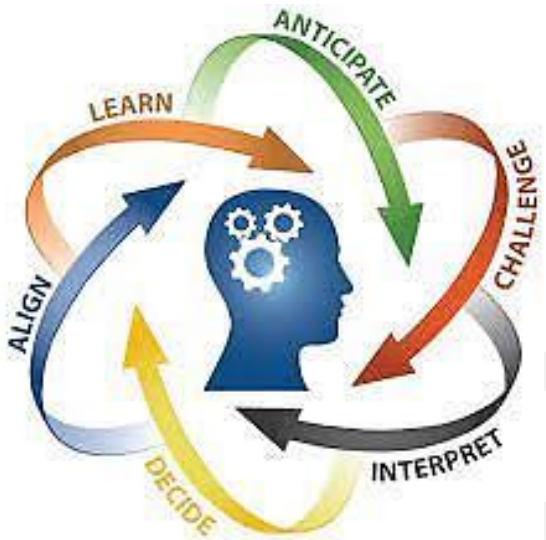

GENERAL APTITUDE

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Calendar

- In Non Leap year –
  - 365 days
  - 1 year = 52 weeks + 1 odd day(extra day)
  - 28th February
- In Leap year –
  - 366 days
  - 1 year = 52 weeks + 2 odd days
  - 29th February
- A **century leap year** is a **year** that is exactly divisible by 400
  - **years** 1600 and 2000 were **century leap years**; (400,800,1200,1600,2000 – century leap years till date)
  - **years** 1700, 1800, and 1900 were not **century leap years**.
- To find the day of a week on a given date we use the concept of "**odd days**".
- 01/01/0001 A.D(Anno Domini) was a Monday and 1st day of week so 1st January 0001 was a Monday.

Calendar

- In a century,
  - 24 leap year
  - 76 non leap years

100 years

Leap year → 24x2 = $\frac{48}{7}$ → 6

non leap year → 76 x 1 = $\frac{76}{7}$ → 6

remainder

6 + 6 = 12 ÷ 7 = 5 ← remainder

5 extra(odd) days in a century (100 years)

100 years = 5 odd days ← remainder

200 years = 10 ÷ 7 = 3 odd days

300 years = 15 ÷ 7 = 1 odd days

400 years = 0 odd days (as century leap year)

Calendar

Years	No. of odd
Ordinary year	1
Leap year	2
100 years	5
200 years	3
300 years	1
400 years	0

Calendar

Day of week	No. of odd
Sunday	0
Monday	1
Tuesday	2
Wednesday	3
Thursday	4
Friday	5
Saturday	6

Calendar

Month		Remainder
January	31 ÷ 7	3
February	28 ÷7 or 29 ÷ 7	0(non leap) or 1(leap)
March	31 ÷ 7	3
April	30 ÷ 7	2
May	31 ÷ 7	3
June	30 ÷ 7	2
July	31 ÷ 7	3
August	31 ÷ 7	3
September	30 ÷ 7	2
October	31 ÷ 7	3
November	30 ÷ 7	2
December	31 ÷ 7	3

Calendar

Q. What was the day of the week on 15th August, 1947?

Soln:

Completed till 1946

1946

$\frac{1900}{400}$ = 300 $\frac{46}{4}$ = 11(quotient)

1 odd day 46 + 11 = 57 $\frac{57}{7}$ = 1(remainder)

In 1946, odd days are,

1900 46

1 + 1 = 2 odd days

1946 month date

Total odd days = 2 + 2 + 1 = 5 odd days

As per table for days of a week , 5 ⟷ Friday

As month is August, go till July as per table,

J F M A M J J

3 + 0 + 3 + 2 + 3 + 2 + 3 = 16

Now, $\frac{16}{7}$ = 2 (remainder)

For date ,

$\frac{15}{7}$ = 1 (remainder)

Calendar

For Months -

J	F	M	A	M	J	J	A	S	O	N	D
0	3	3	6	1	4	6	2	5	0	3	5

For years -

1600 – 1699	6
1700 – 1799	4
1800 – 1899	2
1900 – 1999	0
2000 – 2099	6

Calendar

Q. What was the day of the week on 26th January, 1947?

Soln:

1. Last 2 digits of the year → 47
2. Divide by 4 (47 ÷ 4) = 11(quotient)
3. Take the date → 26
4. Take the no. of month → 0 (from table)
5. Take the no. of year → 0 (from table)

84 (add)

