i.e. $x \begin{matrix} > \\ < \end{matrix} y$

Relation can't established.

Ex-6. **I. $2x^2 - 5x - 3 = 0$,**

II. $4y^2 + 16y + 15 = 0$

Solution :

$2 \times -3 = -6 \lessgtr \begin{matrix} -6/2 \Rightarrow 3 \\ +1/2 \Rightarrow -1/2 \end{matrix}$

$x = 3, -\frac{1}{2}$

$4 \times 15 = +60 \lessgtr \begin{matrix} +10/4 = -5/2 \\ +6/4 = -3/2 \end{matrix}$

$y = -\frac{5}{2}, -\frac{3}{2}$

i.e. $x > y$

Ex-7. **I. $x^2 = 16$,**

II. $y = \sqrt{16}$

Solution : $x = \pm 4$

$y = 4$

i.e. $x \leq y$

Ex-8. **I.** $x^2 - 14x + 48 = 0$,

II. $y^2 + 6 = 5y$

Solution : $+48 \lessgtr \begin{matrix} -8 = 8 \\ -6 = 6 \end{matrix}$

$x = 8, 6$

$+6 \lessgtr \begin{matrix} -3 = 3 \\ -2 = 2 \end{matrix}$

$y = 3, 2$

$x > y$

Ex-9. **I.** $x^2 + 9x + 20 = 0$

II. $y^2 + 7y + 12 = 0$

Solution :

$+20 \lessgtr \begin{matrix} +5 = -5 \\ +4 = -4 \end{matrix}$

$x = -5, -4$

$+12 \lessgtr \begin{matrix} +4 = -4 \\ +3 = -3 \end{matrix}$

$y = -4, -3$

$x \leq y$

Ex-10. **I.** $x^2 + 13x + 42 = 0$

II. $y^2 + 16y + 63 = 0$

Solution :

$+42 \lessgtr \begin{matrix} +7 = -7 \\ +6 = -6 \end{matrix}$

$x = -7, -6$

$+63 \lessgtr \begin{matrix} +9 = -9 \\ +7 = -7 \end{matrix}$

$y = -9, -7$

$x \geq y$

Ex-11. **I.** $2x + 3y = 14$

II. $4x + 2y = 16$

Solution :

solving eq. (i) & (ii)

$x = \frac{5}{2}$, $y = 3$

$x < y$

EXERCISE

INEQUALITY

Q.1-30. In the following questions two equation numbered I and II are given. You have to solve both equestions and ----------

Give answer if (1) $x > y$

Give answer if (2) $x \geq y$

Give answer if (3) $x < y$

Give answer if (4) $x \leq y$

Give answer if (5) $x = y$ or the relationship can not be established.

Q.1.	(I) $5x^2 - 18x + 9 = 0$	(II) $20y^2 - 13y + 2 = 0$
Q.2.	(I) $x^3 - 878 = 453$	(II) $y^2 - 82 = 39$
Q.3.	(I) $\frac{3}{\sqrt{x}} + \frac{4}{\sqrt{x}} = \sqrt{x}$	(II) $y^2 - \frac{(7)^{\frac{5}{2}}}{\sqrt{y}} = 0$
Q.4.	(I) $9x - 15.45 = 54.55 + 4x$	(II) $\sqrt{y + 155} - \sqrt{36} = \sqrt{49}$
Q.5.	(I) $x^2 + 11x + 30 = 0$	(II) $y^2 + 7y + 12 = 0$
Q.6.	(I) $x^2 + x - 20 = 0$	(II) $y^2 - y - 30 = 0$
Q.7.	(I) $225x^2 - 4 = 0$	(II) $\sqrt{225y} + 2 = 0$
Q.8.	(I) $x^2 - x - 12 = 0$	(II) $y^2 + 5y + 6 = 0$
Q.9.	(I) $x^2 - 32 = 112$	(II) $y - \sqrt{169} = 0$
Q.10.	(I) $x - \sqrt{121} = 0$	(II) $y^2 - 121 = 0$
Q.11.	(I) $x^2 - 16 = 0$	(II) $y^2 - 9y + 20 = 0$
Q.12.	(I) $x^2 - 7x + 12 = 0$	(II) $y^2 + y - 12 = 0$
Q.13.	(I) $2x^2 + 11x + 14 = 0$	(II) $4y^2 + 12y + 9 = 0$
Q.14.	(I) $x^4 - 227 = 398$	(II) $y^2 + 321 = 346$
Q.15.	(I) $x^2 - 4 = 0$	(II) $y^2 + 6y + 9 = 0$
Q.16.	(I) $x^2 = 729$	(II) $y = \sqrt{-729}$
Q.17.	(I) $x^2 - 1 = 0$	(II) $y^2 + 4y + 3 = 0$
Q.18.	(I) $x^2 - 7x + 12 = 0$	(II) $y^2 - 12y + 32 = 0$
Q.19.	(I) $x^3 - 371 = 629$	(II) $y^3 - 543 = 788$
Q.20.	(I) $5x - 2y = 31$	(II) $3x + 7y = 36$
Q.21.	(I) $2x^2 + 11x + 12 = 0$	(II) $5y^2 + 27y + 10 = 0$
Q.22.	(I) $x^2 - 14x + 48 = 0$	(II) $y^2 + 6 = 5y$
Q.23.	(I) $x^2 + 9x + 20 = 0$	(II) $y^2 + 7y + 12 = 0$
Q.24.	(I) $x^2 = 529$	(II) $y = \sqrt{529}$
Q.25.	(I) $x^2 + 13x = -42$	(II) $y^2 + 16y + 63 = 0$
Q.26.	(I) $2x + 3y = 14$	(II) $4x + 2y = 16$
Q.27.	(I) $x = \sqrt{81}$	(II) $y^2 = 81$
Q.28.	(I) $x^2 = 144$	(II) $y = \sqrt{81}$
Q.29.	(I) $x^2 - 15x + 56 = 0$	(II) $y^2 - 23y + 132 = 0$
Q.30.	(I) $x^2 + 7x + 12 = 0$	(II) $y^2 + 6y + 8 = 0$

CHAPTER-17

PERMUTATION & COMBINATION

Factorial :

Factorial denoted by $\lfloor n$ or n !

Where n! = n. (n-1) (n-2).....3.2.1

eg. (I.) 5! = 5.4.3.2.1 = 120

(II) 6! = 6.5.4.3.2.1 = 720

from (i),and (II) we get

6! = 6.5.4.3.2.1

6! = 6.5!

in general n! = n (n-1) !

(III) 1! = 1

(IV) 0! = 1

Permutation : (Arrangement)

The different arrangements of a given number or things by taking some or all at a time, are called permutations.

All permutations (or arrangements) made with the letters of 'abc', taking two at a time are : (ab ba, ac, ca, bc, cb).

All permutation made with the letters a,b,c taking all at a time are :

(abc, acb, bac, bca, cab, cba)

Number of Permutations :

Number of all permutations of n. things, taken r at a time, is given by :

$${}^nP_r = \frac{n!}{(n-r)!}$$

eg.

(i) $${}^6P_2 = \frac{6!}{(6-2)!} = \frac{6!}{4!} = \frac{6\times5\times4!}{4!} = 30$$

(ii)

$${}^7P_3 = \frac{7!}{(7-3)!} = \frac{7!}{4!} = \frac{7\times6\times5\times4!}{4!} = 210$$

Note : Number of all permuations of n-things, taken all at a time = n!

Combinations :

(selection, committee, group)

Each of the different groups or selections which can be formed by taking some or all of a number of object called a combinations.

Suppose we want to select two out of three persons A, B,C. Then possible selections are :

AB, BC, CA

Note : AB and BA represent the same selection.

Suppose we want to select three out of three person A, B, C. Then possible selections are ABC.

Note : ABC and BAC and CAB are the same selection.

Number of combinations :

The number of combinations of n things, taken r at a time is :

$${}^nC_r = \frac{n!}{r!\times(n-r)!}$$

Note :

(i) If (n=r), ${}^nC_r = 1$ and ${}^nC_0 = 1$

Important points:

$${}^nC_r = {}^nC_{(n-r)}, \text{ if } r > \frac{n}{2}$$

eg. $${}^{16}C_{13} = {}^{16}C_{16-13} = {}^{16}C_3 = \frac{16!}{3!\times13!}$$

$$= \frac{16\times15\times14\times13!}{3\times2\times1\times13!} = 560$$

Conclusion :

The basic difference between permutation & combination.

Permutation :

There are three letters a,b,c and permutation made with them by taking two at a time- a,b,c

ab
ac
bc
ba
ca
cb
} 6-different ways

* Here ab, is possible then ba is also possible in permutation.

Combination :

There are three person A, B, C we want to select two out of three. The number of combination are : ABC

AB
AC
~~BA~~
BC
~~CA~~
~~CB~~
} 3-different ways

* Here AB is possible, then BA is not possible in combination because they represent same combination.

Result : In the above discussion, we observe that if AB is possible and BA is also possible then we apply permutation and when AB is possible and BA is not possible then we apply combination.

PERMUTATION

Ex-1. **In how many different ways can the letters of the word HOME be arranged ?**

Solution :

n = 4, r = 4

ByFormula

$${}^4P_4 = \frac{4!}{(4-4)!} = \frac{4!}{0!} = \frac{4\times3\times2\times1}{1} = 24$$

Trick : 4! = 4 × 3 × 2 × 1 = 24

Ex-2. **In how many different ways can the letters of word 'COFFEE' arranged ?**

Solution :

Here, 'F' two time and 'E' repeat two time therefore-

$$\frac{{}^6P_6}{{}^2P_2\times{}^2P_2} = \frac{\frac{6!}{(6-6)!}}{\frac{2!}{(2-2)!}\times\frac{2!}{(2-2)!}} = \frac{6!}{2!\times2!}$$

$$= \frac{6\times5\times4\times3\times2\times1}{2\times1\times2\times1} = 180$$

Trick :

$$\frac{6!}{2!\times2!} = \frac{6\times5\times4\times3\times2\times1}{2\times1\times2\times1} = 180$$

Ex-3. **In how many different ways can the word 'HOME' be arranged so as vowel always come together?**

Solution :

In this ex- Two vowel (O,E)

HOME = H,M, (O, E)

Now, we consider O and E as a single unit and then count the all units i.e. 3 unit

3! × 2! = 3 × 2 × 1 × 2 × 1

= 12 ways.

Ex-4. **In how many different ways can the word 'COFFEE' can be arranged so as vowel always come together?**

Solution :

In this word F- repeats two times

E - repeat two times

and there are three vowels O,E,E.

Now, we consider O, E, E as a single unit.

