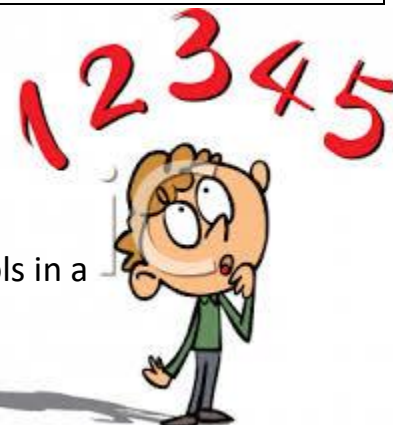


# Competency Development Test (CDT) – Content

## Class – V

### Mathematics

#### Number System



The ways of representation of numbers using digits or other symbols in a consistent manner.

#### **Types of numbers:-**

1. **Natural Numbers**- Counting numbers 1,2,3,4,5 are called natural numbers. e.g., 1,2,3,4,5,6,.....
2. **Whole Numbers**- All counting numbers together with zero form the set of whole numbers.
  - (i) 0 is the only whole number which is not a natural number.
  - (ii) Every natural number is a whole number.
3. **Integers**-All natural numbers, 0 and negatives of counting numbers. e.g., 0,-1-2,-3,1,2,3.....
4. **Even Numbers**- A number divisible by 2 is called an even number, e.g.,2,4,6,8,14, 52 etc.
5. **Odd Numbers**- A number not divisible by 2 is called an odd number. e.g.,1,3,5,7,9,11, etc.
6. **Prime Numbers**- A number greater than 1 is called a prime number, if it has exactly two factors, namely 1 and the number itself. e.g.,3, 11, 7.....
7. **Composite Numbers**- Numbers greater than 1 which are not prime, are known as composite numbers, e.g. 9,10,12, 15, 36 etc.
  - (i) 1 is neither prime nor composite.
  - (ii) 2 is the only even number which is prime. So, it is the smallest prime.
  - (iii) There are 25 prime numbers between 1 and 100.

## Place Value and Face Value-

**Place Value-** Place value of a digit in a number is the digit multiplied by its position in the place value chart. It depends upon a digit's position in the number. As the digit moves on to the left, its value increases.

The place value chart has been separated into three groups: The ones period has three places- Hundreds, tens, and ones. The thousands period has two places- Ten thousands and thousands. The next period is the lakh period which includes- Ten lakhs and lakhs.

Lakhs Period		Thousands Period		Ones Period		
Ten Lakhs	Lakhs	Ten Thousand	Thousands	Hundreds	Tens	Ones
6	4	5	7	2	8	3

Use of Commas

If we write the number without using the place value charts, we use comma ( , ) to separate the periods.

Let us take an example: **64,57,283**

First comma is used when the ones period is complete. Second comma is used when thousands period is complete. Next comma is used to separate thousands and lakhs period.

**Face Value-** Face value of a digit in a number is the digit itself, irrespective of the position of the digit in the number.

In the number 9843

Face value of 9 = 9

Face value of 8 = 8

Face value of 4 = 4

Face value of 3 = 3

*Remember*

- 1. The face value of a digit in any number is the digit itself.*
- 2. The place value and face value of a digit in the ones place are always equal.*
- 3. The place value and face value of zero in any number is always zero.*

We follow two types of number systems:-

1. Indian Numeral System
2. International Numeral System

As per the chart given below, the corresponding international number places can be matched.

10 Lakhs = 1 Million

1 Crore = 10 Million

Indian Number System:-

Numbers	Crores	Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundred	Tens	Ones
One								1
Ten							1	0
1 Hundred						1	0	0
1 Thousand					1	0	0	0
10 Thousand				1	0	0	0	0
1 Lakh			1	0	0	0	0	0
10 Lakh		1	0	0	0	0	0	0
1 Crore	1	0	0	0	0	0	0	0

International Number System:-

Numbers	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
One								1
Ten							1	0
1 Hundred						1	0	0
1 Thousand					1	0	0	0
10 Thousand				1	0	0	0	0
100 thousand			1	0	0	0	0	0
1 million		1	0	0	0	0	0	0
10 Million	1	0	0	0	0	0	0	0

### Sample Questions-

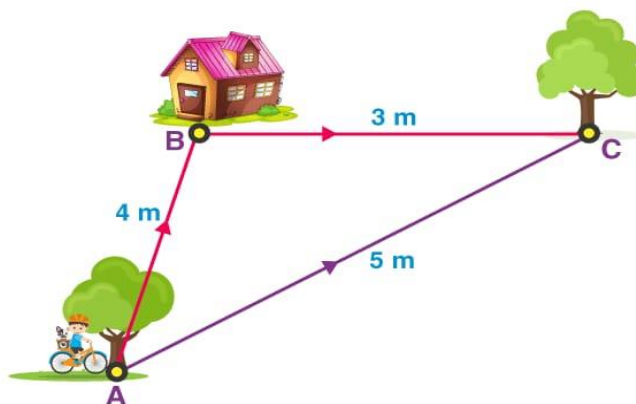
1. Divide the place value of 6 in 306035 by the face value of 2 in 4523.  
a) 2000  
b) 4000  
c) 6000  
d) 3000
2. What is the least number should be added to 7856756, so that resulting number would be greatest 7-digit number.  
a) 2413243  
b) 1243243  
c) 2143243  
d) None of these
3. Find the product of the place values of 2 and 5 in 7054293.  
a) 1000000  
b) 10000000  
c) 100000  
d) None of these
4. A number 45782 less than the smallest 7-digit number. Then the number is equal \_\_\_\_\_.  
a) 1000000  
b) 945218  
c) 954218  
d) None of these
5. Zero is the smallest natural number. Mark True / False.  
a) True  
b) False

## ANSWER KEY

1-d-3000	2-c-2143243	3-b-10000000	4-c-954218	5-b-False
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## Time And Distance

**Distance:** Distance is the total movement of an object without any regard to direction. we can define distance as to how much ground an object has covered despite its starting or end point



Distance here will be=  $4m+3m+5m=12m$

- It is a scalar quantity and can be measured in units such as meters(m), kilometers(km), miles(mi) and so on.

- Distance is an important parameter in physics since it helps to calculate different physical quantities such as speed, velocity and acceleration.
- Distance can be calculated by determining the length of path covered by an object when it moves from one point to another.

Moreover, the change in position is proportional to the distance that an object travels. The distance measurement usually takes place in miles, inches, millimeter, centimeter, meter and kilometer.

**Time:** Time is the progression of events. Time is an interval separating two events. We measure time in seconds, minutes, hours, days, week, months and years with clock and calendar.

- 1 day=24hours
- 1 hour=60minutes
- 1 min=60seconds



**Speed:** Speed is the rate at which a particular distance is covered by an object in motion.

- Speed is measured as the ratio of distance to the time in which the distance was covered.
- Speed is a scalar quantity as it has only direction, no magnitude
- Speed= Distance/Time

### Relationship between Distance, Time and Speed

1. Speed= Distance/Time
2. Speed is directly proportional to Distance and inversely proportional to time.,
3. Time= Distance/speed
4. Distance= Speed x Time, as the speed increases the time taken will decrease and vice versa.

### Units of speed, Time, and Distance

Each speed, distance and time can be expressed in different units:

Time: Seconds(s), minutes(min), hours(hr)

Distance: Meters(m), Kilometers(km), miles and feet

So, if the distance =km and time =hr, then Speed=Distance /time = km/hr

If the distance =m and time=sec, then speed= Distance/time=m/sec

### Speed, Time and Distance conversions

- To convert from km/hour to m/sec we multiply by 5/18. So  $1\text{km/hour} = 5/18\text{m/sec}$
- To convert from m/sec to km/hour  $= 18/5\text{m/sec}$
- $1\text{Km} = 1000\text{m}$
- $1\text{hr} = 60\text{minutes}$
- $1\text{hr} = 60 \times 60 = 3600\text{seconds}$



### SOLVED EXAMPLES:

**Q1.** A train covers 51km in 3 hours. Calculate its speed. How far does the train go in 30 minutes?

Solution: Distance covered by train = 51km

Time = 3 hours

Hence, speed = Distance /time =  $51/3 = 17\text{km/h}$

Now for 30 min = 0.5 hour or  $\frac{1}{2}$  an hour

Distance covered by train in 30min =  $17 \times 0.5 = 8.5\text{km}$

**Q2.** A motorist travelled the distance between two towns, which is 65km, in 2 hours and 10 minutes. Find his speed in meter per minute?

Solution: Distance covered by motorist = 65km

$1\text{km} = 1000\text{m}$

So,  $65\text{km} = 65 \times 1000 = 65000\text{m}$

Time = 2hr 10min =  $(2 \times 60 + 10) = 130\text{min}$

Hence speed = Distance /time =  $65000/130 = 500\text{m/min}$



**Q3.** A train travels 700meters in 35 seconds. What is its speed in km/hours?

Solution: Distance covered by train = 700m

Time = 35 seconds

Speed = distance/time =  $700/35 = 20\text{m/sec}$

Distance in km/hr =  $20 \times (18/5)$   
 $= 72\text{km/h}$

Q4. I travel a distance of 10km and come back in 2 and  $\frac{1}{2}$  hour. What is my speed?

Solution: Given,

10km distance travelled twice in 2 and  $\frac{1}{2}$  hours

So, Distance travelled= 10km+10km=20km

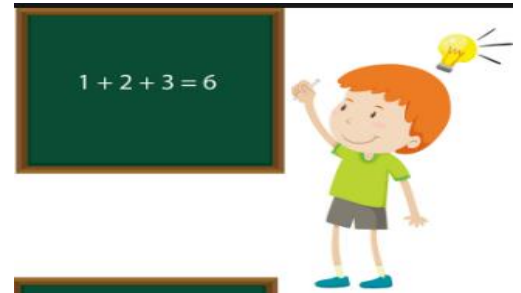
Time =  $5\frac{1}{2}$  hours

Speed= Distance/time =  $[20\text{km}/(5\frac{1}{2}\text{hours})] = (20 \times 2)/5 = 40/5 = 8\text{km/h}$

**Practice Time:**

Q1. What will be the speed of a car, if it travels 100kms in 2 hours?

- A. 29km/hr
- B. 50km/hr
- C. 100km/hr
- D. 60km/hr



Q2. Convert in km/hr

30m/sec= \_\_\_\_\_ km/hr

- A. 108km/hr
- B. 180km/hr
- C. 100km/hr
- D. None of these

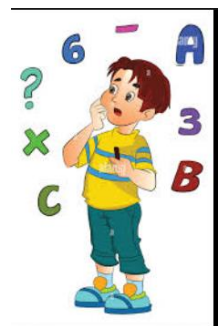


Q3. Hari runs at a speed of 20km/hr. How far will he run in 6 hours?

- A. 120 km
- B. 60km
- C. 12km
- D. None of these

Q4. A man is walking at the rate of 5km/hr crosses a bridge in 15 minutes. The length of bridge is?

- A. 1250m
- B. 1200m
- C. 1050m
- D. 1500m



Q5. An athlete runs 200m in 24 seconds. His speed is \_\_\_\_\_ km/hr

- A. 27km/hr
- B. 17km/hr
- C. 20Km/hr
- D. 30km/hr

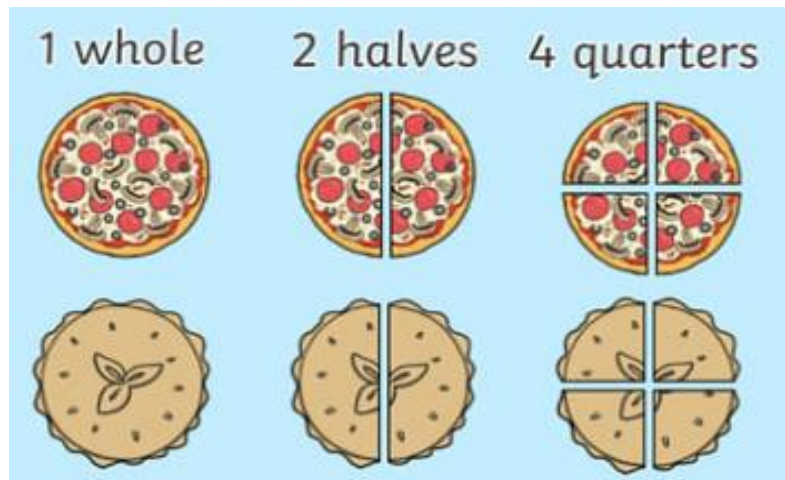
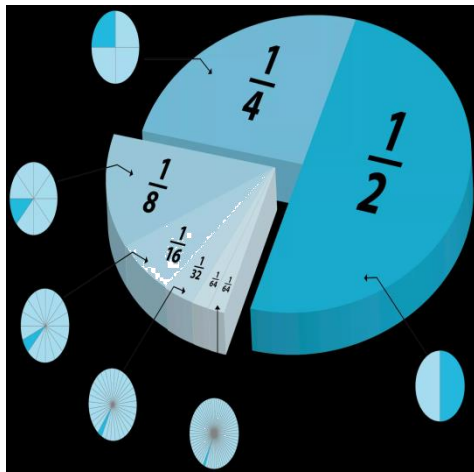
Answer key:

1.B	2.A	3.A	4.A	5.D
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# Fractions

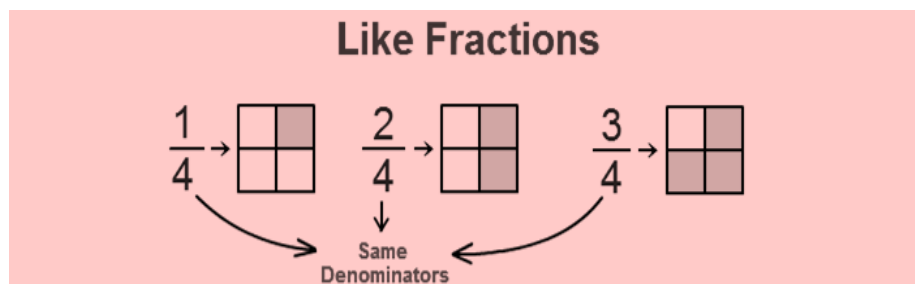
A fraction is a part of a whole. It consists of an upper part (numerator) and a lower part (denominator). The denominator can never be equal to zero. However, a numerator can be equal to zero. Any fraction with the same non-zero numerator and denominator equals 1. Any fraction with a denominator of 1 becomes the same number as its numerator.



## Types of Fractions:

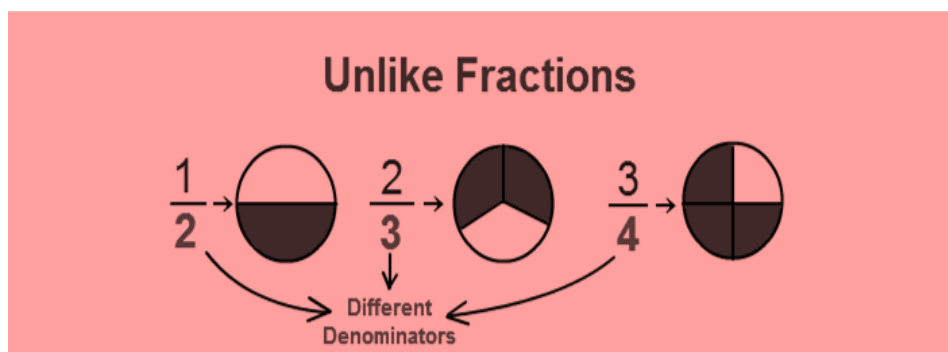
1. **Like fractions** : Fractions which have a common denominator are called like fractions.

**Example** :  $\frac{2}{3}$  ,  $\frac{1}{3}$  ,  $\frac{4}{3}$



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

**Example** :  $\frac{2}{3}$  ,  $\frac{1}{5}$  ,  $\frac{3}{6}$





3. **Proper fractions** : The fractions where the numerator is less than the denominator.