6. Divide by 7 → $\frac{84}{7}$ = 0 (remainder)

Check table for day of the week

0 ⟷ Sunday

Calendar

Q. What was the day of the week on 29th February, 2012?

Soln:

1. Last 2 digits of the year → 12
2. Divide by 4 (12 ÷ 4) = 03(quotient)
3. Take the date → 29
4. Take the no. of month → 03 (from table)
5. Take the no. of year → 06 (from table)

53 (add)

6. Divide by 7 → $\frac{53}{7}$ = 4 (remainder)

subtract 1 from remainder

In this case for all dates of **January & February** in a leap year , 4 -1 =3

Check table for day of the week

3 ⟷ Wednesday

Calendar

Q. Today is Monday. Which day will be on 61st day?

Soln:

1 week = 7 days. Taking the multiple of 7

56 - Monday	or	63 - Monday
57 – Tuesday		62 - Sunday
58 – Wednesday		61 - Saturday
59 – Thursday		
60 – Friday		
61 - Saturday		
56 + 5 = 61 days		63 – 61 = 2 days
(add 5 days)	or	(subtract 2 days)

Calendar

Q. What dates of May 2002 did Monday fall on?

Soln:

Lets take date = 1st May 2002

1. Last 2 digits of the year → 02
2. Divide by 4 (02 ÷ 4) = 00(quotient)
3. Take the date → 01
4. Take the no. of month → 01 (from table)
5. Take the no. of year → 06 (from table)

   10 (add)

6. Divide by 7 → $\frac{10}{7}$ = 3 (remainder)

Check table for day of the week

3 ⟷ Wednesday

1st May 2002 falls on Wednesday

1	2	3	4	5	6
W	Th	F	Sa	Su	M

↑ first Monday

Now add 7 to it to find remaining Mondays

Dates on which Monday falls are -
6 , 13 , 20, 27

Calendar

Q. If we have preserved the calendar of 2017. Find the next immediate year in which we can reuse.

A. 2027 B.2023 C. 2025 D. 2029

Soln:

x/4 (x = given year)

$\frac{2017}{4}$ = 1 (remainder)

For any year divide by 4, the possibility of remainder is 0,1,2,3

If remainder = 0 → x + 28

If remainder = 1 → x + 6

If remainder = 2/3 → x + 11

So, $\frac{2017}{4}$ = 1(remainder)

2017 + 6 = 2023 **Ans: B**

Calendar

Q. Which of the following days can never be the last day of a century?

A. Sunday B. Monday C. Tuesday D. Wednesday

- **Soln**:
- The last day of century can be only
- 1 odd day(Monday)
- 3 odd days (Wednesday)
- 5 odd days (Friday)
- 7 or 0 odd days (Sunday)
- So, century can never end in **Tuesday** , **Thursday** or **Saturday**.
- **Ans: C**

Calendar

- Q. The day on 5th April of a year will be the same day on 5th of which month of the same year?
- A. 5th July B. 5th August C. 5th June D. 5th October

- **Ans A**

- April & July for all years have the same calendar. So, a day on any date of April will be the same day on the corresponding date in July.
- The same day will fall on 5th July of the same year.

Calendar(Assignment)

Q. What was the day of the week on your birthdate?

Q. 13th October 2019 is a Sunday. Find the day on 13th October 1989?

A. Sunday B. Monday C. Friday D. Wednesday

Ans: C

Q. 1st March 2006 falls on a Wednesday .What day does 1st March 2010 fall on?

A. Tuesday B. Monday C. Friday D. Wednesday

Ans: B

Q. Today is Monday. Which day will be after 64 days?

A. Tuesday B. Monday C. Friday D. Wednesday

Ans: A

Q. Today is Monday. After 30 days it will be?

A. Tuesday B. Monday C. Friday D. Wednesday

B. Ans: D

Calendar(Assignment)

Q. 15th August 1947 was a Friday. Find the day on 15th August 1977?

- Soln:

  1977
- 1947
  ---
  30 years

Leap years between 1947 to 1977

1948	1964
1952	1968
1956	1972
1960	1976

8 years

30 + 8 = 38

total years leap

$\frac{38}{7}$ = 3 (remainder)

As 15th August 1947 was a Friday ,

So, Friday + 3 days = **Monday**

Calendar(Assignment)

Q. 4th January 2016 falls on Monday. What day of the week does 4th January 2017 lies?

A. Wednesday B. Thursday C. Tuesday D. Monday

Soln:

Normal year = 1 odd day

Leap year = 2 odd days

Jan 4, 2016 → Monday

\+ 2 (as leap year)

Jan 4,2017 → Wednesday

Ans: A

Calendar(Assignment)

Q. Wednesday falls on 5th of a month .So which day will fall 5 days after 22nd of the same month?

A. Tuesday B. Friday C. Thursday D. Wednesday

Ans: B

5th = Wednesday

+7

12th = Wednesday

+7

19th = Wednesday

22nd = Saturday

+5

27th = Thursday

5 days after 22nd will be **Friday**

Calendar(Assignment)

Q. On what dates of April, 2001 did Wednesday fall?

A. 1^{st}, 8^{th}, 15^{th}, 22^{nd}, 29^{th} B. 2^{nd}, 9^{th}, 16^{th}, 23^{rd}, 30^{th} C. 3^{rd}, 10^{th}, 17^{th}, 24^{th}

D. 4^{th}, 11^{th}, 18^{th}, 25^{th}

Ans: D

Calendar(Assignment)

Q. What is the day on 22 April 2222?

A. Monday B. Tuesday C. Saturday D. Sunday

Ans: A

Calendar(Assignment)

Which of the following is not a leap year?

A. 700 B. 800 C. 1200 D. 2000

Ans: A

The century divisible by 400 is a leap year.
The year 700 is not a leap year.

Calendar(Assignment)

It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

A. Sunday B. Saturday C. Friday D. Wednesday

Ans: C

On 31st December, 2005 it was Saturday.
Number of odd days from the year 2006 to the year 2009 = (1 + 1 + 2 + 1) = 5 days.
On 31st December 2009, it was Thursday.
on 1st Jan, 2010 it is Friday.

Calendar(Assignment)

Q. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?

A. Monday

B. Tuesday

C. Wednesday

D. Sunday

Ans: B

Permutation & Combination

- What is permutation?
- It is the number of ways a group of things can be arranged.

E.g: Consider 3 letters A,B,C . In how many ways they can be arranged?

- A B C
- A C B
- B A C
- B C A
- C A B
- C B A

6 ways to arrange these 3 letters

- For 3 letter / 4 letter words its possible but for more number of letters we need a formula-
- $nPr = \frac{n!}{(n-r)!}$

Permutation & Combination

Q. Consider 4 letters A,B,C,D and arrange them in 3 spaces

- - - 3 spaces

No . Of letters = 4

No of spaces = 3

nPr = $4P_3 = \frac{4!}{(4-3)!} = \frac{4!}{1!}$ =4! = 4 x 3 x 2 x 1 = 24 ways it can be arranged

