Better Education, Bright Future

GOLDEN FUTURE SERIES

A Course Book of Mathematics

Maths Pool

7

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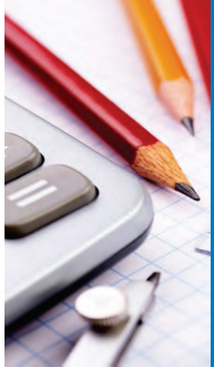


Chapter

1

Integers

Main Points of the Chapter

☞ Whole numbers and integers ☞ Absolute value of integers ☞ Addition of integers ☞ Additive inverse ☞ Properties of addition of integers ☞ Subtraction of integers ☞ Properties of subtraction of integers ☞ Multiplication of integers ☞ Properties of multiplication of integers ☞ Division of integers ☞ Properties of division of integers.

Whole Numbers and Integers

Integers make a group of numbers, in which there are whole numbers and negative numbers.

The numbers 1,2,3,...which we use for calculations are known as natural numbers. If we include 0 in them then they are known as whole numbers. For example: 0,1,2,3,.....etc.

The group of numbers in which whole and natural numbers are included is called as group of whole numbers. 0 is the smallest whole number, but no one is the smallest whole number.

....., –3, –2, –1, 0, 1, 2, 3..... are the whole numbers.

Remember

- The numbers +1, +2 , +3,... is written as 1,2,3,... and are called positive integers.
- The numbers –1, –2, –3, are called negative integers.
- The sum of negative and positive integers is zero, $a+(-a)=0$.
- 0 is neither positive nor negative.
- 0 is less than every positive integer.
- 0 is greater than every negative integer.
- Every positive integer is always greater than every negative integer.

Absolute Value of Integers

This shows the value of an integer always in positive, it is taken without thinking about its sign. We use '| |' sign to show the absolute value of integers.

Here, $|+6|=6$; $|-6|=6$.

Addition of Integers

1. To add the same sign integers, we always add them with the sign and the common sign is also followed by the result:

   Example : $3+4=7$; $(-3)+(-4)=(-7)$

2. To add the different sign integers, we always subtract them without the sign and whose value is higher then the answer is also followed by that sign:

   Example : $-3+5=2$; $3+(-5)=-2$

Additive Inverse

The additive inverse of a number is the same number with opposite sign.

Example : Additive inverse of 5 is (–5) and that of (–5) is 5.

The sum of a number and its additive inverse is always zero.

$5+(-5)=5-5=0$

Properties of Addition of Integers

1. Closure Property

The sum of two integers is always an integer. If a and b are two whole numbers then $a+b=c$, where c is a whole number.

Example : $5+3=8$; (which is a whole number)

$(-5)+3=-2$; (which is a whole number)

$(-5)+(-3)=-8$: (which is a whole number)

2. Commutative Property

The sum of two numbers is same as the sum of reverse order of numbers. If a and b are two integers then,

$$a+b=b+a$$

Example : $(-5)+3=-2$ and $3+(-5)=-2$

So, $(-5)+3 = 3+(-5)$

3. Associative Property

The sum of three numbers arranged in any order is always same. If a, b, c are three integers then,

$$a+(b+c)=(a+b)+c$$

Example : $(-4)+[(-2)+(-5)]=(-11)$; $[(-4)+[(-2)]+(-5)=-11$

So, $(-4)+[(-2)+(-5)]=[(-4)+[(-2)]+(-5)$

4. Additive Identity

If we add zero in an integer then the result will be an integer. For a whole number a,

$$a+0=a, \quad 0+a=a$$

So, $a+0=0+a=a.$

Example : $(-4)+0=-4$; $0+(-4)=-4$

So, 0 is an additive identity for whole numbers.

5. Additive Inverse

Adding an integer to its negative form gives zero. To find the additive inverse of any number, we change its sign. So, for an integer a,

$$a+(-a)=0; \qquad (-a)+a=0$$

So, $(-a)$ is additive inverse of a and a is additive inverse of $(-a)$.

Example : $8+(-8)=0$; $(-8)+8=0$

Subtraction of Integers

Subtraction is opposite of addition. For two integers a and b, $a-b=a+(-b)$

Example: $8-5=8+(-5)=3$

Properties of Subtraction of Integers

1. Closure Property

The difference of two integer numbers is always an integer. For two integers a and b, $(a-b)$ or $(b-a)$ will also be an integer.

Example : $5-3=2$; (which is an integer)

$3-5=-2$; (which is an integer)

2. Subtraction is not commutative.

Example : $5-(-3)=8$ and $(-3)-5=-8$

So, $5-(-3)\neq(-3)-5$

3. Subtraction is not associative.

Example : $(8-5)-(-3)=(8-5)+3=3+3=6$

$8-[5-(-3)=(8-[5+3]=8-8=0$

So, $(8-5)-(-3)\neq 8-[5-(-3)]$

4. On subtracting zero from an integer, we get the same number.

Example : $5-0=5$; $(-5)-0=-5$

5. On subtracting an integer from zero, we get the inverse of that number.

Example : $0-5=-5$; $0-(-5)=5$

Exercise 1.1

1. Find the sum of:
   (a) 105 and 65 (b) –51 and 48 (c) –82 and 66
   (d) –575 and –125 (e) 98 and –132 (f) –128 and 300
   (g) –265 and –335 (h) 600 and –876 (i) 143 and –143
2. Find the absolute value of:
   (a) (–258) (b) (+325) (c) –8 (d) (+28)
3. Find the additive inverse of:
   (a) –78 (b) 32 (c) –21
   (d) 108 (e) 0 (f) –2017
   (g) 256 (h) –525
4. Subtract:
   (a) 73 from 88 (b) (–17) from (–33) (c) 165 from 0
   (d) (–177) from 217 (e) 95 from (–205) (f) (–82) from 54
   (g) (–48) from 0 (h) (–78) from 78 (i) (–8) from 17
5. The sum of two integers is –62. If one of them is 74 then find other.
6. The sum of two integers is 58. If one of them is –78 then find other.
7. The sum of two integers is –132. If one of them is –82, then find other.
8. Subtract the sum of 893 and –431 from (–312).
9. Add (–570) and (–307). Subtract their sum from the sum of (–213) and (79).
10. Subtract (–97) from sum of 68 and (–217).
11. Subtract (–219) from sum of (–74) and (–114).

12. Write True or False:
    (a) 0 is the smallest integer. _____
    (b) The sum of two negative numbers is a positive number. _____
    (c) (–21) is smaller than 2. _____
    (d) 32 is greater than (–78). _____
    (e) 0 is neither positive nor negative. _____
13. Prove that:
    $a-(-b)=a+b$ if $a=7$ and $b=8$.
14. Fill in the blanks:
    (a) $(-15)+(-11)=(-11)+\square$
    (b) $-55+\square=-55$
    (c) $48+\square=0$
    (d) $[15+(-12)]+\square=15+[(-12)+(-3)]$
    (e) $(-2)+[11+(-5)]=[-2+(11)]+\square$

Multiplication of Integers

1. If we have the integers with same sign (both positive or negative) then the answer will come in positive (+) always.

Example 1: Multiply:

(a) 8×7 (b) $(-5)\times(-6)$

Solution: (a) $8\times7=56$ (b) $(-5)\times(-6)=+(5\times6)=30$

2. If we have both the integers with different signs (one positive and one negative) then the answer will come in negative (–) form.

Example 2 : (a) $(-7)\times9$ (b) $6\times(-8)$

Solution : (a) $(-7)\times9=-(7\times9)=-63$

(b) $6\times(-8)=-(6\times8)=-48$

REMEMBER

1. When the negative sign comes in even form (2,4,6,....) then it gives positive answer in product.
2. When the negative sign comes in odd form (1,3,5,.....) then it gives negative value.

Properties of Multiplication of Integers

1. Closure Property

The product of two integers is always an integer. If a and b are two integers then $a\times b=c$, where c is also an integer.

Example: $4\times(-6)=-24$ (which is an integer)

$(-5)\times(-7)=35$ (which is an integer)

2. Commutativity

The product of two numbers is same as the product of reverse order of numbers. If a and b are two integers then $a\times b=b\times a$.

Example: $-(-7)\times(-3)=+(7\times3)=21$

$(-3)\times(-7)=+(3\times7)=21$

So, $(-7)\times(-3)=(-3)\times(-7)$

3. Associative Property

The product of three numbers arranged in any order is always same. If a,b,c are three integers then

$$a \times (b \times c) = (a \times b) \times c$$

Example : $(-6) \times [(-2) \times (-3)] = (-6) \times (+6) = -(6 \times 6) = -36$

$$[(-6) \times (-2)] \times (-3) = (+12) \times (-3) = -(12 \times 3) = -36$$

So, $(-6) \times [(-2) \times (-3)] = [(-6) \times (-2)] \times (-3)$

4. Distributive Property of Multiplication over Addition

It states that the numbers can be multiplied over addition as shown below, giving the same value.

For the numbers a,b and c

$$a \times (b + c) = a \times b + a \times c$$

Example: For three integers (–3), (+5) and (–2),

$$(-3) \times [5 + (-2)] = (-3) \times (3) = -9$$

$$(-3) \times [5 + (-2)] = (-3) \times 5 + (-3) \times (-2)$$

$$= -15 + 6 = -9$$

So, $(-3) \times [5 + (-2)] = (-3) \times 5 + (-3) \times (-2)$

5. Distributive Property

It states that the numbers can be multiplied over subtraction as shown below, giving the same value.