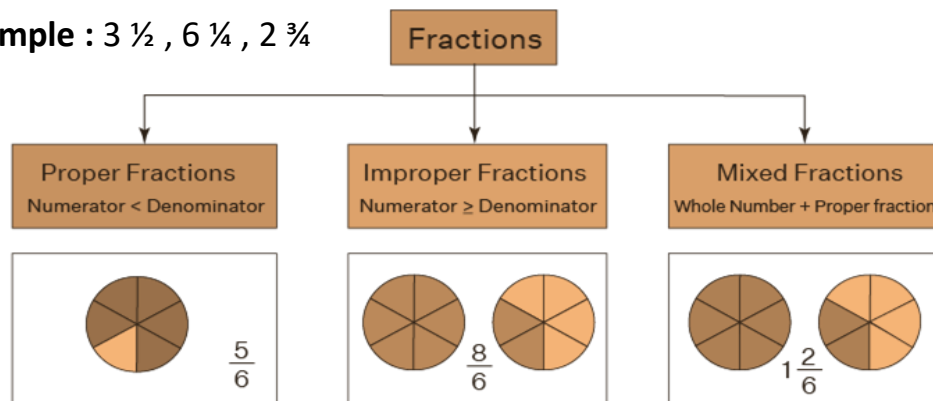
**Example** :  $\frac{2}{3}$  ,  $\frac{3}{4}$  ,  $\frac{4}{5}$

4. **Improper fractions** : The fractions where the numerator is greater than or equal to the denominator.

**Example** :  $\frac{4}{3}$  ,  $\frac{6}{5}$  ,  $\frac{5}{3}$

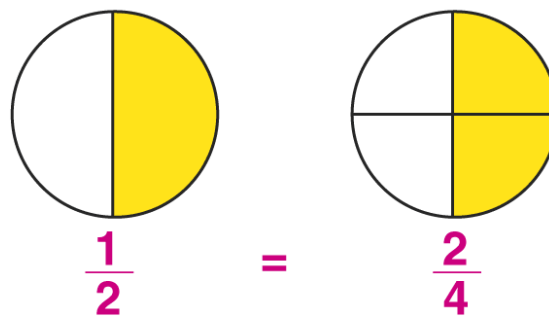
5. **Mixed fractions** : A fraction which consists of two parts, an integer and a fraction is called mixed fraction.

**Example** :  $3\frac{1}{2}$  ,  $6\frac{1}{4}$  ,  $2\frac{3}{4}$



6. **Equivalent fractions** : Some fractions may look different, but are really the same.

**Example** :  $\frac{1}{2}$  ,  $\frac{2}{4}$  ,  $\frac{3}{6}$  ,  $\frac{4}{8}$

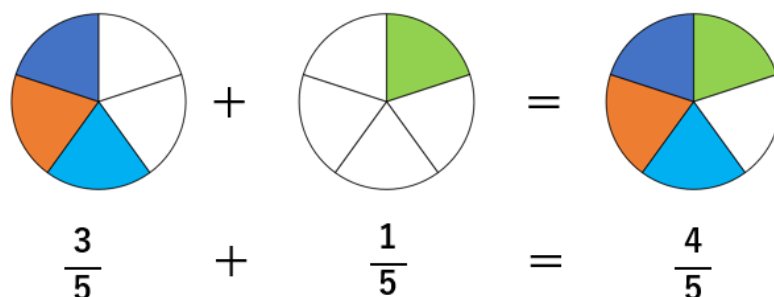


### Addition of Fractions:

We can add fractions easily if the bottom number (the denominator) is the same.

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

$$\frac{3}{6} + \frac{5}{6} = \frac{8}{6}$$

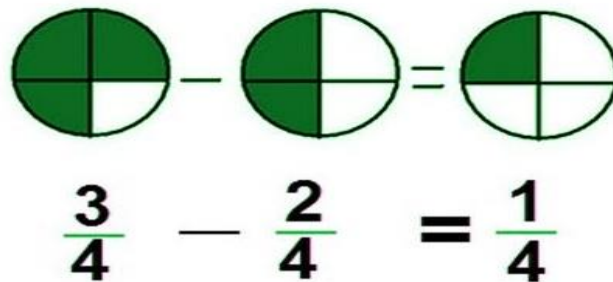


## Subtraction of Fractions :

We can subtract fractions easily if the bottom number (the denominator) is the same.

$$5/8 - 2/8 = 3/8$$

$$7/11 - 1/11 = 6/11$$



## Comparing Fractions :

Sometimes we need to compare two fractions to discover which is larger or smaller. The easy way to compare fractions is by making the same denominator method.

The denominator is the bottom number in a fraction. It shows how many equal parts the item is divided into.

If two fractions have the same denominator then they are easy to compare.

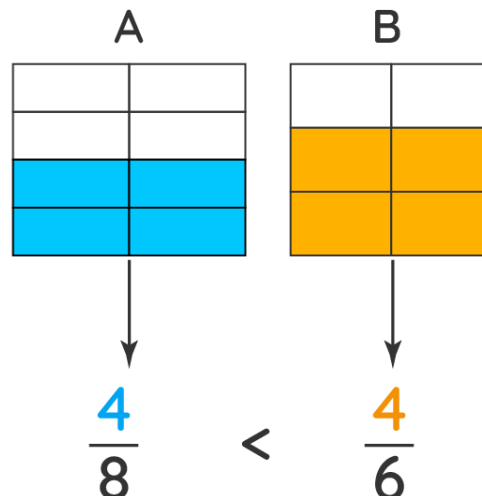
Example :  $4/9$  is less than  $5/9$  (because 4 is less than 5)

But if the denominators are not the same, you need to make them the same (using equivalent fractions).

Example : Which is larger :  $3/8$  or  $5/12$  ?

If you multiply  $8 \times 3$ , you get 24, and if you multiply  $12 \times 2$ , you also get 24, so let's do that. It is now easy to see that  $9/24$  is smaller than  $10/24$  (because 9 is smaller than 10).

So,  $5/12$  is the larger fraction.



## Practice Questions

1. Which of the following is equal to  $\frac{5}{100}$  ?

- a. 5                      b. 0.5                      c. 0.05                      d. 0.005

Ans : C

2. Add 2.372 to 14.04.

- a. 3.776                      b. 37.76                      c. 16.412                      d. 16.312

Ans : C

3. Which of the following can be written in the box  $\frac{7}{2} = \frac{49}{\quad}$  ?

- a. 16                      b. 14                      c. 28                      d. 35

Ans : B

4. Which one of the following fractions is the largest?

- a.  $\frac{29}{36}$                       b.  $\frac{7}{9}$                       c.  $\frac{5}{6}$                       d.  $\frac{3}{4}$

Ans: C

5. The simplest form of  $\frac{48}{60}$  is

- a.  $\frac{5}{4}$                       b.  $\frac{4}{5}$                       c.  $\frac{8}{10}$                       d.  $\frac{12}{15}$

Ans : B

## Roman Numerals


Roman numbers are used widely in our daily life. The most important and common example is watches and clocks with Roman numbers on it. Roman numerals are used to number different volumes of a book classroom in school. Questions in a question paper or exercise.

### ROMAN SYMBOLS

There are 7 symbols used in this system which are as follows:

**I, V, X, L, C, D, M**



NUMERALS 1-10		
1 = I	6 = VI	
2 = II	7 = VII	
3 = III	8 = VIII	
4 = IV	9 = IX	
5 = V	10 = X	

1	<b>I</b>	6	<b>VI</b>	10	<b>X</b>
2	<b>II</b>	7	<b>VII</b>	50	<b>L</b>
3	<b>III</b>	8	<b>VIII</b>	100	<b>C</b>
4	<b>IV</b>	9	<b>IX</b>	500	<b>D</b>
5	<b>V</b>	10	<b>X</b>	1000	<b>M</b>

**Note :** There is no symbol for zero in the Roman Numeral system.

### Uses of Roman Numerals:

- When certain Roman Numerals are repeated, the value of the resulting numeral is equal to their sum.

$$III = 1 + 1 + 1 = 3$$

$$XX = 10 + 10 = 20$$

- Roman numerals read from left to right, larger values to the left and work to the smaller values on the right.

- If a lesser symbol is before a greater symbol, the lesser is subtracted from the greater. For example,  $IV = 5 - 1 = 4$

- If a lesser symbol is after a greater symbol, the two values are added. For example,  $VI = 5 + 1 = 6$

- I and V can only modify up to an X. For example, 49 is not written as IL, rather you first resolve 40 as XL and then resolve 9 as IX. Put them together and  $49 = 10 + 40 + 9 = XLIX$ .

- X and L can only modify up to a C. For example, 490 is not written as XD. First you resolve 400 as CD then you resolve 90 as XC. Put them together and  $490 = CDXC$ .

- C and D can only modify up to an M. For example, 950 is not written as LM, rather you first resolve 900 as CM and then add L for 50. So,  $950 = CML$ .

→ V, L, D are not repeated.

→ No Roman Numeral can come together more than 3 times.

→ The symbol V can never be written on the left of any greater value symbol.

**REMEMBER**

## Sample Questions

1. Roman Numerals are still commonly used today to:
- Outline and number lists
  - Number pages that precede a main body of a book
  - Number certain annual reporting events
  - All of the above

Ans : D

2. Write MMMCXXXIV as a number.

- a. 3034                      b. 3134                      c. 3334                      d. 3224

Ans : D

3. Write 3,396 as a Roman Numeral.

- MMMMMMMCLXXVI
- MMMCXCVI
- MDCXXXVI
- MMMCCCXCVI

Ans : D

4. The Roman Numeral 'LXXV' is equal to:

- a. 66                      b. 45                      c. 75                      d. 60

Ans : C

5. Write DCLXIV as a number.

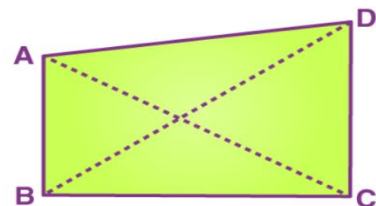
- a. 664                      b. 644                      c. 904                      d. 954

Ans : A

## Quadrilaterals

A quadrilateral is a closed shape and a type of polygon that has four sides, four vertices and four angles. It is formed by joining four non-collinear points. The sum of interior angles of quadrilaterals is always equal to 360 degrees.

If ABCD is a quadrilateral then angles at the vertices are  $\angle A$ ,  $\angle B$ ,  $\angle C$  and  $\angle D$ . The sides of a quadrilateral are AB, BC, CD and DA.

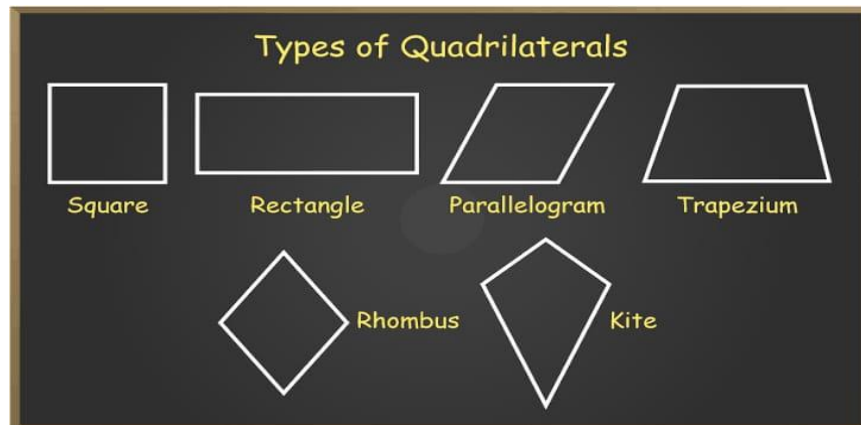


If we join the opposite vertices of the quadrilateral, we get the diagonals. In the below figure AC and BD are the diagonals of quadrilateral ABCD.

## Types of Quadrilaterals

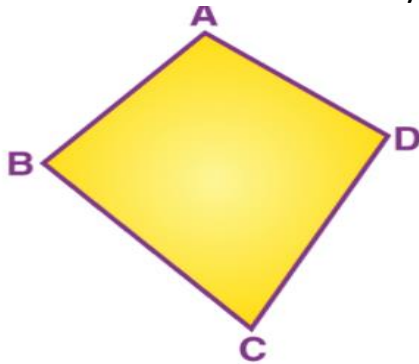
The list of types of quadrilaterals are:

1. Trapezium
2. Parallelogram
3. Squares
4. Rectangle
5. Rhombus
6. Kite



## Properties of Quadrilaterals

Let us understand in a better way with the help of an example:

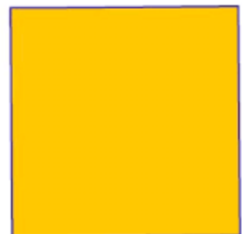


- It has four sides: AB, BC, CD, and DA
- It has four vertices: Points A, B, C, and D
- 4 angles:  $\angle ABC$ ,  $\angle BCD$ ,  $\angle CDA$ , and  $\angle DAB$
- $\angle A$  and  $\angle B$  are adjacent angles
- $\angle A$  and  $\angle C$  are the opposite angles
- AB and CD are the opposite sides
- AB and BC are the adjacent sides

Quadrilateral	Properties
Rectangle	4 right angles and opposite sides equal
Square	4 right angles and 4 equal sides
Parallelogram	Two pairs of parallel sides and opposite sides equal
Rhombus	Parallelogram with 4 equal sides
Trapezoid	Two sides are parallel
Kite	Two pairs of adjacent sides of the same length

## Properties of Square

- All the sides of the square are of equal measure
- The sides are parallel to each other
- All the interior angles of a square are at 90 degrees (i.e., right angle)
- The perpendicular diagonals of a square bisect each other



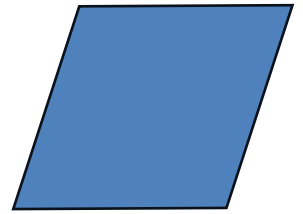
## Properties of Rectangle

- The opposite sides of a rectangle are of equal length
- The opposite sides are parallel to each other
- All the interior angles of a rectangle are 90 degrees.
- The diagonals of a rectangle bisect each other.



## Properties of Rhombus

- All the four sides of a rhombus are of the same measure
- The opposite sides of the rhombus are parallel to each other
- The opposite angles are of the same measure
- The sum of any two adjacent angles of a rhombus is equal to 180 degrees
- The diagonals perpendicularly bisect each other



## Properties of Parallelogram

- The opposite side of the parallelogram are of the same length
- The opposite sides are parallel to each other
- The diagonals of a parallelogram bisect each other
- The opposite angles are of equal measure
- The sum of two adjacent angles of a parallelogram is equal to 180 degrees



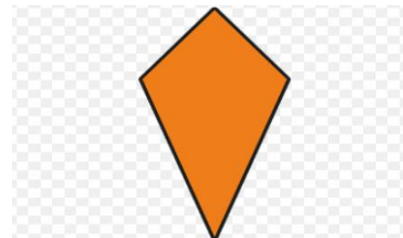
## Properties of Trapezium

- Only one pair of the opposite side is parallel to each other
- The two adjacent sides are supplementary (180 degrees)
- The diagonals bisect each other in the same ratio



## Properties of Kite

- The pair of adjacent sides of a kite are of the same length
- The largest diagonal of a kite bisect the smallest diagonal
- Only one pair of opposite angles are of the same measure.



