MATHEMATICS

TERM - III

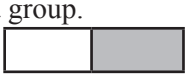
CHAPTER 1 FRACTIONS

Important points

- A fraction is a number representing a part of a whole. The whole may be a single object or a group of objects.
- Fraction = $\frac{\text{Numerator}}{\text{Denominator}}$

  where the denominator represents the number of parts the whole is divided into and the numerator tells us how many of those parts are we dealing with.

  E.g. $\frac{1}{4}$ is a fraction and it is read as one fourth.
- In other words a fraction is a selected parts out of the total number of equal parts of an object or a group.

  E.g  is $\frac{1}{2}$

EQUIVALENT FRACTIONS :

- Fractions having the same values are called equivalent fractions.
- An equivalent fraction of a given fraction can be obtained by multiplying the numerator and denominator by the same number (other than zero)

  E.g. $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}$ are equivalent fractions.
- An equivalent fraction of a given fraction can be obtained by dividing both the numerator and the denominator by the same number (common factor of the numerator and denominator)

  E.g. Equivalent fraction of $\frac{12}{15}$ is $\frac{4}{5}$

  $\frac{12}{15} = \frac{12 \div 3}{15 \div 3} = \frac{4}{5}$

FRACTION IN REAL LIFE :

- Nine - tenth of the water on the earth is salty.

COMPARISON OF UNLIKE FRACTIONS :

- To compare two or more unlike fractions we have to convert them into like fractions.
- These 'like fractions' are the equivalent fractions of the given fractions.
- The denominator of the 'like fractions' is the least common multiple (LCM) of the denominators of the given unlike fractions.

ADDITION AND SUBTRACTION OF UNLIKE FRACTIONS :

- Unlike fractions can be added or subtracted by converting them into 'like fractions'.
- While adding two like fractions the total number of parts (denominator) remains the same and the two numerators are added.
- The process of finding the like fractions of the given unlike fractions can be made easier by finding the common multiples of the denominators of the unlike fractions.

Quantity of water in the second beaker $= \frac{1}{4}$

Quantity of water in the third beaker $= \frac{3}{4}$

Quantity of water in the fourth beaker $= \frac{1}{2}$

Ascending order $\frac{1}{4} < \frac{1}{2} < \frac{3}{4} < 1$

3. Write the fraction of shaded part in the following.

Solution :

(i) Total number of equal parts = 3; shaded parts = 2

Fraction representing the shaded portion $= \frac{2}{3}$

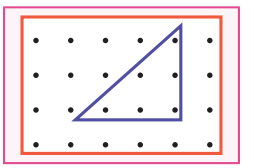
(ii) Total number of equal parts = 4 ; Shaded parts = 3

Fraction representing the shaded parts $= \frac{3}{4}$

(iii) Total number of equal parts = 5; shaded parts = 4

Fraction representing the shaded parts $= \frac{4}{5}$

4. Write the fraction that represents the dots in the triangle.

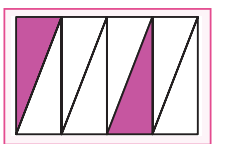


Solution : Total number of dots = 24

Number of dots in the triangle = 6

$\therefore$ Fraction represents the dots in the triangle $= \frac{6}{24}$

5. Find the fractions of the shaded and unshaded portions in the following.



Solution :

(a) Total number of equal parts = 8; shaded parts = 2

$\therefore$ Fraction representing shaded parts $= \frac{2}{8}$

(b) Total number of equal parts = 8; unshaded parts = 6

$\therefore$ Fraction of unshaded portion $= \frac{6}{8}$

Equivalent fractions of $\frac{7}{12}$ are $\frac{14}{24}, \frac{21}{36}, \frac{28}{48}, \frac{35}{60}$,.....

Therefore $\frac{45}{60} > \frac{35}{60} > \frac{27}{60}$

The descending order of given fractions is $\frac{3}{4} > \frac{7}{12} > \frac{9}{20}$

TRY THESE

(Text book Page No. 9)

(i) $\frac{2}{3} + \frac{5}{7}$

Solution : By cross multiplication technique

$\frac{2}{3} \times \frac{5}{7} = \frac{(2\times7)+(5\times3)}{3\times7} = \frac{14+15}{21} = \frac{29}{21}$; $\frac{2}{3}+\frac{5}{7} = \frac{29}{21}$

(ii) $\frac{3}{5} - \frac{3}{8}$

Solution : By cross multiplication technique

$\frac{3}{5} \times \frac{3}{8} = \frac{(3\times8)-(3\times5)}{5\times8} = \frac{24-15}{40} = \frac{9}{40}$

$\frac{3}{5} - \frac{3}{8} = \frac{9}{40}$

Activity

(Text book Page No. 10)

1. Using the given fractions $\frac{1}{5}, \frac{1}{6}, \frac{1}{10}, \frac{1}{15}, \frac{2}{15}, \frac{4}{15}, \frac{1}{30}, \frac{7}{30}$ and $\frac{9}{30}$ fill in the missing ones in the given 3 × 3 square in such a way that the addition of fractions through rows, columns and diagonals give the same total $\frac{1}{2}$.