For the numbers a, b and c

$$a \times (b - c) = a \times b - a \times c$$

Example : For the three integers (–5), (+4) and (+3)

$$(-5) \times (4 - 3) = -5 \times 1 = -5$$

$$(-5) \times (4 - 3) = (-5) \times 4 - (-5) \times 3$$

$$= -20 + 15 = -5$$

So, $(-5) \times (4 - 3) = (-5) \times 4 - (-5) \times 3$

6. Multiplicative Identity

The product of an integer and 1 is the number itself. For a whole number a,

$$a \times 1 = 1 \times a = a$$

So, 1 is known as multiplicative identity.

Example : $8 \times 1 = 8$; $(-8) \times 1 = -8$

7. Multiplicative Inverse

For an integers a

$$a \times \left(\frac{1}{a}\right) = \left(\frac{1}{a}\right) \times a = 1$$

So, $\left(\frac{1}{a}\right)$ is multiplicative inverse of a and a is multiplicative inverse of $\left(\frac{1}{a}\right)$.

Example : $5 \times \left(\frac{1}{5}\right) = 1$; $-7 \times \left(\frac{1}{-7}\right) = 1$

8. Multiplication by Zero

If we multiply a number by zero then it gives zero. For an integer a, $a \times 0 = 0 \times a = 0$.

Example : $6 \times 0 = 0$; $(-9) \times 0 = 0$

1. Find the product of:
   (a) 12 and 7 (b) –15 and 4 (c) –17 and 8 (d) 22 and –11
   (e) –12 and –14 (f) –102 and –5 (g) 18 and –8 (h) –32 and 7
   (i) –25 and 0
2. Find the product of:
   (a) $6 \times 5 \times (-7)$ (b) $5 \times (-7) \times (-8)$ (c) $8 \times (-3) \times (-2)$ (d) $12 \times (-5) \times 0$
   (e) $13 \times (-2) \times (-6)$ (f) $(-5) \times 5 \times 10$
3. Solve by using properties:
   (a) $20 \times (-16) + 20 \times 16$ (b) $-26 \times 5 + (-26) \times 10$
   (c) $16 \times (-5) + (-5) \times 4$ (d) $(-15) \times 4 + 15 \times (-6)$
   (e) $9 \times (-13) + 13 \times (-8)$ (f) $13 \times (-6) + 14 \times 13$
   (g) $(-11) \times (-15) + (-11) \times 5$ (h) $16 \times 8 + 12 \times (-3)$
4. Fill in the blanks:
   (a) $117 \times$ _____ $= 1$
   (b) $303 \times$ _____ $= 0$
   (c) $(-5) \times (\frac{1}{-5}) =$ _____
   (d) $(-8) \times 6 = 6 \times$ _____
   (e) $14 \times (7 \times 5) = ($ _____ $\times 7) \times 5$
   (f) $(-15) \times ($ _____ $\times 12) = [(-15) \times (-5)] \times 12$
5. Write True of False:
   (a) Multiplication of two numbers is not closure. _____
   (b) The product of zero and integer is zero. _____
   (c) The multiplicative inverse of a number is the reciprocal of that number. _____
   (d) The product of two negative integers is a negative integer. _____
   (e) The product of three negative integers is a positive integer. _____
   (f) 1 is the multiplicative identity. _____

Division of Integers

The division process is opposite of multiplication process.

1. If both the integers have same sign then we divided them irrespective of their sign and put (+) sign in quotient.

Example 1 : Divide:
(a) 45 by 15 (b) –75 by –25

Solution : (a) $45 \div 15 = \frac{45}{15} = 3$ **Ans.**

(b) $-(75) \div (-25) = \frac{-75}{-25} = 3$ **Ans.**

2. If both the integers have different signs then we divide them by simple method and put (–) minus sign in the quotient.

Example 2 : Divide:

(a) (-117) by 13 (b) 112 by (-16)

Solution : (a) $(-117) \div 13 = \frac{-117}{13} = -9$ **Ans.**

(b) $112 \div (-16) = \frac{112}{-16} = -7$ **Ans.**

Example 3 : Find the value of a in :

(a) $a \div 24 = -3$ (b) $a \div (-18) = 2$

Solution : (a) $a \div 24 = -3$

$\Rightarrow \frac{a}{24} = -3$

$\Rightarrow a = (-3) \times 24$

$\therefore a = -72$ **Ans.**

(b) $a \div (-18) = 2$

$\Rightarrow \frac{a}{-18} = 2$

$\Rightarrow a = 2 \times (-18)$

$\therefore a = -36$ **Ans.**

Properties of Division of Integers

1. The division of two integers is not always an integer. So, closure property doesn't hold here.

   If a and b are two whole numbers then $a \div b$ is necessarily not a whole number.

   Example : $(-10) \div (-2) = 5$ an integer.

   $(-9) \div (-2) = \frac{9}{2}$ not an integer.

2. The division of two numbers is not same as the division of reverse order of numbers. If a and b are two integer then,

   $a \div b \neq b \div a$

   Example : $(-35) \div (-7) = \frac{-35}{-7} = 5$

   $(-7) \div (-35) = \frac{-7}{-35} = \frac{1}{5}$

   So, $(-35) \div (-7) \neq (-7) \div (-35)$

   Exception : Commutative property holds only that time when dividend and divisors are equal.

3. When we divide a number by 1 then the number comes itself. If a is an integer then $a \div 1 = a$.

   Example : $7 \div 1 = 7$; $(-7) \div 1 = -7$

4. If a is an integer and a is not equal to 0 then $a \div a = 1$.

   Example : $(-14) \div (-14) = 1$; $15 \div 15 = 1$

5. If we divide 0 by an integer (except zero) then it gives zero but $a/0$ is meaningless or infinite. If a is a whole number then $0 \div a = 0$ but $a \div 0$ is meaningless.

Example : $0 \div (-16) = 0$; $0 \div (13) = 0$

But $14 \div 0$ = Meaningless

6. Distributive property of division states that the numbers cannot be divided over distribution.

So, division is not distributive for integers.

For three integers a,b,c then $a \div (b \div c) \neq (a \div b) \div c$ (except $c = 1$).

Example: $[(-16) \div 8] \div (-2) = (-2) \div (-2) = 1$

$(-16) \div [8 \div (-2) = (-16) \div (-4) = 4$

So, $[(-16) \div 8] \div (-2) \neq (-16) \div [8 \div (-2)]$

7. Division law is not associative for addition or subtraction over division.

If a,b,c are integers then $a \div (b + c) \neq (a \div b) + (a \div c)$.

Example : $(-12) \div [(-6) + 4] = (-12) \div (-2) = 6$

$(-12) \div [(-6) + (-12) \div 4 = 2 - 3 = -1$

So, $(-12) \div [(-6) + 4] \neq (-12) \div (-6) + (-12) \div 4$

Exercise 1.3

1. Divide:

(a) 45 by -9 (b) (-80) by 10 (c) 0 by (-25) (d) 70 by 14

(e) (-121) by 11 (f) (-87) by $-(87)$ (g) (-42) by (-14) (h) (-66) by 22

(i) 81 by (-9) (j) 256 by (-16) (k) (-289) by (-17) (l) (-625) by (-25)

2. Fill in the blanks:

(a) $84 \div$ _____ $= 7$ (b) _____ $\div 28 = -1$ (c) $90 \div$ _____ $= -18$

(d) $40 \div$ _____ $= 1$ (e) $-52 \div$ _____ $= 1$ (f) _____ $\div 36 = 0$

(g) $66 \div$ _____ $= -3$ (h) $-1 \div$ _____ $= 1$ (i) _____ $\div 7 = 7$

3. Write True or False:

(a) Closure property doesn't apply for division. _____

(b) The number divides by itself gives zero. _____

(c) A number divided by zero gives infinite. _____

(d) Commutative property holds for division. _____

SUMMARY

- Whole number and natural numbers with negative numbers are called integers.
- 0 is neither positive nor negative.
- 0 is less than positive integers but greater than negative integers.
- The absolute value of an integer is the value which does not depend on its sign.

- If we add to same signed integers then we find their sum, and keep the common sign of integers.
- If we have to add oppsite signed integers than we find their difference of absolute values, then we keep the sign of highest integer in the answer.
- To find the additive inverse of an integer (except zero), we change its sign only.
- If we multiply two integers of same sign then the product comes positive.
- If we multiply two integers of different sign then the product comes negative.
- If the divisor and dividend are of same sign then the quotient becomes positive.
- If the divisor and dividend are of different sign then the quotient becomes negative.

Multiple Choice Questions (MCQs)

1. The absolute value of (-101) is:
   (a) 0 ☐ (b) 1 ☐ (c) 101 ☐ (d) -101 ☐
2. The additive inverse of 55 is:
   (a) 55 ☐ (b) -55 ☐ (c) 110 ☐ (d) -110 ☐
3. The multiplicative inverse of 8 is:
   (a) $\frac{1}{8}$ ☐ (b) $\frac{1}{-8}$ ☐ (c) 8 ☐ (d) -8 ☐
4. $6-0=?$
   (a) 0 ☐ (b) 1 ☐ (c) 6 ☐ (d) Meaningless ☐

MENTAL MATHS

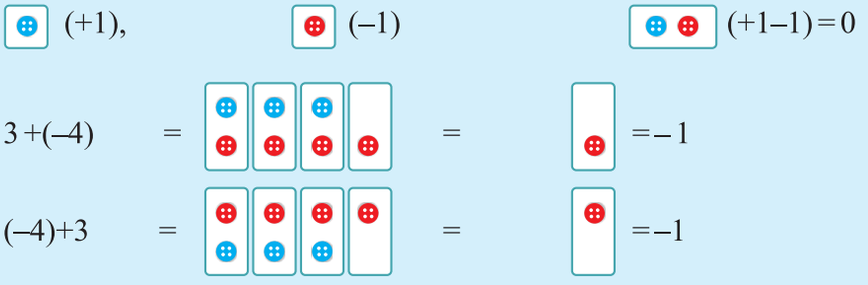
In an exam, +3 marks are given for right answer and (–2) marks are given for wrong answer. Naveen scored 20 marks. If he gave 12 correct answers then find the number of incorrect answers.