## Formula's to calculate Area of Quadrilateral

Area of a Parallelogram	Base x Height
Area of a Rectangle	Length x Width
Area of a Square	Side x Side
Area of a Rhombus	$(1/2) \times \text{Diagonal 1} \times \text{Diagonal 2}$
Area of a Kite	$1/2 \times \text{Diagonal 1} \times \text{Diagonal 2}$



## Formula's to find Perimeter of Quadrilateral

Quadrilateral Name	Perimeter
Square	$4 \times \text{Side}$
Rectangle	$2(\text{Length} + \text{Breadth})$
Parallelogram	$2(\text{Base} + \text{Side})$
Rhombus	$4 \times \text{Side}$
Kite	$2(a + b)$ , a and b are adjacent pairs

### Solved Examples:

1. The Quadrilateral with all its equal sides and equal angles which are equal to 90 degrees, is Called \_\_\_\_\_.

- a. Rectangle
- b. Square**
- c. Kite
- d. Parallelogram



2. The Sum of All of the Angles for a Quadrilateral Equals:

- a.  $180^\circ$
- b.  $270^\circ$
- c.  $360^\circ$**
- d.  $90^\circ$

3. A Trapezium has:

- a. One pair of the opposite sides parallel**
- b. Two pair of the opposite sides which are parallel to each other
- c. All of its sides are equal
- d. All of the angles are equal

4. A Diagonal of the Parallelogram divides it into two congruent:

- a. Square
- b. Parallelogram
- c. Triangles**
- d. Rectangle



5. In a Square two sides are 4 cm each. What is the area of the square:

- a.  $16 \text{ cm}^2$**
- b.  $20 \text{ cm}^2$
- c.  $25 \text{ cm}^2$
- d.  $64 \text{ cm}^2$

## Practice Time

Dear children here are the practice time for you, try to do your own.

1. A quadrilateral is a polygon with \_\_\_\_ sides.

- a. 3                      b. 4                      c. 5                      d. 2

2. In a kite two pairs of adjacent sides are of \_\_\_\_

- a. Different length                      b. Irregular length                      c. Same length                      d. None of these

3. The base of a parallelogram is 6 cm and its height is 4 cm. what is the perimeter?

- a. 20 cm                      b. 30 cm                      c. 40 cm                      d. 45 cm

4. The side of a rhombus is 5 cm. What is the perimeter?

- a. 10 cm                      b. 20 cm                      c. 25 cm                      d. 30 cm

5. The length of the rectangle is 5 cm and its width is 3 cm. what is the area?

- a. 10 cm                      b. 12 cm                      c. 15 cm                      d. 20 cm

Answer Key:

1. b
2. c
3. a
4. b
5. c

## Profit And Loss

Profit and loss are the terms used to identify whether a deal or a sale is profitable or loss-making. We use these terms very often in our daily lives.

When a person buys an article for a certain price and then sells it for a different price, he makes a profit or incurs a loss.

**Cost Price:-** The price at which an article is purchased is called its cost price. For example, if Anil purchased a pen for Rs. 15, then here the cost price of that pen will be Rs. 15. It is **expressed as C.P.**

**Selling Price:-** The price at which an article is sold is known as the selling price of the article. For example, if Anil sold the pen for Rs. 20, then here the selling price of the pen will be Rs. 20. It is **expressed as S.P.**

**Profit:-** Within a transaction, **if the selling price of a product is more than the cost price of that product, then it denotes the profit.** Profit earned by Anil is Rs. 5 after selling a pen of Rs. 15 at the rate of Rs. 20. It can be solved with the help of the formula

as given below.

Profit = Selling price - Cost price		
Profit = S.P. – C.P.	S.P. = Profit + C.P.	C.P. = S.P. - Profit

In the above example, the Cost price of the pen was Rs. 15 and the Selling price of the pen was Rs. 20. Hence the Profit = Selling price - Cost price = 20-15 = Rs. 5.

**Loss:-** Within a transaction, if the selling price of a product is lesser than the cost price of that particular product, then it denotes the loss. For example, when a particular book is purchased for Rs. 100 and it is sold for Rs. 80, it indicates a loss of Rs. 20 in this transaction. Loss can be solved with the help of the formula given below.

Loss = Cost price - Selling price		
Loss = C.P. – S.P.	S.P. = C.P. – Loss	C.P. = Loss + S.P.

In the above example, the Cost price of the book is Rs. 100 and the Selling price of the book is Rs. 80. Hence the Loss = Cost price - Selling price = 100-80 = Rs. 20.

### **Sample Questions**

Q1. Raju buys a book for Rs 236 and sells it at Rs 300. He makes a \_\_\_\_\_.

- (a) Loss                      (b) Profit                      (c) Neither profit nor loss                      (d) None of these

Ans- (b)

Q2. Ritu sells a pen at Rs 86. She has earned a profit by selling it. At what price did she buy it ?

- (a) Rs 86                      (b) More than Rs 86                      (c) Less than Rs 86                      (d) None of these

Ans- (c)

Q3. Rishabh buys a bag for Rs 569 and sells it at Rs 400. He makes a \_\_\_\_\_ of Rs \_\_\_\_\_.

- (a) Loss, 169                      (b) Profit, 169                      (c) Profit, 969                      (d) Loss, 969

Ans- (a)

Q4. Ranu buys a bike for Rs 96036 and sells it at Rs 89395. He has a loss of Rs \_\_\_\_\_.

- (a) 6651                      (b) 6631                      (c) 5641                      (d) 6641

Ans- (d)

Q5. Cost price of a table is Rs 1869. The shopkeeper sold it at a profit of Rs 131. At what price did he sell the table?

(a) Rs 1900

(b) Rs 1800

(c) Rs 2000

(d) Rs 2100

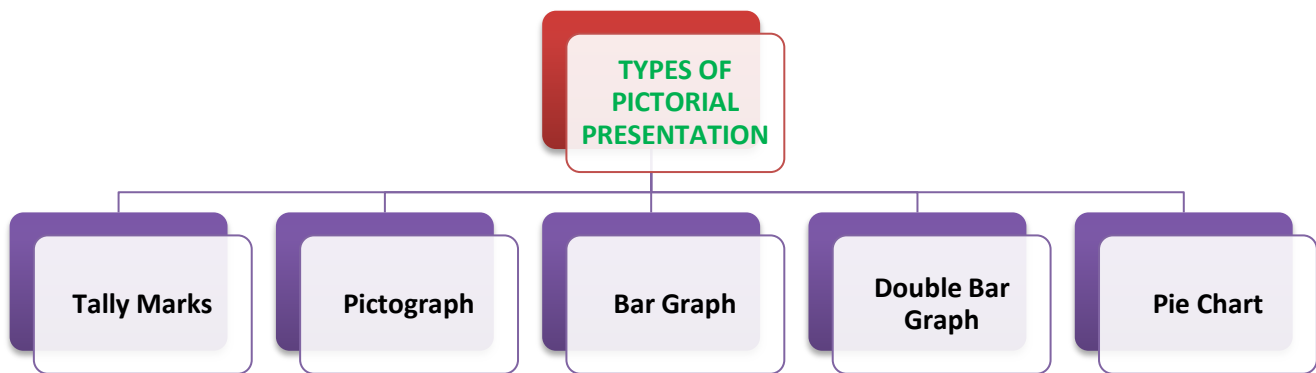
Ans- (c)

## Pictorial Presentation Of Data

**Statistics:** The extraction of meaningful information studied in a branch of mathematics is called statistics.

**Data:** Facts and information collected for the specific purpose are called data.

**Pictorial Presentation of Data:** Visual representation of data which provides a powerful means of summarising and presenting data in a way that most people find easier to comprehend.



Tally Marks

Color	Tally Marks	No. of Toys
Red	III	3
Black	I	1
Green	II	2
White	II	2
Blue	II	2
		10

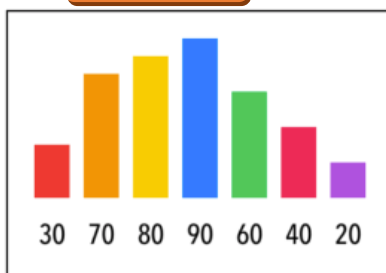
Tally marks are represented as numbers in groups of five. One vertical line is made for each of the first four numbers; the fifth number is represented by a diagonal line across the four lines

Pictorial representation of statistics on a chart, graph or table is pictograph. It is a way of showing data using images. Each image stands for a certain number of things.

Pictograph

Type of Tree Planted	Number of trees planted 🌴 = 5 trees
Guava	🌴 🌴 🌴 🌴 🌴 🌴
Banana	🌴 🌴 🌴
Papay	🌴 🌴 🌴 🌴 🌴
Orange	🌴 🌴 🌴 🌴

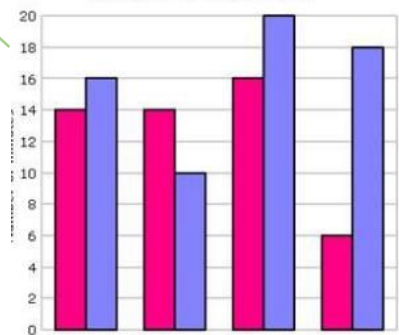
Bar Graph



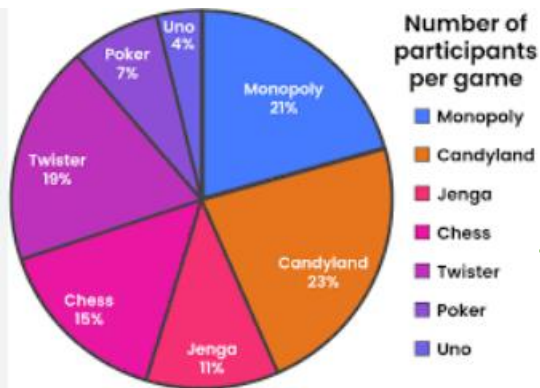
A bar graph contains a bar for each category of a set of qualitative data. The bars are arranged in a manner so that the tallest bar represents the highest value. It can be vertical or horizontal.

The two bars represent different parts of same data. Like girls and boys .This makes it easier to compare the two sets of data.

Double Bar Graph



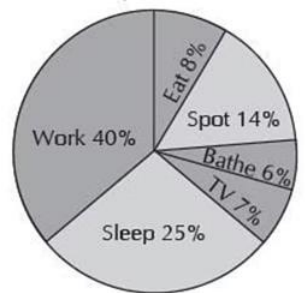
Pie Chart



A pie chart displays data in the form of a circular plate also called pie. A pie chart requires a list of categorical variables and numerical variables.

### Practice Problems:

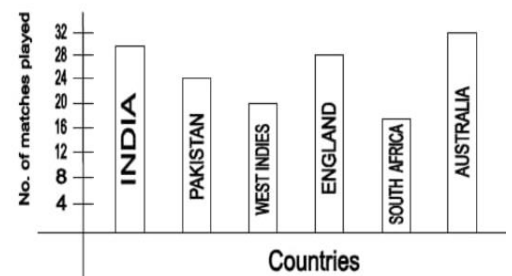
- In a bar graph bars are made
  - Sometime horizontally sometime vertically
  - Obliquely
  - Horizontally
  - Vertically
- The tally Mark **||||** shows frequency
  - 6
  - 5
  - 4
  - 0
- The face of the clock look like pie chart with 12 parts. What is the angle of each part?
  - 30°
  - 90°
  - 360°
  - 60°
- The pie chart shows the amount of time each day Mr.Rahul spends on various activities. In which activity he spends minimum time?
  - Sleep
  - Bathe
  - TV
  - Eat
- Look at the bar graph given below:



Question:

Which country played maximum number of matches?

- India
- Australia
- England
- Pakistan

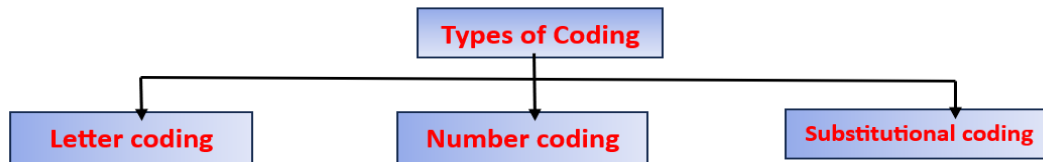


### Answer Key

Q.No.	1	2	3	4	5
Answer	a)	b) 5	a) 30°	b) Bathe	b) Australia

## Coding And Decoding

- ❖ **Code** is arrangement of letters or can be said as system of signals.
- ❖ **Coding** is a process used to encrypt (*convert easy language into a secret code*) a word, a number or in a particular code or pattern based on some set of rules.
- ❖ **Decoding** is a process to decrypt (*convert code into easy language*) the pattern into its original form given codes.

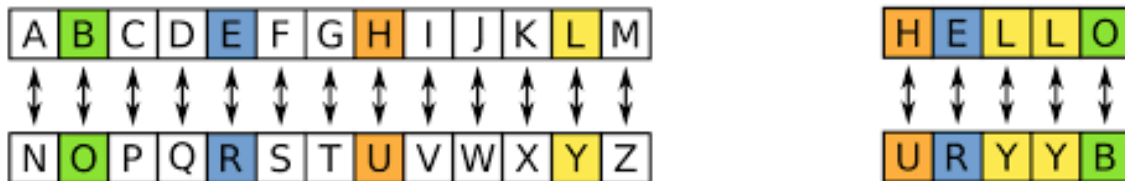


- ❖ **Letter coding**- Code values are given to a word in terms of letters.

Possible relations on the basis of position of letters in the given words are:



It also includes the substitution of letters in reverse alphabetical order.



**Example**- In a secret code language RADIO is written as ARDOI. How we can write UNION can be written?

Ans- RADIO      UNION  
    X  |  X      X  |  X  
    A R D O I    N U I N O

- ❖ **Number coding**- Code values are given to a word in terms of numbers. Symbols can also be used in addition to it.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

**Example**- In a secret language GREAT is written as 7+18+5+1+20, How will EIGHT be written?

Ans-    G    R        E        A        T                                  E        I        G        H        T  
         7 + 15 + 5 + 1 + 20                                  5 + 9 + 7 + 8 + 20

(Positions of alphabets is shown in above image)

❖ **Substitutional coding-** Code values are substituted with different numbers, letters, words or symbols.

**Ex-** In a certain code language, **Eye** is called **Hand**, **Hand** is called **Mouth**, **Mouth** is called **Ear**, **Ear** is called **Tongue**. Which of the following will be used by a person to hear?

Ans- Ears are the part of the body that helps a person to hear but in the **code language 'Ear is called tongue'**. Tongue will be the right answer.)

### Practice Questions

1. if '**tee see pee**' means '**drink fruit juice**'. '**pee kee lee**' means '**juice is sweet**' and '**lee kee mee**' means '**sweet is good**'. Which word in this language means sweet?  
a. Pee                      b. Kee                      c. Lee                      d. Mee
2. In a certain code language, **TEACHER** is coded as **REHCAET**, **BOOK** is coded as **KOOB**. How the word **ORGANISATION** will be coded?  
a. NOITASINAGRO   b. NOITASIANRGO   c. NOSAITINAGRO   d. INOATSINAGRO
3. If **MODERN** is coded as **5%38#@** and **WIN** is coded as **6\*#@**. How **RIDER** will be written in the code language?  
a. \*#3#8                      b. #3\*8#                      c. #\*38#                      d. none of these
4. In a certain code language, **TIMES** is coded as **GRNVH**, **BOOK** is coded as **YLLP**. How the word **CHIEF** will be coded?  
a. XSRVU                      b. UVSVU                      c. NNOPS                      d. SXRUV
5. If **SISTER** is coded as **535201** and **UNCLE** is coded as **78960**. How **NEST** will be written in the code language?  
a. 5201                      b. 8056                      c. 8052                      d. none of these

### Answer Key

Q.No.	1	2	3	4	5
Answer	c	a	c	a	c

-----



# English

## TENSE

- A tense is a form of the verb that allows to express time.
- The tense of the verb tells us when an event or something existed or when a person did something.
- There are three main types of tenses-Past, Present and Future.
- These tenses are further divided into four forms each-Simple, Continuous, Perfect and Perfect Continuous.

### 1. Present Tense

Simple Present	John does his homework.  (Subject+V1+ Object)
Present continuous	John is doing his homework.  (Subject+am/are+V1 with 'ing' ending+ Object)
Present Perfect	John has done his homework.  (Subject+ has/have+V3+Object)
Present Perfect Continuous Tense	John has been doing his homework.  (Subject +has/have+been+V1+ing +Object)

### 2. Past Tense

Simple Past	The baby cried for milk.  (Subject+V2+ Object)
Past Continuous	The baby was crying for milk.  (Subject was/were + V1 with 'ing' ending+ Object)
Past Perfect	The baby had cried for milk.

