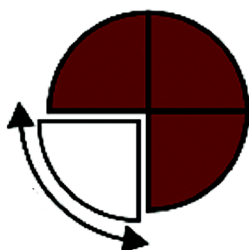


# Fractions and Decimals

## Introduction

The word fraction derives from the Latin word “**Fractus**” meaning broken. It represents a part of a whole, consisting of a number of equal parts out of a whole.

E.g : slices of a Cake



## Representation of Fractions

A fraction is represented by 2 numbers on top of each other, separated by a line. The number on top is the numerator and the number below is the denominator.

Example :  $\frac{3}{4}$  which basically means 3 parts out of 4 equal divisions.

## Types of Fractions

Proper fractions represent a part of a whole. The numerator is smaller than the denominator.

**Example:**  $\frac{1}{4}, \frac{3}{5}, \frac{27}{38}$ . Proper fractions are greater than 0 and less than 1

Improper fractions have a numerator that is greater than or equal to the denominator.

**Example:**  $\frac{61}{4}, \frac{15}{8}$ . Improper fractions are greater than 1 or equal to 1.

Mixed fractions are a combination of a whole number and a proper fraction.

**Example:**  $\frac{23}{5}$  can be written as  $4\frac{3}{5}$ .

**Conversion of fractions :** An improper fraction can be represented as mixed fraction and a mixed fraction can be represented as improper.

**Like fractions :** Fractions with the same denominator are called like fractions.

Example:  $\frac{5}{7}, \frac{3}{7}$ . Here we can compare them as  $\frac{5}{7} > \frac{3}{7}$

**Unlike fractions :** Fractions with different denominators are called unlike fractions.

Example:  $\frac{5}{2}, \frac{7}{3}$ . To compare them, we find the L.C.M of the denominator.

Here the L.C.M is 6 So,  $\frac{5}{2} \times \frac{3}{3}, \frac{7}{3} \times \frac{2}{2}$

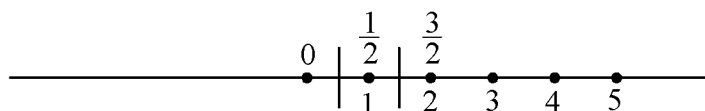
$$\frac{15}{6}, \frac{14}{6}$$

$$\frac{15}{6} > \frac{14}{6}$$

### Fractions on the Number Line

In order to represent a fraction on a number line, we divide the line segment between two whole numbers into n equal parts, where n is the denominator.

Example: To represent  $\frac{1}{2}$  or  $\frac{3}{2}$ , we divide the line between 0 and 1 in 2 equal parts and 1 & 2 in two equal Parts. Then the **numerator gives the number of divisions** to mark.



### Multiplication of Fractions

Multiplication of a fraction by a whole number :

Example :  $7 \times \frac{1}{3} = \frac{7}{3}$

Example :  $5 \times \frac{7}{45} = \frac{35}{45}$ , Dividing numerator and denominator by 5, we get  $\frac{7}{9}$

Multiplication of a fraction by a fraction is basically product of numerators/product of denominators

Example:  $\frac{4}{5} \times \frac{6}{7} = \frac{24}{35}$

Example : Multiplication of mixed fractions

$$3\frac{1}{2} \times 4\frac{2}{3} = \frac{7}{2} \times \frac{14}{3} = \frac{98}{6} = \frac{49}{3}$$

First convert mixed fractions to improper fractions and then multiply

Fraction as an Operator ‘Of’

The ‘of’ operator basically implies multiplication.

Example:  $\frac{1}{7}$  of 28 =  $\frac{1}{7} \times 28 = 4$

### Reciprocal of a Fraction

Reciprocal of any number  $n$  is written as  $\frac{1}{n}$

Reciprocal of a fraction is obtained by interchanging the numerator and denominator.

Example: Reciprocal of  $\frac{3}{5}$  is  $\frac{5}{3}$

Although zero divided by any number means zero itself, we cannot find reciprocals for them, as a number divided by 0 is undefined.

Example : Reciprocal of  $\frac{0}{9} \neq \frac{9}{0}$

### Division of Fractions

Division of a whole number by a fraction : we multiply the whole number with the reciprocal of the fraction.

Example:  $45 \div \frac{3}{4} = 45 \times \frac{4}{3} = 60$

Division of a fraction by a whole number: we multiply the fraction with the reciprocal of the whole number.

Example:  $\frac{8}{11} \div 4 = \frac{8}{11} \times \frac{1}{4} = \frac{2}{11}$

Division of a fraction by another fraction : We multiply the dividend with the reciprocal of the divisor.