LAB ACTIVITY

Aim: To understand the commutative property of integers.

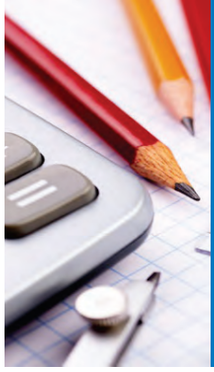
Materials Required: Red and blue buttons.

Procedure: Let one blue button shows (+1) integer and red button shows (–1) integer. So, the blue button and red button together show $(+1)+(-1)=0$.



So, $3+(-4)=(-4)+3$

So, the result comes that integers addition is commutative.



Chapter

2

Fractions

Main Points of the Chapter

✦ Fractions ✦ Kinds of fractions ✦ Comparison of fractions ✦ Addition and subtraction of fractions ✦ Multiplication of fractions ✦ Fraction as an operator 'Of' ✦ Reciprocal of a fraction ✦ Division of fractions.

Fraction

Fraction is written in the form of $\frac{a}{b}$, where a is numerator and b is denominator and $b \neq 0$.

Kinds of Fractions

1. Proper Fraction: The fraction in which the numerator is less than the denominator is called proper fraction.
   Example : $\frac{2}{5}, \frac{5}{7}, \frac{11}{15}$ etc.
2. Improper Fraction: The fraction in which the numerator is greater than the denominator is called improper fraction.
   Example : $\frac{9}{7}, \frac{11}{8}, \frac{45}{23}$ etc.
3. Decimal Fraction: The fraction in which the denominator is the multiple of 10,100 or 1000 is called decimal fraction.
   Example : $\frac{3}{10}, \frac{17}{100}, \frac{27}{1000}, \frac{51}{10000}$ etc.
4. Simple Fraction: The fractions having denominators other than multiples of 10 are called simple fractions.
   Example : $\frac{3}{7}, \frac{11}{25}, \frac{17}{36}, \frac{103}{119}$, etc.
5. Mixed Fraction: The fractions which are mixed in nature are called mixed fraction.
   Example : $3\frac{4}{5}, 7\frac{5}{9}, 5\frac{1}{7}$, etc.
   Here, improper fraction = (whole number × denominator + numerator) ÷ denominator
   Example : $3\frac{4}{5} = \frac{3 \times 5 + 4}{5} = \frac{15 + 4}{5} = \frac{19}{5}$
6. Equivalent Fraction: The fraction in which numerator and denominator are multiplied or divided by same number is called an equivalent fraction.
   Example: $\frac{2}{5}, \frac{2 \times 2}{5 \times 2} = \frac{4}{10}, \frac{2 \times 3}{5 \times 3} = \frac{6}{15}, \frac{4}{5 \times 4} = \frac{8}{20}$
   All are equivalent fractions. $\frac{2}{5}, \frac{4}{10}, \frac{6}{15}, \frac{8}{20}$
7. Equal Fraction: The fractions having equal denominators are called equal fraction.
   Example: $\frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}$ etc.
8. Unequal Fraction: The fractions having unequal denominators are called unequal fraction.
   Example: $\frac{2}{5}, \frac{3}{7}, \frac{4}{9}, \frac{11}{14}$ etc.

9. **Minimum Fraction:** The fraction $\frac{a}{b}$ in which the HCF of numerator and denominator comes 1, is called a minimum fraction.

Example 1: Change the following into equal fractions :

$\frac{2}{3}, \frac{3}{5}, \frac{5}{6}, \frac{7}{10}$

Solution: LCM of 3, 5, 6, 10 = 30

So, $\frac{2}{3} = \frac{2 \times 10}{3 \times 10} = \frac{20}{30}$

$\frac{3}{5} = \frac{3 \times 6}{5 \times 6} = \frac{18}{30}$

$\frac{5}{6} = \frac{5 \times 5}{6 \times 5} = \frac{25}{30}$

$\frac{7}{10} = \frac{7 \times 3}{10 \times 3} = \frac{21}{30}$

2	3, 5, 6, 10
3	3, 5, 3, 5
5	1, 5, 1, 5
	1, 1, 1, 1

So, $\frac{20}{30}, \frac{18}{30}, \frac{25}{30}, \frac{21}{30}$ are equal fractions. **Ans.**

Example 2 : Change into minimum fractions:

(a) $\frac{85}{105}$ (b) $\frac{-48}{144}$

Solution : (a) Lets find the HCF of 85 and 105 first.

$\because$ their HCF is 5.

$\therefore$ divide numerator and denominator by 5.

$\frac{85 \div 5}{105 \div 5} = \frac{17}{21}$

So, the minimum fraction of $\frac{85}{105}$ is $\frac{17}{21}$. **Ans.**

(b) Lets find the HCF of 48 and 144.

$\because$ their HCF is 48.

$\therefore$ divide numerator and denominator by 48.

$\frac{-48 \div 48}{144 \div 48} = \frac{-1}{3}$

$\therefore$ the minimum fraction of $\frac{-48}{144}$ is $\frac{-1}{3}$. **Ans.**

Comparison of Fractions

There are two methods for this:

1. By cross multiplication
2. By making the equal denominators

1. By Cross Multiplication:

Let $\frac{a}{b}$ and $\frac{c}{d}$ are two different fractions.

$\frac{a}{b} \times \frac{c}{d}$

(a) If $ad > bc$ then $\frac{a}{b} > \frac{c}{d}$

(b) If $ad < bc$ then $\frac{a}{b} < \frac{c}{d}$

(c) If $ad = bc$ then $\frac{a}{b} = \frac{c}{d}$

2. By Making the Equal Denominators :

(a) Find the LCM of denominators of given fractions.

(b) Change the numerator and denominator according to the multiplication of given LCM.

(c) Now you will get the equal fractions.

Now, the fraction having greatest numerator will be the highest.

Example 1: Solve the fractions by cross multiplication:

(a) $\frac{3}{5}$ and $\frac{4}{7}$ (b) $\frac{5}{9}$ and $\frac{11}{13}$ (c) $\frac{3}{7}$ and $\frac{45}{105}$

Solution: (a) $\frac{3}{5} \times \frac{4}{7}$

$3 \times 7 \quad 4 \times 5$

$21 > 20$

$\therefore \frac{3}{5} > \frac{4}{7}$ **Ans.**

(b) $\frac{5}{9} \times \frac{11}{13}$

$5 \times 13 \quad 11 \times 9$

$65 < 99$

$\therefore \frac{5}{9} < \frac{11}{13}$ **Ans.**

(c) $\frac{3}{7} \times \frac{45}{105}$

$3 \times 105 \quad 45 \times 7$

$315 = 315$

$\therefore \frac{3}{7} = \frac{45}{105}$ **Ans.**

Example 2: Solve by making the denominators equal:

(a) $\frac{9}{10}$ and $\frac{13}{15}$ (b) $\frac{5}{12}$ and $\frac{9}{16}$

Solution: (a) $\frac{9}{10}$ and $\frac{13}{15}$

LCM of 10 and $15 = 2 \times 3 \times 5 = 30$

$\frac{9}{10} = \frac{9 \times 3}{10 \times 3} = \frac{27}{30}$

$\frac{13}{15} = \frac{13 \times 2}{15 \times 2} = \frac{26}{30}$

$\because \quad 27 > 26$

$\therefore \frac{27}{30} > \frac{26}{30}$ or $\frac{9}{10} > \frac{13}{15}$ **Ans.**

2	10, 15
3	5, 15
5	5, 5
	1, 1

(b) $\frac{5}{12}$ and $\frac{9}{16}$

LCM of 12 and $16 = 2 \times 2 \times 2 \times 2 \times 3 = 48$

$\frac{5}{12} = \frac{5 \times 4}{12 \times 4} = \frac{20}{48}$

$\frac{9}{16} = \frac{9 \times 3}{16 \times 3} = \frac{27}{48}$

$\because \quad 20 < 27$

$\therefore \frac{5}{12} < \frac{9}{16}$ **Ans.**

2	12, 16
2	6, 8
2	3, 4
2	3, 2
3	3, 1
	1, 1

Addition and Subtraction of Fractions

Rules:

1. If the denominators are equal then we can directly add or subtract the numerators.
2. If the denominators are not same then we take the LCM and then solve them accordingly. After that we add or subtract thier numerators.