	$\frac{1}{30}$	
	$\frac{1}{6}$	
$\frac{2}{15}$		

Solution :

$\frac{4}{15}$	$\frac{1}{30}$	$\frac{1}{5}$
$\frac{1}{10}$	$\frac{1}{6}$	$\frac{7}{30}$
$\frac{2}{15}$	$\frac{9}{30}$	$\frac{1}{15}$

Maths

4. **Multiply $7\frac{3}{4}$ by $5\frac{1}{2}$**

Solution : $7\frac{3}{4} \times 5\frac{1}{2} = \frac{31}{4} \times \frac{11}{2} = \frac{31 \times 11}{4 \times 2} = \frac{341}{8}$

TRY THESE

(Text book Page No. 17)

(i) **How many 6s are there in 18?**

Solution : Number of 6s in 18 are $\frac{18}{6} = 3$

(ii) **How many $\frac{1}{4}$s are there in 5?**

Solution : Number of $\frac{1}{4}$s in 5 are $5 \div \frac{1}{4} = 5 \times \frac{4}{1} = 20$

(iii) $\frac{1}{3} \div 5 = ?$

Solution : $\frac{1}{3} \div 5 = \frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$

TRY THESE

(Text book Page No. 18)

(i) **Find the value of $5 \div 2\frac{1}{2}$.**

Solution : $5 \div 2\frac{1}{2} = 5 \div \frac{5}{2} = 5 \times \frac{2}{5} = \frac{10}{5} = 2$ [reciprocal of $\frac{5}{2}$ is $\frac{2}{5}$]

(ii) **Simplify : $1\frac{1}{2} \div \frac{1}{2}$**

Solution : $1\frac{1}{2} \div \frac{1}{2} = \frac{3}{2} \div \frac{1}{2} = \frac{3}{2} \times \frac{2}{1} = \frac{6}{2} = 3$ [reciprocal of $\frac{1}{2}$ is $\frac{2}{1}$]

(iii) **Divide $8\frac{1}{2}$ by $4\frac{1}{4}$.**

Solution : $8\frac{1}{2} \div 4\frac{1}{4} = \frac{17}{2} \div \frac{17}{4} = \frac{17}{2} \times \frac{4}{17} = 2$

EXERCISE 1.1

1. **Fill in the blanks.**

(i) $7\frac{3}{4} + 6\frac{1}{2} =$ _____ **[Ans:$14\frac{1}{4}$]**

(ii) The sum of whole number and a proper fraction is called_____ **[Ans: Mixed Fraction]**

(iii) $5\frac{1}{3} - 3\frac{1}{2} =$ _____ **[Ans: $1\frac{5}{6}$]**

(iv) $8 \div \frac{1}{2} =$ _____ **[Ans: 16]**

(v) The number which has its own reciprocal is _____. **[Ans: 1]**

9. **Nilavan can walk $4\frac{1}{2}$ km in an hour. How much distance will he cover in $3\frac{1}{2}$ hours?**

Solution :

Distance walked by Nilavan in one hour $= 4\frac{1}{2}$ km.

$\therefore$ Distance walked in $3\frac{1}{2}$ hours $= 4\frac{1}{2} \times 3\frac{1}{2}$ km.

$= \frac{9}{2} \times \frac{7}{2}$ km

$= \frac{63}{4}$ km

$= 15\frac{3}{4}$ km

$$4\overline{)63}\ 15,\ 4,\ 23,\ 20,\ 3$$

Nilavan walks $15\frac{3}{4}$ km in $3\frac{1}{2}$ hours

10. **Ravi bought a curtain of length $15\frac{3}{4}$ m. If he cut the curtain into small pieces each of length $2\frac{1}{4}$ m, then how many small curtains will he get?**

Solution :

Length of the curtain Ravi had $= 15\frac{3}{4}$ m

Length of the small curtain $= 2\frac{1}{4}$ m

$\therefore$ Number of pieces $= 15\frac{3}{4} \div 2\frac{1}{4} = \frac{63}{4} \div \frac{9}{4} = \frac{63}{4} \times \frac{4}{9} = 7$

Ravi will get 7 small curtains.

Objective Type Questions

11. **Which of the following statement is incorrect?**

(a) $\frac{1}{2} > \frac{1}{3}$ (b) $\frac{7}{8} > \frac{6}{7}$ (c) $\frac{8}{9} < \frac{9}{10}$ (d) $\frac{10}{11} < \frac{9}{10}$

Hint : $\frac{10\times10}{11\times10} < \frac{9\times11}{10\times11} = \frac{100}{110} < \frac{99}{110}$ **[Ans : (d) $\frac{10}{11} < \frac{9}{10}$]**

12. **The difference between $\frac{3}{7}$ and $\frac{2}{9}$ is**

(a) $\frac{13}{63}$ (b) $\frac{1}{9}$ (c) $\frac{1}{7}$ (d) $\frac{9}{16}$

Hint : $\frac{3}{7} - \frac{2}{9} = \frac{(3\times9)-(2\times7)}{63} = \frac{27-14}{63} = \frac{13}{63}$ **[Ans : (a) $\frac{13}{63}$]**