Example:  $\frac{3}{5} \div \frac{21}{15} = \frac{3}{5} \times \frac{15}{21} = \frac{3}{7}$

### Decimal

Decimal numbers are used to represent numbers that are smaller than the unit 1. Decimal number system is also known as base 10 system since each place value is denoted by a power of 10.

Hundreds (100)	Tens (10)	Ones (1)	Tenths $\left(\frac{1}{10}\right)$	Hundredths $\left(\frac{1}{100}\right)$	Thousandths $\left(\frac{1}{1000}\right)$	Number
2	5	3	1	4	7	253.147
6	2	9	3	2	1	629.321
0	4	3	1	9	2	.....

A decimal number refers to a number consisting of the following two parts:

- (i) Integral part (before the decimal point)
- (ii) Fractional Part (after the decimal point).

These both are separated by a decimal separator (.) called the decimal point.

A decimal number is written as follows: Example 211.65, or 321.11

The numbers to the left of the decimal point increase with the order of 10, while the numbers to the right of the point increase with the decrease order of 10.

The above example 221.65 can be read as ‘five hundred and sixty four and eight tenths’

$$2 \times 100 + 2 \times 10 + 1 + 6 \times \frac{1}{10} + 5 \times \frac{1}{100}$$

A fraction can be written as a decimal and vice-versa. Example  $\frac{3}{2} = 1.5$  or  $1.5 = \frac{15}{10} = \frac{3}{2}$

### **Multiplication of Decimals**

#### ***Multiplication of decimal numbers with whole numbers :***

Multiply them as whole numbers. The product will contain the same number of digits after the decimal point as that of the decimal number.

E.g :  $16.2 \times 3 = 48.6$

#### ***Multiplication of decimals with powers of 10 :***

If a decimal is multiplied by a power of 10, then the decimal point shifts to the right by the number of zeros in its power.

E.g :  $45.678 \times 10 = 456.78$  (decimal point shifts by 1 place to the right)

or,  $45.678 \times 1000 = 45678$  (decimal point shifts by 3 places to the right)

#### ***Multiplication of decimals with decimals :***

Multiply the decimal numbers without decimal points and then give decimal point in the answer as many places same as the total number of places right to the decimal points in both numbers.

E.g :  $1.6 \times 3.2 = 5.12$

**Division of Decimals**

Dividing a decimal number by a whole number:

Example:  $\frac{45.25}{5}$

Step 1. Convert the Decimal number into Fraction:  $45.25 = \frac{4525}{100}$

Step 2. Divide the fraction by the whole number:  $\frac{4525}{100} \div 5 = \frac{4525}{100} \times \frac{1}{5} = 9.05$

Dividing a decimal number by a decimal number:

Example 1:  $\frac{45.25}{0.5}$

Step 1. Convert both the decimal numbers into fractions:  $45.25 = \frac{4525}{100}$  and  $0.5 = \frac{5}{10}$

Step 2. Divide the fractions:  $\frac{4525}{100} \div \frac{5}{10} = \frac{4525}{100} \times \frac{10}{5} = 90.5$

***Dividing a decimal number by powers of 10 :***

If a decimal is divided by a power of 10, then the **decimal point shifts** to the left by the number of zeros present in the **power of 10**.

Example:  $98.765 \div 100 = 0.98765$  Infinity

When the denominator in a fraction is very very small (almost tending to 0), then the value of the fraction tends towards infinity.

E.g:  $\frac{999999}{0.000001} = 999999000001 \approx$  a very large number, which is considered to be  $\infty$



## Fractions and Decimals

### Fill in the Blanks

- $\frac{2}{3}$  is a \_\_\_\_\_ fraction.
- $\frac{4}{3}$  is an \_\_\_\_\_ fraction.
- $\frac{2}{3} + \frac{1}{5} - \frac{1}{6} =$  \_\_\_\_\_
- $(14.263 + 3.737) \div 9 =$  \_\_\_\_\_
- $\frac{2}{13}$  and  $\frac{7}{13}$  are \_\_\_\_\_ fractions.
- $3\frac{1}{2}$  is a \_\_\_\_\_ fraction.
- Ascending order of decimal fractions 1.345, 1.025 and 1.435 is \_\_\_\_\_
- 8.3 meter = \_\_\_\_\_ cm
- 23 of \_\_\_\_\_ = 14
- On multiplying a decimal number by 100, we shift decimal point 2 places to the \_\_\_\_\_.