	(Subject+had+V3+Object)
Past Perfect Continuous Tense	The baby had been cried for milk.  (Subject + had+ been+V1+ing +Object)

### 3.Future Tense

Simple Future	They will cook dinner.  (Subject+ will+V1+Object)
Future Continuous	They will be cooking dinner.  (Subject will be+ V1 with 'ing' ending+Object)
Future Perfect	They will have cooked dinner.  (Subject+ will have+V3+Object)
Future Perfect Continuous Tense	They will have been doing their homework.  Subject +will/shall +have+been+V1+ing +Object

### Sample Questions

#### Q.1 Choose the correct form of the verb to fill in the blank.

i.Anchal \_\_\_\_\_ her Economics notebook in the classroom.

- a. has finds                      b.founded                      **c. found**                      d. was found

**Answer: c**

ii.The river \_\_\_\_\_ into the sea.

- a.flow                              **b.flows**                              c. has flown                      d. flowing

**Answer:b**

iii.The monkeys \_\_\_\_\_ on the tree.

- a.is                                  b.am                                  **c.are**                                  d.was

**Answer: c**

**Q.2 In the given sentences choose the sentence showing the correct use of tense.**

- a. My mother was angry with me.
- b. My mother has angry with me.
- c. My mother are angry with me.
- d. My mother had angry with me.

**Answer: a**

**Q.3. Choose a sentence which shows past continuous tense.**

- a. Suraj visits Shimla very often.
- b. The cat sat under the table.
- c. Riya was reading a book.
- d. I will go to the market.

**Answer: c**

### **VOICE- ACTIVE AND PASSIVE CONSTRUCTION**

There are two voices-(i) Active Voice (ii) Passive Voice

- i. When the subject of the verb is the doer of the action, it is said to be in active voice.

Examples:

- a. Arvind drove a car.
- b. She writes a letter.
- c. Shasha has eaten the cake.
- d. Someone knocked at the door.

- ii. When the subject of the verb is acted upon, it is said to be in the passive voice.

- a. A car was driven by Arvind.
- b. A letter is written by her.
- c. The cake has been eaten by Shasha.
- d. The door was knocked at.

**Note: Only transitive verbs can be changed into passive voice.**

**Rules for changing the voice of sentence.**

- a. The object of the active verb becomes the subject of the passive verb.
- b. The subject of the active verb can be mentioned with the help of preposition- 'by'

- c. The passive voice must contain the past participle form of principal verb.
- d. Some form of the verb “to be” (**is, am, are, was, were, being, or been**) is used according to the tense.

Illustrated Examples:

1. Simple Present Tense (is/am/are + third form of verb)

Active Voice	Passive Voice
➤ Dhoni plays cricket.	Cricket is played by Dhoni.
➤ They eat apples.	Apples are eaten by them.

2. Simple Past Tense (was/were + third form of the verb)

Active Voice	Passive Voice
➤ We helped you.	u were helped by us.
➤ Riya made a mistake.	mistake was made by Riya

**Sample Questions**

**Q.1 Change the voice of the sentences from active to passive and choose the correct answer.**

i. Bees make hives.

- a. Hives were made by bees.
- b. Hives are made by bees.**
- c. Hives have been made by bees.
- d. Hives are being made by bees.

**Answer: b**

ii. The lion chased the deer.

- a. The deer is chased by the lion.
- b. The deer is being chased by the lion.
- c. The deer has been chased by the lion.
- d. The deer was chased by the lion.**

**Answer: d**

iii. Hari hits the ball.

- a. The ball is hit by Hari.**
- b. The ball has been hit by Hari.
- c. The ball was hit by Hari.
- d. The ball is being hit by Hari.

**Answer: a**

**Q.2. Choose the sentence which is written in active voice.**

- a. He is admired by all.
- b. The function was ruined by the rain.
- c. The children wrote an essay.**
- d. This house was built by my grandfather.

**Answer: c**

**Q.3. Choose the sentence which shows passive voice.**

- a. The plumber repaired the pipes.
- b. Plague is spread by rats.
- c. Ramesh has stolen a book.
- d. He purchased many books.

Answer: b

## **VOCABULARY**

Vocabulary refers to the words or set of words used to communicate effectively.

- Reading will increase a person's vocabulary.
- Active Vocabulary refers to the words which you use whereas Passive Vocabulary refers to the words you understand but don't use.
- Oral Vocabulary consists of all the words you use while speaking. Written Vocabulary comprises of all the words that you use while writing.
- Vocabulary Includes jumbled words.

### **JUMBLED WORDS**

YMNKOE	MONKEY
EDESRT	DESERT
BELRE	REBEL
CTPRFEE	PERFECT
RSSANANCEIE	RENAISSANCE
CEPDURO	PRODUCE
HTIORECUTULR	HORTICULTURE
EGREDEDANN	ENDANGERED

**Q.1. Choose the correct spelling.**

- a) beginning
- b) beggining
- c) begining
- d) beginning

Ans. a

**Q.2. Unscramble the letters and find the correct spelling.**

**orydnair**

- a) ordinary
- b) order
- c) road

d) rainy

Ans. A

**Q.3. Conflict, fight, war are synonyms of**

- a) abolish
- b) horrible
- c) combat
- d) efficient

Ans. c

**Q.4. One who knows many languages is known as**

- a) alien
- b) lecturer
- c) professor
- d) linguist

Ans. d

**Q.5. Choose the odd one out.**

- a) mansion
- b) monastery
- c) abode
- d) menage

Ans. d

**6. Rearrange the letters to form a meaningful word.**

- i) Swerna
- a) Answer
- b) Wernas
- c) Serwans
- d) None of these

Ans. a

ii) Agelangu:

- a) languleag
- b) geanugal
- c) Language
- d) All of the above

Ans. c

iii) Aoustm:

- a) Famous

- b) Mousfa
- c) Famuos
- d) None of these

Ans. A

iv) Stieve:

- |            |                     |
|------------|---------------------|
| a) Thieves | b) Hievest          |
| c) Theives | d) All of the above |

Ans. C

v) Sorpts:

- a) Stopsr
- b) Sports
- c) Portss
- d) All of the above

Ans. b

## DIRECT and INDIRECT SPEECH

The process of changing Direct Speech to Indirect Speech or Indirect Speech to Direct Speech without changing the core meaning of the speaker's words is known as narration change.

Direct speech is when we repeat the actual words spoken by the speaker. These words are put within inverted commas.

For example, Arun said, "I know Pratham."

Indirect speech tells us what someone else said. Therefore, it is also called reported speech. Indirect speech does not tell us the exact words but only the meaning. No inverted commas are used.

Indirect speech: Arun said that he knew Pratham.

### Direct Speech

**Direct speech** may be a question, statement, exclamation or an imperative sentence.

The exact words are within inverted commas.



## Indirect Speech

Indirect speech is only a statement.

Inverted commas are not used.

The verb that introduces the actual words of the speaker is called the **Reporting Verb**. If the reporting verb is in the present tense then the tense of the indirect speech does not change.

It remains the same.

### EXAMPLE

He says, "I am positive."

He says that he is positive.

## Rules of Changing Direct Speech into Indirect Speech

### Change in pronouns

I (is changed into) he/she

We - they


You - they/he/she


My/mine - his/her/hers


### (ii) Change in expressions of time and place


#### Direct Indirect


now	then
here	there
ago	before
thus	so
today	that day
tomorrow	the next day
yesterday	the day before/ the previous day
last night	the night before

<b>SIMPLE PRESENT TENSE (CHANGES INTO)-----</b> 	<b>SIMPLE PAST TENSE</b>
is/am/are	was/were
does not, do not	did not
She said, "I play."	She said that she played
He said, "I do not know."	He said that he did not know.

<b>PRESENT CONTINUOUS</b> 	<b>PAST CONTINUOUS</b>
He said, "I am writing."	He said that he was writing.
They said, "We are decorating the room."	They said that they were decorating the room.

<b>PRESENT PERFECT</b> 	<b>PAST PERFECT</b>
have/has	had
She said, "I have an eraser."	She said that she had an eraser.
He said, "The watch has stopped."	He said that the watch had stopped.

<b>SIMPLE PAST</b> 	<b>PAST PERFECT</b>
He said, "I came late."	He said that he had come late.
He said, "I did not play."	He said that he had not played.

<b>PAST CONTINUOUS</b> 	<b>PAST PERFECT CONTINUOUS</b>
She said, "I was knitting."	She said that she had been knitting.
Mom said, "I was cooking your favourite dish."	Mom said that she had been cooking my favourite dish.

**PAST PERFECT and PAST PERFECT CONTINUOUS remain the same.**

**PRESENT PERFECT CONTINUOUS changes into PAST PERFECT CONTINUOUS.**

**Universal truths remain the same.**

**EXAMPLE-**

**Q.1.Rahul said, "Man is mortal."**

- a) Rahul said that man is mortal.
- b) Rahul said that man was mortal.
- c) Rahul said man is mortal.
- d) None of these.

**Q.2.She said, "I wrote a book."**

- a) She said that she wrote a book.
- b) She said that she has written a book.
- c) She said that she had written a book.
- d) None of these.

**Q.3.Namita said, “I am reading a book.”**

- a) Namita said that she read a book.
- b) Namita said that she has read a book.
- c) Namita said that she was reading a book.
- d) Namita said that she is reading a book.

**Q.4.He says, “I am sick.”**

- a) He said that he was sick.
- b) He says that he is sick.
- c) He said that he is sick.
- d) He says that he was sick.

**Q.5.Kiran said, “I am very busy now.”**

- a) Kiran said that she was very busy then.
- b) Kiran said that she is very busy now.
- c) Kiran said that she is very busy then.
- d) None of these.

Answer key

Q.No.	1	2	3	4	5
Answer	a	c	c	b	a

## SYNONYMS and ANTONYMS

An antonym is a word that means the opposite of another word. For example, hot and cold are antonyms, as are good and bad. Antonyms can be all types of words: verbs, nouns, adjectives, adverbs, and even prepositions. Antonyms are words that have opposite meanings.

### ANTONYMS

- (a) able -unable
- (b) abstract-concrete
- (c) agree-disagree

(d) descend-ascend

(e) finally- initially

(f) love- hate

(g) here- there

(h) traditional- modern

### **SYNONYMS**

A synonym is a word that has the same meaning as another word (or nearly the same meaning). For example, anger and fury are synonyms of each other that shows that a person is not in a good mood.

<b><u>WORD</u></b>	<b><u>SYNONYMS</u></b>
(a) aid-	help
(b) annoy-	displease
(c) control-	regulate
(d) delicate-	soft
(e) expand-	spread
(f) happy-	joyful
(g) factual-	real
(h) proclaim-	declare

### **Idioms and Phrases:**

A set of words, or, to put it another way, a phrase, that has a meaning beyond the words' actual meanings is known as an idiom. The idiom can be defined as "a group of words in a fixed order that has a particular meaning that is different from the meanings of each word on its own," OR "an idiom is a group of words whose meaning is different from the meanings of the individual words."

Idiom is a type of phrase that has a meaning that can't be deciphered by defining the individual word. Many verbs, when followed by various prepositions, or adverbs, acquire an idiomatic sense; as,

1. Hand in: submit something
2. Handout: something free
3. Out of hand: not in control
4. Second hand: owned by someone else before

- |    |                     |                |
|----|---------------------|----------------|
| 5. | Give a hand:        | help out       |
| 6. | Hand to hand:       | close fight    |
| 7. | Of and on:          | at intervals   |
| 8. | Bag and baggage:    | with all goods |
| 9. | Hither and thither: | here and there |

Here are some more idioms and their meanings:-

Idioms	Meanings
1. Beat around the bush: important	to avoid talking about what's
2. Get your act together: effectively	Get organized and do things
3. Hit the sack:	Go to sleep
4. Your guess is as good as mine:	I do not know
5. Good things come to those who wait:	To have patience
6. Back against the wall: no escape	Stuck in a difficult circumstance with
7. Up in arms: something	Being grumpy or angry about
8. Sell like hot cakes:	Quick sellout
9. Run around in circles:	Putting efforts into something that
	is not a worthwhile result
10. On cloud nine:	Being very happy
11. Left out in the cold:	Being ignored
12. Blow hot and cold:	Alternate inconsistently between
	moods and actions
13. Cut corners:	Doing something in an easier and

	least expensive manner
14. Boil the ocean:	Taking up an almost impossible or overly ambitious project
15. Keep an ear to the ground:	Staying informed and updated about everything
16. Eat like a horse:	Eating too excessively
17. By hook or by crook :	By some means or other
18. Beat A Dead Horse:	To force an issue that has already ended.
19. Bend Over Backwards:	Do whatever it takes to help. Willing to do anything.
20. Between A Rock and A Hard Place:	Stuck between two very bad options.
21. Bite Off More Than You Can Chew:	To take on a task that is way to big.
22. Bite Your Tongue:	To avoid talking.
23. Blood Is Thicker Than Water: anything else.	The family bond is closer than
24. Blue Moon:	Arare event or occurrence.
25. Cock and Bull Story:	An unbelievable tale.
26. Cross Your Fingers:	To hope that something happens the way you want it to
27. Cry Over Spilt Milk:	When you complain about a loss from the past.
28. Drink like a fish:	To drink very heavily.

## Phrases

Phrases are groups of words that come together to express a single idea but do not form a complete sentence. They act like building blocks, adding more detail and information to sentences. Phrases can function as nouns, verbs, adjectives, or adverbs.

### Types of Phrases

**Noun Phrases:** Noun phrases are **groups of words centered around a noun**. They can include determiners (like articles or possessive pronouns) and adjectives that describe the noun. For example:

The fluffy cat jumped over the fence.

My best friend is coming over tomorrow.

**Verb Phrases:** Verb phrases consist of the **main verb along with auxiliary (helping) verbs or modifiers**. They express actions, events, or states. For example:

She is studying for the exam.

They have been playing soccer all afternoon.

**Adjective Phrases:** Adjective phrases are groups of words that **modify nouns**. They provide more information about the noun they describe. For example:

The boy with curly hair won the contest.

The cake covered in chocolate looked delicious.

**Adverb Phrases:** Adverb phrases **modify verbs, adjectives, or other adverbs**. They describe how, when, where, or to what extent something happens. For example:

She danced with grace.

The students waited patiently for the results.



## Identifying Phrases

To identify phrases in a sentence, **look for groups of words that work together and provide extra information.** Remember that phrases do not have a subject and a verb, so they cannot stand alone as complete sentences.

### Examples:

**Noun Phrase:** The big red apple fell from the tree.

"The big red apple" is a noun phrase that describes the subject of the sentence.

**Verb Phrase:** The dog is barking at the milkman.

"is barking" is a verb phrase that tells us what the dog is doing.

**Adjective Phrase:** The girl with a bicycle is my sister.

"with a bicycle" is an adjective phrase that gives more information about the girl.

## **Practice Questions**

### QUESTIONS ON ANTONYMS

Question 1:

Choose the antonym for the word "brave":

- a) Strong
- b) Cowardly
- c) Fearless
- d) Bold

Ans. b

Question 2:

Which word is the antonym for "small"?

- a) Tiny
- b) Little
- c) Large
- d) Minuscule

Ans. c

Question 3:

What is the antonym for the word "brilliant"?

a) Bright

**b) Dull**

c) Clever

d) Smart

Ans. b

Question 4:

What is the antonym for "villain"?

**a) Hero**

b) Criminal

c) Evil

d) Scoundrel

Ans. a

Question 5:

Which word is a synonym for "courageous"?

a) Fearful

**b) Brave**

c) Timid

d) Cowardly

Ans. b

## Practice Questions on Synonyms

Question 1:

Choose the synonym for the "exhausted":

- a) Tired
- b) Energetic
- c) Rested
- d) Active

Ans. a

Question 2:

What is the synonym for the word "victory"?

- a) Loss
- b) Triumph
- c) Defeat
- d) Failure

Ans. b

Question 3:

Which word is a synonym for "generous"?

- a) Selfish
- b) Stingy
- c) Greedy
- d) Kind

Ans. d

Question 4:

What is a synonym for the word "furious"?