CFF,OEE

$$= \frac{4!\times3!}{2!\times2!} = \frac{4\times3\times2\times1\times3\times2\times1}{2\times1\times2\times1}$$

= 36

Ex-5. **In how many different ways can the word 'HOME' be arranged so as, the vowels never come together ?**

Solution :

Ways (never)

= ways (total) - ways (always)

(see ex-1) (see ex-3)

= 4! - 3! × 2! = 24 -12 = 12

Ex-6. **In how many different ways can the word 'COFFEE'arranged so as, vowels never come together ?**

Solution :

Ways (never) = ways (Total) - ways (always)

(see-ex-2) (see ex-4)

$$= \frac{6!}{2! \times 2!} - \frac{4! \times 3!}{2! \times 2!}$$

$= 180 - 36$

$= 144$

COMBINATION :

Ex-1. **Find the value of ${}^5c_2$.**

Solution : ${}^5C_2 = \frac{\lfloor 5}{\lfloor 2 \lfloor 5-2} = \frac{\lfloor 5}{\lfloor 2 \times \lfloor 3}$

$$= \frac{5 \times 4}{2} = 10$$

Ex-2. **Find the value of n when ${}^nc_2 = 105$?**

Solution :

${}^nC_2 = 105$

$$\frac{\lfloor n}{\lfloor 2 \lfloor n-2} = 105$$

$n(n-1) = 210 \quad \{14^2 < 210 < 15^2\}$

$n = 15$

Ex-3. **There are 15 persons in a group. They hand shake to each other. Find the different no. of hand shake.**

Solution :

By formula

$${}^{15}C_2 = \frac{\lfloor 15}{\lfloor 2 \lfloor 15-2} = \frac{\lfloor 15}{\lfloor 2 \lfloor 13} = \frac{15 \times 14}{2}$$

$= 105$

Ex-4. **From a group of 10 men & 5 women 4 persons are to be selected to form a committee. Find the different number of ways for selection.**

Solution :

$${}^{15}C_4 = \frac{\lfloor 15}{\lfloor 4 \lfloor 15-4} = \frac{\lfloor 15}{\lfloor 4 \lfloor 11}$$

$$= \frac{15 \times 14 \times 13 \times 12}{4 \times 3 \times 2}$$

$= 105 \times 13 = 1365$

Ex-5. **From a group of 10 men & 5 women, 4 persons to be selected such that 3 men and 1 woman in the group ?**

Solution :

$= {}^{10}C_3 \times {}^5C_1$

$$= \frac{\lfloor 10}{\lfloor 3 \times \lfloor 7} \times \frac{\lfloor 5}{\lfloor 1 \lfloor 4} = \frac{\lfloor 10}{\lfloor 3 \lfloor 7} \times \frac{\lfloor 5}{\lfloor 4}$$

$$= \frac{10 \times 9 \times 8}{3 \times 2} \times 5$$

$= 120 \times 5 = 600$

Ex-6. **From a group of 10 men & 5 women, 4 persons are to be selected such that 4 men or 4 women in the group. Find the different number of ways.**

Solution :

${}^{10}C_4 + {}^5C_4$

$$= \frac{\lfloor 10}{\lfloor 4 \lfloor 6} + \frac{\lfloor 5}{\lfloor 4 \lfloor 1}$$

$$= \frac{10 \times 9 \times 8 \times 7}{4 \times 3 \times 2} + 5$$

$= 210 + 5 = 215$

Ex-7. **A committee of 5 members is to be formed out of 4 men and 5 women.**

(i) In how many ways can a committee consisting of at least 1 woman be formed?

Solution :

${}^5C_1 \times {}^4C_4 + {}^5C_2 \times {}^4C_3 + {}^5C_3 \times {}^4C_2 + {}^5C_4 \times {}^4C_1 + {}^5C_5 \times {}^4C_0$

$= 5 \times 1 + 10 \times 4 + 10 \times 6 + 5 \times 4 + 1$

$= 126$

(ii) In how many ways can a committee consisting of 3 men and 2 women be formed ?

Solution :

$${}^4C_3 \times {}^5C_2 = \frac{\lfloor 4}{\lfloor 3 \lfloor 1} \times \frac{\lfloor 5}{\lfloor 2 \lfloor 3}$$

$$= \frac{4 \times 5 \times 4}{2} = 40$$

EXERCISE

PERMUTATION & COMBINATION

Q.1. There are 6 candidates for 3 posts. In how many ways can the posts be filled ?
(1) 120 (2) 130 (3) 100 (4) 110 (5) None of these

Q.2. From among the 36 teachers in a school, one principal and one vice-principal are to be appointed. In how many ways can this be done?
(1) 1360 (2) 1260 (3) 1060 (4) 1160 (5) None of these

Q.3. There are 15 buses running between Lucknow and Kanpur. In how many ways can a man go to Kanpur and return by a different bus ?
(1) 280 (2) 310 (3) 240 (4) 210 (5) None of these

Q.4. If $(n+1)! = 6[(n-1)!]$, Find n.
(1) 6 (2) 4 (3) 8 (4) 2 (5) None of these

Q.5. Find n if ${}^nP_4 = 18.{}^{n-1}P_2$.
(1) 4 (2) 8 (3) 6 (4) 12 (5) None of these

Q.6. In how many different ways can the letters of the word 'SERIES' be arranged ?
(1) 720 (2) 180 (3) 120 (4) 5040 (5) None of these

Q.7. How many words (with or without meaning) can be formed using all letters of the word EQUATION, using each letter exactly once ?
(1) 38320 (2) 39320 (3) 20160 (4) 38400 (5) None of these

Q.8. Ten students are participating in a race. In how many ways can the first three prizes be won?
(1) 920 (2) 680 (3) 820 (4) 720 (5) None of these

Q.9. It is required to seat 5 men and 4 women in a row so that the women occupy the even places. How many such arrangements are possible?
(1) 2880 (2) 2480 (3) 3680 (4) 3280 (5) None of these

Q.10. Four books, one each in Chemistry, Physics, Biology and Mathematics are to be arranged in a shelf. In how many ways can this be done ?
(1) 12 (2) 36 (3) 42 (4) 48 (5) None of these

Q.11. There are three different rings to be worn in four fingers with at most one in each finger. In how many ways can this be done ?
(1) 36 (2) 28 (3) 24 (4) 32 (5) None of these

Q.12. In how many ways can 6 apples be distributed among 4 boys, there being no restriction to the number of apples each boy may get ?
(1) 6729 (2) 5739 (3) 7592 (4) 4096 (5) None of these

Q.13. In how many different ways can the letters of the word 'KURUKSHETRA' be arranged ?
(1) 4497600 (2) 4979600 (3) 4989600 (4) 4789600 (5) None of these

Q.14. In how many different ways can the letters of the word 'ALLAHABAD' be arranged ?
(1) 7560 (2) 7840 (3) 7460 (4) 7650 (5) None of these

Q.15. How many three-digit numbers can be formed by using the digits, 1, 3, 6 and 8 when the digits may be repeated any no. of times ?
(1) 48 (2) 64 (3) 80 (4) 32 (5) None of these

Q.16. How many arrangements can be made of the letters of the word 'ARRANGEMENT'?
(1) 2492800 (2) 249300 (3) 2494800 (4) 2491808 (5) None of these

Q.17. If the different permutations of the word EXAMINATION are listed as in a dictionary, how many items are there in this list before the first word starting with E ?
(1) 906200 (2) 907200 (3) 908200 (4) 905200 (5) None of these

Q.18. How many numbers greater than a million can be formed with the digits 2, 3, 0, 3, 4, 2, 3 ?
(1) 360 (2) 240 (3) 480 (4) 460 (5) None of these

Q.19. How many different necklaces can be formed with 6 White and 5 Red beads ?
(1) 18 (2) 24 (3) 21 (4) 27 (5) None of these

Q.20. The Chief Ministers of 11 States of India meet to discuss the language problem. In how many ways can they seat themselves at a round table so that the Punjab and Madras Chief Ministers sit together ?
(1) 725760 (2) 625760 (3) 925760 (4) 825760 (5) None of these

Q.21. If C(n, 7) = C(n, 5), Find the value of n ?
(1) 15 (2) 12 (3) 18 (4) 2 (5) None of these

Q.22. If C(n, 8) = C(n, 6), find C(n, 2)
(1) 91 (2) 81 (3) 61 (4) 71 (5) None of these

Q.23. How many words can be formed out of the letters of the word 'ORIENTAL' so that vowels always occupy the odd places ?
(1) 576 (2) 578 (3) 676 (4) 720 (5) None of these

Q.24. How many ways can the letters of the word 'UNIVERSAL' be arranged ? In how many of these will E, R, S always occur together ?
(1) 32240 (2) 30240 (3) 30248 (4) 31240 (5) None of these

Q.25. In how many different ways, the letters of the word ALGEBRA can be arranged in a row if. The two As are together ?
(1) 720 (2) 620 (3) 780 (4) 1600 (5) None of these

Q.26. In how many ways can a cricket team of 11 players be selected out of 16 players if one particular players is to be excluded ?
(1) 1565 (2) 1365 (3) 1165 (4) 1265 (5) None of these

Q.27. In how many ways can a cricket team of 11 players be selected out of 16 players if two particular players are to be included and one particular player is to be rejected ?
(1) 715 (2) 615 (3) 915 (4) 515 (5) None of these

Q.28. In how many different ways can the letters of the word 'RUMOUR' be arranged ?
(1) 180 (2) 90 (3) 30 (4) 720 (5) None of these

Q.29. 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 ?
(1) 63 (2) 90 (3) 126 (4) 45 (5) None of these

Q.30. In how many ways can a committee consisting of 5 men and 6 women be formed from 8 men and 10 women ?
(1) 266 (2) 5040 (3) 11760 (4) 86400 (5) None of these

Q.31. How many words can be formed from the all letters of the word **INITIAL** such that the all words must have started and ended with letter 'I' ?
(1) 120 (2) 20 (3) 5040
(4) 240 (5) None of these

Q.32. In how many ways can the all letters of the word **'DELHI'** be arranged that the vowels occupy only at even places?
(1) 12 (2) 60 (3) 120 (4) 30 (5) None of these

Q.33. In how many ways can the letters of the word **RUSSIA** be arranged?
(1) 360 (2) 60 (3) 180 (4) 64 (5) None of these

Q.34. In how many ways we can select a six members team from 8 men and 5 women. In which women are dominating ?
(1) 148 (2) 48 (3) 60
(4) can't determined (5) None of these

Q.35. There are 5 boys and 3 girls. In how many ways can they be seated in a row so that all the three girls do not sit together ?
(1) 38,000 (2) 36,000 (3) 18,000 (4) 19,000 (5) None of these

CHAPTER-18
PROBABILITY

Some useful facts:

If one dice is rolled randomly, the set of total possible outcome is {1, 2, 3, 4, 5, 6} and the set of all outcomes even number is 2,4,6.

From the above example we design some definitions

I. ***Experiment :*** The process of rolling dice is known as experiment.

II. ***Random Experiment :*** The process of rolling dice randomly is known as Random experiment.

- Rolling an unbiased dice.

- Tossing a fair coin.

- Drawing a card from a pack of well stuffled card.

- Picking up a ball of certain colour from a bag containing balls of different colours.

III. ***Sample space :*** The set of total possible outcomes in an random experiment is known as sample space, denoted by S.

