $\boxed{} \times 15.6 = 15.6$

(f) $\boxed{} \times 1 = 4.7$

(g) $\boxed{} \times 1.8 = 15.5 \times \boxed{}$

(h) $95.601 \times \boxed{} = 0$

102

Word Problems

Let us study the following word problem.

Example 1: One box of apples weighs 25.25 kg. Find the weight of seven such boxes of apples.

Solution: Weight of one box of apples = 25.25 kg

Weight of seven such boxes of apples = 25.25

$$\begin{array}{r} 25.25 \\ \times\ 7 \\ \hline 176.75 \text{ kg} \\ \hline \end{array}$$

Seven boxes of apples weigh 176.75 kg.

Worksheet 5

1. **Solve the following word problems.**

   (a) Renu needs five pieces of ribbon of length 7.5 cm. What is the total length of ribbon needed?

   (b) One Mathematics book of Class–V costs ₹ 75.50. What is the cost of 15 such books?

   (c) It needs 2.75 metres of cloth to stitch one shirt. What is the total length of cloth needed to stitch six such shirts?

   (d) The weight of one chair is 3.75 kg. Find the weight of three dozen chairs.

   (e) The cost of one kilogram of mangoes is ₹ 65. Find the cost of 2.5 kg mangoes.

   (f) A bag has 85.7 kg wheat. How much wheat will be there in 1,000 such bags?

DIVISION OF DECIMAL NUMBERS

I. Division of a decimal number by a whole number.

Division of decimal numbers is similar to division of whole numbers.

Example 2: Divide 18.24 by 8

Solution: 18.24 ÷ 8

Here, dividend = 18.24, divisor = 8

```
        2.28
    8 ) 18.24
      − 16
        ─────
         22
       − 16
        ─────
         64
       − 64
        ─────
          0
```

Decimal point will come directly above the decimal point in the dividend.

We get, **Quotient = 2.28,   Remainder = 0**

Example 3: Divide 0.695 ÷ 5

Solution: Here, dividend = 0.695, divisor = 5

There is no whole number.

```
        0.139
    5 ) 0.695
      −  5
        ─────
         19
       − 15
        ─────
         45
       − 45
        ─────
          0
```

Decimal point will come directly above the decimal point in the dividend.

We get, **Quotient = 0.139,   Remainder = 0**

104

Worksheet 6

1. **Divide the following:**

   (a) 0.95 ÷ 5

   (b) 3.44 ÷ 8

   (c) 4.9   ÷ 7

   (d) 25.41 ÷ 11

   (e) 31.5 ÷ 9

   (f) 16.5   ÷ 15

   (g) 0.077 ÷ 7

   (h) 88.88 ÷ 22

   (i) 35.49 ÷ 13

   (j) 57.5   ÷ 25

Study this example.

Example 4:   4.23 ÷ 5

Solution:

```
          0.846
    5 ) 4.23
        − 4 0
        ──────
          2 3
        − 2 0
        ──────
            3 0
          − 3 0
          ──────
              0
```

Keep on adding zeroes and divide till no remainder is left.

Worksheet 7

1. **Divide the following:**

   (a) 0.5   ÷ 2

   (b) 3.4   ÷ 4

   (c) 12.6 ÷ 5

   (d) 6.05 ÷ 25

   (e) 11.7 ÷ 6

   (f) 12.06 ÷ 12

   (g) 9.2   ÷ 16

   (h) 3.75   ÷ 6

   (i) 8.5   ÷ 17

   (j) 14.4   ÷ 12

II. Division of a decimal number by 10, 100, 1000

Remember

In order to divide a decimal number by 10, 100, 1000, we just shift the decimal point in the quotient to the left by as many places as there are zeroes in the divisor.

Let us study these questions.

$56.8 \div 10 = 5.68$

Divisor having one zero

> Decimal point shifts one place to the left.

$438.5 \div 100 = 4.385$

Divisor having two zeroes

> Decimal point shifts two places to the left.

$105.2 \div 1000 = 0.1052$

Divisor having three zeroes

> Decimal point shifts three places to the left.