13. **The reciprocal of $\frac{53}{17}$ is**

(a) $\frac{53}{17}$ (b) $5\frac{3}{17}$ (c) $\frac{17}{53}$ (d) $3\frac{5}{17}$

$\therefore$ The number to be subtracted $= (9 + \frac{3}{7}) - (3 + \frac{1}{5})$

$= (9 - 3) + (\frac{3}{7} - \frac{1}{5}) = 6 + \left[\frac{(3\times5) - (1\times7)}{7\times5}\right]$

$= 6 + \left(\frac{15-7}{35}\right) = 6 + \frac{8}{35}$

$\therefore$ The fraction to be subtracted $= 6\frac{8}{35}$

9. The sum of two fractions is $5\frac{3}{9}$. If one of the fractions is $2\frac{3}{4}$, find the other fraction.

Solution :

Sum of two fractions $= 5\frac{3}{9}$

One of them $= 2\frac{3}{4}$

$\therefore$ The other fraction $= 5\frac{3}{9} - 2\frac{3}{4}$

$= \frac{48}{9} - \frac{11}{4} = \frac{16}{3} \times \frac{11}{4}$

$= \frac{(16\times4) - (11\times3)}{3\times4} = \frac{64-33}{12} = \frac{31}{12} = 2\frac{7}{12}$

The other number is $2\frac{7}{12}$

$12\overline{)31}\ 2$, 24, 7

$\frac{31}{12} = 2\frac{7}{12}$

10. By what number should $3\frac{1}{16}$ be multiplied to get $9\frac{3}{16}$?

Solution :

$3\frac{1}{16} \times$ the required number $= 9\frac{3}{16}$

$\therefore$ The required number $= 9\frac{3}{16} \div 3\frac{1}{16}$

$= \frac{147}{16} \div \frac{49}{16} = \frac{147}{16} \times \frac{16}{49} = 3$

The number to be multiplied is 3.

$49\overline{)147}\ 3$, 147, 0

11. Complete the fifth row in the Leibnitz triangle which is based on subtraction.

		$\frac{1}{1}$		
	$\frac{1}{2}$		$\frac{1}{2}$	
$\frac{1}{3}$		$\frac{1}{6}$		$\frac{1}{3}$
$\frac{1}{4}$	$\frac{1}{12}$		$\frac{1}{12}$	$\frac{1}{4}$
$\frac{1}{5}$				$\frac{1}{5}$

Solution :

$\frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$ Also $\frac{1}{5} \times \frac{1}{6} = \frac{1}{30}$

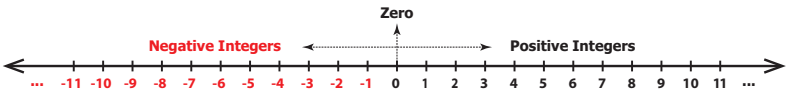
CHAPTER 2 INTEGERS

Important points

- When zero is included to the set of natural numbers, then the set of numbers is called as "Whole Numbers".
- The set of numbers ....., –3, –2, –1, 0, 1, 2, 3,..... is called Integers. It is denoted by the letter Z. The numbers .....–3, –2, –1 to the left of zero is negative integers, and 1, 2, 3,.... are positive integers.
- The number 0 is neither positive nor negative.
- Two numbers that are at the same distance from '0' on the number line, but are on the opposite sides of it, are opposite to each other.
- The opposite of the opposite of a number is the number itself. E.g. – (–5) = 5.
- Natural numbers are called as positive integers and whole numbers are called as 'non-negative' integers.
- Positive and negative numbers together are called as signed numbers.
- Signed numbers are also called as 'Directed Numbers'.
- The number line can be shown in horizontal and vertical directions.
- The positive number can be written without sign., E.g. 5 is considered as +5.
- The letter 'Z' was first used by Germans. In German language 'Zahlen' means 'number'.
- Opposite of zero is zero.
- Opposite of a positive integer is negative.
- Opposite of a negative integer is positive. E.g. opposite of 2 is –2
- For a given number its predecessor one less than it and its successor is one more than it.

  E.g. Predecessor of 0 is –1 and Successor of 0 is +1
- Every positive integer is greater than each of the negative integers. E.g. $3 > -5$
- 0 is less than every positive integer
- 0 is greater then every negative integer.

  E.g. $0 < 2$ but $0 < -2$.
- When we move towards the right of a number on number line, the numbers become larger.
- When we move towards the left of a number on the number line, the numbers become smaller.



EXERCISE 2.1

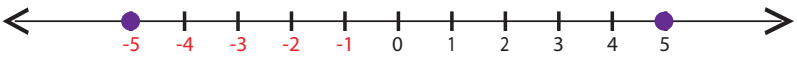
1. Fill in the blanks.

