NEW HORIZON
COLLEGE OF ENGINEERING

DEPARTMENT OF HRD

QUANTITATIVE & REASONING ABILITY

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Module-1

DATA INTERPRETATION

What is Data Interpretation?

Data interpretation refers to the process of reviewing provided data and to use these data for calculating the required value. The data can be provided in various forms like in table format, pie chart, line graph, bar graph, caselet or a combination of these.

What is a Data Interpretation Method?

Data interpretation method is a way to analyse and help people make sense of numerical data which has been collected, analysed and presented. When a data is collected, it normally stays in a raw form, which may be difficult for the normal person to comprehend, and that is why analysts always try to break down the information gathered so that others can make sense out of it.

For instance, when Founders present their pitches to his or her potential investors, they do that by interpreting the data such as market size, growth rate, and so on for better understanding. There are two principal methods in which data interpretation can be done, such as quantitative methods and qualitative methods.

Qualitative Data Interpretation Method

The qualitative data interpretation method is used to analyse qualitative data, which is often termed as categorical data. This approach uses texts, rather than numbers or patterns to represent data.

Qualitative data requires first to be coded into numbers before it can be analysed. As the texts are usually cumbersome and take more time. Coding done by the analyst is also documented so that it can be reused by others and also examined further.

There are two main types of qualitative data, such as nominal and ordinal data.

These two data types are both performed using the same method, but ordinal data interpretation is easier than that of nominal data.

In most of the cases, ordinal data is usually labelled with numbers throughout the process of data collection, and so many times coding may not be required. This is different from nominal data that still requires to be coded for proper interpretation.

Quantitative Data Interpretation Method

The quantitative data interpretation method is used to analyse quantitative data, which is also termed as numerical data. This data type includes numbers and is therefore can be analysed with the help of numbers and not texts.

Quantitative data can be categorized into two main types, such as discrete and continuous data. Continuous data is further divided into interval data and ratio data, with all the data types being numeric.

Due to its natural existence as a number, analysts do not need to use the coding method on quantitative data before analysing it. The process of analysing quantitative data requires statistical modelling techniques namely standard deviation, mean and median

Types of Data Interpretation

Data Interpretation can be classified into a few categories such as Tabular DI, Pie Charts, Bar Graph, Line Graph, Caselet DI, Miscellaneous. Let us understand them one by one from below.

Tabular DI

In it data is provided in horizontal rows and vertical columns called tabular form. A table is one of the simplest and most convenient tools used for summarizing data and presenting it in a meaningful way. In a table, data is arranged systematically in columns and rows. While reading a table, the following parts need to be given a careful observation

Title of the Table: It gives the description of the content of the table and precisely describes the kind of data, measurements and the period for which it occurred.

Column Heading: This defines the information contained in the various columns with specifications of the unit of measurement in some cases.

Head Note: In general, the unit of measurement is specified in the head note.

Footnote: These are used to point out any exceptions in arriving at the data.

Pie Charts

It is a circular chart divided in various sectors. The sectors of the circle are constructed in such a way that the area of each sector is proportional to the

corresponding values of information provided. In pie charts total quantity is distributed over a total angle of 360° or 100%.

Pie graphs have the shape of a pie and each slice of the pie represents the portion of the entire pie allocated to each category. Here the data could be presented and converted into 360 degree or in percentage or in fraction. Many times, statisticians may use exact figures against these sectors inside or outside as the case may be.

Bar Graph

In this section, data is represented as horizontal or vertical bars. One of the parameters is given on the x-axis and other on y-axis. Here we need to understand the given information and thereafter answer the given questions. A bar graph or a bar chart that presents the grouped data with the help of rectangular bars. These bars are either horizontal or vertical and their lengths are proportional to the value that they represent.

There are two axes in the graph in which one represents particular categories being compared and the other axis shows a discrete value. Those bar graphs in which clustered groups of more than one bar are presented are known as grouped bar graphs, And, bar graphs in which bars are divided into sub parts to show cumulative effect are known as cumulative bar graphs or stacked bar graphs.

Line Graph

A line graph shows the quantitative information or a relationship between two changing quantities with a line or curve. We are required to understand the given information and thereafter answer the given questions. A line graph or a line chart is a geographical representation of the change in two variables over a period of time. A line graph is created by connecting various data points.

Each data point is obtained as a result of plotting a point when we are given the value of two variables such as one independent variable and one dependent variable. Line graphs are a small but important part of data interpretation. In line graph questions, candidates are provided with certain data in the form of a line graph. The data may be related to various categories such as the following, Average income and expenses, Comparing pie charts, population or demographics study, demand and supply, funds, distribution and utilization etc.