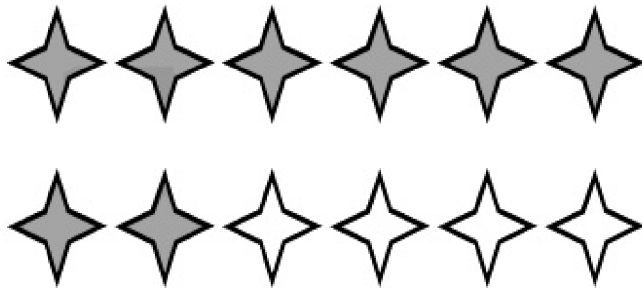
### Match The Followings

Part A	Part B
Fraction that represents a part of whole is	8
1 m =	Like fractions
$\frac{1}{2}$ of 16 is	Unit fractions
Fractions which indicates the same fractional number are said to be	$\frac{3}{5}$
Fractions having same denominators are called	Proper fraction
The fractions which have 1 as numerator are called	100 cm
Out of 50 birds 20 are crows and remaining are pigeons. Part of pigeons is	Equivalent fractions
The reciprocal of $\frac{3}{7}$ is	$\frac{7}{3}$

Others



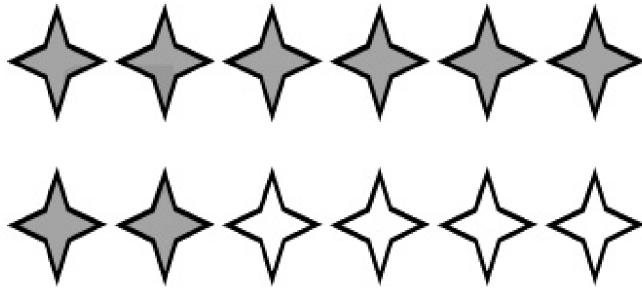
Express the shaded part of the given figure as a fraction.



Convert the fraction  $\frac{8}{12}$  into decimal form.



Find  $\frac{8}{12}$  of 4.



Write two equivalent fractions of  $\frac{8}{12}$ .



Write  $\frac{8}{12}$  into lowest form.

### True False

1. Lowest form of  $\frac{111}{33} = \frac{11}{37}$ .
2.  $\left(\frac{7}{21} \times \frac{3}{14}\right) - \left(\frac{5}{14} \times \frac{4}{15}\right) = \frac{-1}{42}$
3.  $24.5 + 19.7 - 37.29 = 6.19$
4.  $\frac{3}{8}$  is greater than  $\frac{4}{5}$ .
5.  $\frac{7}{8}, \frac{13}{24}, \frac{5}{16}$  are in ascending order.
6.  $28.56 \div 6 = 4.76$
7. The decimal form of  $\frac{3}{4}$  is 0.75.
8. The fraction form of 0.02 is  $\frac{1}{50}$ .
9.  $7.85 \times 100 = 78.5$
10. 6.418 is less than 6.47.



## Short Answers

1. Arrange the following fractions in ascending order:

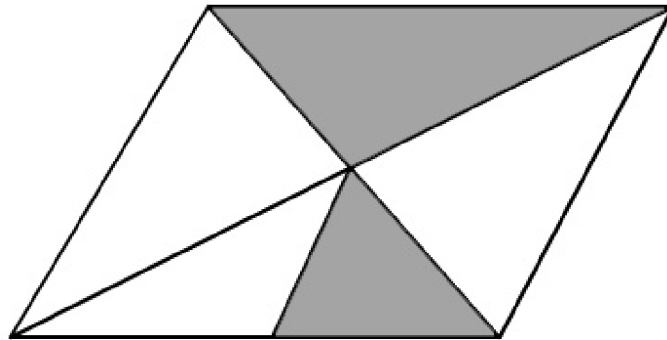
$$\frac{2}{15}, \frac{1}{3}, \frac{4}{5}, \frac{6}{30}$$

2. Simplify:  $5.406 + 1.26 - 3.1$

3. Multiply:  $0.586 \times 780$

4. A bucket can hold 15.25 litres of water. How much water can be stored in 14 such buckets?

## Picture Comprehension



1. Write the fraction represented by the shaded part in the given figure.

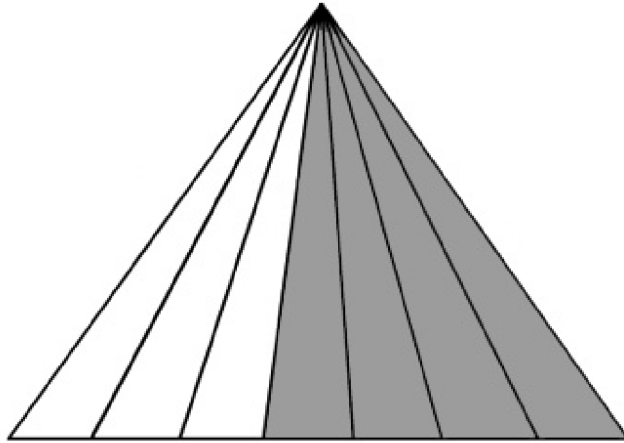
2. Write the fraction in words.