Example 1: Solve:

(a) $\frac{4}{11} + \frac{5}{11} + \frac{1}{11}$ (b) $\frac{10}{19} - \frac{6}{19}$

Solution : (a) $\frac{4}{11}+\frac{5}{11}+\frac{1}{11}=\frac{4+5+1}{11}=\frac{10}{11}$ **Ans.**

(b) $\frac{10}{19}-\frac{6}{19}=\frac{10-6}{19}=\frac{4}{19}$ **Ans.**

Example 2 : Solve:

(a) $\frac{3}{10}+\frac{7}{12}+\frac{4}{15}$ (b) $4\frac{1}{10}-2\frac{1}{15}$

Solution : (a) $\frac{3}{10}+\frac{7}{12}+\frac{4}{15}$

LCM of 10,12,15 $=2\times2\times3\times5=60$

2	10, 12, 15
2	5, 6, 15
3	5, 3, 15
5	5, 1, 5
	1, 1, 1

$\frac{3}{10}=\frac{3\times6}{10\times6}=\frac{18}{60}$

$\frac{7}{12}=\frac{7\times5}{12\times5}=\frac{35}{60}$

$\frac{4}{15}=\frac{4\times4}{15\times4}=\frac{16}{60}$

$\therefore \frac{3}{10}+\frac{7}{12}+\frac{4}{15}=\frac{18}{60}+\frac{35}{60}+\frac{16}{60}$

$=\frac{18+35+16}{60}=\frac{69}{60}=\frac{23}{20}=1\frac{3}{20}$ **Ans.**

(b) $4\frac{1}{10}-2\frac{1}{15}=\frac{41}{10}-\frac{31}{15}$

LCM of 10 and 15 $=2\times3\times5=30$

2	10, 15
3	5, 15
5	5, 5
	1, 1

$\frac{41}{10}=\frac{41\times3}{10\times3}=\frac{123}{30}$

$\frac{31}{15}=\frac{31\times2}{15\times2}=\frac{62}{30}$

$\frac{41}{10}-\frac{31}{15}=\frac{123}{30}-\frac{62}{30}$

$=\frac{123-62}{30}=\frac{61}{30}=2\frac{1}{30}$ **Ans.**

1. Change the following fractions into equal fractions:

(a) $\frac{5}{12}, \frac{7}{8}, \frac{3}{4}$ and $\frac{17}{20}$ (b) $\frac{5}{6}, \frac{4}{7}, \frac{3}{14}$ and $\frac{8}{21}$

(c) $\frac{2}{3}, \frac{3}{5}, \frac{7}{10}$ and $\frac{8}{15}$ (d) $\frac{7}{15}, \frac{11}{25}, \frac{3}{10}$ and $\frac{9}{20}$

2. Change into simplest fraction:

(a) $\frac{35}{140}$ (b) $-\frac{27}{81}$ (c) $\frac{75}{220}$ (d) $\frac{-15}{50}$

(e) $-\frac{80}{200}$ (f) $\frac{142}{180}$ (g) $\frac{30}{95}$ (h) $\frac{64}{130}$

3. Compare the given fraction:

(a) $\frac{5}{9}$ and $\frac{12}{15}$ (b) $\frac{9}{17}$ and $\frac{8}{13}$ (c) $\frac{4}{9}$ and $\frac{12}{27}$

(d) $\frac{5}{16}$ and $\frac{3}{8}$ (e) $\frac{-6}{13}$ and $\frac{-5}{12}$ (f) $\frac{11}{12}$ and $\frac{14}{15}$

4. Arrange the given numbers in ascending order:

(a) $\frac{3}{4}, \frac{7}{8}, \frac{17}{32}, \frac{7}{16}$ (b) $\frac{2}{3}, \frac{5}{6}, \frac{7}{8}, \frac{1}{24}$

5. Arrange the given numbers in descending order:

(a) $\frac{1}{6}, \frac{3}{4}, \frac{11}{12}, \frac{5}{9}$ (b) $\frac{5}{12}, \frac{7}{8}, \frac{6}{24}, \frac{3}{16}$

6. Find the values of:

(a) $\frac{3}{13}+\frac{7}{13}$ (b) $\frac{5}{17}+\frac{6}{17}$ (c) $\frac{9}{25}+\frac{12}{25}$

(d) $\frac{1}{10}+\frac{3}{20}+\frac{4}{25}$ (e) $\frac{1}{2}+\frac{3}{46}+\frac{5}{23}$ (f) $\frac{5}{6}+\frac{8}{21}+\frac{9}{14}$

7. Find the difference of:

(a) $\frac{7}{9}-\frac{2}{9}$ (b) $\frac{5}{8}-\frac{2}{8}$ (c) $\frac{5}{6}-\frac{3}{4}$

(d) $8\frac{1}{9}-3\frac{5}{18}$ (e) $6\frac{1}{7}-2\frac{2}{7}$ (f) $2\frac{3}{10}-1\frac{1}{5}$

8. Find the value of:

(a) $6\frac{1}{10}-3\frac{2}{5}+3$ (b) $1\frac{5}{12}-4\frac{3}{8}+7\frac{5}{6}$ (c) $5-3\frac{1}{7}+2\frac{3}{14}$

(d) $2\frac{1}{10}+3\frac{1}{5}-1\frac{1}{2}-\frac{1}{4}$ (e) $2\frac{5}{12}+4\frac{1}{3}-5\frac{1}{6}$ (f) $1\frac{1}{10}-2\frac{2}{5}+3\frac{1}{4}$

Multiplication of Fractions

If $\frac{a}{b}$ and $\frac{c}{d}$ are two fractions then $\frac{a}{b}\times\frac{c}{d}=\frac{ac}{bd}$ and we can also change it into simplest form.

Example 1: Multiply:

(a) $\frac{7}{15}$ by $\frac{5}{28}$ (b) $\frac{21}{25}$ by $\frac{30}{49}$

Solution : (a) $\frac{7}{15}\times\frac{5}{28}=\frac{\overset{1}{\cancel{7}}\times\cancel{5}^{1}}{3\cancel{15}\times\cancel{28}4}=\frac{1\times1}{3\times4}=\frac{1}{12}$ **Ans.**

(b) $\frac{21}{25}\times\frac{30}{49}=\frac{\overset{3}{\cancel{21}}\times\cancel{30}^{6}}{\underset{5}{\cancel{25}}\times\cancel{49}_{7}}=\frac{3\times6}{5\times7}=\frac{18}{35}$ **Ans.**

Example 2: Find the product of:

(a) $9\frac{1}{2}\times1\frac{9}{19}$ (b) $5\frac{5}{6}\times1\frac{5}{7}$

Solution : (a) $9\frac{1}{2} \times 1\frac{9}{19} = \frac{\cancel{19}^{1}}{\cancel{2}_{1}} \times \frac{\cancel{28}^{14}}{\cancel{19}_{1}} = \frac{1 \times 14}{1 \times 1} = 14$ **Ans.**

(b) $5\frac{5}{6} \times 1\frac{5}{7} = \frac{\cancel{35}^{5}}{\cancel{6}_{1}} \times \frac{\cancel{12}^{2}}{\cancel{7}_{1}} = \frac{5 \times 2}{1 \times 1} = 10$ **Ans.**

Fraction as an Operator 'Of'

'Of' shows the multiplication.

Example 1: Find 45 of $\frac{2}{5}$.

Solution : $45 \text{ of } \frac{2}{5} = \cancel{45}^{9} \times \frac{2}{\cancel{5}} = 9 \times 2 = 18$

Example 2 : Find the $\frac{7}{20}$ cm of a meter.

Solution: $\frac{7}{20}$ of 1 meter $= \frac{7}{20}$ of 100 cm

$= \cancel{100}^{5}\text{ cm} \times \frac{7}{\cancel{20}} = 5 \text{ cm} \times 7 = 35 \text{ cm}$ **Ans.**

Exercise 2.2

1. Multiply the following and change into simplest form:

(a) $\frac{3}{6} \times 25$ (b) $\frac{25}{32} \times \frac{8}{15}$ (c) $\frac{4}{5} \times \frac{15}{20}$ (d) $\frac{21}{4} \times 20$

(e) $\frac{5}{8} \times \frac{4}{7}$ (f) $\frac{4}{7} \times \frac{21}{32}$ (g) $\frac{2}{5} \times \frac{15}{16}$ (h) $\frac{7}{18} \times \frac{36}{49}$

(i) $4\frac{2}{3} \times 3\frac{6}{7}$ (j) $18\frac{3}{5} \times 41\frac{2}{3}$ (k) $5\frac{3}{5} \times 42\frac{1}{2}$ (l) $6\frac{2}{3} \times \frac{6}{15}$

2. Simplify:

(a) $\frac{15}{28} \times \frac{35}{36} \times \frac{12}{25}$ (b) $\frac{13}{15} \times \frac{10}{23} \times \frac{46}{65}$ (c) $\frac{36}{55} \times \frac{10}{27} \times \frac{22}{25}$

(d) $1\frac{1}{5} \times 4\frac{1}{16} \times 3\frac{5}{13}$ (e) $10 \times 2\frac{1}{5} \times 5\frac{5}{11}$ (f) $1\frac{2}{3} \times 2\frac{2}{5} \times 4\frac{3}{5}$

3. Find the value of:

(a) $\frac{4}{5}$ of 35 (b) $\frac{2}{3}$ of 27 (c) $\frac{3}{4}$ of 20

(d) $\frac{9}{20}$ of 100 (e) $\frac{17}{19}$ of 95 (f) $\frac{7}{11}$ of 220

4. Find:

(a) $\frac{3}{16}$ of 48 litres (b) $\frac{3}{15}$ of 120 rupees (c) $\frac{5}{11}$ of 330 kg

(d) $\frac{9}{18}$ of 90 meters (e) $\frac{5}{8}$ of 40 km (f) $\frac{6}{7}$ of 280 grams

WORD PROBLEMS

Example 1: If the cost of 1 kg of potato is ₹ $5\frac{2}{5}$ then find the cost of 5 kg of potatoes.

Solution :

Cost of 1 kg of potatoes $= ₹ \frac{27}{5}$

Cost of 5 kg of potatoes $= ₹\left(\frac{27}{5} \times 5\right) = ₹ 27$

So, the cost of 5 kg of potatoes is ₹ 27. **Ans.**

Example 2: A class has 49 students. If $\frac{3}{7}$ of them are girls then find the number of boys.

Solution :

Students in class $= 49$

Class has $\frac{3}{7}$ girls.