GENERAL TIPS TO CRACK THE DI QUESTIONS

- Read the entire question carefully - Read the complete data given in the form of values, graph etc.
- Analyze the data - Take a look and analyze the data carefully. Don't get diverted or afraid due to a lot of information and avoid skipping the information before giving a glance to it.
- Pay attention to the units - Many times, different units are used in one question. For example speed is given in km/h and time is to be calculated in seconds.
- Use of approximation - If the options are adequately far apart then you can approximate values, fractions and percentages to nearby numbers which can ease our calculations.
- Use of last Digit- Check if all options have different last digits then to find the correct. option we can just calculate the last digit of our answer (but then approximation is not at all allowed).
- Mental calculations Try to do mental calculations as frequently as possible while practicing. It will help in minimizing the time to solve the question.
- Remember the following relations

Value of sector= (Angle of sector/360°) × Total Value

Value of sector = (Percentage of sector/100) Total value

Question 1: Directions: Study the following information carefully and answer the given questions based on it.

Table shows the number of trees planted by the government in 6 different years.

Find the respective ratio between the number of neem trees planted in the year 2015 and the number of banyan trees planted in the year 2014

Year	Banyan	Neem	Teak
2013	30000	25000	15000
2014	35000	30000	5000
2015	35000	45000	10000
2016	40000	40000	25000
2017	45000	55000	35000
2018	55000	50000	40000

Solution: Number of neem trees planted in 2015 = 45000

Number of banyan trees planted in 2014 = 35000

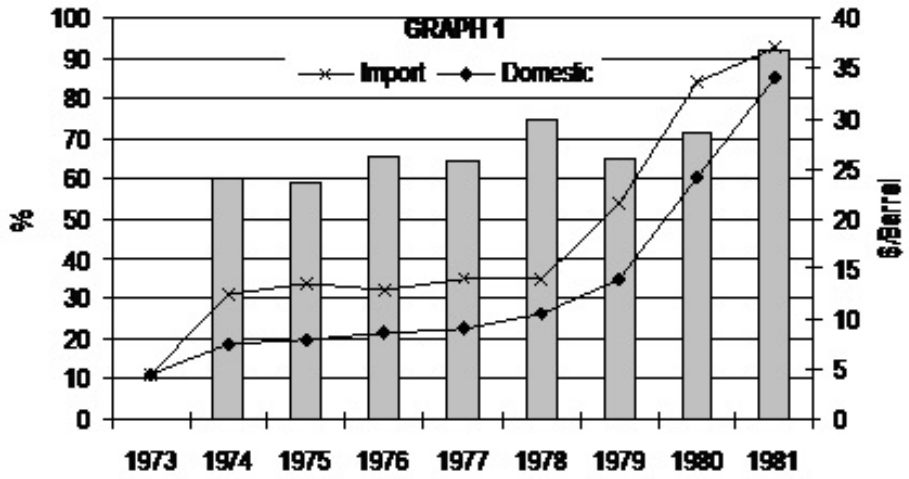
Required ratio = 45000: 35000=9:7

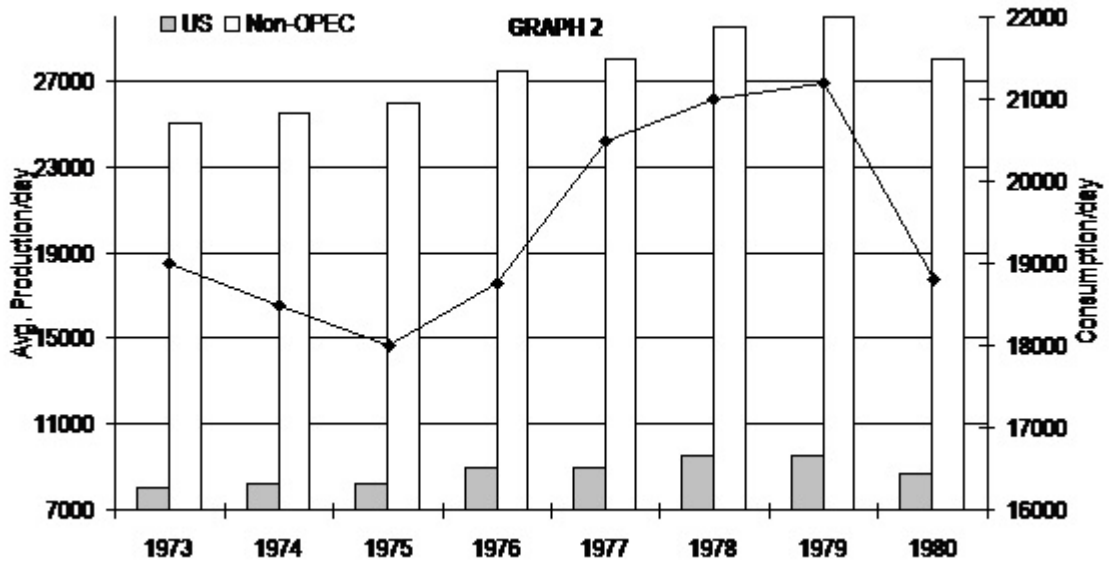
Question 2: What was the approximate average number of neem trees planted in all the years together?