- a) Angry
- b) Calm
- c) Kind

d) Generous

Ans. a

Question 5:

Which of the following words is a synonym for "happy"?

a) Sad

**b) Joyful**

c) Angry

d) Worried

Ans. b

### **Practice Questions on Idioms**

Question 1:

What does the idiom "cost an arm and a leg" mean?

a) Something that is very cheap

**b) Something that is very expensive**

c) Something that requires physical effort

d) Something that is difficult to find

Answer: b) Something that is very expensive

Question 2:

What does the idiom "hit the nail on the head" mean?

a) To miss the target

b) To hit a nail with a hammer

c) To do something without thinking

**d) To be exactly right or accurate**

Answer: d) To be exactly right or accurate

Question 3:

What does the idiom "let the cat out of the bag" mean?

- a) To release a cat from a bag
- b) To keep a secret
- c) To reveal a secret or surprise
- d) To play with a cat using a bag

Answer: c) To reveal a secret or surprise

Question 4:

What does the idiom "break the ice" mean?

- a) To shatter a block of ice
- b) To create an awkward situation
- c) To start a conversation or friendship in a social setting
- d) To slip and fall on ice

Answer: c) To start a conversation or friendship in a social setting

Question 5:

What does the idiom "in hot water" mean?

- a) In a state of physical warmth
- b) In trouble or facing difficulties
- c) In need of a hot bath
- d) In a situation with many people

Answer: b) In trouble or facing difficulties

### **Practice Questions on Phrases**

Question 1:

Identify the phrase in the sentence: "The girl with curly hair won the art competition."

a) The girl

**b) curly hair**

c) won the art competition

d) The girl with curly hair

Answer: b) curly hair

Question 2:

What type of phrase is this: "is playing in the park"?

a) Noun phrase

**b) Verb phrase**

c) Adjective phrase

d) Adverb phrase

Answer: b) Verb phrase

Question 3:

Choose the phrase in the sentence: "The book on the shelf is mine."

a) The book

**b) on the shelf**

c) is mine

d) The book on the shelf

Answer: b) on the shelf

Question 4:

Which type of phrase is this?

*quickly running to catch the bus*

a) Noun phrase

**b) Verb phrase**

c) Adjective phrase

d) Adverb phrase

Answer: d) Adverb phrase.

Question 5:

Identify the noun phrase in the sentence: "That old wooden table needs repair."

a) That old

b) table needs

c) needs repair

d) That old wooden table

Answer: b) That old wooden table

## Homophones

Homophones are the words that sound the same **but** spelled differently and have different meanings.

Son (noun)/(sun) (noun)

1. son- male child

Sentence-My son is ten years old.

b.sun-The star that provides light and heat for the earth and around which the earth moves.

Sentence-The sun shines brightly.

2. cell (noun)/sell (verb)

a. cell - The smallest unit of human body.

Sentence -Cell is the basic building unit of all living things.

b.sell-To exchange a product or service for money.

Sentence- They sell school uniform.

3.weather (noun)/whether (conjunction)

a. weather refers to the atmospheric condition in a specific place at a time.

Sentence-The weather forecast predicts rain today.

b. whether is used to introduce alternatives or possibilities.

Sentence- I am not sure whether I should go to the movie or stay home.

4.waste(noun)/waist(noun)

a. waste refers to something that is unused, discarded or thrown away.

Sentence- Don't waste water.

b. waist is the part of the body between the ribs and hips.

Sentence-These trousers have an elastic waist.

5. brake/break

a. brake is a device for slowing or stopping a moving vehicle.

Sentence-Driver applied the brakes to stop bus.

b.break has different meaning. As a noun, it means separate into pieces and as a verb, an interruption of continuity.

Sentence- The vase breaks into hundreds of pieces.

**Choose the correct homophone for each sentence.**

1.Could you please pass a .....(piece/peace) of the pastry?

2. I saw a beautiful..... (dear/deer) in the forest.

3.Mohan's trousers were big so he wore a belt around his  
.....(waist/waste).

4.Tisa's sister was sick so he ..... (made/maid) a card for her.

5. Out in the forest, the ..... (bear/bare) ate some berries.

**Answer Key- 1. Piece 2. Deer 3. Waist 4. Made 5. bear**



## Words That May Often Be Confused

Some words in English cause trouble for speakers and writers because these words share a similar pronunciation or spelling with another word. These words are called commonly confused words.

### **Currant vs. Current**

- a. **Currant-Currant is a noun that refers to a small raisin or berry.**

Sentence- I love to eat black currant ice-cream.

- b. **Current-Current is a noun that refers to a continuous movement of water or air in the same direction.**

Sentence-We were rowing against the current.

### **There Vs. Their**

- a. **There-There is used when we are referring to a place.**

Sentence-We went there in a group.

- b. **Their- Their refers to possession of something.**

Sentence-Their house is small but comfortable.

### **Affect vs. Effect**

- a. **Affect(verb) meansto influence**

Sentence-Motivational speech will affect my daughter greatly.

- b. **Effect( noun) meansresult.**

Sentence- Weight gain can be the effect of an unhealthy lifestyle.

### **Lose vs. Loose**

- a. **Lose( verb) means fail to win .**

Sentence-I don't want to lose this match.

- b. **Loose(adjective)meansnot tight.**

Sentence-Wear loose clothes as they are more comfortable.

### **Than vs. Then**

- a. **Than - Than is used to compare two things.**

Sentence-I like cake better than pie.

- b. **Then-Then is used to indicate time.**

Sentence-Finish your homework then you can watch TV.

**Select words from the brackets to fill in the blanks.**

1. It was..... difficult for her to remain.....even for a few minutes. (quiet, quite)
2. Please ..... till I noted down the .....of the first child. (weight, wait)
3. The ..... fell into a drum containing blue paint and his.....got dyed blue. ( hair, hare)
4. The wound on his .....took a long time to ..... (heel, heal)
5. This shop.....battery .....also. (sells, cells)

**Answer Key- 1. quiet, quite 2. wait, weight 3. hare, hair 4. heel, heal 5. sells, cell**

## Reasoning

Logical reasoning refers to the ability to understand and logically work through concepts and problems expressed in words. It checks the ability to extract and work with the meaning, information, and implications from the bulk of the text. The logics are expressed verbally, and you have to understand the logic before solving the questions.

Examples-

**CUP : LIP :: BIRD : ?**

- A. GRASS
- B. FOREST
- C. BEAK
- D. BUSH

Answer: C. BEAK. You drink out of a cup with your lips. Similarly, birds bite grass with their beaks.

**Paw : Cat :: Hoof : ?**

- A. Lamb
- B. Horse
- C. Elephant
- D. Tiger

Answer: B. Horse. Cat's feet are called paws and horse's are called hoofs.

**Safe : Secure :: Protect :**

- A. Lock

- B. Guard
- C. Sure
- D. Conserve

Answer: B. Guard

**Melt : Liquid :: Freeze :**

- A. Ice
- B. Solid
- C. Condense
- D. Push

Answer: B. Solid

**Parts : Strap :: Wolf :**

- A. Flow
- B. Animal
- C. Wood
- D. Fox

Answer: Flow

**Which word does NOT belong with the others?**

- A. wing
- B. fin
- C. beak
- D. rudder

Answer: C. Beak. Rest are parts of an aero plane.

**Which word is the odd one out?**

- A. hate
- B. fondness
- C. liking
- D. attachment

Answer: A. hate. Rest are positive emotions.

**Pick the odd one out?**

- A. just
- B. fair
- C. equitable
- D. biased

Answer: D. Biased. The others signify honesty

## **Figures of speech – Simile and Alliteration**

A simile is a figure of speech that compares two different things that have similar properties or characteristics. Similes are often confused with metaphors, which is another different figure of speech used for comparison. The easiest way to identify a simile as opposed to a metaphor is to look for the words 'like' or 'as'.

Thus, the best examples of similes include ‘as’ or ‘like’ such as “as proud as a peacock”.

## **Importance of Using a Simile**

Similes are a powerful tool for making language more interesting, descriptive, and creative because the mind thinks in images and associations, similes can elicit stronger and more effective descriptions than adjectives or exact descriptions; they can activate linked emotions, generate new mental connections, and underline specific features. From common conversation to poetry, similes are required for creative expression.

## **How to Use a Simile in a Sentence ?**

A simile is generally used in a sentence to make comparisons between two or more nouns and this is done with the use of words such as ‘like’ or ‘as’. The general idea of using a simile with the word ‘as’ is by using a noun that is known for a particular quality. For example: as proud as a peacock, as busy as a bee and so on. A simile is a direct comparison of two like or unlike things. A simile helps your reader or listener visualize, understand, and have a better conception of the quality of the nouns being compared. It makes it a lot more vivid and descriptive. In other words, it can be said that similes can be used to provide a mental image to your reader or listener.

## **Examples –**

1. As black as coal

Example: His face became as black as coal after being criticized.

2. As blind as a bat

Example: My uncle is as blind as a bat without his spectacles.

3. As cool as a cucumber

Example: While all of us were panicking just before the declaration of the results, Naina was as cool as a cucumber.

4. As brave as a lion

Example: While fighting the war, the soldier was as brave as a lion.

5. Cunning like a fox

Example: Don’t trust his words, he is cunning like a fox.

6. As cold as ice

Example: The expression on her face was as cold as ice.

7. As busy as a bee

Example: My wife is as busy as a bee in the mornings.

### **List of similes –**

1. As innocent as a lamb
2. As tough as nails
3. As shiny as a new pin
4. As hot as hell
5. As white as a ghost
6. As bright as a button
7. As cool as a cucumber
8. As cold as ice
9. As light as a feather
10. As sweet as sugar
11. As blind as a bat
12. As common as dirt
13. As tall as a giraffe
14. As hard as nails
15. As cute as a kitten
16. As bold as brass
17. As happy as a clam
18. As black as coal
19. As American as apple pie.
20. As big as an elephant.
21. As black as coal.
22. 2As blind as a bat.
23. As boring as watching paint dry.
24. As brave as a lion.
25. As busy as a bee.
26. As cold as ice
27. As cool as a cucumber
28. As cunning as a fox
29. As dead as a doornail
30. As deaf as a post
31. As difficult as nailing jelly to a tree
32. As dry as a bone
33. As dull as dishwater
34. As easy as ABC
35. As old as the hills
36. As pale as death
37. As for fit as a fiddle
38. As flat as a pancake
39. As free as a bird

40. As fresh as a daisy
41. As gentle as a lamb
42. As good as gold
43. As hard as nails
44. As heavy as lead
45. As helpless as a baby
46. As honest as the day is long
47. As hot as blue blazes
48. As hungry as a bear
49. As cheap as dirt.
50. As clean as a whistle.
51. As clear as mud.
52. As clear as crystal.

## **Alliteration –**

### **What Is Alliteration?**

Alliteration is a literary device that uses similar phonetic sounds in continuity to make an effect. This device is usually used to decorate the words with a musical, lyrical or emotional effect.

The Oxford Learner's Dictionary defines alliteration as "the use of the same letter or sound at the beginning of words that are close together." According to the Cambridge Dictionary, alliteration is defined as "the use, especially in poetry, of the same sound or sounds, especially consonants, at the beginning of several words that are close together."

Alliteration is "the use, in speech or writing, of several words close together which all begin with the same letter or sound", according to the Collins Dictionary and "the repetition of usually initial consonant sounds in two or more neighbouring words or syllables", according to the Merriam-Webster Dictionary.

### **Examples of Alliteration Used in Tongue Twisters.**

Take a look at the following common and well-known tongue twisters to see the use of alliteration.

She sells sea shells on the sea shore.

In this tongue twister, the words sells, sea and sea is one alliteration group and she, shells and shore is another group.

Betty bought a bit of butter but the butter was very bitter so Betty bought some better butter to make the bitter butter better.

This tongue twister uses the words bit, but, butter, bitter and better are used repetitively to create an effect and serves as an excellent example of alliteration.

## Examples of Alliteration in Declarative Sentences

Alliteration need not necessarily be a device that can be used in poetic works or literature alone, but is also used in normal everyday communication.

### **Examples -**

1. The little girl was excited to see the dazzling and dainty stars in the sky.

Alliterated words: Dazzling, dainty

2. You have got to fight the fight.

Alliterated words: Fight, fight

3. Love's Labour Lost is one among the comedy plays of William Shakespeare.

Alliterated words: Love's, Labour, Lost

4. Peter Piper picked a peck of pickled peppers.

Alliterated words: Peter, Piper, picked, peck, pickled, peppers

5. My brother saw a big, black bug sitting on the bushes in his garden.

Alliterated words: Big, black, bug

6. I have a dream, a dream to have the world let people decide their destiny.

Alliterated words: Dream, dream, decide, destiny

7. "Now old desire doth in his death-bed lie."

Alliterated words: Desire, doth, death-bed

8. The teacher taught a lesson on turtles and tortoises.

Alliterated words: Teacher, taught, turtles, tortoises

9. The Dewey Decimal System is taught in school.

Alliterated words: Dewey, decimal

10. Nobody knew where the big black bear was.

Alliterated words: Big, black, bear

# EVS

## Matter and Materials

Matter is a substance made up of different particles that has weight and volume(occupies space). The common objects that we use everyday like pencil, book, pen, bag, etc., are the examples of matter.

Atoms	Molecules	Elements	Compounds
The smallest and fundamental unit of matter. Example- Neon, Hydrogen, Calcium, etc.	Molecules composed of similar or different kinds of atoms. Example: Nitrogen ( $N_2$ ), Ozone ( $O_3$ ), etc.	Elements consists of one kind of atom. Example: Carbon. Oxygen, iron, etc.	Compounds are chemical substances made up of two or more elements. Examples: Water, carbon dioxide, etc.

**Table 1: Kinds of matter.**

### States of Matter

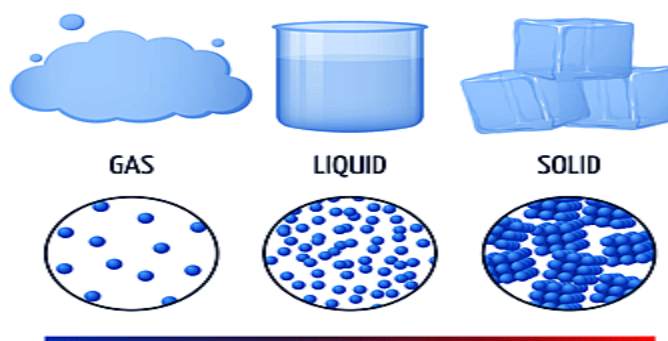
The matter is classified into solids, liquids, and gases in terms of physical properties.

Solids are rigid (particles are intact) and have a definite shape. For example, ice, rock, salt, etc.

Liquids tend to flow and takes the shape of the container. Hence, it has definite volume, but it has indefinite shape. For example, oil, water, milk, etc.

Gas is a state of matter that has a fixed mass but indefinite shape and volume. The particles in gases are far apart. For example, air, helium, oxygen, etc.

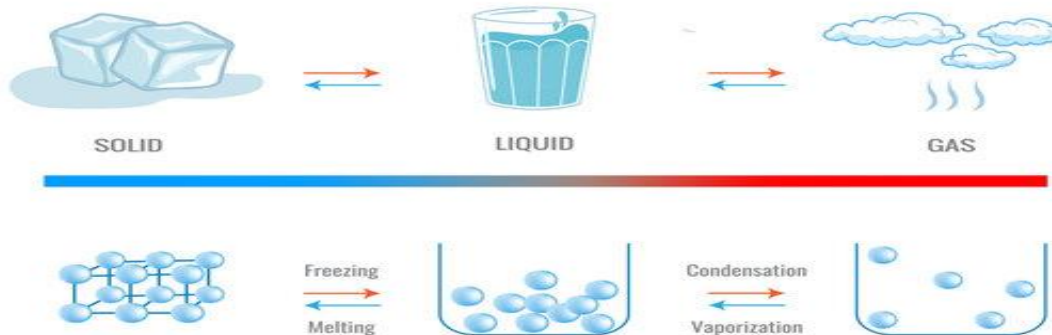
### STATES OF MATTER



The state of matter can be changed depending upon the change in temperature. When solids are heated, they melt and changes into liquids. Liquids changes into solids when it cools.