3. Convert the fraction into decimal form.

4. Write the reciprocal of the fraction.

5. Identify  $\frac{3}{8}$  as proper or improper fraction.

## MCQS



1. Express the shaded portion of the given figure as a fraction.

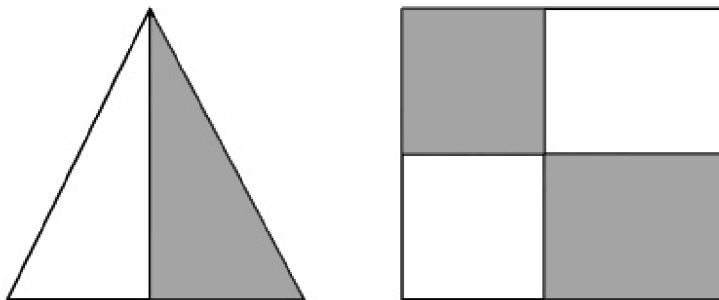
- A.  $\frac{4}{7}$
- B.  $\frac{7}{4}$
- C.  $\frac{3}{7}$
- D.  $\frac{3}{4}$

2. Sum of  $1\frac{1}{2}$  and  $3\frac{1}{4}$  is

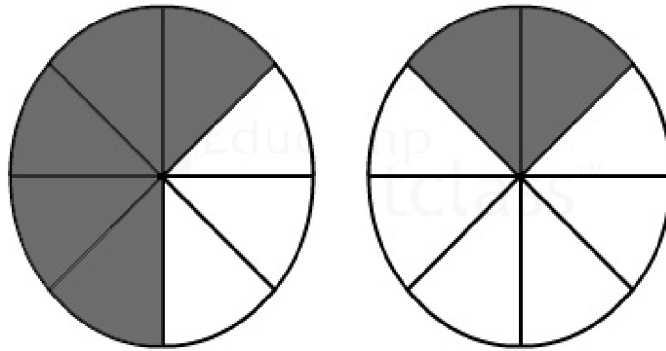
- A.  $4\frac{3}{4}$
- B.  $4\frac{1}{4}$
- C.  $2\frac{1}{2}$
- D.  $4\frac{3}{2}$

3. Which of the following figures represents an equivalent fraction?

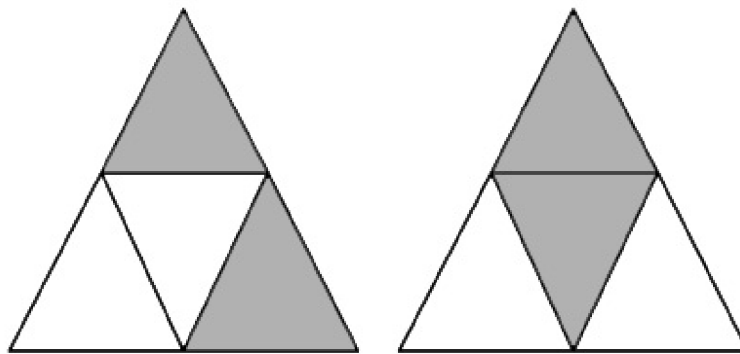
A.



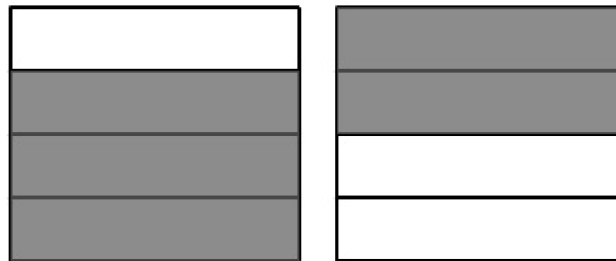
B.



C.



D.



4. The capacity of an oil bottle is  $\frac{3}{12}$  litres. How much oil will be required to fill 38 bottles?

- A. 38 litres
- B. 0.25 litres
- C. 9.5 litres
- D. 12.67 litres

5. A book case is 1.92 m tall. If the height of each shelf is 24 cm then how many shelves are there?

- A. 8
- B. 18
- C. 7
- D. 3