Q. Arrange 7 letters A,B,C,D,E,F,G in 4 spaces

- - - - 4 spaces

nPr = $7P_4 = \frac{7!}{(7-4)!} = \frac{7!}{3!} = \frac{5040}{6}$ = 840

Permutation & Combination - Remember

0! = 1

1 ! = 1

2! = 2 x 1 = 2

3! = 3 x 2 x 1 = 6

4! = 4 x 3 x 2 x 1 = 24

5! = 5 x 4 x 3 x 2 x 1 = 120

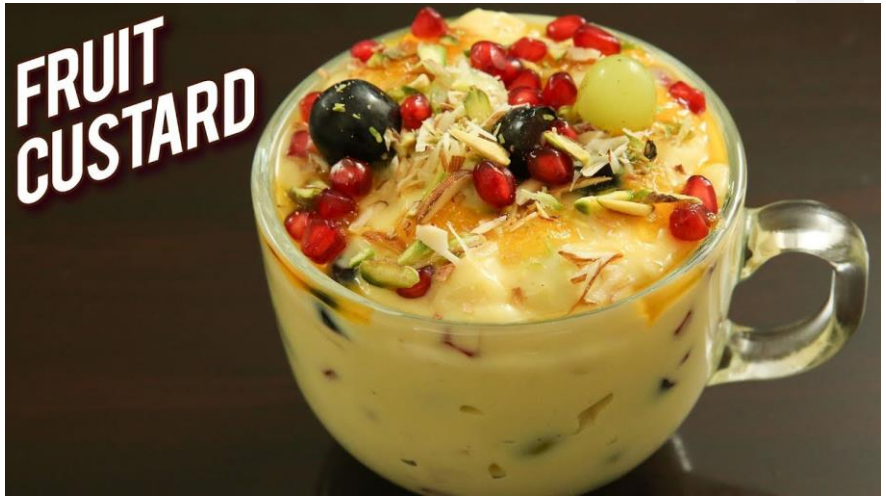
6! = 6 x 5 x 4 x 3 x 2 x 1 = 720

7! = 7 x 6 x 5 x 4 x 3 x 2 x 1 = 5040

Difference between permutation and combination

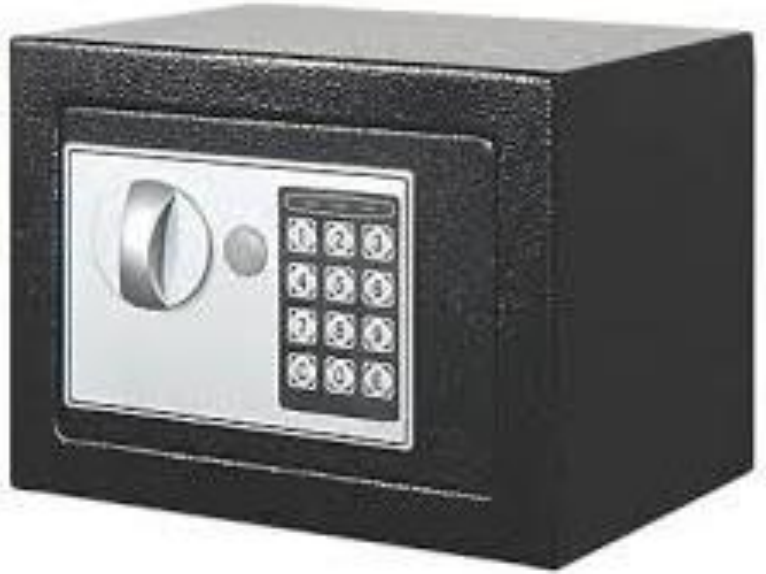
Combination (order does not matter)

"My fruit salad is a combination of apples, grapes and bananas" We don't care what order the fruits are in, they could also be "bananas, grapes and apples" or "grapes, apples and bananas", its the same fruit salad.



Permutation (When the order does matter)

"The combination to the safe is 472". Now we **do** care about the order. "724" won't work, nor will "247". It has to be exactly **4-7-2**.



Difference between permutation and combination

What is permutation?

Permutation: The various ways of arranging a given number of things by taking some or all at a time are all called as permutations.
Permutation includes word formation, number formation, circular permutation, etc. **In permutation, objects are to be arranged in particular order.** It is denoted by $^{n}P_{r}$ **or P(n, r).**

Example: Arrange the given 3 numbers 1, 2, 3 by taking two at a time.
Now these numbers can be arranged in 6 different ways: **(12, 21, 13, 31, 23, 32).**

Here,

12 and 21, 13 and 31 or 23 and 32 do not mean the same, because here order of numbers is important.

Difference between permutation and combination

- **What is combination?**

  Combination: Each of different groups or selections formed by taking some or all number of objects is called a combination.

  Combination is used in different cases which include team/group/committee.

  In combination, objects are selected randomly and here order of objects doesn't matter. It is denoted by $^{n}C_{r}$ **or C(n, r) or** $^{n}C_{r} = {}^{n}C_{(n-r)}$.

  Example: If we have to select two girls out of 3 girls X, Y, Z, then find the number of combinations possible.

  Now only two girls are to be selected and arranged. Hence, this is possible in 3 different ways: **(XY, YZ, XZ,).**

  Here,
  You cannot make a combination as XY and YX, because these combinations mean the same.

Permutation & Combination

Q. In how many ways can the letters of the word 'LEADER' be arranged?

A. 72 B. 144 C. 360 D. 720 E. None of these

Soln:

The word LEADER has 6 letters. So I can be arranged in 6! ways.

Out of these 6 letters , 2 letters are repeated (letter E repeated twice)

So we write it as - $\frac{6!}{2!}$

$6!$ → 6! ways to arrange letters in the word LEADER

$2!$ → 2! In the denominator as letter E is repeated twice

$$= \frac{6\times5\times4\times3\times2\times1}{2\times1}$$

= 360 ways

Ans : C

Permutation & Combination

Q. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?

A. 360 B. 480 C. 720 D. 5040 E. None of these

Soln:

L E A D I N G ⟶ vowels in this word are E,A I

Remaining letters(consonants) are - L D N G

now we can arrange the vowels together in the remaining spaces as

_ L _ D _ N _ G_ in 5! ways and vowels be rearranged in those spaces in 3! ways

5! X 3! = 720 ways

Ans : C

Permutation & Combination

Q. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?