So, Number of girls in class $= \frac{3}{7}$ of 49

$= 49 \times \frac{3}{7} = 7 \times 3 = 21$

So, number of boys in class $= 49 - 21 = 28$

So, the class has 28 boys. **Ans.**

Example 3: Raj has a monthly income of ₹25000. He saves $\frac{1}{5}$ part of his salary per month. Find his total expenditure.

Solution :

Income per month $= ₹ 25000$

Savings per month $= ₹ 25000$ of $\frac{1}{5}$

$= ₹\left(25000 \times \frac{1}{5}\right) = ₹ 5000$

Expenditure per month $= ₹ (250000 - 5000) = ₹ 20000$

So, Raj expends ₹ 20000 per month. **Ans.**

1. One litre of milk costs ₹ 30. Find the cost of $5\frac{1}{2}$ litres of milk.
2. Pankaj travels $2\frac{2}{5}$ km distance in 1 hour. How much distance will he cover in $\frac{1}{5}$ hours?
3. A school has 3500 students. $\frac{2}{7}$ of them are girls. Find the number of boys in school.
4. The bus ticket from Delhi to Jaipur is ₹140. Find the cost of $3\frac{1}{2}$ tickets.
5. An edible oil packet has 850 ml oil. How much oil will come in $2\frac{1}{5}$ packets?
6. Anshul earns ₹15000 per month. If he spends $\frac{5}{8}$ part of his salary , find his savings per month.

Reciprocal of a Fraction

Two non-zero fractions , which gives 1 as product, are the reciprocal of each other.

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

So, the reciprocal of $\frac{4}{7}$ is $\frac{7}{4}$ and that of $\frac{7}{4}$ is $\frac{4}{7}$.

We can get the reciprocal of a fraction by reversing it.

So, the reciprocal of $\frac{1}{5}$ is 5 and that of 5 is $\frac{1}{5}$.

REMEMBER

- The reciprocal of a proper fraction is an improper fraction.
- The reciprocal of an improper fraction is a proper fraction.

Division of Fractions

If $\frac{a}{b}$ and $\frac{c}{d}$ are two fractions then $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$

So, we multiply first fraction by the reciprocal of other.

Example 1: Divide:

(a) $\frac{4}{25}$ by $\frac{12}{35}$ (b) $\frac{7}{9}$ by 14

Solution : (a) $\frac{4}{25} \div \frac{12}{35} = \frac{4}{25} \times \frac{35}{12} = \frac{{}^{1}\cancel{4} \times \cancel{35}^{7}}{{}_{5}\cancel{25} \times \cancel{12}_{3}} = \frac{1 \times 7}{5 \times 3} = \frac{7}{15}$ **Ans.**

(b) $\frac{7}{9} \div 14 = \frac{7}{9} \times \frac{1}{14} = \frac{{}^{1}\cancel{7} \times 1}{9 \times \cancel{14}_{2}} = \frac{1 \times 1}{9 \times 2} = \frac{1}{18}$ **Ans.**

Example 2: Divide:

(a) $3\frac{3}{7} \div \frac{8}{21}$ (b) $5\frac{4}{7} \div 1\frac{5}{7}$

Solution : (a) $3\frac{3}{7} \div \frac{8}{21} = \frac{24}{7} \times \frac{21}{8} = \frac{{}^{3}\cancel{24} \times \cancel{21}^{3}}{{}_{1}\cancel{7} \times \cancel{8}_{1}} = \frac{3 \times 3}{1 \times 1} = 9$ **Ans.**

(b) $5\frac{4}{7} \div 1\frac{5}{7} = \frac{39}{7} \div \frac{12}{7} = \frac{39}{7} \times \frac{7}{12} = \frac{{}^{13}\cancel{39} \times \cancel{7}^{1}}{{}_{1}\cancel{7} \times \cancel{12}_{4}} = \frac{13 \times 1}{1 \times 4} = \frac{13}{4} = 3\frac{1}{4}$ **Ans.**

Exercise 2.4

1. Find the reciprocal of:

   (a) $\frac{7}{8}$ (b) $\frac{11}{5}$ (c) $\frac{1}{6}$ (d) $\frac{5}{12}$ (e) $\frac{9}{10}$ (f) $\frac{17}{15}$

2. Divide:

   (a) $\frac{13}{25}$ by $\frac{39}{50}$ (b) $\frac{19}{35}$ by $\frac{57}{70}$ (c) $\frac{11}{24}$ by $\frac{7}{8}$ (d) $\frac{7}{15}$ by $\frac{14}{25}$

   (e) 24 by $\frac{2}{5}$ (f) $9\frac{4}{5}$ by 42 (g) $20\frac{2}{3}$ by $7\frac{3}{4}$ (h) $6\frac{2}{9}$ by $4\frac{2}{3}$

   (i) $69\frac{3}{4}$ by $7\frac{3}{4}$ (j) $1\frac{2}{3}$ by $3\frac{1}{5}$ (k) $3\frac{1}{5}$ by $1\frac{1}{5}$ (l) $15\frac{5}{6}$ by $6\frac{2}{3}$

3. Simplify:

(a) $13\frac{1}{2} \div \frac{6}{7}$ (b) $16\ \frac{2}{3} \div 50$ (c) $20\ \frac{1}{4} \div \frac{3}{4}$ (d) $\frac{7}{9} \div \frac{5}{3}$

(e) $2\ \frac{1}{4} \div \frac{3}{5}$ (f) $4\ \frac{1}{2} \div \frac{9}{7}$ (g) $45 \div 1\ \frac{4}{5}$ (h) $15\ \frac{5}{6} \div 6\ \frac{1}{3}$

WORD PROBLEMS

Example 1: A grocer sells oranges at the rate of ₹ $3\ \frac{3}{4}$ and gets ₹ 420. How much oranges did he sell?

Solution :

Cost of one orange $= ₹\ \frac{15}{4}$

Total cost $= ₹\ 420$

So, number of orange sold $= 420 \div \frac{15}{4}$

$= 112$

So, the grocer sold 112 oranges. **Ans.**

Example 2 : Rajesh bought $9\ \frac{1}{2}$ kg sugar for ₹ $237\ \frac{1}{2}$. Find the cost of 1 kg of sugar.

Solution :

Cost of $9\ \frac{1}{2}$ kg of sugar $= ₹\ 237\ \frac{1}{2}$

So, cost of 1 kg of sugar $= ₹\left(237\ \frac{1}{2} \div 9\ \frac{1}{2}\right)$

$= ₹\left(\frac{475}{2} \div \frac{19}{2}\right)$

$= ₹\left(\frac{\overset{25}{\cancel{475}}}{\cancel{2}_{1}} \div \frac{\cancel{2}^{1}}{\cancel{19}_{1}}\right) = ₹\ 25$

So, the cost of 1kg of sugar is ₹ 25. **Ans.**

Example 3 : The product of two numbers is 72. If one number is $2\ \frac{2}{5}$ then find the other.

Solution :

Product of two numbers $= 72$

First number $= 2\frac{2}{5}$

Other number $= 72 \div 2\frac{2}{5} = 72 \div \frac{12}{5}$

$= \overset{6}{\cancel{72}} \times \frac{5}{\cancel{12}} = 6 \times 5 = 30$

So, the other number is 30. **Ans.**

Example 4 : By what number we will divide $6\ \frac{2}{9}$ to get $4\ \frac{2}{3}$?

Solution : Let it be divided by x.

So, $6\ \frac{2}{9} \div x = 4\ \frac{2}{3}$

$\frac{56}{9} \times \frac{1}{x} = \frac{14}{3}$

$$x = \frac{\cancel{56}^{4}}{\cancel{9}_{3}} \times \frac{\cancel{3}^{1}}{\cancel{14}_{1}}$$

$$x = \frac{4}{3} = 1\frac{1}{3}$$

So, we will get $4\frac{2}{3}$ on dividing $6\frac{2}{9}$ by $1\frac{1}{3}$. **Ans.**

Exercise 2.5

1. A shopkeeper sold pen ₹ $2\frac{3}{4}$ and gets ₹ 220. How much pens did he sell?
2. A wire $17\frac{1}{2}$ m long was cut into 7 pieces. Find the length of each piece.
3. Neeraj travelled $50\frac{3}{4}$ km distance in $5\frac{1}{2}$ hrs. How much distance will he travel in 1 hr?
4. Seema bought $8\frac{1}{2}$ kg of rice of ₹ $195\frac{1}{2}$. How much she pays to get 11 kg of rice?
5. The product of two numbers is 12. If one number is $2\frac{10}{11}$ then find the other.
6. By what number $3\frac{1}{8}$ be multiplied to get 50?

SUMMARY

- A number in the form of $\frac{a}{b}$ is called a fraction if b is not equal to zero.
- In $\frac{a}{b}$, a is called numerator and b is called denominator.
- The fraction in which numerator is smaller than denominator is called a proper fraction.
- The fraction in which numerator is greater than denominator is called a improper fraction.
- The fractions whose denominators are same are called equal fractions.
- The fractions whose denominators are not same are called unequal fractions.
- If we want to get an equivalent fraction to a fraction then we multiply or divide its numerator and denominator by same non-zero number.
- Let $\frac{a}{b}$ and $\frac{c}{d}$ are two fractions then:
  (a) $ad > bc$ then $\frac{a}{b} > \frac{c}{d}$ (b) $ad < bc$ then $\frac{a}{b} < \frac{c}{d}$ (c) $ad = bc$ then $\frac{a}{b} = \frac{c}{d}$
- The term 'of' shows the multiplication.
- We can get the reciprocal of a fraction by reversing it.