Worksheet 8

1. **Find the quotient orally.**

   (a) $1.7 \div 10$

   (b) $4.9 \div 10$

   (c) $19.2 \div 1000$

   (d) $57.98 \div 100$

   (e) $601.8 \div 1000$

   (f) $44.81 \div 1000$

   (g) $1.3 \div 100$

   (h) $2.56 \div 1000$

   (i) $148.5 \div 10$

   (j) $708.13 \div 100$

2. **Fill in the boxes. The first one is done for you.**

   (a) $6.5 \div \boxed{10} = 0.65$ — Decimal has shifted one place to the left.

   (b) $3.7 \div \boxed{} = 0.37$

   (c) $15.81 \div \boxed{} = 1.581$

   (d) $8.19 \div \boxed{} = 0.819$

   (e) $77.1 \div \boxed{} = 0.771$

   (f) $36.2 \div \boxed{} = 0.362$

   (g) $710.3 \div \boxed{} = 7.103$

III. Division of a decimal number by another decimal number.

Example 5: Divide 1.6 by 0.4

Solution: Here, dividend = 1.6, divisor = 0.4

$$1.6 \div 0.4 = \frac{1.6}{0.4}$$ — Division expressed as a fraction.

Let us change the divisor into a whole number.

Now, we have, $\frac{1.6}{0.4} = \frac{1.6 \times 10}{0.4 \times 10}$ — 0.4 has one decimal place. So, multiply the numerator and denominator by 10 to get an equivalent fraction.

$$= \frac{16}{4}$$

$$= 4$$

Example 6: Divide 9.63 by 0.09

Solution: $9.63 \div 0.09 = \frac{9.63}{0.09}$

$$= \frac{9.63 \times 100}{0.09 \times 100}$$ — Divisor 0.09 has two decimal places. So, multiply numerator and denominator by 100.

$$= \frac{963}{9}$$

$$= 107$$

Worksheet 9

1. **Divide the following:**

   (a) 2.8 ÷ 0.7
   (b) 3.6 ÷ 0.4
   (c) 3.2 ÷ 0.8
   (d) 8.5 ÷ 1.7
   (e) 0.75 ÷ 0.15
   (f) 1.25 ÷ 2.5
   (g) 5.6 ÷ 1.4
   (h) 1.44 ÷ 1.2
   (i) 0.993 ÷ 0.331
   (j) 25.925 ÷ 0.425

IV. Division of a whole number by a decimal number.

Example 7:   Let us divide 6 by 0.2

Solution: $6 \div 0.2 = \dfrac{6}{0.2}$ ——————— Division expressed as a fraction.

$= \dfrac{6 \times 10}{0.2 \times 10}$ ——————— Divisor has one decimal place. So, multiply both numerator and denominator by 10.

$= \dfrac{60}{2}$

$= 30$

Example 8:   Divide 36 by 0.45

Solution: $36 \div 0.45 = \dfrac{36}{0.45}$

$= \dfrac{36 \times 100}{0.45 \times 100}$

$= \dfrac{3600}{45}$

$= 80$

Example 9:   Divide 65 by 0.013

Solution: $65 \div 0.013 = \dfrac{65}{0.013}$

$= \dfrac{65 \times 1000}{0.013 \times 1000}$

$= \dfrac{65000}{13}$

$= 5000$

Worksheet 10

1. Find the quotient.

(a) 6   ÷ 0.2

(b) 15   ÷ 0.05

(c) 64   ÷ 0.32

(d) 822 ÷ 1.644

(e) 31   ÷ 0.5

(f) 81   ÷ 0.27

(g) 13   ÷ 0.13

(h) 225 ÷ 7.5

(i) 100 ÷ 2.5

(j) 112 ÷ 1.6

V. Conversion of a fraction into a decimal number.

Example 10:   Convert $\dfrac{4}{5}$ into a decimal number.

Solution: $\dfrac{4}{5} = 4 \div 5$ ——————— Fraction expressed as a division sum.

$$
\begin{array}{r}
0 \\
5\overline{)\,4} \\
-\,0 \\
\hline
4
\end{array}
$$

4 is less than 5. We place a zero in the quotient.

$$
\begin{array}{r}
0. \\
5\overline{)\,4.0} \\
-\,0 \\
\hline
40
\end{array}
$$

Place a decimal next to zero.

Add zero to the remainder.

$$
\begin{array}{r}
0.8 \\
5\overline{)\,4.0} \\
-\,0 \\
\hline
40 \\
-\,40 \\
\hline
0
\end{array}
$$

Continue the division till you get remainder zero.