- For a dice S = {1, 2, 3, 4, 5, 6}

- For a coin, S = {H, T}

- If two coins are tossed, then

S = {HH, HT, TH, TT}

IV. ***Event :*** Any subset of a sample space is called an event, denoted by E.

In the above, E = {2, 4, 6} is an event and $E \subseteq S$

V. ***Probability of occurrence of an event :***

Probability of any event = $\frac{n(E)}{n(S)}$ i.e.

$$P(E) = \frac{n(E)}{n(S)}$$

Where- n (E) ⇒ Total number of required outcomes

n (S) ⇒ Total number of possible outcomes.

P (E) ⇒ Probability of Events.

For rolling a dice

Probability of the even number = $\frac{3}{6}$

$P(E) = \frac{1}{2}$

Results :

(i) P (S) = 1.....(maximum probability is 1)

(ii) P (ϕ) = 0.....(minimum probability is 0)

(iii) $0 \leq P(E) \leq 1$

(iv) $P(E) + P(\bar{E}) = 1$

ie. $P(E) = 1 - P(\bar{E})$ .....Where $\bar{E}$ denotes not E

Ex-1. **In a question there are 5-options in which one is right and remaining 4 are wrong, if one option is to be selected randomly, what is the probability that-**

(I) The question will be right

(II) The question will be wrong

Solution :

$P(E) = \frac{1}{5}$ .....(I)

$$P(\bar{E}) = \frac{4}{5} \quad \text{.....(II)}$$

Adding these equation (I) & (II), we get-

$$P(E)+P(\bar{E}) = \frac{1}{5}+\frac{4}{5}$$

i.e. $P(E)+P(\bar{E}) = 1$ .....(Remember that)

Ex-2. **Find the probability of head when single coin is tossed.**

Solution :

For single coin

n(E) = 1 {H}

n(S) = 2 {H, T}

$$P(E) = \frac{1}{2}$$

Ex-3. **Find the probability of 1 head when two coins are tossed simultaneously.**

Solution :

For two coins

n(S) = 4 {(H, H) (T, T) (H, T) (T, H)}

n(E) = 2 {(H, T) (T, H)}

$$P(E) = \frac{2}{4} = \frac{1}{2}$$

Ex-4. **Find the probability of at least one head when two coins are tossed simultaneously.**

Solution :

For two coins

n(S) = 4 {(H, H) (T, T) (H, T) (T, H)}

Here n(E) = 3{(H, H) (H, T) (T, H)}

$$P(E) = \frac{3}{4}$$

Ex-5. **Find the probability of at most one head when two coins are tossed simultaneously.**

Solution :

n(S) = 4 {(H, H) (T, T) (H, T) (T, H)}

n(E) = 3 {(T, T) (H, T) (T, H)}

$$P(E) = \frac{3}{4} \text{ Ans}$$

Ex-1. **Find the probability of getting a multiple of 3 when one dice is thrown once.**

Solution :

n(s) = 6 {1, 2, 3, 4, 5, 6}

n(E) = 2 {3, 6}

$$P(E) = \frac{2}{6} = \frac{1}{3}$$

Ex-2. **Find the probability of that number which is multiple of 2 when one dice is thrown once.**

Solution : n(s)=6 {1, 2, 3, 4, 5, 6,}

n(E) = 3{2, 4, 6}

$$P(E) = \frac{3}{6} = \frac{1}{2}$$

Ex-3. **Find the probability that sum on both faces is 9 when two dice are thrown simultaneously.**

Solution :

n(s) = 36

n (E) = 4

$$P(E) = \frac{4}{36} = \frac{1}{9}$$

$$6^2 = 36 \begin{bmatrix} 6, 3 \\ 3, 6 \\ 5, 4 \\ 4, 5 \end{bmatrix}$$

Ex-4. **Find the probability that sum is divisible by 4 when two dice are thrown simultaneously.**

Solution :

$$P(E) = \frac{n(E)}{n(S)}$$

$$\frac{9}{36} = \frac{1}{4} \qquad \begin{bmatrix} 1,3 & 2,6 & 2,2 \\ 3,1 & 6,2 & 6,6 \\ 3,5 & 5,3 & 4,4 \end{bmatrix}$$

Ex-5. **Find probability that sum is a prime no. & less than 8 when two dice are thrown simultaneously.**

Solution :

$$P(E) = \frac{1+2+4+6}{36} = \frac{13}{36}$$

Note :

Sum	Ways	No. of results
2	(1, 1)	1
3	(1,2) (2,1)	2
5	(3,2) (2,3) (1,4) (4,1)	4
7	(1, 6) (6, 1) (4, 3) (3, 4) (2, 5) (5, 2)	6

MISCELLANEOUS

Ex-1. **A box contains 5 red, 4 green & 6 black balls. If 3 balls are drawn at random.**

(I) **Find the probability that all balls are red colour.**

Solution :

$$P(E) = \frac{n(E)}{n(S)}$$

$$= \frac{5_{C_3}}{15_{C_3}} = \frac{\frac{\lfloor 5}{\lfloor 3 \lfloor 2}}{\frac{\lfloor 15}{\lfloor 3 \lfloor 12}} = \frac{5\times4\times3}{15\times14\times13} = \frac{3\times2}{3\times2}$$

$$= \frac{10}{35\times13} = \frac{2}{91}$$

(II) **Find the probability that 1 ball is red & 2 balls are green.**

Solution :

$$P(E) = \frac{5_{C_1}\times4_{C_2}}{15_{C_3}} = \frac{\frac{5\times4\times3}{2}}{\frac{15\times14\times13}{3\times2}}$$

$$= \frac{6}{91}$$

(III) **Find the probability that none ball is red ?**

Solution :

$$P(E) \quad \frac{10_{C_3}}{15_{C_3}} = \frac{\frac{10\times9\times8}{3\times2}}{\frac{15\times14\times13}{3\times2}} = \frac{24}{91}$$

(IV) **Find the probability that at least one ball is red.**

Solution :

P(E) =1–(none)

$$= 1-\frac{24}{91} \Rightarrow \frac{67}{91}$$

Ex-2. **A bag contains 6 white balls & 4 black balls. 2 balls are randomly taken away. Find the probability that they are of the same colour.**

Solution :

$$P(E) = \frac{n(E)}{n(S)} = \frac{6_{C_2}+4_{C_2}}{10_{C_2}}$$

$$= \frac{\frac{6\times5}{2}+\frac{4\times3}{2}}{\frac{10\times9}{2}} = \frac{15+6}{45} = \frac{21}{45}$$

Ex-3. **A box contains 4 black, 3 red & 2 yellow balls. Two balls are drawn at randomly. What is probability that they are not of the same colour ?**

Solution :

$$P(E)=\frac{{}^4c_1\times{}^3c_1+{}^4c_1\times{}^2c_1+{}^3c_1\times{}^2c_1}{{}^9c_2}=\frac{4\times3+4\times2+3\times2}{36}$$

$$=\frac{26}{36}=\frac{13}{18}$$

Ex-4. **A basket contains 3 blue, 2 green & 5 red balls. If three balls are picked at random, what is the probability that at least one is red ?**

Solution :

$$P(E)=1-\frac{5_{c_3}}{10_{c_3}}=1-\frac{\frac{5\times4}{2}}{\frac{10\times9\times8}{3\times2}}$$

$$=1-\frac{10}{120}=\frac{11}{12}$$

Ex-5. **A bag contains 7 white & 3 black balls. Two balls are drawn at random one after the other without replacement. Find the probability that balls drawn are black.**

Solution :

$$P(E)=\frac{3_{c_1}}{10_{c_1}}\times\frac{2_{c_1}}{9_{c_1}}=\frac{3}{10}\times\frac{2}{9}=\frac{1}{15}$$

Ex-6. **A table has two drawers. First drawer has 3 gold coins & second has 4 silver coins. Open a drawer randomly & take a coin. What is the probability that it is a gold coin?**

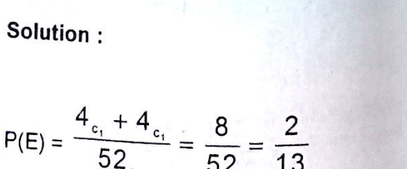
Solution :

Porbability to open one drawer = $\frac{1}{2}$

Hence probability to get 1 coins of gold

$$=\frac{1}{2}\times1+\frac{1}{2}\times0=\frac{1}{2}$$

CARDS



2, 3, 4, 5, 6, 7, 8, 9, 10 – no. cards → 9×4 = 36

Ace, King, Queen; Jack - Face cards → 4×4 = 16

Ex-1. **If from a pack of 52 cards, 1 card is drawn at random. Find the probability that the card is a Ace card.**

Solution :

$$P(E)=\frac{n(E)}{n(S)}$$

$$=\frac{4_{c_1}}{52_{c_1}}=\frac{4}{52}=\frac{1}{13}$$

Ex-2. **If from a pack of 52 playing cards, 1 card is drawn at random. What is the probability that it is either a king or queen ?**

Solution :

$$P(E)=\frac{4_{c_1}+4_{c_1}}{52_{c_1}}=\frac{8}{52}=\frac{2}{13}$$

EXERCISE

PROBABILITY

Q.1-50. In each of the following questions a number of possible answers are given, out of which one answer is correct. Find out the correct answer.

Q.1. In a simultaneous toss of two coins, find the probability of tails.
(1) $\frac{1}{2}$ (2) $\frac{1}{4}$ (3) $\frac{3}{4}$ (4) $\frac{1}{3}$ (5) None of these

Q.2. In a simultaneous toss of two coins, find the probability of exactly 1 tail.
(1) $\frac{1}{2}$ (2) $\frac{1}{4}$ (3) $\frac{3}{4}$ (4) $\frac{1}{8}$ (5) None of these

Q.3. In a simultaneous toss of two coins, Find the probability of no tail.
(1) $\frac{3}{4}$ (2) $\frac{1}{2}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$ (5) None of these

Q.4. Three coins are tossed.Find the probability of heads.
(1) $\frac{1}{6}$ (2) $\frac{1}{8}$ (3) $\frac{1}{4}$ (4) $\frac{1}{3}$ (5) None of these

Q.5. Three coins are tossed. Find the probability of exactly 2 heads.
(1) $\frac{3}{8}$ (2) $\frac{1}{2}$ (3) $\frac{1}{8}$ (4) $\frac{1}{4}$ (5) None of these

Q.6. Three coins are tossed. Find the probability of no heads.
(1) $\frac{3}{8}$ (2) $\frac{1}{8}$ (3) $\frac{1}{2}$ (4) $\frac{2}{3}$ (5) None of these

Q.7. Three coins are tossed. Find the probability of at least one head and one tail.
(1) $\frac{1}{2}$ (2) $\frac{1}{4}$ (3) $\frac{3}{4}$ (4) $\frac{2}{3}$ (5) None of these

Q.8. Four coins are tossed once . Find the probability of exactly 3 tails.
(1) $\frac{1}{16}$ (2) $\frac{1}{4}$ (3) $\frac{5}{16}$ (4) $\frac{4}{3}$ (5) None of these

Q.9. Four coins are tossed once. Find the probability of exactly 2 tail.
(1) $\frac{1}{16}$ (2) $\frac{1}{8}$ (3) $\frac{3}{8}$ (4) $\frac{5}{16}$ (5) None of these