A. 810 B. 1440 C. 2880 D. 50400 E. 5760

Soln:

C O R P O R A T I O N------- vowels in this word are O,O,A,I,O

Remaining letters(consonants) are - C R P R T N

now we can arrange the vowels together in the remaining spaces as

_C_R_P_R_T_N_ in 7! ways and vowels be rearranged in those spaces in 5! Ways

But the repeated letters are 2R in consonants and 3O in vowels

$$\frac{7!}{2!} X \frac{5!}{3!} = 50400 \text{ ways}$$

Ans : D

Permutation & Combination

Q. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

A. 210 B. 1050 C. 25200 D. 21400 E. None of these

Soln:

we need to form a 5letter word with 3consonants & 2vowels = C C C V V

Ways to select, (3 consonants out of 7) AND (2 vowels out of 4)

$= {}^{7}C_{3} \times {}^{4}C_{2} \times 5!$ ← each group has 5 letters and they can be arranged in 5! ways

$= \frac{7\times6\times5}{3\times2\times1} \times \frac{4\times3}{2\times1} \times 5!$

$= 35 \times 6 \times 120$

$= 25200$ ways

Ans : C

Permutation & Combination

Q. In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions?

A. 32 B. 48 C. 36 D. 60 E. 120

Ans: C

Permutation & Combination

Q. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?

A. 564 B. 645 C. 735 D. 756 E. None of these

Soln:

We may have (3 men and 2 women) or (4 men and 1 woman) or (5 men only).

Required number of ways= (7C3 x 6C2) + (7C4 x 6C1) + (7C5)

$$= \left(\frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{6 \times 5}{2 \times 1}\right) + (7C3 \times 6C1) + (7C2) \rightarrow [\text{using } {}^{n}C_{r} = {}^{n}C_{(n-r)}]$$

$$= 525 + \left(\frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{6}{1}\right) + \left(\frac{7 \times 6}{2 \times 1}\right)$$

$$= 525 + 210 + 21$$

$$= 756$$

Ans: D

Permutation & Combination(Assignment)

Q. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?

A. 159 B. 194 C. 205 D. 209 E. None of these

Soln:

(1 boy and 3 girls) or (2 boys and 2 girls) or (3 boys and 1 girl) or (4 boys).

= (6C1 x 4C3) + (6C2 x 4C2) + (6C3 x 4C1) + (6C4)

= (6C1 x 4C1) + (6C2 x 4C2) + (6C3 x 4C1) + (6C2) → using $^nC_r = {}^nC_{(n-r)}$(to reduce calculation)

$$= (6 \times 4) + \left(\frac{6 \times 5}{2 \times 1} \times \frac{4 \times 3}{2 \times 1}\right) + \left(\frac{6 \times 5 \times 4}{3 \times 2 \times 1} \times 4\right) + \frac{6 \times 5}{2 \times 1}$$

= (24 + 90 + 80 + 15)

= 209

Ans: D

Permutation & Combination(Assignment)

Q. How many 4-letter words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed?

A. 40

B. 400

C. 5040

D. 2520

Ans: C

Permutation & Combination(Assignment)

Q. In how many different ways can the letters of the word 'MATHEMATICS' be arranged so that the vowels always come together?

A. 10080

B. 4989600

C. 120960

D. None of these

Ans: C

Permutation & Combination(Assignment)

Q. In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

A. 120

B. 720

C. 4320

D. 2160

E. None of these

Ans: B

Permutation & Combination(Assignment)

Q. How many Permutations of the letters of the word APPLE are there?

A.600 B.120 C.240 D.60

Ans: D

Permutation & Combination(Assignment)

Q. How many different words can be formed using all the letters of the word ALLAHABAD?

A.7560

B.7890

C.7650

D. None of these

Ans: A

Permutation & Combination(Assignment)

Q. Find the value of ${}^{50}P_2$

A. 4500
B. 3260
C. 2450
D. 1470

Ans : C

Permutation & Combination(Assignment)

Q. How many words can be formed by using letters of the word ‘DELHI’?

a. 50
b. 72
c. 85
d. 120

Ans : D

Permutation & Combination(Assignment)

Q. Find the number of ways the letters of the word ‘RUBBER’ can be arranged?

A. 450
B. 362
C. 250
D. 180

Ans: D

Permutation & Combination(Assignment)