## STATES OF MATTER



## Materials

Material is a matter which is used to make an object. In our daily life, we use variety of materials, like, glass, wood, metal, plastic etc.

Materials have certain properties like, malleability, ductility, lustre, sonorous, good conductors of electric



Stones



Metal



Cotton



Wood



Sand



Coal



Gold



Clay

## Characteristics of Materials



strong



weak



flexible



transparent



translucent



opaque



soft



hard



waterproof



absorbent



shiny



dull



rigid



hot

## Practice Questions

1. Which one of the following has a definite volume but indefinite shape?
  - a. Solid
  - b. Liquid
  - c. Gas

2. The process of conversion of ice into water is known as-
  - a. Evaporation
  - b. Freezing
  - c. condensation
  - d. melting
3. Gases consist of particles
  - a. Are packed close together
  - b. Are strongly attracted to each other
  - c. have a regular arrangement
  - d. Are very far apart
4. Which material is weak and absorbent?
  - a. Plastic
  - b. Paper/tissue paper
  - c. Rubber
  - d. Fabric
5. On heating a substance, the movement of particles:
  - a. Become slower
  - b. Remains the same
  - c. Become faster
  - d. None of these
6. Which among the following statements are correct?
  - a. Gases have indefinite shape
  - b. Solids have fixed volume
  - c. Liquids have fixed volume
  - d. All the above
7. Which material is shiny and conducts electricity?
  - a. Glass
  - b. Rubber
  - c. Metal
  - d. Plastic
8. Which one of the following can be compressed easily?
  - a. A glass of water
  - b. A block of wood
  - c. balloon filled with air
  - d. All of these
9. What material can conduct heat and electricity, can be hammered into a shape
  - a. Plastic
  - b. Metal
  - c. Fabric
  - d. Glass
10. Handles of cooking pots are made of
  - a. Plastic
  - b. Metal
  - c. Glass

#### Answer Key

1-b	2-d	3-d	4-b	5-c
6-d	7-c	8-c	9-b	10-a

## Adaptations in Plants and Animals

Habitat is the place where a plant or animal lives is called habitat. Habitat can be divided into two main groups

- a. Terrestrial habitat: land based
- b. Aquatic habitat: water based

Habitat includes interaction between the biotic and abiotic

components of the environment Biotic component: living

things in a habitat eg. plants, animals, microorganism

Abiotic components: non-living things eg soil, air, rocks, water, sunlight, temp.

etc.

## **ADAPTATIONS**

The presence of specific body features which enables a plant or an animal to

live in a particular habitat is called adaptation

Terrestrial habitat:

- a. Desert
- b. Mountain region
- c. Forest

## **DESERT:-**

### **ANIMALS**

1.Desert animals such as desert rat and desert snakes survive by living in burrows during hot day time. They come out of the burrows only during cool night in search of food.

2. These animals pass out very small amount of urine and hence conserve water in their body. In this way they are adapted to cope up with lack of water.

3. One common type of adaptation is camouflage. Camouflage allows an organism to blend in with its environment and avoid being seen by predators or prey. Another common adaptation is a predator's ability to detect prey. Predators have adaptations that allow them to see, smell, or hear prey from a distance.



## PLANTS

Cactus: the adaptations which help the cactus plants to survive in hot and dry climate are:

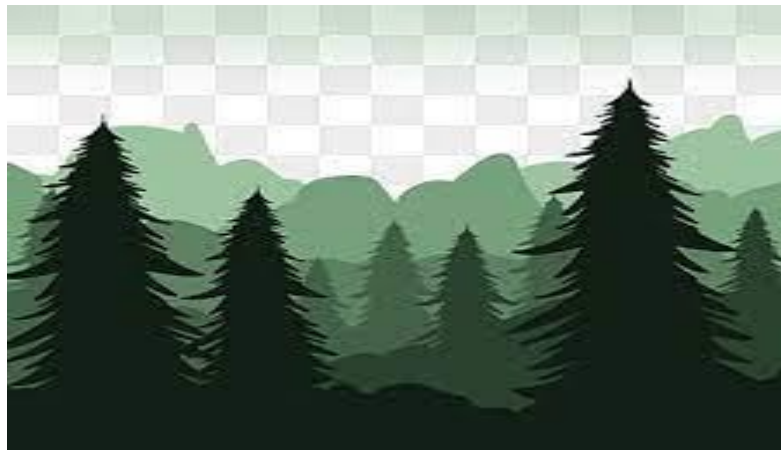
- a. Plants have modified their leaves in the form of thin spines to reduce the loss of water through transpiration
- b. Photosynthesis is carried out by the green stem.
- c. Stems store water and is covered with thick waxy layer to prevent the loss of water.
- d. Cactus plants have long roots to absorb water from a larger area.



### Mountain Region:-

#### Adaptations in plants

- a. The tree in mountain habitats are cone shaped having sloping branches. This shape of mountain trees makes the rainwater and snow to slide off easily without damaging leaves and branches.



b. Small needle like leaves prevent the loss of water in windy condition which help the mountain tree to survive in winter when the soil water is frozen in the form of ice and not available to the roots

c. Needle like leaves have a thick waxy layer to reduce the loss of water through transpiration

### **Adaptations in Animals in climate: -**

#### **Extreme cold conditions**

a. **Yak** : long hair on their body to protect them from cold by keeping them warm.



b. **Mountain Goat** :

- Long hair to protect it from cold
- Strong hooves for running up the rocky slopes of mountains for grazing.

c. **Snow Leopard** :

- Thick fur to protect it from cold.
- Thick layer of fat beneath its skin for insulation to protect it from cold.
- Rounded body and small ears to reduce the heat loss from the body.

**Forests or Grasslands:** Area of land with trees and covered mainly plants.

#### **Adaptation in Lion**

- Long, strong and sharp claws in its front legs to catch its prey.
- The lion has eyes in front of its head which enable it to have a correct idea of the location of its prey. This helps in catching the prey.
- 3. Lion is light brown in colour. The light brown colour helps the lion



to hide in dry grasslands [without being noticed] when it hunts for prey.

### **Adaptation in Deer**

- The deer has eyes on the sides of its head which enable it to see in all directions at the same time.
- Big ears for good hearing to hear the movement of predators.
- Deer is fast and agile animal. The speed of deer helps it to run away from the predators which try to catch it.
- The brown colour of deer helps it to hide in dry grassland without being noticed by lion.
- The deer has strong teeth for chewing hard plant stems of the forests.

### **Aquatic Habitat-**

Important aquatic habitat are:

i) Oceans

ii) Ponds

#### **A. Sea animals:**

1. Sea animals have streamlined bodies to help them move in sea water.
2. Most of the sea animals have gills which enable them to use oxygen dissolved in water for breathing whereas Dolphins and whales breathe in air through nostrils which are located on the upper parts of their heads.

#### **B. Aquatic plants:**



-Aquatic plants have very short and small roots whose main function is to hold the plant in place.

-The stems of aquatic plants are soft, hollow and light having large spaces.

-The submerged aquatic plants have narrow and ribbon like leaves which bend in the flowing water of rivers and streams and hence do not obstruct the flow of water

### C. Animals adapted to live in water and on land:

- Frogs are adapted to live in water as well as on land
- Frogs have webbed back feet which help them to swim in water
- Frogs have strong back legs for hopping and catching their prey.

### Adaptations in Birds

1. Birds have a streamlined body that is covered with feathers. The forelimbs of the birds are well-developed and modified into wings for flying.
2. The body shape of the birds reduces resistance to air during flight.
3. Birds have a beak instead of a mouth. Beaks are used for eating, killing the prey, feeding the young one, etc.



Kingfisher  
Aerial Fishing



Pelican  
Dip Netting



Woodpecker  
Chiseling



Chicken  
Grain Eating



Toucan  
Fruit Eating



Parrot  
Coniferous Seed Eating



Hummingbird  
Nectar Feeding



Black Skimmer  
Surface Skimming



Eagle  
Raptorial



Duck  
Water Foraging



Ibis  
Mud Foraging



Heron  
Pursuit Fishing

4. Birds breathe or respire through their lungs. There is the presence of air sacs that aids in double respiration.

5. They have pneumatic bones that contain air cavities and thus are hollow and light. These bones reduce the bodyweight of the birds.



6. Bird's tail helps in the control of direction and movements.
7. Birds have strong and well-developed chest muscles that help withstand the air pressure while flapping the wings during flight.
8. They have binocular vision - they can see one object with one eye and another object with another eye.
9. Some of the birds have webbed feet that aids in swimming.



10. Most birds can fly, but some of the birds cannot fly - flightless birds.

### Practice Questions

1. In Cactus plants found in desert regions, the photosynthesis occurs in-
  - (a) leaves
  - (b) spines
  - (c) modified roots
  - (d) modified stems
2. An animal having a streamlined and slippery body in the habitat of the animals-
  - (a) water
  - (b) grassland
  - (c) Desert
  - (d) mountain
3. Following are some features of plants.
  - (i) They lose a lot of water through transpiration.
  - (ii) Their leaves are always broad and flat.
  - (iii) They lose very little water through transpiration.



(iv) Their roots grow very deep into the soil.

Which of the combination of the above features are typical of desert plants?

- (a) (i) and (ii)
- (b) (ii) and (iv)
- (c) (ii) and (iii)
- (d) (iii) and (iv)

4. Camels have long legs which help to-

- (a) run long distances
- (b) keep their body away from the heat of the desert
- (c) carry a lot of luggage
- (d) be able to run in the sand.

5. The animals such as birds have-

- (a) light pneumatic bones
- (b) solid heavy bones
- (c) heavy pointed bones
- (d) none of these

### Answer Key

1.d

2.a

3.d

4.b

5.a

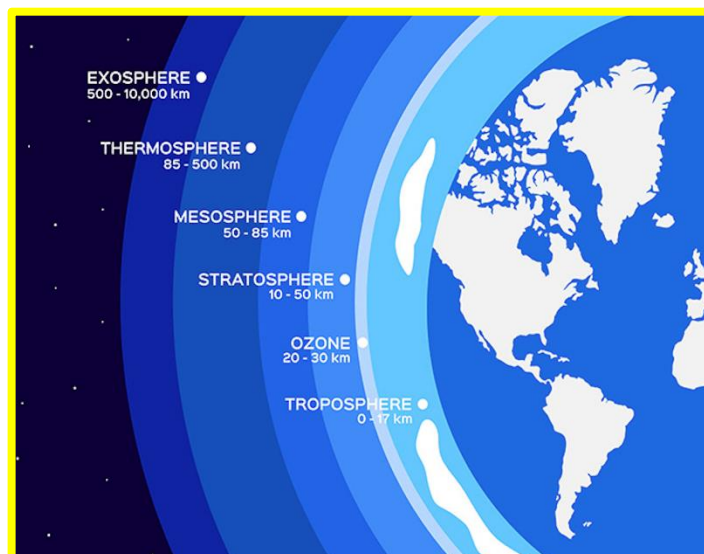
### OZONE LAYER DEPLETION

#### OZONE

Ozone is a gas composed of three atoms of oxygen. Ozone occurs both in the Earth's upper atmosphere and at ground level. Ozone can be good or bad, depending on where it is found. Ozone at ground level is a harmful air pollutant, because of its effects on people and the environment. Ozone layer in the upper level of atmosphere is good for us as it makes a protective layer.

#### OZONE LAYER

The ozone layer is the layer present in the Stratosphere. It absorbs the harmful ultraviolet rays that come from the sun. The ozone layer absorbs over 97 to 99 per cent of the Sun's medium-frequency ultraviolet radiations. The famous French physicists Charles Fabry and Henri Buisson in 1913 discovered the ozone layer.

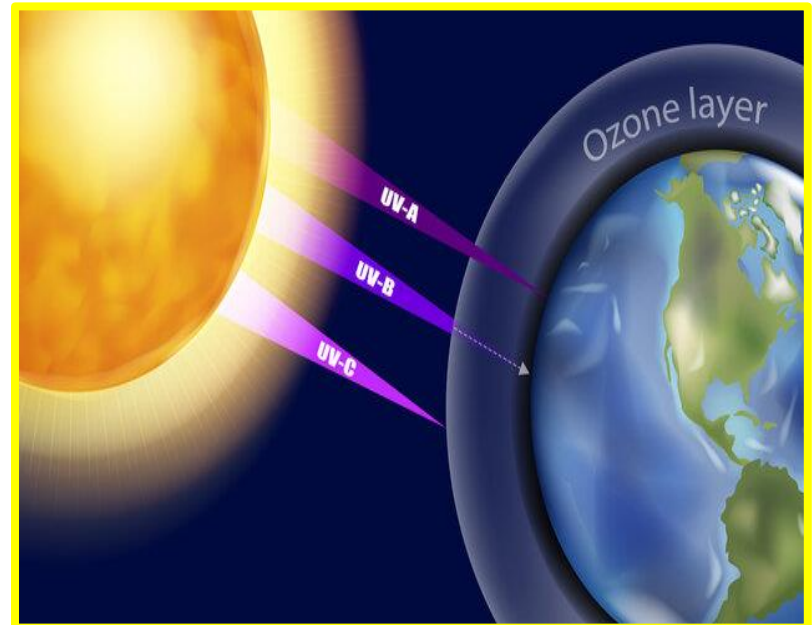


The ozone layer is basically present in the lower stratosphere that is near about 20 to 35 kilometres above the earth. The ozone layers thickness differs across the world and is usually thin near the equators and thick near the poles. Moreover, the thickness of the ozone layer may differ depending upon the seasonal and geographical changes.

### **IMPORTANCE OF OZONE LAYER**

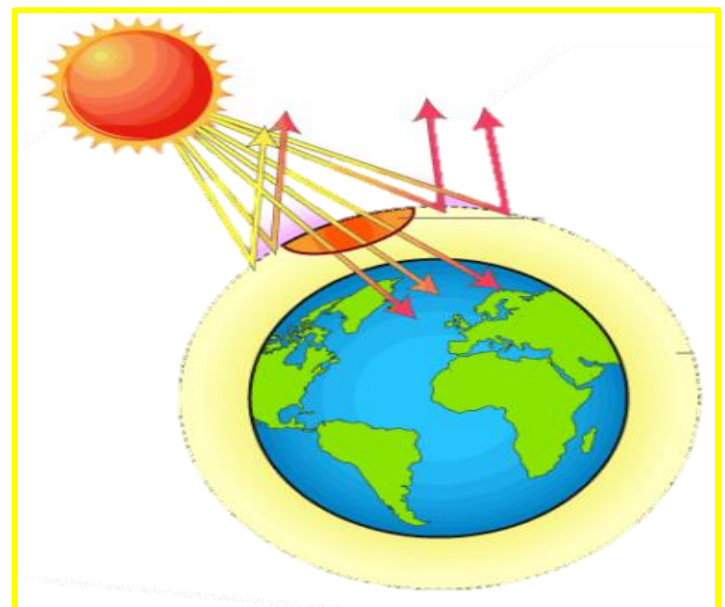
The ozone layer is important for the earth because it protects the earth from the harmful ultraviolet radiation. This radiation comes from the sun and is harmful to the earth's surface.

The flora and the fauna would not be able to survive if the earth will be directly affected by the harmful ultraviolet rays. Moreover, humans and animals on earth will face a lot of problems because of excess heating. The ozone layer in the stratosphere absorbs a portion of the radiation from the sun, preventing it from reaching the planet's surface. Most importantly, it absorbs the portion of UV light called UVB. UVB has been linked melanoma skin cancer, which is the most serious type of skin cancer forming in cells. It can also cause cataracts, which is an eye disease that clouds the eye lens. UVB rays can have an impact on plants. Which, of course, produces most of our oxygen.