Q.10. In a single throw of two dice. Find the probability of doublet ?
(1) $\frac{1}{6}$ (2) $\frac{5}{6}$ (3) $\frac{1}{9}$ (4) $\frac{1}{18}$ (5) None of these

Q.11. In a single throw of two dice. What is the probability of a multiple of 2 on one and a multiple of 3 on the other ?
(1) $\frac{5}{36}$ (2) $\frac{25}{36}$ (3) $\frac{11}{36}$ (4) $\frac{1}{9}$ (5) None of these

Q.12. Two dice are throwm . Find the probability of getting an odd number on one and a multiple of three on the other ?
(1) $\frac{5}{36}$ (2) $\frac{25}{36}$ (3) $\frac{11}{36}$ (4) $\frac{1}{9}$ (5) None of these

Q.13. The letters of word "SOCIETY" are placed in a row. What is the probability that three vowels come together ?
(1) $\frac{3}{7}$ (2) $\frac{2}{7}$ (3) $\frac{1}{7}$ (4) $\frac{4}{7}$ (5) None of these

Q.14. Find the probability that in a random arrangement of letters of the words "UNIVERSITY" two '*I*'s do not come together.
(1) $\frac{4}{5}$ (2) $\frac{1}{5}$ (3) $\frac{3}{5}$ (4) $\frac{2}{3}$ (5) None of these

Q.15. If letters of the word 'PENCIL' are arranged in random order, What is the probability that N is 'ALWAYS' next to E ?
(1) $\frac{1}{6}$ (2) $\frac{5}{6}$ (3) $\frac{1}{3}$ (4) $\frac{2}{3}$ (5) None of these

Q.16. What is the probability that one card drawn at random from the pack of playing cards may be either a queen or an ace ?

(1) $\frac{1}{13}$ (2) $\frac{2}{13}$ (3) $\frac{3}{13}$ (4) $\frac{4}{13}$ (5) None of these

Q.17. In a class of 25 students with roll numbers 1 to 25, a student is picked up at random to answer a question. Find the probability that the roll number of the selected student is either multiple of 5 or 7.

(1) $\frac{6}{25}$ (2) $\frac{4}{25}$ (3) $\frac{8}{25}$ (4) $\frac{7}{25}$ (5) None of these

Q.18. A card is drawn from a pack of 52 cards. find the probability of getting spade or ace or red card.

(1) $\frac{9}{13}$ (2) $\frac{4}{13}$ (3) $\frac{11}{13}$ (4) $\frac{10}{13}$ (5) None of these

Q.19-21 One bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. One ball is drawn from each bag.

Q.19. Find the probability that both are white.

(1) $\frac{1}{2}$ (2) $\frac{1}{3}$ (3) $\frac{1}{4}$ (4) $\frac{3}{4}$ (5) None of these

Q.20. Find the probability that both are black.

(1) $\frac{5}{24}$ (2) $\frac{19}{24}$ (3) $\frac{11}{24}$ (4) $\frac{1}{24}$ (5) None of these

Q.21. Find the probability that one is white and one is black.

(1) $\frac{11}{24}$ (2) $\frac{13}{24}$ (3) $\frac{1}{2}$ (4) $\frac{1}{6}$ (5) None of these

Q.22-25. An urn contains 25 balls numbered 1 to 25. Suppose an odd number is considered a 'success' Two balls are drawn from the urn with replacement.

Q.22. Find the probability of getting two successes.

(1) $\frac{169}{625}$ (2) $\frac{312}{625}$ (3) $\frac{481}{625}$ (4) $\frac{144}{625}$ (5) None of these

Q.23. Find the probability of getting exactly one success.

(1) $\frac{169}{625}$ (2) $\frac{312}{625}$ (3) $\frac{481}{625}$ (4) $\frac{144}{625}$ (5) None of these

Q.24. Find the probability of getting at least one success.

(1) $\frac{169}{625}$ (2) $\frac{312}{625}$ (3) $\frac{481}{625}$ (4) $\frac{144}{625}$ (5) None of these

Q.25. Find the probability of getting no success.

(1) $\frac{169}{625}$ (2) $\frac{312}{625}$ (3) $\frac{481}{625}$ (4) $\frac{144}{625}$ (5) None of these

Q.26. From a pack of cards, two are drawn the first being replaced before the second is drawn Find the probability that the first is a diamond and the second is a king.

(1) $\frac{3}{52}$ (2) $\frac{1}{26}$ (3) $\frac{1}{52}$ (4) $\frac{1}{4}$ (5) None of these

Q.27-30. A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is 1/7 and that of wife's 1/5

Q.27. What is the probability that only one of them will be selected ?

(1) $\frac{2}{7}$ (2) $\frac{1}{35}$ (3) $\frac{24}{35}$ (4) $\frac{11}{35}$ (5) None of these

Q.28. What is the probability that both of them will be selected ?

(1) $\frac{2}{7}$ (2) $\frac{1}{35}$ (3) $\frac{24}{35}$ (4) $\frac{11}{35}$ (5) None of these

Q.29. What is the probability that none of them will be selected ?

(1) $\frac{2}{7}$ (2) $\frac{1}{35}$ (3) $\frac{24}{35}$ (4) $\frac{11}{35}$ (5) None of these

Q.30. What is the probability that at least one of them will be selected ?

(1) $\frac{2}{7}$ (2) $\frac{1}{35}$ (3) $\frac{24}{35}$ (4) $\frac{11}{35}$ (5) None of these

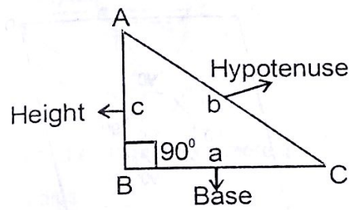
CHAPTER-19

AREA AND VOLUME

Properties of Triangle :

1. Sum of the angles of a traingle is 180^0
2. The sum of any two sides of a triangle is greater than the third side.
3. Pythagoras Therorem : In a right angle triangle.

$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Height})^2$

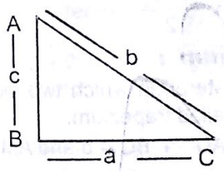


(i) Area of a right angle triangle

$= \left(\frac{1}{2} \times \text{base} \times \text{height}\right)$

i.e. $A = \frac{1}{2} a \times c$

(ii) Perimeter of a triangle

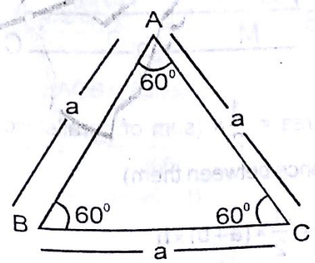


= Sum of all sides

P = a + b + c

5. *Equilateral Triangle*

(i) All sides of equilateral triangle are equal each angles are equal (i.e 60^0)



(ii) Area of equilateral triangle

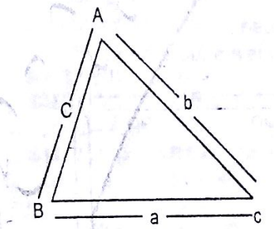
$= \frac{\sqrt{3}}{4} \times (\text{side})^2$

i.e., $A = \frac{\sqrt{3}}{4} a^2$

(iii) Perimeter = 3 × side

P = 3.a

6. *Any Triangle.*



If side of a triangle are a, b and c then.

(i) Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

Where $s = \frac{a+b+c}{2}$; (known as semi-perimeter)

(ii) Perimeter = a +b + c

P = a + b + c

7. *Quadrilateral*

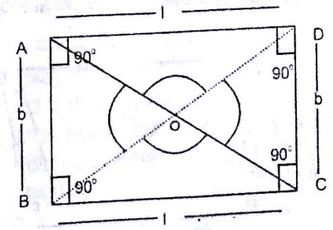
A figure having four sides is called quadrilateral and sum of all angle is 360^0

8. *Rectangle :*

A quadrilateral in which opposite sides are equal and parallel and each angles are 90^0 is called rectangle.

Suppose :

ABCD is a rectangle



and $\angle A = \angle B = \angle C = \angle D = 90^0$
AD= BC = l
and AB = DC = b
AC = BD = Diagonal
$\angle A$ O D = $\angle$ BOC
$\angle$AOB = $\angle$DOC

(i) Area of rectangle = (length × breadth)
A = l × b

(ii) Perimeter of rectangle = Sum of all sides
P = 2. [l + b]

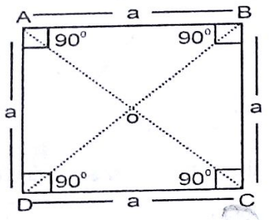
Diagonal = $\sqrt{l^2 + b^2}$

D = $\sqrt{l^2 + b^2}$ .....{see in ΔACD and apply pythagoras theory}

9. Square :

A quadrilateral, in which all sides are equal and parallel and each angle is equal and 90^0

Suppose :
ABCD is a square and



$\angle A = \angle B = \angle C = \angle D = 90^0$
AB = BC = CD = DA = a
Diagonal AC = BD
$\angle A$ O D = $\angle$DOC = $\angle$COB = $\angle$BOA = 90^0

(i) Area of square = $(side)^2$
$A = a^2$

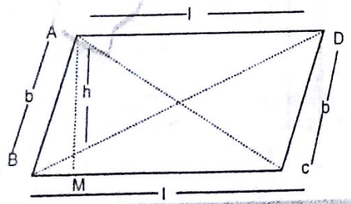
(ii) Perimeter of square = Sum of all sides
P = 4×a

(iii) Diagonal = $\sqrt{a^2 + a^2}$

D = $a.\sqrt{2}$ .....{see in ΔABC and apply phythagoras theorem}

10. Parallelogram :

A quadrilateral, in which opposite side are equal and parallel, called parallelogram.