Multiple Choice Questions (MCQs)

1. What kind of fraction is $\frac{2}{7}$?
   (a) Proper ☐ (b) Improper ☐ (c) Mixed ☐ (d) Decimal ☐

2. The simplest form of $\frac{16}{24}$:

(a) $\frac{8}{12}$ ☐ (b) $\frac{4}{6}$ ☐ (c) $\frac{2}{3}$ ☐ (d) 1 ☐

3. The equivalent fraction of $\frac{3}{5}$ is:

(a) $\frac{6}{15}$ ☐ (b) $\frac{15}{20}$ ☐ (c) $\frac{18}{25}$ ☐ (d) $\frac{21}{35}$ ☐

4. The reciprocal of $\frac{6}{25}$ is:

(a) $\frac{3}{5}$ ☐ (b) $\frac{25}{6}$ ☐ (c) $\frac{25}{3}$ ☐ (d) $\frac{5}{3}$ ☐

MENTAL MATHS

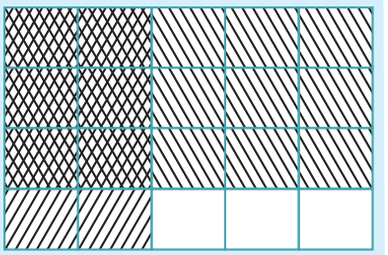
Nisha's refrigerator had $\frac{5}{2}$ cup of ice cream. She divided that into 3 friends equally. Find the share of each.

LAB ACTIVITY

Aim: To understand the multiplication of fractions $\left(\frac{2}{5} \times \frac{3}{4}\right)$.

Materials Required: Paper, Pen , Scale.

Procedure: Make a rectangle and cut it into 5 parts according to the length. Each strip will show $\frac{1}{5}$ part and two strips will show $\frac{2}{5}$ part. Now, show these two strips in a line in one direction by diagonal- lines



Now, divide the rectangle into 4 equal parts horizontally. Each strip will show a part of $\frac{1}{4}$ and three strips will show $\frac{3}{4}$ part. Put these strips in the opposite direction of first strips by shading them diagonally.

Here are 20 small rectangles, count the double shaded rectangles. Out of 20, 6 rectangles are double-shaded. This double shaded part represents the $\frac{6}{20}$ part.

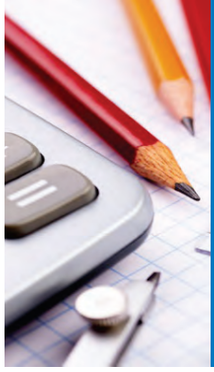
So, $\frac{2}{5} \times \frac{3}{4} = \frac{6}{20} = \left(\frac{2 \times 3}{5 \times 4}\right)$

Similarly, we can write- $\frac{3}{4} \times \frac{2}{5} = \frac{6}{20}$

Or, $\frac{2}{5} \times \frac{3}{4} = \frac{3}{4} \times \frac{2}{5} = \frac{6}{20}$

So, we can write $\frac{6}{20}$ in the simplest form as:

$$\frac{6}{20} = \frac{6 \div 2}{20 \div 2} = \frac{3}{10}$$



Chapter

3

Decimal Number

Main Points of the Chapter

✦ Decimal numbers ✦ Addition and subtraction of decimal numbers ✦ Multiplication of decimal numbers ✦ Division of decimal numbers.

Decimal Numbers

The numbers which are expressed in the decimal form are known as decimal numbers. It has two parts-whole numeral part and decimal part like- in 15.68 , 15 is whole part and 68 is decimal part.

Same Decimal Numbers- The numbers having equal places after decimals are known as same decimal numbers. Example: 3.78, 5.24, 16.39, etc.

Different Decimal Numbers- The numbers don't having the equal places of decimals are known as different decimal numbers. Example: 5.7, 6.12, 17.421, etc.

REMEMBER

- If we put zero to the left part of the decimal number then it gives no change in the number. Similarly, in the decimal part of unequal decimal numbers, we can change them into equal decimal numbers by putting zero in the left part.
  For example: We can write 2.14 as 2.140, 5.8 as 5.800 and 12.439 as 12.439.

Addition and Subtraction of Decimal Numbers

Addition of Decimal Numbers :

Rules: 1. Arrange the decimal numbers into equal decimal numbers.
2. Arrange them in the column.
3. Keep the decimal part below the decimal part and main part below the main part.
4. Add them properly, and keep the decimal point below the other decimal point.

Example 1: Add:
2.13, 11, 0.31, 12.014

Solution : On changing the given numbers into same decimal numbers,
2.130, 11.000, 0.310 and 12.014
Now add all the numbers in a column as shown.

```
  2.130
 11.000
  0.310
+12.014
 25.454
```

So, the total of numbers is = 25.454 **Ans.**

Subtraction of Decimal Numbers:

Rules: 1. Arrange the given decimal numbers into equal decimal numbers.
2. Keep the smaller decimal number below the larger decimal number such that decimal part comes below the decimal part and main part comes below the main part in a column.
3. Arrange them in the column and subtract them like simple numbers.
4. Subtract them properly keeping the decimal point below the other decimal point.

Example 2: Subtract 14.056 from 25.69.

Solution: On changing the given numbers into same decimal numbers and subtracting them columnwise:

$$\begin{array}{r} 25.690 \\ -\ 14.056 \\ \hline 11.634 \end{array}$$

So, $25.690 - 14.056 = 11.634$. **Ans.**

1. Add:
   (a) 131.56 + 29.7 + 9.801
   (b) 88 + 8.8 + 8.08 + 80.80
   (c) 127.56 + 29.81 + 1.31 + 0.27
   (d) 12.1 + 12.21 + 12.612 + 0.12
   (e) 77.77 + 99.99 + 55.5 + 22.2
   (f) 4.321 + 7.923 + 18.125 + 723
   (g) 216.6 + 0.004 + 4.681
   (h) 28.074 + 0.66 + 15.445
   (i) 164.12 + 14 + 123.71
   (j) 14.389 + 204.9 + 529.85
2. Subtract:
   (a) 37 – 0.031
   (b) 1.25 – 0.01
   (c) 78.53 – 23
   (d) 72.13 – 49
   (e) 927 – 432.81
   (f) 99.99 – 77.777
   (g) 253.55 – 178.792
   (h) 529.1 – 428.53
   (i) 183.45 – 81.2
   (j) 350.7 – 187.29

Multiplication of Decimal Numbers

Multiplication by 10, 100, 1000:

Rules: 1. If we multiply a number by 10, the decimal shifts one place to the right side.
2. If we multiply a number by 100, the decimal shifts two places to the right side.
3. If we multiply a number by 1000, the decimal shifts three places to the right side.

Example 1: Multiply :

(a) 6.84×10 (b) 13.468×100 (c) 93.28×1000

Solution:
(a) $6.84 \times 10 = 68.4$ (on shifting the decimal to one decimal place)
(b) $13.468 \times 100 = 1346.8$ (on shifting the decimal to two decimal place)
(c) $93.28 \times 1000 = 93280$ (here decimal part has two digits, where we have to shift decimal to three decimal places. So add 0 to decimal part and make it 3 digits.)

Multiplication of a whole number to a decimal number:

Rules: 1. We multiply a decimal number by a whole number by assuming decimal number as a whole number.
2. We put the decimal from the right side according to the decimal present in the original whole number.

Example 2 : Multiply:

Find the product of 6.752×15

Solution :

$$\begin{array}{r} 6.752 \\ \times\ 15 \\ \hline 33760 \\ +\ 67520 \\ \hline 101.280 \end{array}$$

So, $6.752 \times 15 = 101.280$ **Ans.**

Here, we put the decimal from the right side to the 3rd place according to the decimal present in the original whole number, which is also on 3rd place.

Multiplication of a decimal number to a decimal number:

Rules: 1. We multiply a decimal number by another decimal number by simple multiplication process of simple numbers.

2. Then we put the decimal from the right side according to the decimal present in the both the original numbers.

Example 3: Multiply 3.12×2.8.

Solution : First multiply 312 with 28.

$$\begin{array}{r} 312 \\ \times\ 28 \\ \hline 2496 \\ +\ 6240 \\ \hline 8736 \end{array}$$

Sum of places of decimals= 2+1=3

So, decimal will come after 3 places from right side in the product.

So, $3.12 \times 2.8 = 8.736$ **Ans.**

1. Find the product of :

(a) 5.26×10 (b) 0.002×10 (c) 0.721×10

(d) 7.328×100 (e) 0.009×100 (f) 0.2331×100

(g) 26.4862×1000 (h) 0.00897×1000 (i) 0.2364×1000

2. Find the product of :

(a) 3.69×53 (b) 14.81×125 (c) 9.8763×12

(d) 0.8463×32 (e) 0.0812×24 (f) 19.324×44

3. Find the product :

(a) 3.51×7.9 (b) 15.21×1.37 (c) 12.28×14.7

(d) 2.143×0.43 (e) 0.245×2.56 (f) 1.542×4.78

Division of Decimal Numbers

Division by 10, 100, 1000:

Rules: 1. If we divide a decimal number by 10 then the decimal shifts to the left side in the number by one place.

2. If we divide a decimal number by 100 then the decimal shifts to the left side in the number by two places.

3 If we divide a decimal number by 1000 then the decimal shifts to the left side in the number by three places.

Example 1: Divide:

(a) $12.34 \div 10$ (b) $138.14 \div 100$ (c) $21.846 \div 1000$

Solution : (a) $12.34 \div 10 = 1.234$ (On shifting the decimal one place to left side)

(b) $138.14 \div 100 = 1.3814$ (On shifting the decimal two places to left side)

(c) $21.846 \div 1000 = 0.021846$ (On shifting the decimal three places to left side)

Division of a decimal number by a whole number:

Rules: 1. We divide the given decimal number by the given whole number as usual.