109

Example 11: Convert $\dfrac{37}{8}$ into a decimal number.

Solution:

```
        4.625
    8 ) 37.000
      − 32
        50
      − 48
         20
       − 16
          40
        − 40
           0
```

Continue adding zeroes to the remainder and divide till you get remainder zero.

Worksheet 11

1. **Convert the following fractions into a decimal number.**

(a) $\dfrac{3}{4}$　　　　(c) $\dfrac{1}{20}$　　　　(e) $\dfrac{18}{90}$　　　　(g) $\dfrac{11}{20}$

(b) $\dfrac{7}{8}$　　　　(d) $\dfrac{8}{25}$　　　　(f) $\dfrac{12}{15}$　　　　(h) $\dfrac{31}{50}$

2. **Convert the following into a decimal number.**

(a) $1\dfrac{1}{2}$　　　　(c) $16\dfrac{1}{5}$　　　　(e) $4\dfrac{1}{4}$　　　　(g) $1\dfrac{2}{25}$

(b) $5\dfrac{1}{5}$　　　　(d) $4\dfrac{1}{20}$　　　　(f) $4\dfrac{3}{8}$　　　　(h) $1\dfrac{3}{4}$

PROPERTIES OF DIVISION OF DECIMAL NUMBERS

Division of a decimal number by one.

$4.8 \div 1 = 4.8$

$0.059 \div 1 = 0.059$

A decimal number divided by one is the decimal number itself.

Division of zero by a decimal number.

$$0 \div 4.1 = \frac{0}{4.1} = \frac{0 \times 10}{4.1 \times 10} = \frac{0}{41} = 0$$

$$0 \div 17.82 = \frac{0}{17.82} = \frac{0 \times 100}{17.82 \times 100} = \frac{0}{1782} = 0$$

> Zero divided by any decimal number is zero.

Division of a decimal number by the same decimal number.

$$0.3 \div 0.3 = \frac{0.3}{0.3} = \frac{0.3 \times 10}{0.3 \times 10} = \frac{3}{3} = 1$$

$$5.21 \div 5.21 = \frac{5.21}{5.21} = \frac{5.21 \times 100}{5.21 \times 100} = \frac{521}{521} = 1$$

> A decimal number divided by itself is one.

Worksheet 12

1. **Fill in the boxes.**

(a) 9.85 ÷ 1 = ☐

(b) ☐ ÷ 0.3 = 1

(c) 0.4 ÷ 0.4 = ☐

(d) ☐ ÷ 5.1 = 0

(e) 0 ÷ 19.1 = ☐

(f) 10.506 ÷ ☐ = 1

(g) ☐ ÷ 1 = 16.032

(h) ☐ ÷ 1.32 = 0

Word Problems

Let us study the given word problem.

Example 12:   Rahul bought 25 balls for ₹ 56.25. Find the cost of one ball.

Solution: Cost of 25 balls = ₹ 56.25

Cost of one ball = ₹ 56.25 ÷ 25

$$\begin{array}{r} 2.25 \\ \overline{25\,)\,56.25} \\ -50 \\ \hline 62 \\ -50 \\ \hline 125 \\ -125 \\ \hline 0 \end{array}$$
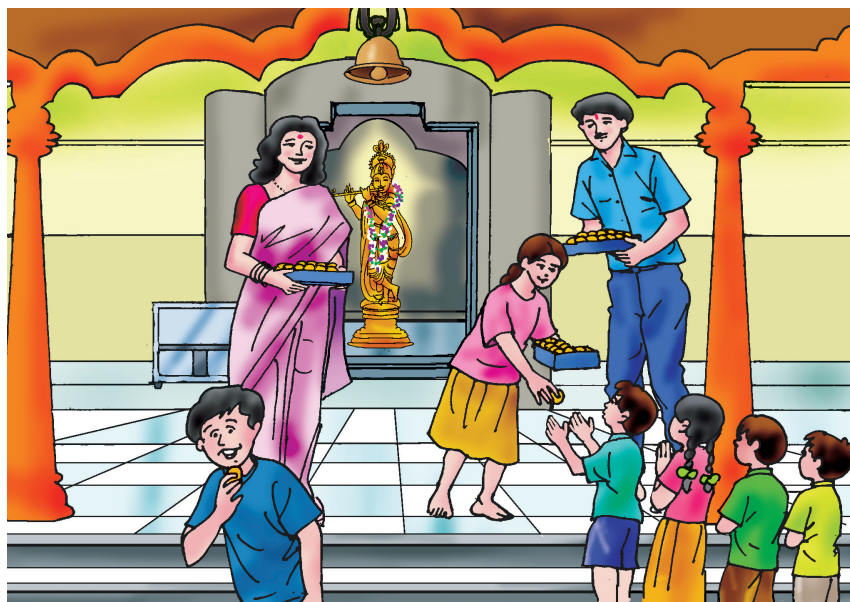
One ball costs ₹ 2.25