* Suppose ABCD is a parallelogram and
AB = CD = b &
AD = CB = l
and AM = h.....(suppose)
AC ≠ BD

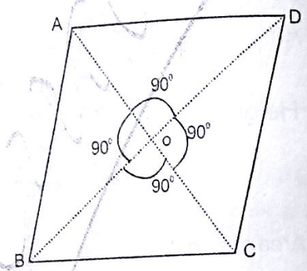
(i) Area of a parallelogram = (base × height)

(ii) Perimeter = 2 × [l + b]

(iii) Adjacent angle of A is B & D
$\angle A + \angle B = 180^0 = \angle A + \angle D$

11. Rhombus :

A quadrilateral, in which all sides are equal and parallel, called rhombus .
& suppose : ABCD is a rhombus



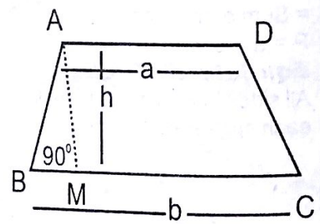
Let diagonals AC = d_1 and BD = d_2
$\angle$ AOB = $\angle$ BOC = $\angle$ COD = $\angle$ DOA = 90^0

(i) Area of Rhombus = $\frac{d_1 \times d_2}{2}$

$A = \frac{d_1 \times d_2}{2}$

12. Trapezium :

A quadrilateral, in which two sides are parallel, called trapezium.
Suppose AD =a, BC = b and AM = h

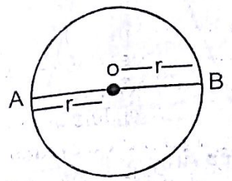


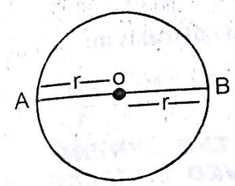
Area = $\frac{1}{2}$× (sum of parallel side× distance between them)

$A = \frac{1}{2} \times (a+b) \times h$

CIRCLE

Suppose, OA = radius
radius = r (Let)
Then Diameter = AB = 2r





(i) Area of a circle = πr^2, where $\pi = \frac{22}{7}$, r = radius

(ii) Circumference of a cirlce = $2\pi r$ where $\pi = \frac{22}{7}$, r = radius

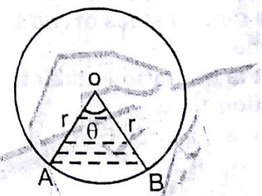
14. Semi-circle

(i) Area = $\frac{\pi r^2}{2} = \frac{1}{2}\pi r^2$

(ii) Circumference = $\frac{2\pi r}{2} + 2r$
$= \pi r + 2r$
$= r(\pi + 2)$

(iii) Length of an arc AB = $\frac{2\pi r}{2} = \pi r$

15. Sectorial Area of a circle



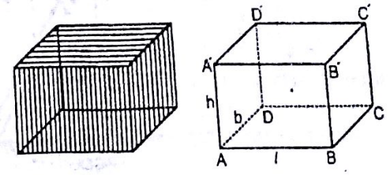
Let $\angle AOB = \theta$ then

(i) Area = $\pi r^2 \times \frac{\theta}{360^0}$

(ii) Length of an arc AB
$= 2\pi r \times \frac{\theta}{360^0}$

(iii) Circumference of AOB
$= 2\pi r \times \frac{\theta}{360^0} + 2r$

CUBOID AND CUBE:



In the given figure, a cuboid is shown. It has six faces and its each face is rectangular. Each of the opposite faces are parallel and congruent. There are three pairs of parallel faces. Two adjacent faces join in a line segment called edge. there are 12 edges in a cuboid.

SURFACE AREA OF CUBOID :
Surface area of cuboid =2(lb+bh+hl)

SURFACE AREA OF CUBE :
For cube, l=b=h=a (let)
S μ r f a c ²e a

DIAGONAL OF CUBOID.
length of diagonal of cuboid
$= \sqrt{l^2 + b^2 + h^2}$

DIAGONAL OF CUBE.
length of diagonal of cube= $a\sqrt{3}$

VOLUME OF CUBOID
Volume of cuboid (V) =
= Length x Breadth x Height
= l × b × h

VOLUME OF CUBE:
Volume of cube (V) = a^3

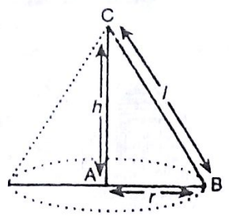
CYLINDER :
curved surface area of the cylinder
= 2 π rh
= perimeter of base x height.

WHOLE SURFACE AREA OF CYLINDER
The whole surface of a cylinder
= Curved surface +area of the base+ area of the top
= 2 π rh + π r^2 + π r^2
= 2 π rh + 2 π r^2= 2 π r(h+r).

VOLUME OF THE CYLINDER
Volume of a cylinder = area of the base x height
= π r^2 x h = π r^2h.

RIGHT CIRCULAR CONE

VOLUME OF RIGHT CIRCULAR CONE



Volume of cone = $\frac{1}{3}$(area of the base) x height

$$V = \frac{1}{3}\pi r^2 h$$

where r = radius of the base and h= height.

SLANT HEIGHT OF RIGHT CIRCULAR CONE

Slant height (l) = $\sqrt{h^2 + r^2}$,

CURVED SURFACE OF RIGHT CIRCULAR CONE

Curved surface of a cone

$= \pi r l$

where r = radius of the base, l = slant height of the cone.

TOTAL SURFACE OF RIGHT CIRCULAR CONE

Total surface of the cone

= area of the base+ area of the curved surface

i.e, total surface of the cone = (i)

$\pi r^2 + \pi r l$

$= \pi r(r + l)$

i.e, total surface of the cone = $\pi r(r + l)$. (ii)

FRUSTUM OF CONE

If a cone is cut by a plane parallel to the base of the cone, then the portion between the plane and base is called the frustum of cone. (iii)

Surface Area of Frustum :

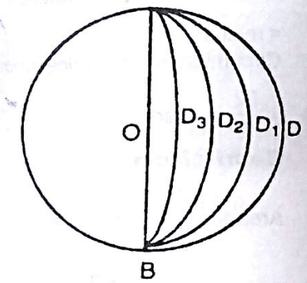
$\pi(r_1 + r_2)l$

volume of frustum

$$= \frac{\pi(r_1^2 + r_2^2 + r_1 r_2)h}{3}$$

THE SPHERE

CURVED SURFACE AREA AND VOLUME OF A SPHERE



The curved surface area of a sphere $= 4\pi r^2$, where r is the radius of the sphere,

The volume of a sphere = $\frac{4}{3}\pi r^3$,

where 'r' is the radius of the sphere.

Ex-1. **If the ratio of sides of two squares is 5 : 6, then**

What is the ratio in their areas?

Solution :

Given- $a_1 : a_2 = 5 : 6$

$A_1 : A_2 = a_1^2 : a_2^2$

$= 25 : 36$

What is the ratio in their perimeter ?

Solution :

Given $a_1 : a_2 = 5 : 6$

$P_1 : P_2 = 4a_1 : 4a_2$

$= a_1 : a_2 = 5 : 6$

What is the ratio in their diagonals ?

Solution :

Given - $a_1 : a_2 = 5 : 6$

$d_1 : d_2 = a_1\sqrt{2} : a_2\sqrt{2} = a_1 : a_2$

$= 5 : 6$

Ex-2. **A wheel makes 1000 revolutions in covering a distance of 88 km. what is the radius of wheel ?**

Solution : $2\pi r \times 1000 = 88$ km

$$2 \times \frac{22}{7} \times r \times 1000$$

$= 88000$ m

$r = 14$ m

Ex-3. **What will be the ratio of the area of a square to that of the square drawn on its diagonal?**

Solution : $\frac{A_1}{A_2} = \frac{a^2}{2a^2} = \frac{1}{2}$

$A_1 : A_2 = 1 : 2$

Ex-4. **A circle & rectangle have the same perimeter. The sides of rectangle are 18 cm & 26 cm. Find the area of a circle.**

Solution : $2\pi r = 2(l + b)$

$= 2(18 + 26)$

$2\pi r = 88$

$r = \frac{88 \times 7}{2 \times 22} = 14$ cm

$\text{Area} = \pi r^2 = \frac{22}{7} \times 14$

$\times 14. = 616$ cm²

Ex-5. **The perimeter of a circular field & a square field are same. If area of the square field is 12100 m². What is area of circular field ?**

Solution : $2\pi r = 4a$

Area of square = 12100

$a^2 = 12100$

$a = 110$

$2\pi r = 4 \times 110 = 440$

$r = \frac{440 \times 7}{2 \times 22} = 70$

$\text{Area} = \pi r^2 = \frac{22}{7} \times 70 \times 70$

$= 15400$ m²

Ex-6. **The inner circumference of circular race track, 14m wide is 440 m. What is the radius of outer circle ?**

Solution : Let r_2 be the inner radius

$2\pi r_2 = 440$

$r_2 = \frac{440 \times 7}{2 \times 22} = 70$ m

$r_1 = 70 + 14 = 84$ m.

Ex-7. **A sector of 120⁰ cut out from circle has an Area $9\frac{3}{7}$ cm² . What is radius of circle ?**

Solution : $\text{Area} = \pi r^2 \times \frac{\theta}{360^0}$

$\frac{66}{7} = \frac{22}{7} \times r^2 \times \frac{120^0}{360^0}$

$r^2 = 9,\ r = 3$

Ex-8. **The breadth of a rectangle is half of its length. If length is decreased by 5 m & breadth is increased by 5m, the area increased by 100 m². What is perimeter of rectangle ?**

Solution : $b = \frac{l}{2}$ -----(I)

$(l - 5)(b + 5) = l b + 100$

$l - b = 25$ ----(II)

(I) & (II)

$l - \frac{l}{2} = 25$

$\frac{l}{2} = 25$

$l = 50,\ b = 25$

Perimeter $= 2(50 + 25) = 150$ m.

Ex-9. **The ratio between the length & the breadth of a rectangular park is 3 : 2. If a man cycling along the boundry of the park at the speed of 12 km/h completes one round in 8 minutes, then Find the area of park.**

Solution :

Perimeter (Distance covered by man)

$2(l + b) = \frac{12 \times 1000 \times 8}{60} = 1600$ m

$2(3x + 2x) = 1600$

$10x = 1600$

$x = 160$m

$l = 3x = 480$m. $b = 320$

Area = $l \times b = 480 \times 320$

$= 153600$ m²

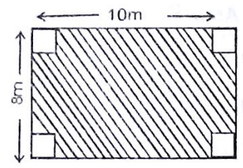
Ex-10. **A square of side 2 m is cut from the each corner of a rectangular sheet and remaining sheet is converted into an open box. Find the inner volume of the box.**

Solution. It is clear form given figure that a rectangular sheet of length 10m and 8m wide is folded and a box is formed, then

length of box = 10-4=6m

breadth of box = 8-4=4m

height of box = 2 m



Volume of box = length x breadth x height

= 6m x 4m x 2m = $48m^3$.

Ex-11. **The area of base of a right circular cylinder is 154 cm^2 and height is 10 cm. Find its volume.**

Solution: Given, Area of base =154 cm^2 and height = 10cm.

We know, Volume of right circular cylinder

$= \pi r^2 h$

= area of base x height

= 154 x 10 = 1540 cm^3.

Ex-12. **The area of the base of a right circular cylinder is 25 π cm^2. Find the diameter of the base.**

Solution: Given, Base area of cylinder

$= 25\pi$

Let the radius of the base = r

Now, area of base of cylinde = πr^2

$25\pi = \pi r^2$

$r^2 = 25$

$r = \sqrt{25} = 5cm.$

Hence, the diameter of base of cylinder

= 2x5 = 10 cm.

Ex-13. **Find the curved surface area of a cone whose height and radius of base are 4 cm and 3 cm respectively.**

Solution : Here, h=4 cm and r =3 cm.

$\therefore l = \sqrt{h^2 + r^2} = \sqrt{4^2 + 3^2}$

$= \sqrt{16 + 9} = \sqrt{25} = 5cm.$

Now, curved surface area of cone = πrl

$= \pi \times 3 \times 5$

$= 15\pi\ cm^2$.