(i) The potable water available at 100m below the ground level is denoted as _____ m.
Hint : Below ground level – negative; ground level – 0; above ground level – positive. **[Ans : –100]**

(ii) A swimmer dives to a depth of 7 feet from the ground into the swimming pool. The integer that represents this, is _____ feet.
Hint : Below ground level – negative numbers. **[Ans : –7]**

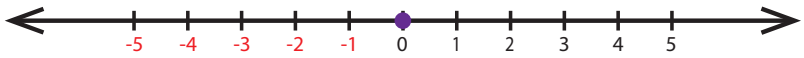
(iii) –46 is to the _____of –35 on the number line.
Hint : – 46 < – 35 **[Ans : Left]**

(iv) There are _____ integers from –5 to +5 (both inclusive).



[Ans : 11]

(v) _____is an integer which is neither positive nor negative.



[Ans : 0]

2. Say True or False.

(i) Each of the integers –18, 6, –12, 0 is greater than –20. **[Ans: True]**

(ii) –1 is to the right of 0. **[Ans: False]**

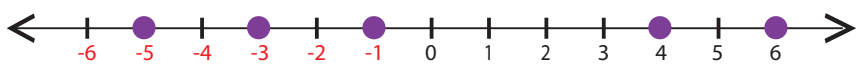
(iii) –10 and 10 are at equal distance from 1. **[Ans: False]**

(iv) All negative integers are greater than zero. **[Ans: False]**

(v) All whole numbers are integers. **[Ans: True]**

3. Mark the numbers 4, –3, 6, –1 and –5 on the number line.

Solution :

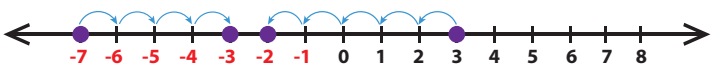


4. On the number line, which number is

(i) 4 units to the right of –7?

(ii) 5 units to the left of 3?

Solution :



(i) – 3 is 4 units to the right of –7

(ii) – 2 is 5 units to the left of 3

5. Find the opposite of the following numbers.

(i) 44 (ii) –19 (iii) 0 (iv) –312 (v) 789

Solution :

(i) Opposite of 44 is – 44

(ii) Opposite of – 19 is + 19 or 19

iv) Find the pairs of letters which are opposite of a number.
v) Say True or False: 6 units to the left of D is –6.

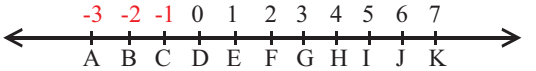
Solution :

i) K is greater. K represents –1 and G represents –3. Because it is to the right of G in the negative side of the number line.
ii) C represents –4
iii) G represents –3 and H represents 4.
∴ –2, –1, 0, 1, 2, 3 are the 6 numbers between G and H.
iv) (C, H) and (E, J) are opposite pairs.
v) False. 6 units to the left of D is 0. Because D represents +6 on the number line

6. If G is 3 and C is –1, what numbers are A and K on the number line?

Solution : Given G is 3 and C is –1,

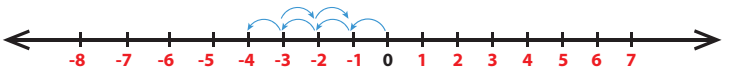
∴ The number line becomes



A represents –3 and K represents 7

7. Find the integers that are 4 units to the left of 0 and 2 units to the right of –3

Solution :



4 units to the left of 0 is –4. 2 units to the right of –3 is –1.

Challenge Problems

8. Is there the smallest and the largest number in the set of integers? Give reason.

Solution : No, we cannot find the smallest (–) and largest (+) number in the set of integers, as the numbers on the number line extends on both the sides without end.

9. Look at the Celsius Thermometer and answer the following questions:

i) What is the temperature that is shown in the thermometer?
ii) Where will you mark the temperature 5°C below 0° C in the Thermometer?
iii) What will be the temperature, if 10°C is reduced from the temperature shown in the thermometer.
iv) Mark the opposite of 15°C in the Thermometer.

Solution :

i) Temperature shown in the Thermometer is –10°
ii) 5°C below 0°C is at –5°C.
iii) Thermometer shows – 10°C
if 10°C is reduced that means –10°C – (10°C) gives –20°C.
iv) Opposite of 15°C is –15°C

CHAPTER 3 PERIMETER AND AREA

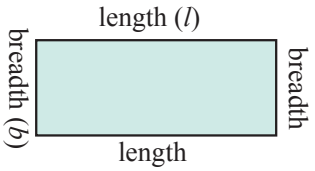
Important points

PERIMETER.

- The length of the boundary of any closed shape is called its perimeter.
- Hence, 'the measure around' of a closed shape is called its perimeter.
- The unit of perimeter is the unit of length itself.
- The units of length may be expressed in terms of metre, millimetre, centimetre, kilometre, inch, feet, yard etc.
- The word perimeter is derived from the greek words 'peri' and 'metron' where 'peri' means 'around' and 'metron' means 'measure'

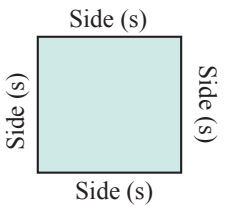
PERIMETER OF A RECTANGLE :

- In a rectangle the opposite sides are equal in length
- Perimeter of a rectangle $P = 2(l + b)$ units. Where P - perimeter, l - length, b - breadth of a rectangle.