2. Now we put the decimal in the quotient according to the decimal present in the whole number from left side.

Example 2: Divide 235.635 by 15.

Solution :

$$
\begin{array}{r}
15.709 \\
15\overline{)\,235.635} \\
-15 \\
\hline
85 \\
-75 \\
\hline
106 \\
-105 \\
\hline
135 \\
-135 \\
\hline
0
\end{array}
$$

So, $235.635 \div 15 = 15.709$ **Ans.**

Example 3: Divide 1.25 by 8.

Solution :

$$
\begin{array}{r}
0.15625 \\
8\overline{)\,1.25000} \\
-0 \\
\hline
12 \\
-8 \\
\hline
45 \\
-40 \\
\hline
50 \\
-48 \\
\hline
20 \\
-16 \\
\hline
40 \\
-40 \\
\hline
0
\end{array}
$$

(Taking three zeroes in dividend)

So, $1.25 \div 8 = 0.15625$ **Ans.**

Division of a decimal number by the multiples of 10, 100, 1000:

First, break the multiples into the factors of 10.

As– $50 = 5 \times 10$; $600 = 6 \times 100$; $4000 = 4 \times 1000$, etc.

Example 4: Divide 78.60 by 400.

Solution :

$$\frac{78.60}{400} = \frac{78.60}{4 \times 100}$$

$$= \frac{78.60}{4} \times \frac{1}{100}$$

$$= \frac{19.65}{100} = 0.1965 \text{ (on shifting the decimal to two places in left side)}$$

$$
\begin{array}{r}
19.65 \\
4\overline{)\,78.60} \\
-4 \\
\hline
38 \\
-36 \\
\hline
26 \\
-24 \\
\hline
20 \\
-20 \\
\hline
0
\end{array}
$$

So, $78.60 \div 400 = 0.1965$ **Ans.**

Division of a decimal number by another decimal number:

Rules: 1. Change the decimal number into whole number by eliminating the decimals by adding zeroes (10,100,1000) to the opposite parts.

2. Divide the new dividend by a new divisor.

Example 5 : Divide 0.00625 by 0.025.

Solution: $0.00625 \div 0.025$

$$= \frac{0.00625}{0.025}$$

$$= \frac{0.00625}{0.025} \times \frac{1000}{1000}$$

$$= \frac{6.25}{25}$$

So, $0.00625 \div 0.025 = 0.25$ **Ans.**

$$\begin{array}{r} 0.25 \\ 25\overline{)6.25} \\ -0 \\ \hline 62 \\ -50 \\ \hline 125 \\ -125 \\ \hline 0 \end{array}$$

Exercise 3.3

1. Divide:
   (a) $86.7 \div 10$ (b) $0.348 \div 10$ (c) $0.0121 \div 10$
   (d) $12.203 \div 100$ (e) $3.498 \div 100$ (f) $0.025 \div 100$
   (g) $0.872 \div 1000$ (h) $57.2 \div 100$ (i) $368.5 \div 1000$
   (j) $827 \div 10000$ (k) $0.0178 \div 10000$ (l) $18.261 \div 10000$
2. Divide:
   (a) $19 \div 4$ (b) $152 \div 8$ (c) $23 \div 5$
   (d) $813 \div 25$ (e) $174 \div 12$ (f) $162 \div 15$
3. Divide:
   (a) $624.8 \div 4$ (b) $2.472 \div 6$ (c) $168.5 \div 5$
   (d) $120.96 \div 12$ (e) $0.338 \div 13$ (f) $235.2 \div 21$
4. Divide:
   (a) $724.8 \div 40$ (b) $12.36 \div 60$ (c) $24.5 \div 50$
   (d) $120.5 \div 200$ (e) $28.08 \div 200$ (f) $42.8 \div 500$
5. Divide:
   (a) $0.256 \div 0.16$ (b) $0.036 \div 0.9$ (c) $0.266 \div 0.38$
   (d) $0.00639 \div 0.213$ (e) $0.8085 \div 0.35$ (f) $16.578 \div 5.4$

WORD PROBLEMS

Example 1: The cost of 1 kg of apples is ₹ 58.38. Find the cost of 8.5 kg of apples.

Solution : Cost of 1 kg of apples = ₹ 58.38

Cost of 8.5 kg of apples = 58.38×8.5

= ₹ 496.23

So, the cost of 8.5 kg of apples is ₹ 496.23. **Ans.**

Example 2: Akash prepared 18.5kg of *khoya* from 64.75 litres of milk. How much milk will be needed to prepare 1 kg of *khoya*?

Solution: Milk needed for preparing 18.5 kg of *khoya* = 64.75 litres

Milk needed for preparing 1 kg of *khoya* = (64.75 ÷ 18.5) litres

Now, $\frac{64.75}{18.5} = \frac{64.75}{18.5} \times \frac{10}{10} = \frac{647.5}{185}$

So, he will need 3.5 litres of milk to prepare 1 kg of *khoya*. **Ans.**

$$\begin{array}{r} 3.5 \\ 185\overline{)647.5} \\ -555 \\ \hline 925 \\ -925 \\ \hline 0 \end{array}$$

Exercise 3.4

1. The cost of one calculator is ₹939. Find the cost of 12 such calculators.
2. The cost of one meter wire is ₹18.48. Find the cost of 19.5 meters of wire.
3. One kg of rice costs ₹ 17.85. Find the cost of 25.450 kg of rice.
4. One clock costs ₹ 575.58. Find the cost of 78 such clocks.
5. One pen costs ₹ 97.43. Find the cost of 28 such pens.
6. 87 copies costs ₹ 1189.29. Find the cost of one copy.
7. The cost of 18 meters khaadi cloth is ₹1022.94. Find the cost of one meter of cloth.
8. A car goes 490.5 kms in 25 litres of petrol. How much will it go in one litre of petrol?
9. The cost of 15 litres of refined oil is ₹ 1122.15. Find the cost of a litre of oil?
10. The cost of 35 wrist watches is ₹ 39397.05. Find the cost of a wrist watch.

SUMMARY

- The numbers which are expressed in decimals are known as decimal numbers.
- Decimal numbers have two parts- whole part and decimal part.
- The numbers having equal places after decimals are known as same decimal numbers.
- The numbers don't having the equal places of decimals are known as different decimal numbers.
- We can add or subtract the decimal numbers to same decimal numbers.
- If we multiply a number by 10,100 or 1000 then the decimal shifts to the right side.
- If we divide a number by 10,100 or 1000 then the decimal shifts to the left side.

Multiple Choice Questions (MCQs)

1. $101.01 \times 0.01 = ?$
   (a) 10.101 ☐ (b) 0.10101 ☐ (c) 1.0101 ☐ (d) 101.0101 ☐
2. $1.8 \times 1000 = ?$
   (a) 0.0018 ☐ (b) 0.018 ☐ (c) 1800 ☐ (d) 18000 ☐
3. $25 \div 0.05 = ?$
   (a) 5 ☐ (b) 50 ☐ (c) 500 ☐ (d) 0.05 ☐
4. By what number we should divide 0.0001 to get 0.1?
   (a) 0.001 ☐ (b) 0.01 ☐ (c) 0.1 ☐ (d) 1 ☐

MENTAL MATHS

1. Find the value of $2 \times 0.2 \times 0.02 \times 0.002$.
2. If $211788 \div 333 = 636$ then find the value of $0.0211788 \div 0.333$ without actual division.

LAB ACTIVITY

Aim : To understand the multiplication of decimals (0.1×0.1).

Materials Required : White chart paper, Pencil, Paper.

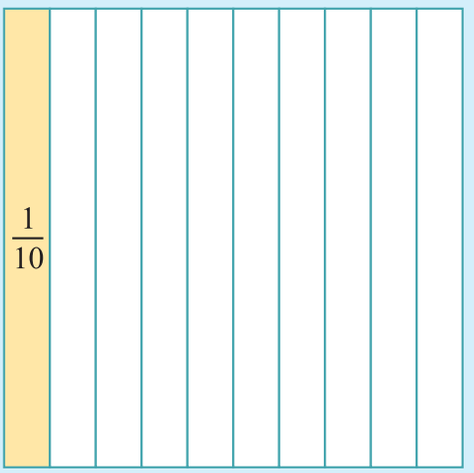
Procedure : 1. Draw a square and divide it into 10 equal squares as shown in figure. Each square will represent $\frac{1}{10}$ or 0.1 value.

2. Now divide it longitudinally into 10 parts.

$$0.1 \times 0.1 = \frac{1}{10} \times \frac{1}{10} \text{ means } \frac{1}{10} \text{ of } \frac{1}{10}$$

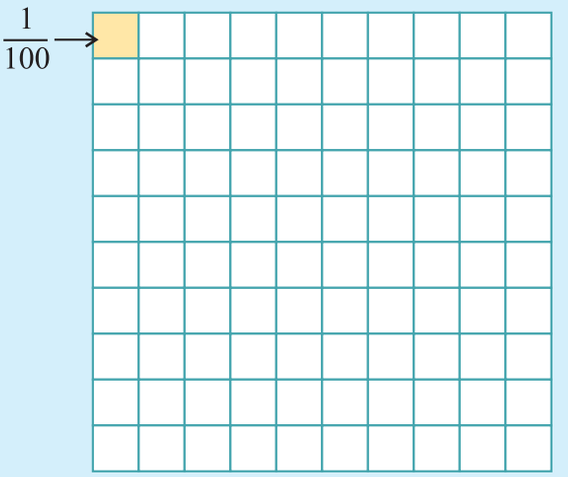
$$= \frac{1 \times 1}{10 \times 10} = \frac{1}{100} = 0.01$$

Hence, our result is verified.