Ex-14. **The diameter of the base of a right circular cone is 18 cm and its slant height is 15 cm. Find the height of the cone.**

Solution: Here, diameter of base of cone = 18 cm and slant height = 15 cm

$\therefore$ Radius of base of cone $= \frac{18}{2} = 9$ cm

Now, Slant height (l) = $\sqrt{h^2 + r^2}$

$\therefore \quad h = \sqrt{l^2 - r^2}$

$= \sqrt{(15)^2 - (9)^2}$

$= \sqrt{225 - 81} = \sqrt{144}$

$= 12cm.$

Hence, the vertical height of cone

= 12cm.

Ex-15. **There are two right circular cones of equal height. The radius of base of one cone is half of the radius of the other . Find the ratio of their volumes.**

Solution: here heights of each cone are equal, let the height of each cone be 'h' and radii of the cones be r_1 and r_2 respectively.

Given that $r_1 = \frac{1}{2} r_2$

i.e., $\frac{r_1}{r_2} = \frac{1}{2}$

Now, (V_1) volume of Ist cone $= \frac{1}{3}\pi r_1^2 h$

and (V_2) volume of IInd cone $= \frac{1}{3}\pi r_2^2 h$

$\therefore \frac{V_1}{V_2} = \frac{\frac{1}{3}\pi r_1^2 h}{\frac{1}{3}\pi r_2^2 h} = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$

Hence' ratio their volume = 1: 4

Ex-16. **Find the diameter of a sphere whose surface area is 100 cm^2.**

Solution: Here, surface area of sphere = 100 π cm^2

$\Rightarrow 4\pi r^2 = 100\pi$

$r^2 = 25$

$r = 5$

Hence the diameter of the sphere

= 2 × 5 = 10 cm

EXERCISE

AREA AND VOLUME

Q.1. One side of a rectangular field is 4 metres and its diagonal is 5 metres. The area of the field is:

(1) 12 m^2 (2) 20 m^2 (3) 15 m^2 (4) $\sqrt{5}m^2$ (5) None of these

Q.2. A rectangular lawn whose length is one - half times of its breadth. The area of the lawn is $\frac{2}{3}$ hectares. The length of the lawn is:

(1) 100 metres (2) $33\frac{1}{3}$ metres (3) $66\frac{2}{3}$ metres (4) $\left(\frac{100}{\sqrt{3}}\right)$ metres (5) None of these

Q.3. The length of rectangle is increased by 60% By what percent would the width have to be decreased to maintain the same area ?

(1) $37\frac{1}{2}\%$ (2) 60% (3) 75% (4) 120% (5) None of these

Q.4. A room 4m × 12m is to be carpeted by carpet 2m wide. What is the length of carpet ?

(1) 12 m (2) 36 m (3) 24 m (4) 48 m (5) None of these

Q.5. The dimensions of the floor of recangular hall is 4m ×3m. The floor of the hall is to be tile fully with 8cm × 6 cm rectangular tiles without breaking tiles to smaller sizes. The number of tiles required is:

(1) 4800 (2) 2600 (3) 2500 (4) 2400 (5) None of these

Q.6. The length of a rectangle is twice its breadth. If its length is decrease by 5 cm and breadth is increased by 5 cm, the area of rectangle is increased by 75 cm^2. therefore, the length of the rectangle is :

(1) 24 cm. (2) 30 cm. (3) 40 cm. (4) 50 cm. (5) None of these

Q.7. A 5m wide lawn is cultivated all along the outside of rectangular plot measuring 80m × 40m . The total area of the lawn is :

(1) 1200 m^2 (2) 1300 m^2 (3) 1350 m^2

(4) 4800 m^2 (5) None of these

Q.8. The length of plot is 4 times its breadth. A playground measuring 12m^2 occupies one third of the total area of the plot in metres. What is the length of plot ?

(1) 90 m. (2) 80 m. (3) 120 m. (4) 60 m. (5) None of these

Q.9. If the width of a rectangle is 3m less than its length, and its perimeter is 30m the area of the rectangle is :

(1) 224 m^2 (2) 108 m^2 (3) 99 m^2

(4) 63 m^2 (5) None of these

Q.10. If the length of a rectangle is increased by $12\frac{1}{2}\%$ and the width increased by $6\frac{1}{4}\%$, the area of the rectangle will :

(1) increase by 19.53% (2) decrease by $6\frac{1}{4}\%$ (3) increase by $19\frac{3}{4}\%$

(4) increase by 19.92% (5) increase by $18\frac{4}{5}\%$

Q.11. A rectangle is having 15 cm as its length and 150 cm^2 as its area then area is increased to $1\frac{1}{3}$ times the original area by increasing only its length, its new perimeter is :
(1) 50 cm (2) 60 cm (3) 70 cm (4) 80 cm (5) None of these

Q.12. Length of a room is 6m longer than its breadth. If the area of the room is 72 m^2, its breadth will be :
(1) 12 m (2) 6 m (3) 8 m (4) 10 m (5) None of these

Q.13. The length of the longest rod which can be laid across a floor of a rectangular room 12 m in length and 5 m in breadth will be :
(1) 17 m (2) 7 m (3)12 m (4) 13 m (5) None of these

Q.14. A man drives 4 km. distance to go around a rectangular park. If the area of the rectangle is 0.75 sq. km, the difference between the length and the breadth of the rectangle is :
(1) 10.25 km (2) 0.5 km (3) 1 km (4) 2.75 km (5) None of these

Q.15. A man walked 20m to cross a rectangular field diagonally. If the length of the field is 12m, the breadth of the field is :
(1) 4 m (2) 16 m (3) 12 m (4) 14 m (5) None of these

Q.16. If the side of square be increased by 4cm , the area increased by 60 sq. cms. The side of the square is :
(1) 12 cm (2) 13 cm (3) 14 cm (4) 5.5 cm (5) None of these

Q.17. The cost of cultivating a square field at the rate of Rs. 160 per hectare is Rs.1440 .The cost of fencing it at 75 paise per metre is.
(1) Rs. 900 (2) Rs. 1800 (3) Rs.360 (4) Rs.810 (5) None of these

Q.18. The length and breadth of square are increased by 40x and 30x respectively. The area of resulting rectangle exceeds the area of the square by:
(1) 42% (2) 62% (3) 82% (4) 52% (5) None of these

Q.19. If the side of a square be increased by 50%. What is the percent increase in area ?
(1) 50 (2) 100 (3) 125 (4) 150
(5) None of these

Q.20. The ratio of areas of two squares, one having double its diagonal than the other is :
(1) 2 : 1 (2) 3 :1 (3) 3 : 2 (4) 4 :1 (5) None of these

Q.21. Of the two square fields, the area of one is 1 hectare, while the other one is broader by 1% , the difference in areas is :
(1) 101 m^2 (2) 201 m^2 (3) 100 m^2 (4) 200 m^2 (5) None of these

Q.22. The area of rectangle is thrice that of square.Length of the rectangle is 40 cm and breadth of the rectangle is $\frac{3}{2}$ times that of the side of the square. The side of the square in cms is :
(1) 60 (2) 20 (3) 30 (4) 15 (5) None of these

Q.23. If the ratio of two squares is 16 : 1. What is the ratio of their perimeters ?
(1) 9 : 1 (2) 3 :4 (3) 3 :1 (4) 2 :1 (5) None of these

Q.24. The length and breadth of room are 1075 cm and 825 cm, respectively. The floor is to be paved with square tiles of the largest possible size. The size of each tile is ---
(1) 25 cm × 25 cm (2) 50 cm × 50 cm (3) 20 cm × 20 cm
(4) 30 cm × 30 cm (5) None of these

Q.25. Area of four walls of a room is 77m^2 . The length and breadth of the room are 11.5 m and 3.5 m respectively. The height of the room is :
(1) 7.7 m (2) 2.5 m (3) 6.77 m (4) 5.4 m (5) None of these

Q.26. Area of four walls of a room is 168 m^2 . The breadth and height of the room are 8 m and 6m respectively. The length of the room is :
(1) 14 m (2) 12 m (3) 3.5 m (4) 6 m (5) None of these

Q.27. The cost of papering four walls of a room is Rs. 48. Each one of length, breadth and height of another room as double that of the room. The cost of papering the walls of this new room is :
(1) Rs.96 (2) Rs.192 (3) Rs.384 (4) Rs.288 (5) None of these

Q.28. The length of rectangular plot is 144 m and its area is same as that of a square plot with one of its sides being 86 m.The width of the plot is :
(1) 7 m (2) 49 m (3) 14 m (4) 45 m (5) None of these

Q.29. The perimeters of both, a square and a rectangle are each equal to 48 m and the difference between their areas is 4 m^2. The breadth of the rectangle is :
(1) 10 m (2) 12 m (3) 14 m (4) 20 m (5) None of these

Q.30. The area of a parallelogram is 72 cm^2 and its altitude is twice the corresponding base.Then the length of the base is :
(1) 3 cm (2) 6 cm (3) 12 cm
(4) 8 cm (5) None of these

Q.31. If each edge of a cube is 6 cm, then find the diagonal of cube.
(1) $6\sqrt{2}$ cm (2) $6\sqrt{3}$ cm (3) $36\sqrt{2}$ cm (4) $36\sqrt{3}$ cm (5) None of these

Q.32. Find the volume of a cube whose surface area is 54 square meter.
(1) 27 m^3 (2) 9 m^3 (3) 16 m^3 (4) 81 m^3 (5) None of these

Q.33. Length of diagonal of a cube is $10\sqrt{3}$ cm, find its volume.
(1) 100 cm^3 (2) 600 cm^3 (3) 1000 cm^3 (4) 10 cm^3 (5) None of these

Q.34. The volume of a cuboid is 1728 cm^3.If height of the cuboid is 12 cm, then find area of its base,
(1) 36 cm^2 (2) 144 cm^2 (3) 48 cm^2 (4) 64 cm^2 (5) None of these

Q.35. Total surface area of a cuboid is 846 cm^2. If ratio of its length, breadth and height is 5: 4 : 3, then find the lenght , breadth and height of cuboid. (In cm.)
(1) 15,12,9 (2) 15,9,12 (3) 12,9,8 (4) 16,12,8 (5) None of these

Q.36. The base radii of two right circular cylinders are in the ratio of 1:2 and their respective heights are in the ratio of 4:1 The volume of the cylinders are in the ratio of :
(1) 1:1 (2) 1:2 (3) 2:1 (4) 4:1 (5) None of these

Q.37. A roller 2 m long and 0.7 m in diameter makes 60 revolutions in a minute on a road. The aea rolled by it is:
(1) 264 m^2 (2) 132 m^2 (3) 66 m^2 (4) 528 m^2 (5) None of these

Q.38. The volume of a cylinder is 924 m^3 and its curved surface area is 264 m^2 . The height of the cylinder is:
(1) 4m (2) 5m (3) 6 m (4) 7m. (5) None of these

Q.39. The diameter of a cylinder is 14 cm and its height is 20 cm. Then curved surface of cylinder will be:
(1) 440 cm^2 (2) 220 cm^2 (3) 880 cm^2 (4) 1760 cm^2 (5) None of these

Q.40. The radius of the base of a cone is 21 cm and the height is 20 cm. Find the volume the cone.
(1) 8460 cm^3 (2) 9240 cm^3 (3) 4620 cm^3 (4) 3230 cm^3 (5) None of these

Q.41. A right circular come of vertical height 24 cm has volume 616 cm^3. Find the area of its curved surface.
(1) 225 cm^2 (2) 1100 cm^2 (3) 550 cm^2 (4) 308 cm^2 (5) None of these

Q.42. The Diameters of two cones are equal. If their slant heights are in the ratio 5:4, find the ratio of their curved surface areas.
(1) 4 : 5 (2) 2 : 3 (3) 3 : 2 (4) 5 : 4 (5) None of these

Q.43. Find the surface area of a sphere whose volume is 4851m^3.
(1) 1386 m^2 (2) 462 m^2 (3) 198 m^2 (4) 612 m^2 (5) None of these

Q.44. Find the radius of the sphere whose curved surface area is 64 π Cm^2.
(1) 8 cm (2) 4 cm (3) 3 cm (4) 2 cm (5) None of these

Q.45. The numerical value of the volume and the surface area of a sphere are equal. Find its radius.
(1) 3 (2) 2 (3) 1 (4) 4 (5) None of these

CHAPTER-20

DATA SUFFICIENCY

INTRODUCTION

Data sufficiency has recently become a favourite question for many of the recent examinations. In this type of questions, usually a question is given followed by two or three statements. These two or three statements contain data or some pieces of information using which the question can possibly be solved. You are required to judge whether the data given is sufficient to answer the question or not.