PERIMETER OF A SQUARE :

- In a square, all the sides are equal in length.
- The perimeter of a regular shape with any number of sides = number of sides × length of a side.
- Perimeter of a square P = 4 × s = 4s units where s is the side of the square.



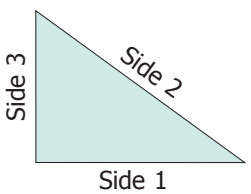
PERIMETER OF A TRIANGLE :

- If three sides of a triangle are taken as a, b, and c, then the perimeter of the triangle P = $(a + b + c)$ units

AREA: Area is the measure of the region / surface occupied by a closed figure.

AREA OF A RECTANGLE :

- Area of a Rectangle = $(l \times b)$ sq. units. where l - length and b - breadth of the rectangle.
- Square units can also be written as unit^2.



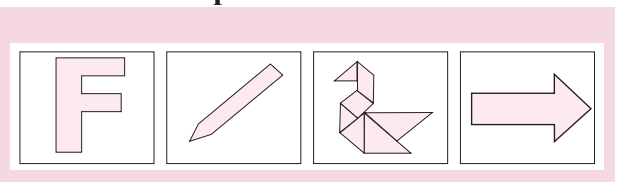
AREA OF A SQUARE :

- If the length and breadth of a rectangle are equal, then it becomes a square.
- If the length (l) = breadth (b) = side (s), then the rectangle becomes a square.
- Area of a square = $(s \times s)$ sq.units. where s - side,

TRY THESE

(Text book Page No. 46)

1. Measure using ruler and find the perimeter of each of the following diagram.



Solution :

i) Perimeter = 2.5 + 0.5 + 1 + 1 + 0.5 + 1 + 0.5 + 1 + 0.5 + 1.5 = 10 cm

ii) Perimeter = 2.5 + 0.5 + 2.5 + 0.5 + 0.5 cm = 6.5 cm

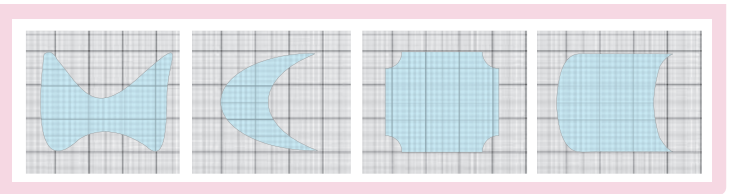
iii) Perimeter = 0.5 + 1+ 0.5 + 0.5 + 1 + 1 + 0.5 + 1 + 1.5 + 0.5 + 1 + 0.5 cm = 9 cm

iv) Perimeter = 2 + 0.5 + 1.5 + 1.5 + 0.5 + 0.5 + 2 + 1 cm = 9.5 cm.

TRY THESE

(Text book Page No. 49)

1. Find the approximate area of the following figures:



Solution :

i) Approximate area = Number of full squares + Number of more than half squares + $\frac{1}{2}$ × Number of half squares

$= 2 + 3 + \frac{1}{2} \times 4 = 5 + 2 = 7 \text{ cm}^2$

ii) Approximate area = Number of full squares + Number of more than half squares + $\frac{1}{2}$ × Number of half squares

$= 1 + 2 = 3 \text{ cm}^2$

iii) Approximate area = Number of full squares + Number of more than half squares + $\frac{1}{2}$ × Number of half squares

$= 5 + 4 = 9 \text{ cm}^2$

iv) Approximate area = Number of full squares + Number of more than half squares + $\frac{1}{2}$ × Number of half squares

$= 4 + 5 = 9 \text{ cm}^2$

8. Find the perimeter and the area of the square whose side is 8 cm.

Solution :

Perimeter of a square = (4 × side) units

Side = 8 cm

∴ Perimeter = 4 × 8 cm = 32 cm

Perimeter = 32 cm

Area of a square = (side × side) unit^2 = (8 × 8) cm^2

= 64 cm^2

Area = 64 cm^2

9. Find the perimeter and the area of right angled triangle whose sides are 6 feet, 8 feet and 10 feet.

Solution :

Perimeter of a right angled triangle = sum of three sides

= (6 + 8 + 10) feets = 24 feets.

Perimeter = 24 feets

Area of a right angled triangle = $\frac{1}{2}$ × (b × h) unit^2

Here the longest side is 10 feet which is the hypoteneous

∴ Sides containing right angle are 6 feet and 8 feet; let base = 6 feet; and height = 8 feet

∴ Area = $\frac{1}{2}$ × 6 × 8 feet^2 = 24 sq. feet

Area = 24 sq feet.

10. Find the perimeter of

i) A scalene triangle with sides 7 m, 8 m, 10 m

ii) An isosceles triangle with equal sides 10 cm each and third side is 7 cm.

ii) An Equilateral triangle with side 6 cm.