### **Ozone Layer Depletion**

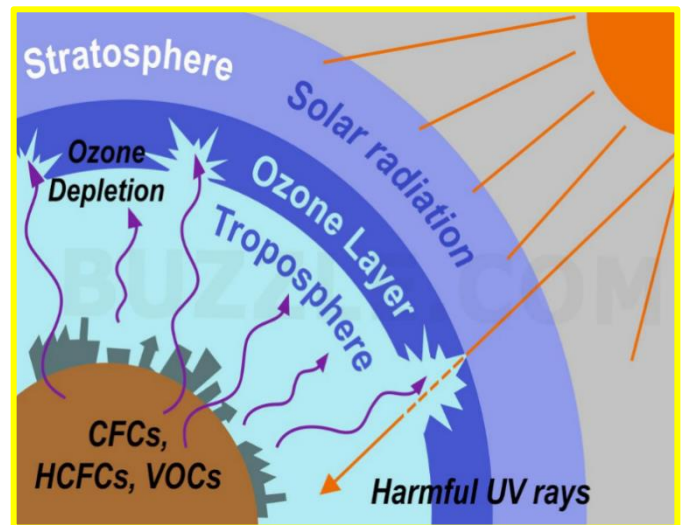
The ozone layer depletion was observed by the researchers in the early 1970s. Ozone layer depletion is the gradual thinning of the earth's ozone layer in the upper atmosphere (what is sometimes called a "hole in the ozone.") caused due to the release of chemical compounds containing gaseous bromine or chlorine from industries or other human activities. The **Dobson unit** is used to measure the amount of ozone in the atmosphere. The average amount of ozone is about 300 Dobson unit which means 3mm thick ozone.



## Causes of Ozone Layer Depletion

Ozone layer depletion is the thinning of the ozone layer present in the upper atmosphere. This happens when the chlorine and bromine atoms in the atmosphere come in contact with ozone and destroy the ozone molecules. One chlorine can destroy 100,000 molecules of ozone. It is destroyed more quickly than it is created. Human activities are the main cause of the depletion of the ozone layer. It occurs due to the excessive use of the man-made chemicals that are bromine and chlorine which release from the man-made compounds such as

- **Chlorofluorocarbons (CFCs)**
- **Halon (used in fire extinguishers)**
- **Methyl chloroform (used as spot cleaner)**
- **Carbon tetrachloride**
- **HCFCs (hydro-chlorofluorocarbons)**
- **Methyl bromide**



Some compounds release chlorine and bromine on exposure to high ultraviolet light, which then contributes to ozone layer depletion. Such compounds are known as **Ozone Depleting Substances (ODS)**.

These ozone depletion substances float and then reach the stratosphere. Therefore, the formation of chlorine and bromine takes place and these chemicals cause the depletion of the ozone layer at a very high speed.

They are capable of breaking down the molecules of the ozone layer. One chlorine molecule has a capacity to breakdown thousands of molecules present in the ozone layer; therefore, it results in the depletion of the ozone layer.

## Natural Causes of Depletion of the Ozone Layer

It is found that the ozone layer gets affected by some natural causes that are sun-spots and stratospheric winds. However, these cause a very nominal contribution to the ozone layer depletion which is near about 1 to 2 percent and therefore these effects are temporary. Some major volcanic eruptions have also contributed to the depletion of the ozone layer.

## Solutions to Ozone Layer Depletion

- **Less use of Fuel**

By reducing the usage of the fuels and petroleum used in vehicles nowadays we can help in reducing the ozone layer depletion

- **Less use of pesticides**

Pesticides helps in growing your farms and plants but cause harm to the ozone layer and contribute to ozone layer depletion.

- **Limited use of harmful chemicals for cleaning**

the chemicals used for making cleaning products results in depletion of the ozone layer.

- **Maintain air conditioners**

As their malfunctions cause CFC to escape into the atmosphere.

### Practice Questions

**1. Ozone Layer consists of:**

- a.  $O_3$
- b.  $H_2O$
- c.  $NaCl$
- d.  $H_2SO_4$

**Ans.  $O_3$**

**2. in which layer of the Earth's atmosphere is the ozone layer found?**

- a. Troposphere
- b. Stratosphere
- c. Mesosphere
- d. Exosphere

**Ans. Stratosphere**

**3. what is the unit used to measure the quantity of ozone content in the atmosphere?**

- a. Einstein unit
- b. Poise
- c. Dobson unit
- d. Becquerel

**Ans. Dobson unit**

**4. Following are referred to as ozone-depleting substances (ODs).**

- a. CFCs
- b. HCFCs
- c. halons
- d. all of the above

**Ans. all of the above**

**5. "International Day for the Preservation of the Ozone Layer" or "World Ozone Day" is celebrated on**

- a. September 16
- b. September 18
- c. October 16
- d. October 18

**Ans. September 16**



# BLACK HOLE

## What is a black hole?

Black holes are one of the most mysterious and powerful forces in the universe. A black hole is a region in space where the pulling force of gravity is so strong that light is not able to escape. The strong gravity occurs because matter has been pressed into a tiny space. The mass of a black hole is so compact, or dense, that the force of gravity is too strong for even light to escape.



## Can we see them?



Black holes are truly invisible. We can't actually see black holes because they don't reflect light. Scientists know they exist by observing light and objects around black holes. Strange things happen around black holes to do with quantum physics and space time.

## How Big Are Black Holes?

Black holes can be big or small. Scientists think the smallest black holes are as small as just one atom. These black holes are very tiny but have the mass of a large mountain. Mass is the amount of matter, or "stuff," in an object.

The largest black holes are called "**supermassive**." These black holes have masses that are more than 1 million suns together. Scientists have found proof that every large galaxy contains a supermassive black hole at its centre. The supermassive black hole at the centre of the Milky Way galaxy is called Sagittarius A. It has a mass equal to about 4 million suns and would fit inside a very large ball that could hold a few million Earths.

Another kind of black hole is called "**stellar**." Its mass can be up to 20 times more than the mass of the sun. There may be many, many stellar mass black holes in Earth's galaxy. Earth's galaxy is called the Milky Way.

### How are they formed?

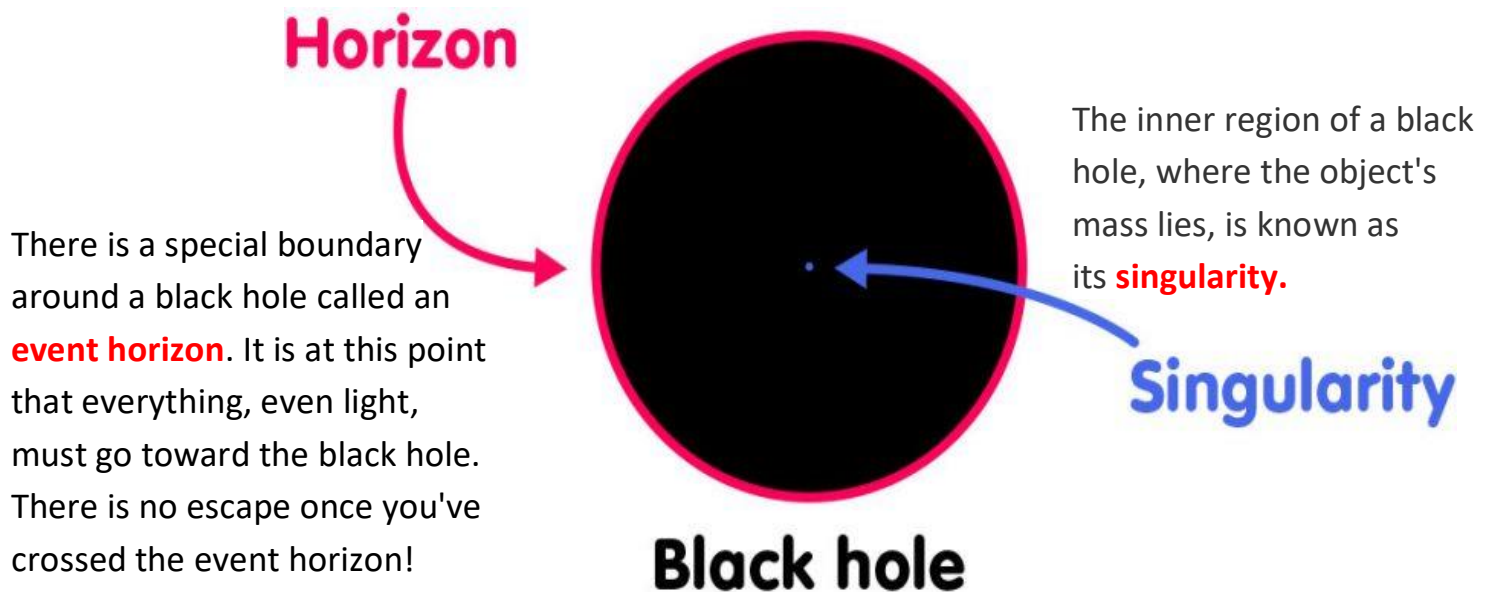
Black holes are formed when giant stars explode at the end of their lifecycle. This explosion is called a supernova. If the star has enough mass, it will collapse on itself down to a very small size. Due to its small size and enormous mass, the gravity will be so strong it will absorb light and become a black hole. Black holes can grow incredibly huge as they continue to absorb light and mass around them. They can even absorb other stars. Many scientists think that there are super-massive black holes at the center of galaxies.

### Structure of a black hole

There are two basic parts to a black hole:

❖ **THE SINGULARITY**

❖ **THE EVENT HORIZON.**



### Facts about black holes

- ✓ Albert Einstein first predicted the existence of black holes in 1916, with his general theory of relativity. The term "black hole" was coined many years later in 1967 by American astronomer John Wheeler.
- ✓ The first black hole ever discovered was Cygnus X-1, located within the Milky Way in the constellation of Cygnus, the Swan.
- ✓ The closest black hole to Earth is dubbed "The Unicorn" and is situated approximately 1,500 light-years away.

- ✓ Astronomers estimate that the Milky Way has anywhere from 10 million to 1 billion stellar black holes, with masses roughly three times that of the sun.
- ✓ Black holes can have the mass of several million suns.
- ✓ They don't live forever, but slowly evaporate returning their energy to the universe.
- ✓ Black holes differ from each other in mass and their spin. Other than that, they are all very similar.
- ✓ The black holes we know about tend to fit into two size categories: "stellar" size is around the mass of one star while "supermassive" are the mass of several millions of stars. The big ones are located at the centres of large galaxies.

### **Practice Questions**

1. What powerful force allows black holes to absorb light?
  - a. nuclear fusion
  - b. Electromagnetism
  - c. Gravity
  - d. Nuclear bonding

**Ans.** Gravity

2. How do scientists know that black holes exist?
  - a. By running experiments on the Sun
  - b. By observing objects and light around black holes
  - c. By viewing black holes with powerful telescopes
  - d. All of the above

**Ans.** By observing objects and light around black holes

3. How do black holes form?
  - a. When planets collide
  - b. When nuclear bombs explode
  - c. When comets strike planets
  - d. When giant stars explode

**Ans.** When giant stars explode

4. Where do super massive black holes likely exist?
  - a. At the center of the Solar System
  - b. Inside gas giant planets
  - c. At the center of galaxies
  - d. All of the above

**Ans.** At the center of galaxies

5. True or False: Black holes are invisible because they don't reflect light.
  - a. TRUE
  - b. FALSE

**Ans.** TRUE

## Environment Global Warming

**Environment:** The environment has been derived from French word “environner”, which means “to surround” or “encircle”. It is further developed from the Old French word “envirun” which had a similar meaning .The English word “environment” means natural world that surrounds us.

**Components of the Environment:** The environment consists of both natural (BIOTIC) and human-made components (ABIOTIC). The natural components include forests, oceans, rivers, mountains, and wildlife. Human-made components include buildings, roads, factories, and cities. It is essential to maintain a balance between these components to ensure the sustainability of the environment.

**Global warming:** It refers to the long-term increase in Earth's average surface temperature due to human activities and natural processes. It is a significant aspect of climate change, which refers to broader changes in Earth's climate patterns, including temperature, precipitation, and weather events. The primary cause of global warming is the enhanced greenhouse effect, which results from the increased concentration of greenhouse gases in the Earth's atmosphere.

**Greenhouse gases:** Gases such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and fluorinated gases, act like a blanket, trapping heat from the sun that would otherwise radiate back into space. This trapped heat warms the planet, leading to an increase in global temperatures.

The major human activities contributing to the rise in greenhouse gases and, consequently, global warming include:

- **Burning of fossil fuels:** The combustion of fossil fuels like coal, oil and natural gas for electricity generation, transportation etc. releases large amount of carbon dioxide into the atmosphere.
- **Industrial processes:** Certain industrial activities release other greenhouse gases, such as methane and nitrous oxide, contributing to the greenhouse effect.
- **Deforestation:** The cutting down of forests reduces the number of trees that can absorb carbon dioxide from the atmosphere through photosynthesis. Trees act as carbon sinks, and their removal results in higher CO<sub>2</sub> levels.

### **Consequences of Global Warming :**

**Rising temperature :** Global warming leads to an increase in average temperatures worldwide, affecting weather patterns, seasons, and ecosystems



**Melting of glaciers and ice caps:** Warming temperatures cause glaciers and ice caps to melt, contributing to rising sea levels, which can lead to coastal flooding and the loss of habitat for various species.

**Extreme Weather Events:** Global warming intensifies extreme weather events, such as hurricanes, droughts, heatwaves, and heavy rainfall, leading to more frequent and severe natural disasters

**Impact on ecosystem :** Many plant and animal species face challenges in adapting to the changing climate, which can lead to disruptions in ecosystems and loss of biodiversity

**Ocean Acidification:** The absorption of excess atmospheric carbon dioxide by the oceans leads to ocean acidification, which negatively impacts marine life, particularly organisms with calcium carbonate shells and skeletons

**Addressing global warming:** It requires collective efforts at the individual, community, national, and international levels. Key actions include:

1. Reducing Greenhouse Gas Emission: Transitioning to clean and renewable energy sources, improving energy efficiency, and promoting sustainable practices are essential to reduce greenhouse gas emissions
2. Conserving Forest : Protecting and restoring forests help absorb carbon dioxide from the atmosphere, mitigating the effects of global warming
3. Promoting Sustainable Practices: Encouraging eco-friendly lifestyles, sustainable agriculture, and responsible consumption can reduce our carbon footprint
4. International Cooperation: Global efforts, such as international agreements like the Paris Agreement, are crucial in coordinating actions and commitments to combat climate change on a worldwide scale

### Practice Questions

Question: Which of the following gas is primarily responsible for Global Warming ?

- A) Nitrogen (N<sub>2</sub>)
- B) Oxygen (O<sub>2</sub>)
- C) Carbon Dioxide (CO<sub>2</sub>)
- D) Hydrogen (H<sub>2</sub>)

Answer: C) Carbon Dioxide (CO<sub>2</sub>)

Question: Which of the following is an example of renewable natural resources

- A) Oil
- B) Solar Energy
- C) Coal
- D) Natural Gas

Answer: B) Solar Energy

Question: Which of the following activities is a major cause of deforestation and contributes to the loss of biodiversity?

- A) Planting more trees
- B) Recycling paper and plastic
- C) Building wildlife sanctuaries
- D) Clearing land for agriculture and logging

Answer:

- D) Clearing land for agriculture and logging

Question: Which of the following actions helps in conserving water and protecting the environment?

- A) Leaving the tap running while brushing teeth
- B) Taking long showers every day
- C) Fixing leaky faucets promptly
- D) Using a hose to wash the driveway

Answer:

- C) Fixing leaky faucets promptly

Question: Which of the following is a biotic component of the environment?

- A) Sunlight
- B) Air
- C) Trees
- D) Soil

Answer:

- C) Trees

### Recent Developments In Science And Technology

#### **1. ENCELADUS**

One of Saturn's moons is Enceladus. waters, or sub-surface waters, have just been shown to exist beneath the moon's frozen surface, according to experts. The research team found that dissolved phosphorous, a vital component of life, should be rather abundant in this ocean. These discoveries were obtained using data collected by the Cassini spacecraft, which spent almost 13 years orbiting Saturn

#### **2. DART (Double Asteroid Redirection Test)**

DART was launched by USA on 23 November 2021.

DART aims to test planetary defence systems against near-Earth objects during a NASA space mission. Recently, NASA intentionally destroyed a spacecraft by crashing it with an asteroid, changing the motion of a celestial body for the first time. According to NASA, it was successful in ejecting the rocky asteroid from its original orbit.