FORMAT OF STUDY

Data sufficiency questions are not new topics in themselves. They may be covering any of the topics already covered; for example : percentage, time and work, algebra, time and distance profit and loss, S.I., C.I. average etc. Hence you should treat these questions as old-type only. Only these questions are asked in a different pattern and not the conventional pattern.

HELPING HANDS

When you are attempting a question of data sufficiency you should follow a systematic approach as laid down below. This approach being a systematic one, will save your time. Also in case you are stuck up at any point, it will help your chances of guessing a correct answer because it narrows down the possible answers from 5 to 3 or 2.

To understand this approach let us first look at the way in which such questions are usually asked : (1) Two statements D.S. (2) Three statements D.S.

In this volume we will discuss only **(1) type**.

Direction : The question given below contain two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the question ? Mark answer-

(1) If statement **I** alone is **sufficient** but statement II alone is not sufficient.

(2) If statement **II** alone is **sufficient** but statement I alone is not sufficient.

(3) If **each** statement **alone** (either I or II) is **sufficient**.

(4) If statement I and II together are not **sufficient**.

(5) If **both** statement together are **sufficient**, but neither statement alone is sufficient.

Ex-1. In a two-digit numbers, the digit at units place is 4 more than the digit at tens place.Find the two digit number.

I. Sum of their digits is 10.

II. The difference between the number and the number obtained by interchanging the position of the digits is 36.

Sol. Let the two-digit number be 10x+y

Then, y-x = 4.....(i)

I. x + y = 10 Solving (I) with (II), we get

x = 3, y = 7

Number = 10 × 3 + 7 = 37

II. |10x+y-10y-x| = 36

or, |9x - 9y| = 36 or, |x-y| = 4

we wouldn't get the value of x and y.

Therefore, only statement I alone is sufficient to answer the question.

Ex-2. What is the value of m - n ÷ 37 ?

I. m is the largest possible six-digit number and n is the smallest possible six-digit number.

II. The difference between m and n is known.

Sol.

I. m = 999999, n = 100000 ∴ ? = m - n ÷ 37

= 999999 - 100000 ÷ 37

= 999999 - 2702.70 = 997296.30

II. m - n = known, but neither the value of 'm' is known nor the value of 'n' is known. So, we cannot find the values of m-n ÷ 37 by this statement.

Ex-3. What is the average daily wages of a worker who works five days if he made Rs 80 the first day?

I. The worker made a total of Rs 400 for the first four days of work.

II. The worker made 20% more each day than he did on the previous day.

Sol. Only II statement is sufficient.

Ex-4. What is the difference between the present ages of mother and her daughter?

I. Ratio of the age of the daughter eight years hence to the present age of the mother is 3 :4.

II. Ratio of the present age of the daughter to that of the mother is 11 :20.

Sol. Statements I and II will give us the separate equations for mother and daughter. Therefore, both statements together are sufficient.

Ex-5. What is the population of state A?

I. After an increase in the population of state A by 12% it becomes 627.20 lakhs.

II. Ratio of population of state A to that of state B is 4:5.

Sol.

Population of State

$$A = \frac{627.20}{1.12} \times 100 = 560 \text{ lakhs}$$

Ex-6. What is the rate of simple interest per annum?

I. The sum triples in 20 years at simple interest.

II. The difference between the sum and the simple interest earned after 10 years is Rs 1000.

Sol.

I. $R = (3-1) \times \frac{100}{20} = 10\%$

II. Here the sum is not given. Therefore, statement I alone is sufficient.

Ex-7. The CI on a certain sum is Rs 43 .20 more than the SI on the same sum at the end of 2 years. Find the rate percent.

I. The compound interest on the same sum at the same rate of interest at the end of 2 years is Rs 1463.20.

II. The simple interest on the same sum at the end of five years is Rs 3600.

Sol. Each the statement alone is sufficient.

Ex-8. What is the time taken by Ram in reaching his school?

I. His grandfather starts his car at 9 am and drives with an average speed of 40 kmph.

II. After dropping Ram at his school, he returns home following the same path which he used while going with the same average speed, ie. 40 kmph, and reaches home at 10 am.

Sol. Halting time in dropping Ram is not given. Both the statements are not sufficient.

Ex-9. What is the speed of a running train which takes 6 seconds to cross a signal post?

I. The length of the train is 90 m.

II. The train takes 18 seconds to cross a platform180 m long.

Sol.

I. Speed of the train = $\frac{90}{6} \times \frac{18}{5}$ = 54 km/hr

II. ***Quicker Method :***

Length of train

$= \frac{\text{Length of platform}}{\text{diff. in time}} \times \text{Time}$

taken to cross a signal post

$= \frac{180}{18-6} \times 6 = 90\text{m}$

Speed of the train = $\frac{90}{6} \times \frac{18}{5} = 54$ km/hr.

Either I or II is sufficient.

Ex-10. A train crosses another train running in the opposite direction in x seconds. What is the speed of the train?

I. Both the trains are running at the same speed.

II. The first train is y cm long.

Sol. The length of the other train is not given in any of the statements.

Both the statements are not sufficient.

EXERCISE

DATA SUFFICIENCY

Q.1-32. Each of the questions given below consists of a statement and/ or a question and two statements numbered (i) and (ii) given below it. have to decide whether the data provided in the statement) is/are sufficient answer the given question.

Read both the statements and give answer (1) if the data in Statement (i) alone are sufficient to answer the question,while the data in Statement (ii) alone are not sufficient to answer the question.

Give answer (2) if the data in Statement (ii) alone are sufficient to answer question, while the data in statement (i) alone are not sufficient to answer the question'

Give answer (3) if the data either in Statement (i) or in Statement (ii) alone not sufficient to answer the question,

Give answer (3) if the data even in both Statements (i) and (ii) together are not sufficient to answer the question,

Give answer (5) if the data in both Statement (i) and (ii) together are necessary to answer the question.

Q.1. The total of the present ages of A,B,C and D is 96 years. What is B's present age ?
(i) The average age of A,B and D is 20 years.
(ii) The average age of C and D is 25 years.

Q.2. What is the average age of children in the class ?
(i) Age of the teacher is as many years as the number of children.
(ii) Average age increased by 1 year if the teacher's age is also included.

Q.3. What is the average weight of the three new team members who are recently included in the team?
(i) The average weight of the team increases by 20 kg.
(ii) The three new men substitute earlier members whose weights are 64 kg,75kg and 66 kg.

Q.4. The average age of P,Q,R and S is 30 years. How old is R ?
(i) The sum of ages of P and R is 60 years
(ii) S is 10 years younger than R.

Q.5. How old will C be after 10 years ?
(i) Five years ago, the average age of A and B was 15 years.
(ii) Average ages of A,B and C today is 20 years.

Q.6. How many children are there in the group ?
(i) Average age of the children in this group is 15 years. The total age of all the children in this group is 240 years.
(ii) The total age of all the children in the group and the teacher is 264 years. The age of the teacher is 9 years more than the average age of the children.

Q.7. What is the two digit number ?
(i) The difference between the two digits is 9.
(ii) The sum of the digits is equal to the difference between the two digits.

Q.8. What is the difference between the digits of a two-digit number?
(i) The sum of the digits of that number is 8.
(ii) One-fifth of that number is 15 less than half of 44.

Q.9. What is the ratio between the two numbers ?
(i) The sum of two numbers is twice their difference.
(ii) The smaller number is 6.

Q.10. The sum of the ages of P, Q,and R is 96 years. What is the age of Q?
(i) P is 6 years older than R
(ii) The total of the ages of Q and R is 56 years.

Q.11. A man mixes two types of rice (X and Y) and sells the mixture at the rate of Rs.17 per kg. Find his profit percentage.
(i) The rate of X is Rs 20 per kg.
(ii) The rate of Y is Rs. 13 per kg.

Q.12. What is the percent profit earned by selling the product ?
(i) The profit earned was Rs. 50.
(II) Had it been sold for Rs. 310 , the profit would have been Rs.70.

Q.13. What is the cost price of the cassette?
(i) The percent profit made when the cassette is sold for Rs. 78 is twice as much as when it is sold for Rs.69.
(ii) If the price of the cassette is marked at 20% above the cost price and discount of 10% is offered on the marked price, the seller gains 8%.

Q.14. What was the cost price of the suitcase purchased by Richard ?
(i) Richard got 20% concession on the labelled price.
(ii) Richard sold the suitcase for Rs. 2000 with 25% profit on the labelled price.

Q.15. A and B are in a partnership business of one year. At the end of the year, a Rs 20,000 was earned, what is A's share ?
(i) A invested Rs.50,000.
(ii) B withdrew his capital after 8 months.

Q.16. Two taps A and B, when opened together, can fill a tank in 6 hours. How long will it take for the pipe A alone to fill the tank ?
(i) B alone takes 5 hours more than A fill the tank.
(ii) The ratio of the time taken by A to that taken by B to fill the tank is 2 : 3.

Q.17. A tank is fitted with two inlet pipes A&B Both the pipes are kept open for 10 minutes so that the tank is two-third full and then pipe A is closed. How much time will B take to fill the remaining part of the tank ?
(i) Pipe A is thrice as fast as pipe B.
(ii) Pipe B alone can fill the tank in 60 minutes.

Q.18. How much time did X take to reach the destination?
(i) The ratio between the speeds of X and Y is 3:4.
(ii) Y takes 36 minutes to reach the same destination.

Q.19. What is the usual speed of the train?
(i) The speed of the train is increased by 25 km/hr to reach the destination 150 km away in time.
(ii) The train is late by 30 minutes.

Q.20. Two towns are connected by railway. What is the distance between them ?
(i) The speed of mail train is 12 km/hr more than that of an express train.
(ii) A mail train takes 40 minutes less than an express train to cover the distance.