Solution :

i) Perimeter of a scalene triangle = (7 + 8 + 10) m = 25 m

ii) The three sides of the isosceles triangle are 10 cm, 10 cm and 7 cm

∴ Perimeter = (10 + 10 + 7) cm = 27 cm

iii) An equilateral triangle with side 6 cm.

The sides of equilateral triangle are 6 cm, 6 cm and 6 cm

∴ Perimeter = (6 + 6 + 6) cm = 18 cm

$$b = \frac{86}{2}\text{ m}$$

$$b = 43\text{ m}$$

$\therefore$ Length $= b + 14$

$= 43 + 14 = 57$ m

Length of the park $= 57$ m

Area of a rectangle $=$ (length $\times$ breadth) unit^2

$= (57 \times 43)\text{ m}^2 = 2,451\text{ m}^2$

Area of the park $= 2,451\text{ m}^2$

5. Your garden is in the shape of a square of side 5 m. Each side is to be fenced with 2 rows of wire. Find how much amount is needed to fence the garden at ₹ 10 per metre.

Solution :

Perimeter of a square = (4 × side) units

side = 5 m

$\therefore$ Perimeter = (4 × 5) m

= 20 m

Each side is fenced with 2 rows of wire

$\therefore$ Distance to be fenced = 2 × 20 m = 40 m

Cost of fencing per metre = ₹ 10

$\therefore$ Cost of fencing 40 m = 40 × 10 = ₹ 400

Cost of fencing the garden = ₹ 400

Challenge Problems

6. A closed shape has 20 equal sides and one of its sides is 3 cm. Find its perimeter.

Solution :

Number of equal sides in the shape = 20

One of its side = 3 cm

Perimeter = length of one side × Number of equal sides

$\therefore$ Perimeter = (3 × 20) cm = 60 cm

$\therefore$ Perimeter = 60 cm

7. A rectangle has length 40 cm and breadth 20 cm. How many squares with side 10 cm can be formed from it.

Solution :

Area of rectangle = (length × breadth) units^2

Length = 40 cm

CHAPTER 4 SYMMETRY

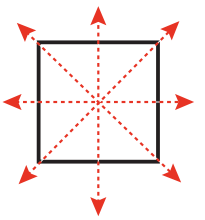
Important points

- The word 'symmetry' comes from the Greek word 'Symmetros' which means having a common measure.
- Symmetry means the exact match in size and shape between two halves, parts or sides of a figure or an object.
- The line of symmetry can be real or imaginary.

LINE OF SYMMETRY

- The line that divides any figure into two halves such that each half exactly coincides with the other is known as the line of symmetry or axis of symmetry.
- The line of symmetry can be vertical horizontal or slant.
- The number of 'lines of symmetry' of each regular polygon (a closed figure having equal sides and equal angles) is equal to its number of sides.

E.g.



A square has four lines of symmetry.

REFLECTION SYMMETRY

- A shape has reflection symmetry if it has a line of symmetry.
- If we keep a mirror along the line of symmetry of some shapes, the other half of the figure gets reflected by the mirror and it looks the same. So reflection symmetry is also called as mirror symmetry.
- When an object is seen in a mirror, the image obtained on the other side of the mirror is called its reflection.
- In this case the object and its image will be at the same distance from the mirror.
- The only difference is that the left side is on the right side and vice-versa.

ROTATIONAL SYMMETRY

- An object is said to have a rotational symmetry if it looks the same after being rotated about its centre through an angle less than 360°.
- The total number of times a figure coincides with itself in one complete rotation is called the order of rotational symmetry.

TRANSLATIONAL SYMMETRY

- Translational symmetry occurs when an object slides to a new position. The sliding movement involves neither rotation nor reflection.

Objective Type Questions

11. Which of the following letter does not have a line of symmetry?

(a) A (b) P (c) T (d) U

Hint : A, T, U have one line of symmetry **Ans:** (b) P

12. Which of the following is a symmetrical figure?

a)  b)  c)  d) 

Hint : refer eyes **Ans:** (c) 

13. Which word has a vertical line of symmetry?

(a) DAD (b) NUN (c) MAM (d) EVE

Hint : D, N, E have no vertical line of symmetry **Ans:** (c) MAM

14. The order of rotational symmetry of 818 is _____

(a) 1 (b) 2 (c) 3 (d) 4 **Ans:** (b) 2

15. The order of rotational symmetry of ★ is _____

(a) 5 (b) 6 (c) 7 (d) 8 **Ans:** (a) 5

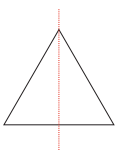
Exercise 4.2

Miscellaneous Practice problems

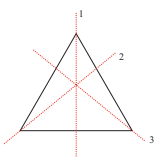
1. Draw and answer the following.

i) A triangle which has no line of symmetry
ii) A triangle which has only one line of symmetry
iii) A triangle which has three lines of symmetry

Solution :



i) A Scalene triangle has no line of symmetry



ii) An isosceles triangle has only one line of symmetry

iii) An equilateral triangle has three lines of symmetry.