Q. Out of 5 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

A. 60
B. 200
C. 5230
D. 7200

Ans : D

Permutation & Combination(Assignment)

Q. In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women?

A. 63

B. 90

C. 126

D. 45

E. 135

Ans: A

IMPORTANT FORMULAE

- **I**.1.Area of a rectangle=(length x breadth)
- Therefore length = (area/breadth) and breadth=(area/length)
- 2.Perimeter of a rectangle = 2 x (length + breadth)

- **II**.Area of a square = (side)^2 =1/2(diagonal)^2
- **III** Area of four walls of a room = 2*(length + breadth)*(height)

- **IV** 1.Area of the triangle=1/2(base*height)
- 2. Area of a triangle = (s*(s-a)(s-b)(s-c))^(1/2), where a,b,c are the sides of a triangle & s= ½(a+b+c)
- 3.Area of the equilateral triangle =((3^1/2)/4)*(side)^2

IMPORTANT FORMULAE

- **V.**1.Area of the parellogram =(base *height)
- 2.Area of the rhombus=1/2(product of the diagonals)
- 3.Area of the trapezium=1/2(size of parallel sides)*distance between them.

- **VI** 1.Area of a circle =pi*r^2,where r is the radius
- 2. Circumference of a circle = 2ΠR.
- 3. Length of an arc = 2ΠRθ/(360) where θ is the central angle
- 4. Area of a sector = (1/2) (arc x R) = pi*R^2*θ/360.

- **VII**. 1. Area of a semi-circle = (pi)*R^2.
- 2. Circumference of a semi-circle = (pi)*R.
- where, **pi** = 3.142

VOLUME AND SURFACE AREA – IMPORTANT FORMULAE

- **I. CUBOID**
- Let length = l, breadth = b and height = h units. Then,
- **1**. Volume = (l x b x h) cubic.units.
- **2. Surface area=** 2(lb + bh + lh) sq.units.
- **3. Diagonal**.=$\sqrt{l^2 + b^2+h^2}$ units

- **II. CUBE**
- Let each edge of a cube be of length a. Then,
- **1. Volume** = a^3 cubic units.
- **2. Surface area** = $6a^2$ sq. units.
- **3. Diagonal** =$\sqrt{3}$ a units.

- **III. CYLINDER**
- Let radius of base = r and Height (or length) = h. Then,
- **1. Volume** = (∏ r2h) cubic units.
- **2. Curved surface area** = (2∏ rh). units.
- **3. Total surface area** =2 ∏ r (h+r) sq. units

VOLUME AND SURFACE AREA – IMPORTANT FORMULAE

- **IV. CONE**
- Let radius of base = r and Height = h. Then,
- **1. Slant height, l =** $\sqrt{h2+r2}$
- **2. Volume** = (1/3) ∏ r^2h cubic units.
- **3. Curved surface area** = (∏ rl) sq. units.
- **4. Total surface area** = (∏ rl + ∏ r^2) sq. units.

- **V. SPHERE**
- Let the radius of the sphere be r. Then,
- **1. Volume** = (4/3) ∏ r^3 cubic units.
- **2. Surface area** = (4 ∏ r^2) sq. units.

- **VI. HEMISPHERE**
- Let the radius of a hemisphere be r. Then,
- **1. Volume** = (2/3) ∏ r^3 cubic units.
- **2. Curved surface area** = (2 ∏ r^2) sq. units.
- **3. Total surface area** = (3 ∏ r^2) units.

Surds and Indices

Rules of Indices: -

i. $a^n * a^m = a^{m+n}$

ii. $\frac{a^m}{a^n} = a^{m-n}$

iii. $(a^n)^m = a^{mn}$

iv. $(ab)^n = a^n * b^n$

v. $(\frac{a}{b})^n = \frac{a^n}{b^n}$

vi. $a^0 = 1$ (where a $\neq 0$)

vii. $a^{-n} = \frac{1}{a^n}$

Rules of Surds: -

i. $\sqrt[n]{a} = a^{\frac{1}{n}}$

ii. $\sqrt[n]{ab} = a^{\frac{1}{n}} * b^{\frac{1}{n}}$

iii. $\sqrt[n]{\frac{a}{b}} = \frac{a^{\frac{1}{n}}}{b^{\frac{1}{n}}}$

iv. $(\sqrt[n]{a})^n = a$

v. $(\sqrt[n]{a})^m = a^{\frac{m}{n}}$


THANK
YOU!