### **3.INCOVACC**

iNCOVACC is the world's first made-in-India intranasal (through nose) Covid-19 vaccine. On the occasion of the 74th Republic Day, Bharat Biotech's product was launched Union Health Minister Mansukh Mandaviya . iNCOVACC was approved by the Drugs Controller General of India (DCGI) in November for limited emergency use as a heterologous booster dose in adults.

### **4.VIHANGAM**

The Aviation Ministry gave the Central Mine Planning and Design Institute (CMPDI) permission to employ drone technology in India's coal fields in 2021. Drones have lately been used in the Mahanadi coal fields in Odisha, which are under the control of the coal ministry, as per the directive. The portal and drone system have been given the names VIHANGAM.

### **5. SUPER BUG**

Superbugs are specific microorganisms, such as bacteria, viruses, fungi, or parasites, that are resistant to antibiotics. In the future, superbugs may become a significant cause of death, according to a recent UN Environment Programme (UNEP) research. These microorganisms may develop antibiotic resistance due to overuse of antibiotics in animal agriculture and pharmaceutical industry contamination.

### **6. MOON**

With the addition of 12 new moons, there are now a record-breaking 92 moons known to exist around Jupiter. In our solar system, no other planet has more than that. With 83 verified moons, Saturn, the previous leader, comes in second place. According to Scott Sheppard of the Carnegie Institution, who was on the team, the Jupiter moons have lately been added to a list maintained by the Minor Planet Centre of the International Astronomical Union. They were found in 2021 and 2022 with the aid of telescopes in Chile and Hawaii, and subsequent observations confirmed their orbits.

### **7. BLUE HOLE**

The coastal regions are home to enormous underwater sinkholes or caverns known as "blue holes." Off the shore of Mexico's Yucatan Peninsula, the second-deepest blue hole has recently been found. The South China Sea's Dragon Hole, which is only one deeper than the new blue hole at roughly 900 feet, is the only other one.



## 8. CHIRAL BOSE-LIQUID STATE

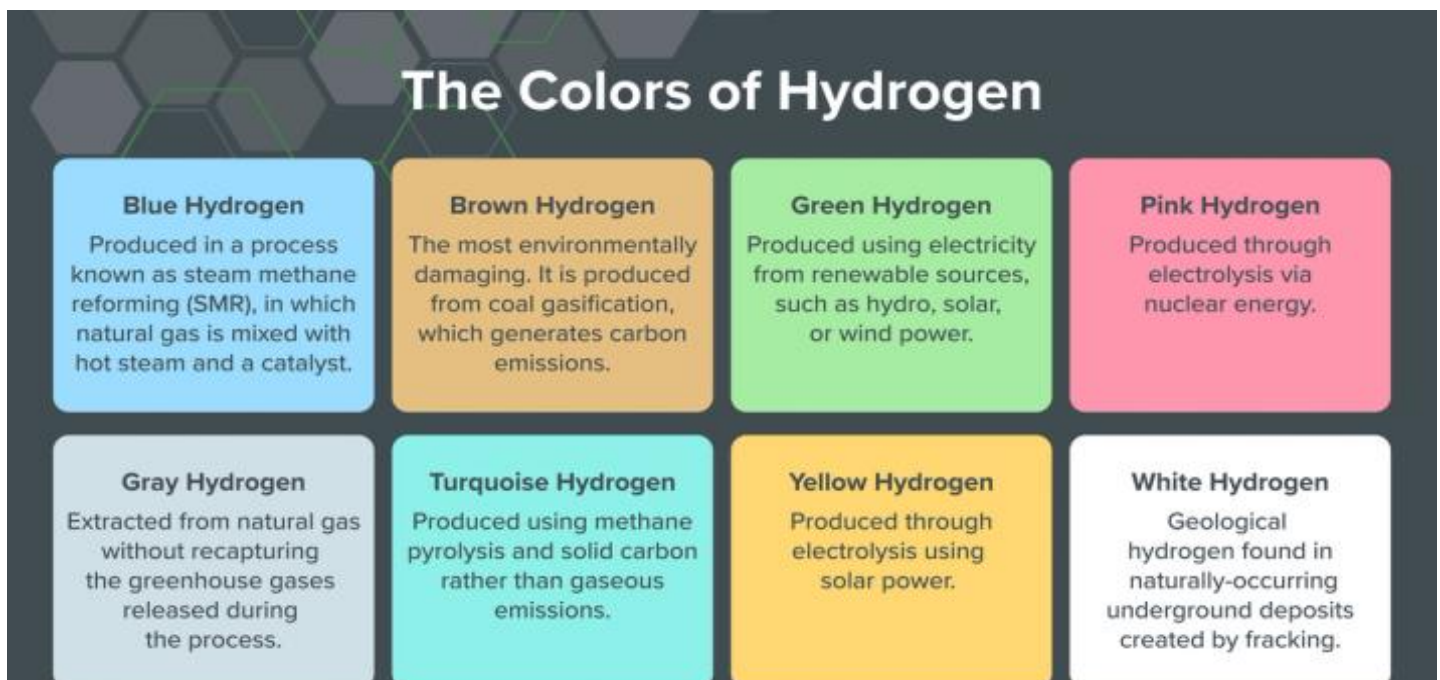
The chiral bose-liquid state, according to physicists from the US and China, is a completely new state of matter. The so-called quantum states of matter, which occur at very low temperatures or at the atomic level, allow objects to behave differently from their conventional solid, liquid, and gaseous states.

## 9. Ornithine transcarbamylase (OTC)

OTC is Ammonia builds up in the blood as a result of the uncommon hereditary condition ornithine transcarbamylase (OTC) deficiency.

When symptoms start to appear soon after birth, it is more severe and more common in boys than in girls. According to research, protein drinks may cause this condition to develop

## 10. PINK HYDROGEN



Pink hydrogen is the name given to the carbon-free hydrogen generated by a nuclear power plant. Additionally, pink hydrogen can be produced through electrolysis using electricity from nuclear power reactors. For the purpose of producing green hydrogen, a wind or solar farm will provide the electrolyzers and the electricity.

### Practice Questions

1. Which substance, according to recent study, causes "Ornithine transcarbamylase (OTC) deficiency"?

- a. Protein drink
- b. Carbonated drink
- c. soda drink
- d. Meals high in carbohydrates

2. What is the name of new state of matter?

- a. solid
- b. liquid
- c. gas
- d. chiral bose-liquid state

3. Which is the deepest Blue Hole in the world?

- a. Pink Hole
- b. South China Sea's Dragon Hole
- c. Mexico's Yucatan Peninsula
- d. Deccan Plateau

4. What is the fullform of UNEP?

- a. UN Environment Programme
- b. United nation education policy
- c. Unknown elements and particles
- d. None of these

5. How many Moon Saturn has?

- a. 34
- b. 83
- c. 76
- d. 90

### Answer Key

1-a	2-d	3-b	4-a	5-b
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# General Knowledge

## Abbreviations and Acronyms

<u>Sl.</u>	<u>Short form</u>	<u>Full form</u>
1.	<b>AICTE</b>	All India Council Of Technical Education.
2.	<b>ASEAN</b>	Association Of South East Asian Nations.
3.	<b>BARC</b>	Bhabha Atomic Research Centre.
4.	<b>BHEL</b>	Bharat Heavy Electricals Ltd.
5.	<b>BIMSTEC</b>	Bangladesh, India, Myanmar, Srilanka, Thailand Economic Cooperation
6.	<b>CAG</b>	Comptroller and Auditor General Of India.
7.	<b>CBDT</b>	Central Board Of Direct Taxes.
8.	<b>DNA</b>	Deoxyribo-nucliec Acid
9.	<b>DTP</b>	Desktop Publishing
10.	<b>FIR</b>	First Information Report
11.	<b>GATE</b>	Graduate Aptitude Test in Engineering
12.	<b>GSLV</b>	Geo-Synchronous Satellite Launch Vehicle
13.	<b>GSM</b>	Global System for Mobile Communications
14.	<b>IPC</b>	Indian Penal Code
15.	<b>LASER</b>	Light Amplification by Stimulated Emmission of Radiation
16.	<b>NABARD</b>	National Bank for Agriculture and Rural Development.
17.	<b>NATO</b>	North Atlantic Treaty Organization.
18.	<b>ONGC</b>	Oil and Natural Gas Corporation.
19.	<b>SEBI</b>	Securities and Exchange Board of India.
20.	<b>WWW</b>	World Wide Web

## Books and Authors

<u>Sl.</u>	<u>Book</u>	<u>Author</u>
1.	<b>Akbarnama</b>	AbulFazal
2.	<b>Chitra</b>	RabindraNath Tagore

3.	<b>Gitanjali</b>	RabindraNath Tagore
4.	<b>Godan</b>	Prem Chand
5.	<b>Guide</b>	R K Narayan
6.	<b>Hamlet</b>	William Shakespare
7.	<b>Harvest</b>	ManjulaPadmanabhan
8.	<b>Jungle Book</b>	Rudyard Kipling
9.	<b>Saket</b>	Maithili Sharan Gupta
10.	<b>The Dairy of a Young Girl</b>	Anne Frank

### Important dates and days

<u>Sl.</u>	<u>Date</u>	<u>Event</u>
1.	30 January	Martyr's Day
2.	22 March	World Day for Water
3.	7 April	World Health Day
4.	22 April	Earth Day
5.	11 July	World Population Day
6.	29 August	National Sports Day
7.	15 September	Engineer's Day
8.	27 September	World Tourism Day
9.	9 October	World Post Day
10	16 October	World Food Day

### Important awards and honors.

<u>Sl.</u>	<u>Awards</u>	<u>Concerned Field</u>
1.	<b>Bhartaiya Jnanpith Award</b>	Literary Award for Indian Languages
2.	<b>Sahitya Akademi Award</b>	Outstanding Literary Contribution
3.	<b>Saraswati Samman</b>	Outstanding Literary Contribution
4.	<b>Kalinga Prize</b>	Popularising Science
5.	<b>Dada Saheb Phalke Award</b>	Film

6.	<b>Tulsi Samman</b>	Traditional and folk arts.
7.	<b>Arjuna Award</b>	Sports
8.	<b>Dronacharya Award</b>	Coaches to different games
9.	<b>Booker Prize</b>	Novels in English
10	<b>Roman Magsaysay Award</b>	Outstanding Contribution to Public Services.
11.	<b>Bharat Ratna</b>	Highest Civilian Award
12.	<b>Padma Awards</b>	Civilian Award
13.	<b>Param Vir Chakra</b>	India's Highest Military honour
14.	<b>Ashoka Chakra</b>	Peace Time military decoration award
15.	<b>Shaurya Chakra</b>	Third most prestigious peace time award
16.	<b>Kirti Chakra</b>	Second highest peace time gallantry award
17.	<b>Maha Vir Chakra</b>	War time award

## Scientific Instruments and Uses

<u>Sl.</u>	<u>Instruments</u>	<u>Uses</u>
1.	<b>Altimeter</b>	In aircraft to measure altitude.
2.	<b>Ammeter</b>	Electric current.
3.	<b>Audiometer</b>	Intensity of sound
4.	<b>Barometer</b>	Atmospheric pressure
5.	<b>Cardiogram</b>	Tracing movement of heart
6.	<b>Dynamo</b>	Mechanical energy to electrical energy
7.	<b>Galvanometer</b>	Small current
8.	<b>Hydrometer</b>	Specific gravity of liquids
9.	<b>Lactometer</b>	Purity of milk
10	<b>Odometer</b>	Electric or mechanical vibrations
11.	<b>Rain gauge</b>	Rainfall at a place
12.	<b>Stethoscope</b>	Movements and condition of heart and lungs.
13.	<b>Telescope</b>	To view distant objects.
14	<b>Transformer</b>	High voltage to low voltage and vice-versa.
15.	<b>Xylophone</b>	Musical instruments with tuned wooden bars.



## Union Territories of India

S.No.	Name of Union Territory
1	Ladakh
2	Jammu & Kashmir
3	Puducherry
4	Lakshadweep
5	Delhi
6	Chandigarh
7	Dadra and Nagar Haveli
8	Daman and Diu
9	Andaman and Nicobar Islands

## States of India

S. No.	States	Capital
1	Andhra Pradesh	Amaravati
2	Arunachal Pradesh	Itanagar
3	Assam	Dispur
4	Bihar	Patna
5	Chhattisgarh	Raipur
6	Goa	Panaji
7	Gujarat	Gandhinagar
8	Haryana	Chandigarh
9	Himachal Pradesh	Shimla
10	Jharkhand	Ranchi
11	Karnataka	Bengaluru
12	Kerala	Trivandrum
13	Madhya Pradesh	Bhopal
14	Maharashtra	Mumbai
15	Manipur	Imphal
16	Meghalaya	Shillong
17	Mizoram	Aizawl

18	Nagaland	Kohima
19	Odisha	Bhubneshwar
20	Punjab	Chandigarh
21	Rajasthan	Jaipur
22	Sikkim	Gangtok
23	Tamil Nadu	Chennai
24	Telangana	Hyderabad
25	Tripura	Agartala
26	Uttar Pradesh	Lucknow
27	Uttarakhand	Dehradun
28	West Bengal	Kolkata

### Important rivers in India

S. No.	Name of rivers	Touching States	Origin
1	Ganga	Uttrakhand, Uttar Pradesh, Bihar, Jharkhand, West Bengal.	Gangothri
2	Yamuna	Uttrakhand, Himachal Pradesh, Uttar Pradesh, Haryana, Delhi.	Garhwal in Yamunotri
3	Brahmaputra	Assam, Arunachal Pradesh, Tibet.	Lake Mansarovar
4	Mahanadi	Chhattisgarh, Odisha.	Amarkantak Plateau
5	Godavari	Maharashtra, Telangana, Chhattisgarh, Andra Pradesh, Puducherry.	Nasik Hills
6	Krishna	Maharashtra, Karnataka, Telangana, Andhra Pradesh.	Near Mahabaleshwar in Maharashtra
7	Narmada	Madhya Pradesh, Maharashtra, Gujarat.	Amarkantak Hills in Madhya Pradesh
8	Tapti	Madhya Pradesh, Maharashtra, Gujarat.	Bettul
9	Gomati	Uttar Pradesh, Gujarat.	Gomat Taal
10	Koshi	Bihar	Ganga

## Historical Monuments of India

Sr. No.	Name of the Monument	State in which it is
1	Shalimar Garden	Jammu & Kashmir
2	Ajanta and Ellora Caves	Maharashtra
3	Victoria Memorial	Kolkata
4	Gateway of India	Maharashtra
5	City Palace	Udaipur,Rajasthan
6	Amber Fort	Jaipur, Rajasthan
7	Laxmi Vilas Palace	Vadodara, Gujarat
8	Mehrangarh Fort	Jodhpur, Rajasthan
9	Howrah Bridge	Kolkata, West Bengak
11	Nalanda University	Nalanda,Bihar
12	Shaniwar Wada	Pune, Maharashtra
13	Bara Imambara	Lucknow, Uttar Pradesh
14	Bastar Palace	Bastar,Chhattisgarh
15	Bhoramdeo Temple	Chhattisgarh

### Practice Questions

Q.1. Who was the first woman Governer of India?

- (a) Mrs. Sarojini Naidu (b) Mrs. Sonia Gandhi  
(c) Mrs. Pratibha Patil (d) Mrs. Droupadi Murmu

Q.2. Origin of the river Brahmpitra is \_\_\_\_\_.

- (a) Bettul (b) Ganga  
(c) Nasik Hills (d) Lake Mansarovar

Q.3. Victoria Memorial is situated in \_\_\_\_\_

- (a)Delhi (b) Patna  
(c)Kolkata (d) Raipur

Q.4. Which is the famous folk dance of Gujarat?

(a) Panthi Dance

(b) Garba

(c) Bihu

(d) Kathak

Q.5. Which state is the smallest state in terms of area in India?

(a) Goa

(b) Bihar

(c) Maharashtra

(d) Rajasthan

Answer Key

1 - a	2 - d	3 - c	4 - b	5 - a
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