2. Find the alphabets in the box which have

i) No Line of symmetry
ii) Rotational symmetry
iii) Reflection symmetry
iv) Reflection and rotational symmetry

A	M	P	E
D	I	K	O
N	X	S	H
U	V	W	Z

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CHAPTER 5 INFORMATION PROCESSING

Important points

ITERATIVE PROCESS

An iterative process is a procedure that is repeated many times which gives raise to a new form.

E.g. 1, 3, 5, 7,.....

The pattern which generates these numbers is 1, 1 + 2, 3 + 2, 5 + 2,....

FIBONACCI SEQUENCE :

Consider the sequence 1, 1, 2, 3, 5, 8, 13, 21, 34,....

Here if we add the previous two consecutive terms, we get the next term as

1 + 1 = 2, 1 + 2 = 3, 2 + 3 = 5, 3 + 5 = 8, 5 + 8 = 13,.....

This special pattern of numbers is called the Fibonacci sequence.

Each term in the Fibonacci sequence is called a **"Fibonacci number".**

We can also begin the Fibonacci sequence with 0 and 1 instead of 1 and 1

LUCAS NUMBERS :

As Fibonacci numbers, the sequence 1, 3, 4, 7, 11, 18, 29, 47, 76, 123,.... also gives the next number when adding previous two consecutive numbers. Here the numbers starts with 1, 3. This special sequence is called Lucas sequence.

GOLDEN RATIO :

The ratio of successive Fibonacci numbers are

$$\frac{3}{2} = 1.5\ ; \quad \frac{5}{3} = 1.66; \quad \frac{8}{5} = 1.6; \quad \frac{15}{8} = 1.625; \quad \frac{21}{13} = 1.6153$$

$$: : : : : : : :$$

We can see that this pattern getting closer to 1.618 and that is denoted by ϕ called the Golden Ratio. $\phi = 1.618$.

* It is observed that shapes having golden ratio appear beautiful.
* The portrait of Mona Lisa has Fibonacci spiral pattern. This is one of the reasons for the enhanced beauty of Mona Lisa.
* Petals on a daisy, arrangement of seeds in the head of a sunflower are some natural phenomena expressing Fibonacci sequence.

EUCLID'S GAME :

HCF of two numbers a and b where $a > b$, is same as the HCF of a and $a - b$.

2. Find next three numbers in the following number patterns.

i) 50, 51, 53, 56, 60, ...

ii) 77, 69, 61, 53, ...

iii) 10, 20, 40, 80, ...

iv) $\frac{21}{33}, \frac{321}{444}, \frac{4321}{5555}$

Solution :

i) The pattern generating these numbers is

50, 50 + 1, 51 + 2, 53 + 3, 56 + 4, 60 + 5, 65 + 6, 71 + 7, ...

∴ 50, 51, 53, 56, 60, 65, 71, 78, ...

∴ The next three numbers will be 65, 71, 78

ii) The pattern generating these numbers is

77, 77 – 8, 69 – 8, 61 – 8, 53 – 8, 45 – 8, 37 – 8, 29 – 8, ...

77, 69, 61, 53, 45, 37, 29, 21,.....

∴ The next three numbers will be 45, 37, 29.

iii) The pattern generating these numbers is

10, 10 + 10, 20 + 20, 40 + 40, 80 + 80, 160 + 160, 320 + 320,....

10, 20, 40, 80, 160, 320, 640,....

∴ The next three numbers will be 160, 320, 640.

iv) The pattern generating these numbers is

$\frac{21}{33}, \frac{321}{444}, \frac{4321}{5555}, \frac{54321}{66666}, \frac{654321}{777777}, \frac{7654321}{8888888}$

Next three numbers will be $\frac{54321}{66666}, \frac{654321}{777777}, \frac{7654321}{8888888}$

3. Consider the Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, 21, 34, 55,... Observe and complete the following table by understanding the number pattern followed. After filling the table discuss the pattern followed in addition and subtraction of the numbers of the sequence.

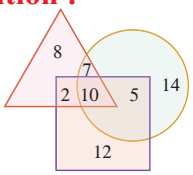
Steps	Pattern 1	Pattern 2
i)	1 + 3 = 4	5 –1 = 4
ii)	1 + 3 + 8 =_____	?
iii)	1 + 3 + 8 + 21 = _____	?
iv)	?	?

Solution :

Steps	Pattern 1	Pattern 2
i)	1 + 3 = 4	5 –1 = 4
ii)	1 + 3 + 8 = 12	13 – 1 = 12
iii)	1 + 3 + 8 + 21 = 33	34 – 1 = 33
iv)	1 + 3 + 8 + 21 + 55 = 88	89 – 1 = 88

iv) Write the number 2 in the place common for triangle and square only.
v) Write the numbers 12, 14 and 8 only in square, circle and triangle respectively.