Q.21. Towns A,B and C are on a straight line. Town C is between A and B. The distance A to B is 100 km. How far is A from C ?
(i) The distance from A to B is 25% more than the distance from C to B.
(ii) The distance from A to C is $\frac{1}{4}$ of the distance from C to B.

Q.22. What is the average speed of the car over the entire distance?
(i) The car covers the whole distance in four equal stretches at speeds of 10 kmph, 20 kmph 30 kmph and 60 kmph respectively.
(ii) The total time taken is 36 minutes.

Q.23. What was the speed of the running train?
(i) Length of the train was 120 metres.
(ii) The train crossed the other stationary train whose length was 180 m in 4 seconds.

Q.24. What is the speed of running train which takes 9 seconds to cross a signal post?
(i) The length of the train is 90 metres.
(ii) The train takes 27 seconds to cross a platform of 180 metres.

Q.25. What is the length of a running train?
(i) The train crossed a man in 9 seconds.
(ii) The train crosses a 240 metre long platform in 24 seconds.

Q.26. What is the rate of simple interest ?
(i) The total interest earned was Rs.4000.
(ii) The sum was invested for 4 years.

Q.27. The simple interest on a sum of money is Rs. 50. What is the sum?
(i) The interest rate is 10% p.a.
(ii) The sum earned simple interest in 10 years.

Q.28. How much money did X invest ?
(i) An increase in the rate of interest from $4\frac{7}{8}\%$ to $5\frac{1}{8}\%$ per annum increases his yearly income by Rs 25.
(ii) The sum invested gets doubled, when invested at 8% p.a. for $12\frac{1}{2}$ years.

Q.29. What percentage of simple interest per annum did Anand pay to Deepak ?
(i) Anand borrowed Rs.8000 from Deepak for four years.
(ii) Anand returned Rs.8800 to Deepak at the end of two years and settled the loan.

Q.30. What is the rate of compound interest ?
(i) The principal was invested for 4 years.
(ii) The earned interest was Rs.1491.

Q.31. What is the area of the rectangle?
(i) The difference between the sides is 5 cm.
(ii) The measure of its diagonal is 10 cm.

Q.32-40. Each of the question given below consists of a statement and or a question and three statements numbered (i), (ii) and (iii) given below it have to decide whether the data provided in the statement is/are sufficient answer the question.

Q.32. What is R's share of profit in a joint venture ?
(i) Q started business investing Rs. 80,000.
(ii) R joined him after 3 months.
(iii) P joined after 4 months with a capital of Rs. 120000 and got Rs. 6000 share of profit.
(1) (i) and (ii) only (2) (ii) and (iii) only
(3) All (i),(ii), and (iii) (4) Even not with all (i),(ii) and (iii) together
(5) None of these

Q.33. What is the difference in the share of profit between P and Q in a joint business the end of one year ?
(i) P invested Rs. 80,000 and withdrew Rs. 20,000 after 6 months.
(ii) Q joined four months after the start of business.
(iii) Q's amount was 80% of P's amount during the last six months.
(1) (i),and (ii) only (2) (ii) and (iii) only
(3) All (i),(ii), and (iii) (4) Even not with all (i),(ii) and (iii) together
(5) None of these

Q.34. A,B and C together start a business with a total investment of Rs.15,000. At the end of the year, the total profit is Rs. 3000. What is A's share of profit ?
(i) A's contribution is $\frac{3}{2}$ times that of B.
(ii) B's contribution is twice that of C.
(iii) A's contribution is thrice that of C.
(1) (i) and (ii) only (2) (ii) and (iii) only (3) All (i),(ii), and (iii)
(4) Any two of the three (5) None of these

Q.35. How many workers are required for completing the construction work in 10 days ?
(i) 20% of the work can be completed by 8 workers in 8 days.
(ii) 20 workers can complete the work in 16 days.
(iii) One-eighth of the work can be completed by 8 workers in 5 days.
(1) (i) only (2) (ii) and (iii) only (3) (iii) only
(4) (i) and (iii) only (5) Any of the three

Q.36. In how many days can the work be done by 9 men and 15 women?
(i) 6 men and 5 women can complete the work in 6 days.
(ii) 3 men and 4 women can complete the work in 10 days.
(iii) 18 men and 15 women can complete the work in 2 days.
(1) (iii) only (2) All (i),(ii),and (iii) (3) Any two
(4) Any one (5) None of these

Q.37. In how many days can 10 women finish a work ?
(i) 10 men can complete the work in 6 days.
(ii) 10 men and 10 women together can complete the work in 3-days.
(iii) If 10 men work for 3 days and there after 10 women replace them,the remaining work is completed in 4 days.
(1) Any two of the three (2) (i) and (ii) only (3) (ii) and (iii) only
(4) (i) and (iii) only (5) None of these

Q.38. What is the speed of the train ?
(i) The train crosses 300 metres long platform in 21 seconds.
(ii) The train crosses another stationary train of equal length in $19\frac{1}{2}$ seconds.
(iii) The train crosses a signal pole in $9\frac{3}{4}$ seconds.
(1) (i) & (ii) only (2) (i) and either (ii) or (iii) only
(3) (iii) & either (i) or (ii) only (4) All (i),(ii),and (iii)
(5) None of these

Q.39. What is the speed of the train ?
(i) The train crosses a signal pole in 18 seconds.
(ii) The train crosses a platform of equal length in 36 seconds.
(iii) Length of the train is 330 metres.
(1) (i) and (ii) only (2) (ii) and (iii) only (3) (i) & (iii) only
(4) (iii) and either (i) or (ii) only (5) any two of the three.

Q.40. What is the length of the train X ?
(i) Train X crosses a telegraph post in 20 seconds.
(ii) Train X crosses a platform of length 80 m in 100 seconds.
(iii) Train X passes through a tunnel 40, long in 60 seconds,
(1) (i) and either (ii) or (iii) only (2) (i) and (iii) only
(3) (ii) and either (i) or (ii) only (4) (iii) and either (i) or (ii) only
(5) any two of the three.

CHAPTER-21

DATA INTERPRETATION

Types of D.I.

(1) Tabulation (2) Bar Graphs (3) Pie- charts (4) Line-Graphs

Useful Tips :

(1) To solve D.I., first we learn some useful topic; percentage profit & loss, Ratio, Average, because these topics are used in D.I.

(2) In, income- expenditure type of D.I.
Expenditure is equivalent to C.P.
& income is equivalent to S.P.

(3) In percentage- 25% of 80 = $\frac{25}{100} \times 80 = 20$

it is equivalent to- 80% of 25 = $\frac{80}{100} \times 25 = 20$

For example : Suppose a student got 80% out of maximum mark 75. What is the marks obtained by that student ?

80% of 75 = $\frac{4}{5} \times 75$ .....($\because$ 80% = $\frac{4}{5}$)

= 60

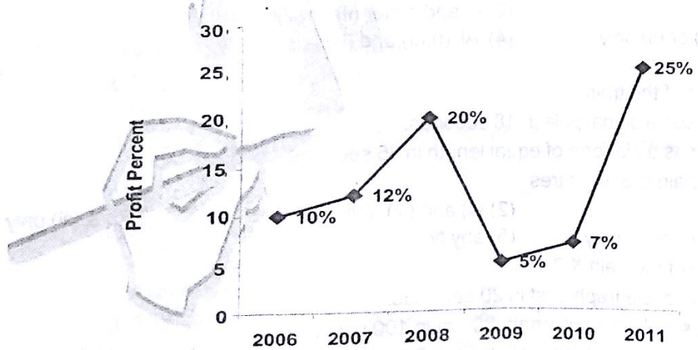
but, suppose another student got 64% marks out of maximum marks 75. What is the marks obtained by that student ?

It is difficult when we find 64% of 75 but if we find (75% = $\frac{3}{4}$)

75% of 64 = $\frac{3}{4} \times 64 = 3 \times 16 = 48$

We easily get the required answer.

(4) % profit of a company x in various years are given below in the form of line graph-



(i) In which year company x got maximum profit ?

Sol. (According to the question, most of the candidate answered year 2011 (25%) but it is not necessary) that 25% is maximum out of all given years then the value of 25% is also maximum (it may be), between (% P is always calculated on its expenditure, (expenditure is not given).

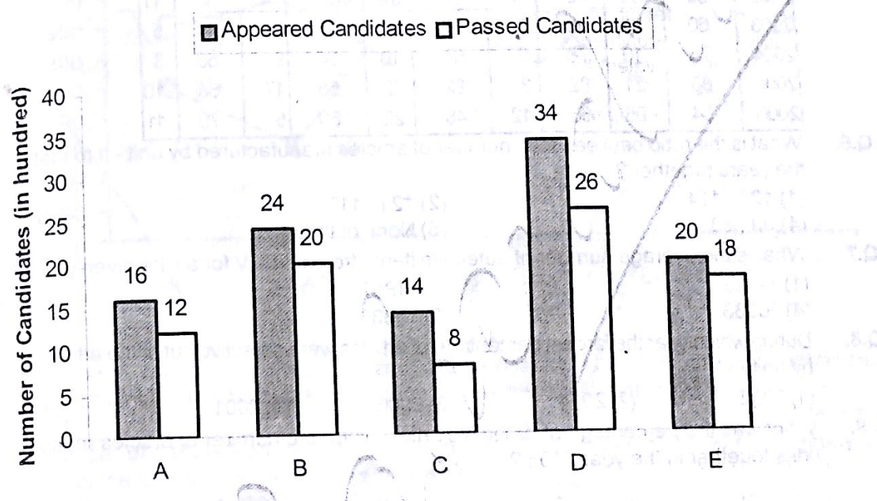
Ans. CND

(ii) In which year, company x got maximum % profit ?

Ans. 2011 (25%)

Q.1-5. Study the following graph and answer the questions that follows:-

Number of appeared candidates and passed Candidates (in hundreds) in a test from six different institutions.



Q.1. What is the ratio between the number of candidates appeared from institutions A, C and E together and candidates passed from B, D and E together?
(1) 25:8 (2) 6:11 (3) 4:7 (4) 32:7 (5) None of these

Q.2. What is the average number of candidates passed from all the institutions together?
(1) 1400 (2) 1500 (3) 1200 (4) 1800 (5) None of these

Q.3. Number of candidates passed from institutions C and D together is **approximately** what percentage of the total number of candidates appeared from institutions B and E together?
(1) 105% (2) 100% (3) 95% (4) 90% (5) 80%

Q.4. From which institution the difference between the appeared candidates and passed candidates is maximum?
(1) D (2) A (3) B (4) C (5) E

Q.5. What is the respective ratio between the number of candidates who have failed from institution B and the number of candidates who have appeared from institutions E ?
(1) 3:7 (2) 1:3 (3) 1:5 (4) 3:4 (5) None of these

SOLUTION

Q.1.(5) Required ratio = 50 : 64 = 25 : 32

Q.2.(5) Required average = $\frac{8400}{5}$

= 1680

Q.3.(5) Required % = $\frac{34}{44} \times 100 = 77\% \approx 80\%$