(A)

$\frac{1}{10}$ of full $= 0.1$



(B)

$\frac{1}{10}$ of $\frac{1}{10} = 0.1 \times 0.1 = 0.01$

ANSWER SHEET

Chapter-1

Exercise 1.1

1. (a) 170 (b) –3 (c) –16 (d) –700 (e) –34 (f) 172 (g) –600 (h) –276 (i) 0 2. (a) 258 (b) 325 (c) 8 (d) 28 3. (a) 78 (b) –32 (c) 21 (d) –108 (e) 0 (f) 2017 (g) –256 (h) 525 4. (a)15 (b) –16 (c) –165 (d) 394 (e) –110 (f) 136 (g) 48 (h) 156 (i) 25 5. –136 6. 136 7. –50 8. –774 9. 743 10. –52 11. 31 12. (a) false (b) false (c) true (d) true (e) true 13. Do yourself 14. (a) (–15) (b) 0 (c) (–48) (d) (–3) (e) (–5)

Exercise 1.2

1. (a) 84 (b) –60 (c) –136 (d) –242 (e) 168 (f) 510 (g) –144 (h) –224 (i) 0 2. (a) –210 (b) 280 (c) 48 (d) 0 (e) 156 (f) –250 3. (a) –200 (b) –390 (c) –100 (d) –150 (e) –221 (f) 104 (g) 110 (h) 88 4. (a) $\frac{1}{117}$ (b) 0 (c) 1 (d) (–8) (e) 14 (f) (–5) 5. (a) false (b) true (c) true (d) false (e) false (f) true

Exercise 1.3

1. (a) –5 (b) –8 (c) 0 (d) 5 (e) –11 (f) 1 (g) 3 (h) –3 (i) –9 (j) –16 (k) 17 (l) 25 2. (a) –12 (b) –28 (c) (–5) (d) 40 (e) (–52) (f) 0 (g) –22 (h) (–1) (i) 49 3. (a) true (b) false (c) true (d) false

M.C.Q

1. (c) 2. (b) 3. (a) 4. (d)

MENTAL MATHS

Naveen gave 8 wrong answers.

Chapter-2

Exercise 2.1

6. (a) $\frac{50}{120}, \frac{105}{120}, \frac{90}{120}, \frac{102}{120}$ (b) $\frac{35}{42}, \frac{24}{42}, \frac{9}{42}, \frac{16}{42}$ (c) $\frac{20}{30}, \frac{18}{30}, \frac{21}{30}, \frac{16}{30}$ (d) $\frac{140}{300}, \frac{132}{300}, \frac{90}{300}, \frac{135}{300}$ 2. (a) $\frac{1}{4}$ (b) $-\frac{1}{3}$ (c) $\frac{15}{44}$ (d) $-\frac{3}{10}$ (e) $-\frac{2}{5}$ (f) $\frac{71}{90}$ (g) $\frac{6}{19}$ (h) $\frac{32}{65}$ 3. (a) $\frac{5}{9} < \frac{12}{15}$ (b) $\frac{9}{17} < \frac{8}{13}$ (c) $\frac{4}{9} = \frac{12}{17}$ (d) $\frac{5}{16} < \frac{3}{8}$ (e) $\frac{-6}{13} < \frac{-5}{12}$ (f) $\frac{11}{12} < \frac{14}{15}$ 4. (a) $\frac{7}{16}, \frac{17}{32}, \frac{3}{4}, \frac{7}{8}$ (b) $\frac{1}{24}, \frac{2}{3}, \frac{5}{6}, \frac{7}{8}$ 5. (a) $\frac{11}{12}, \frac{3}{4}, \frac{5}{9}, \frac{1}{6}$ (b) $\frac{7}{8}, \frac{5}{12}, \frac{6}{24}, \frac{3}{16}$ 6. (a) $\frac{10}{13}$ (b) $\frac{11}{17}$ (c) $\frac{21}{25}$ (d) $\frac{41}{100}$ (e) $\frac{18}{23}$ (f) $\frac{13}{7}$ 7. (a) $\frac{5}{9}$ (b) $\frac{3}{8}$ (c) $\frac{1}{12}$ (d) $\frac{29}{6}$ or $4\frac{5}{6}$ (e) $\frac{27}{7}$ or $3\frac{6}{7}$ (f) $\frac{11}{10}$ or $1\frac{1}{10}$ 8. (a) $\frac{57}{10}$ or $5\frac{7}{10}$ (b) $\frac{39}{8}$ or $4\frac{7}{8}$ (c) $\frac{57}{14}$ or $4\frac{1}{14}$ (d) $\frac{71}{20}$ or $3\frac{11}{20}$ (e) $\frac{19}{12}$ or $1\frac{7}{12}$ (f) $\frac{39}{20}$ or $1\frac{19}{20}$

Exercise 2.2

1. (a) $\frac{25}{2}$ (b) $\frac{5}{12}$ (c) $\frac{3}{5}$ (d) 105 (e) $\frac{5}{14}$ (f) $\frac{3}{8}$ (g) $\frac{3}{8}$ (h) $\frac{2}{7}$ (i) 18 (j) 775 (k) 238 (l) $\frac{8}{3}$ 2. (a) $\frac{1}{4}$ (b) $\frac{4}{15}$ (c) $\frac{16}{75}$ (d) $\frac{33}{2}$ (e) 120 (f) $\frac{92}{5}$ 3. (a) 28 (b) 18 (c) 15 (d) 45 (e) 85 (f) 140 4. (a) 9l (b) ₹ 24 (c) 150 kg (d) 45 m (e) 25 km (f) 240 gm

Exercise 2.3

1. ₹ 165 2. 8 km 3. 2500 4. ₹ 490 5. 1.8701 6. ₹ 5625

Exercise 2.4

1. (a) $\frac{8}{7}$ (b) $\frac{5}{11}$ (c) 6 (d) $\frac{12}{5}$ (e) $\frac{10}{9}$ (f) $\frac{15}{17}$ 2. (a) $\frac{2}{3}$ (b) $\frac{2}{3}$ (c) $\frac{11}{21}$ (d) $\frac{5}{6}$ (e) 60 (f) $\frac{7}{30}$ (g) $\frac{8}{3}$ (h) $\frac{4}{3}$ (i) 9 (j) $\frac{25}{48}$ (k) $\frac{8}{3}$ (l) $\frac{19}{8}$ 3. (a) $\frac{63}{4}$ (b) $\frac{1}{3}$ (c) 27 (d) $\frac{7}{15}$ (e) $\frac{15}{4}$ (f) $\frac{7}{2}$ (g) 25 (h) $\frac{5}{2}$

Exercise 2.5

1. 80 pens 2. $\frac{5}{2}$ m 3. $9\frac{5}{22}$ km 4. ₹ 253 5. $4\frac{1}{8}$ 6. 16

M.C.Q

1. (a) 2. (c) 3. (d) 4. (b)

MENTAL MATHS

Each got $\frac{5}{8}$ cup of ice-cream.

Chapter-3

Exercise 3.1

1. (a) 171.061 (b) 185.68 (c) 158.95 (d) 37.042 (e) 255.46 (f) 753.369 (g) 221.285 (h) 44.179 (i) 301.83 (j) 749.139 2. (a) 36.969 (b) 1.24 (c) 55.53 (d) 23.13 (e) 120) 494.19 (f) 22.213 (g) 74.758 (h) 100.57 (i) 102.25 (j) 163.41

Exercise 3.2

1. (a) 52.6 (b) 0.02 (c) 7.21 (d) 732.8 (e) 0.9 (f) 23.31 (g) 26486.2 (h) 8.97 (i) 236.4 2. (a) 195.57 (b) 1851.25 (c) 118.5156 (d) 27.0816 (e) 1.9488 (f) 850.256 3. (a) 27.729 (b) 20.8377 (c) 180.516 (d) 0.92149 (e) 0.6272 (f) 7.37076

Exercise 3.3

1. (a) 8.67 (b) 0.0348 (c) 0.00121 (d) 0.12203 (e) 0.03498 (f) 0.00025 (g) 0.000872 (h) 0.572 (i) 0.3685 (j) 0.0827 (k) 0.00000178 (l) 0.0018261 2. (a) 4.75 (b) 19 (c) 4.6 (d) 32.52 (e) 14.5 (f) 10.8 3. (a) 156.2 (b) 0.412 (c) 33.7 (d) 10.08 (e) 0.026 (f) 11.2 4. (a) 18.12 (b) 0.206 (c) 0.49 (d) 0.6025 (e) 0.1404 (f) 0.0856 5. (a) 1.6 (b) 0.04 (c) 0.7 (d) 0.03 (e) 2.31 (f) 3.07

Exercise 3.4

1. ₹ 11268 2. ₹ 360.36 3. ₹ 454.28 4. ₹ 44895.24 5. ₹ 2728.04 6. ₹ 13.67 7. ₹ 56.83 8. 19.62 km 9. ₹ 74.81 4. ₹ 1125.63

M.C.Q

1. (c) 2. (c) 3. (c) 4. (a)

MENTAL MATHS

1. 0.000016 2. 0.0636

Chapter-4

Exercise 4.1

1. $\frac{5}{-7}, \frac{4}{11}, \frac{0}{1}, -6$ 2. (a) $\frac{1}{1}$ (b) $\frac{-1}{1}$ (c) $\frac{2}{1}$ (d) $\frac{-2}{1}$ 3. (a) – 5 (b) – 3 (c) – 5 (d) – 7 4. (a) Numerator = – 5, Denominator = –19 (b) Numerator = zero , Denominator = 1 (c) Numerator = – 7, Denominator = 20 (d) Numerator = 15, Denominator = –28