Worksheet 13

1. Solve the following word problems.

(a) 12 tins can hold 39.624 litres of oil. How much oil can one tin hold?

(b) Cost of 23 m of cloth is ₹ 608.50. Find the cost of one metre cloth.

(c) I have a 7.5 m long ribbon. I want to cut it into 1.5 m long pieces. How many pieces will I get?

(d) 16.5 kg sugar is put in paper bags each containing 0.5 kg of it. How many bags are there?

(e) I require 2.25 m cloth to stitch a skirt. How many skirts can be stitched with 20.25 m cloth?

Value Based Question

Manju was excited when she woke up in the morning. It was her birthday! Her parents asked her what gift she would like to have. She told her mother that this time she wanted to distribute sweets to the poor children near the temple. Her parents were very happy with this thought. They bought 25.625 kg sweets and distributed amongst 25 children near the temple. Manju and her parents were happy to see smiles on the children's face.

1. How much sweets did each child get?

2. What quality of Manju is exhibited here?

3. Suggest two different ways in which you can celebrate your birthday as Manju did.

Brain Teasers

1. **Tick (✔) the correct answer.**

   (a) $456.2 \div \boxed{} = 4.562$

       (i) 10   (ii) 100   (iii) 1000   (iv) 10000

   (b) $2.5 \times 1000 \times .1 = \boxed{}$

       (i) 25000   (ii) 2500   (iii) 250   (iv) 2.500

   (c) The product of 0.2, 0.02, 0.002 is–

       (i) 0.08   (ii) 0.0008   (iii) 0.000008   (iv) 0.00008

(d) The decimal form of $\dfrac{9}{25}$ is–

    (i) 0.36   (ii) 3.6   (iii) 3.06   (iv) 36

2. Find the product of the following:

    (a) 8.05 × 16   (b) 14.89 × 2.6   (c) 7.8 × 0.005

3. Find the quotient for the following division questions.

    (a) 1.5 ÷ 12   (b) 122.455 ÷ 0.05   (c) 3622 ÷ 45.275

4. Convert into a decimal number.

    (a) $\dfrac{3}{20}$ (b) $5\dfrac{1}{50}$ (c) $7\dfrac{3}{8}$

5. If 504 ÷ 12 = 42 and 504 × 12 = 6048, find the value of:

    (a) 5.04 × 12   (c) 0.504 × 0.12   (e) 50.4 ÷ 12

    (b) 50.4 × 12   (d) 5.04 ÷ 12   (f) 0.504 ÷ 12

6. Fill in the boxes.

    (a) 3.5 × 10   = ☐   (f) 1.98 ÷ 100   = ☐

    (b) 1.5 × 1000   = ☐   (g) 356.4 ÷ 1000   = ☐

    (c) 7.5 × ☐   = 750   (h) 13.8 ÷ ☐   = 1.38

    (d) 95.65 × ☐   = 95.65   (i) ☐ ÷ 3.6   = 0

    (e) 53.09 ÷ 10   = ☐   (j) 19.85 × ☐   = 19.85

7. Divide 1010.101 by 1.01

8. 3.5 kg toffees are to be distributed among some children. If each child has to be given 0.5 kg toffees, how many children get the toffees?

9. Mr Ajay purchases 3 kg tomatoes at ₹15.50 per kilogram and 5.5 kg potatoes at ₹ 22 per kilogram. Find the total amount spent in all.

10. Which of the following have 15 as quotient?

    (a) 0.075 ÷ 0.5   (b) 0.075 ÷ 0.005   (c) 0.75 ÷ 5