Solution :



10. Fill in the following information.

Candidates EMIS No

1. Name of the candidate in Capital Letters followed by initial leaving one box blank. (Do not write Miss/Master)

2. Class Date of birth

	Date		Month		Year		

3. Father's name in Capital Letters followed by initial leaving one box blank. (Do not write Mr./Dr./Prof)

4. Mother's name in Capital Letters followed by initial leaving one box blank. (Do not write Mr./Dr./Prof)

5. Sex (Put ✓ mark) 6. Area to which candidates resides. (Put ✓ mark)

Male		Female		Rural		Urban	

Solution :

Candidates EMIS Number.

9	0	8	0	9	8	0	3	0	1	0	1	1	1	2	9

1. Name of the candidate in Capital Letters followed by initial leaving one box blank. (Do not write Miss/Master)

A	K	S	H	A	Y	A		B															

2. Class Date of birth

VI		2	5	0	5	2	0	0	7
		Date		Month		Year			

3. Father's name in Capital Letters followed by initial leaving one box blank. (Do not write Mr./Dr./Prof)

B	A	S	K	A	R		R																

Maths

E: The reciprocal of 1/5.
F: The opposite number of –7.
G: The first composite number.
H: Area of a square of side 3 cm.
I: The number of lines of symmetry of an equilateral triangle. After completing the table, what do you observe? Discuss.

Solution :

A : 6th term in Fibonacci sequence is 8.
B : Predecessor of 2 is 1.
C : LCM of 2 and 3 is 6.
D : HCF of 6 and 20 is 2.
E : Reciprocal of $\frac{1}{5}$ is 5.
F : Opposite number of – 7 is 7.
G : The first composite number is 4.
H : Area of square of side 3 cm is $3 \times 3 = 9$ cm^2.
I : The number of lines of symmetry of an equilateral triangle is 3.
∴ The table becomes

8	1	6
2	5	7
4	9	3

From the table we observe that the numbers are from 1 to 9

5. Assign the number for English alphabets as 1 for A, 2 for B upto 26 for Z. Find the meaning of

7	15	15	4

13	15	18	14	9	14	7

Solution :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T

21	22	23	24	25	26
U	V	W	X	Y	Z

7	15	15	4
G	O	O	D

13	15	18	14	9	14	7
M	O	R	N	I	N	G

It means GOOD MORNING.

6. Replace the letter by symbols as + for A, – for B, × for C and ÷ for D. Find the answer for the pattern 4B3C5A30D2 by doing the given operations.

Solution : Given the symbols + for A; – for B; × for C; ÷ for D
∴ 4B3C5A30D2 becomes $4 – 3 \times 5 + 30 \div 2$; Using BIDMAS rule

$4 – 3 \times 5 + 30 \div 2 = 4 – 3 \times 5 + 15$ [÷ done first]
$= 4 – 15 + 15$ [× done second]
$= 4 – 0$ [+ done third]
$= 4$ [– done last]

2. **If GARIMA is coded as 725432 and TINA as 6482, how will MARTINA be coded?**

(A) 3256482 (B) 3265842 (C) 3645862 (D) 3658426

Hint :

A) 3256482

GARIMA and TINA both have the letters I and A and they are coded as 4 and 2 repectively.

∴ In MARTINA , I coded as 4 and A coded as 2 in (A) 3256482 **[Ans : A]**

3. **If '+' is '×', '–' is '+', '×' is '÷' and '÷' is '–' then answer the following $21 \div 8 + 2 - 12 \times 3 = ?$**

(A) 14 (B) 9 (C) 13 (D) 11

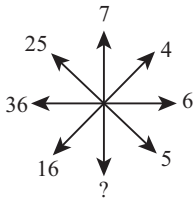
Hint :

Given + is ×; – is +; × is ÷; ÷ is –

so $21 \div 8 + 2 - 12 \times 3$ can be $21 - 8 \times 2 + 12 \div 3 = 21 - 8 \times 2 + 4$

$= 21 - 16 + 4 = 25 - 16 = 9$ **[Ans : A]**

4. **Which number will replace the question mark?**



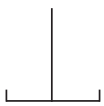
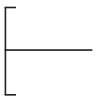
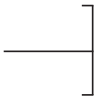
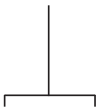
(A) 7 (B) 14 (C) 48 (D) 49

Hint :

(D) 49. [∴ Left side numbers are square numbers]

∴ $7^2 = 49$. **[Ans : D]**

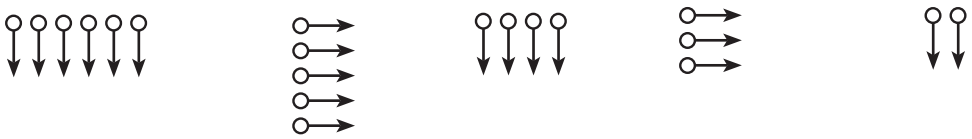
5. **Find the correct figure which replaces the '?'**

(A)  (B)  (C)  (D) 

Hint :

Upside down **[Ans : A]**

6. **Which comes next ?**



(A)  (B)  (C)  (D) 

Hint :

Here the figures rotate anticlockwise and clockwise alternatively making an angle 90° and one arrow deleted in every successive block.

[Ans : D]

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