Solution: Total number of neem trees planted in all the years = 25000 + 30000 + 45000 + 40000 + 55000 + 50000 = 245000

Required average = 245000/6 = 40833.33 = 40830 (approx. depends on options given in question)

Directions for questions 1 to 4: Refer to the following information on prices and production of crude oil for the period 1973-80 and answer the questions given below. In the first graph, the lines show the prices of crude oil per barrel for domestic production and imports while the bars show the domestic price as a percentage of the import price. In the second graph, the bars show average production of barrels per day in the US and Non-OPEC countries, while the line shows the consumption of oil in the US.





1. In 1979, if the US imported crude oil in order to meet demands, what is the total cost of imported crude oil?

1) USD 455,800/day 2) USD 296,800/day

3) USD 376,300/day 4) USD 251,550/day

2. What is the difference between the total cost of domestic production of crude oil in the US in 1975 and the total cost of crude oil imported by the US in order to meet demands in this year?

1) USD 49,500/day 2) USD 96,750/day

3) USD 53,625/day 4) USD 65,625/day

3. Which of the following statements is/are true?

1) The percentage change in the price of imported crude oil in 1974 is approximately 120%.

2) In 1977, the absolute difference between the percentage change in the price of domestic oil and the percentage change in the price of imported oil is approximately 2.

3) The percentage change in the consumption of oil by the US from 1973 to 1979 is -80%.

4) In 1977, the ratio of production of oil by non-OPEC countries to that by the US is 4.25.

1. I only 2. II only 3. III only 4. II and III

4. What is the difference between the percentage change in the price of imported oil and the price of domestic oil in 1976?

1) 2.55 2) -9.95 3) -19 4) 1.25

Q.1 – Ans. 4

The total consumption of crude oil in the US in 1979 is 21,200 barrels per day while the total domestic production of crude oil is 9,500 barrels per day.

This means that the US has to import 11,700 barrels of crude oil per day.
In 1979, the cost of imported crude oil was $ 21.5 per barrel.
So the total cost of imported oil is 11700? 21.5
= $ 251,550 per day.

Q.2 – Ans. 4

In 1975, the domestic production of crude oil in the US was 8250 barrels per day while the consumption was 18000 barrels per day.

This means that the US had to import 9750 barrels per day.
The price of domestic and imported oil in 1975 was $ 8 and $ 13.5 per barrel respectively.
So the total cost of domestic oil was $ 66,000 / day while the cost of imported oil was $ 131,625 per day.
Thus the required difference is $ 65,625 per day.

Q.3 – Ans. 2

The percentage change in the price of imported crude oil in 1974 is (12.5 – 4.5)/4.5? 177%.

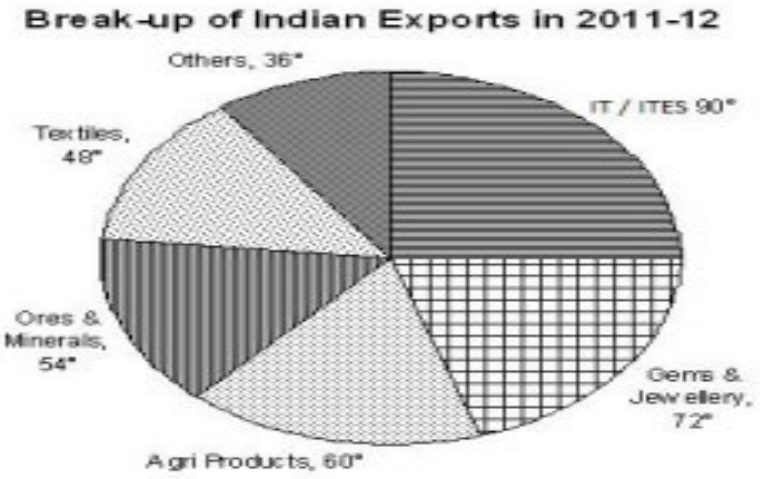
So, statement I is false.
The percentage change in the price of domestic crude oil is (9 - 8.5)/8.5? 5.88% while the percentage change in the price of imported crude oil is
(14 – 13)/13 = 7.69%.
The difference is 5.88 - 7.69 = -1.81.
So statement II is true.
The consumption of crude oil by the US has changed by (21200 – 19000)/ 19000? 11.57%.
So statement III is false.
The production of crude oil by non-OPEC countries and the US in 1977 is 28,000 and 9,000 respectively. The required ratio is 3.11. So, statement IV is false.

Q4 – Ans. 2

The price of imported oil has changed by (13 - 13.5)/13.5 = -3.7%, while the change in the price of domestic oil is (8.5 – 8)/8 = 6.25%.
The difference between these values is difference = – 3.7 – 6.25= – 9.95.

PRACTICE PROBLEMS:

Directions for Questions 1 - 6: The Pie Chart below gives the relative share of India's exports from different sectors in the year 2011-12. The total export is US $ 330 Billion.



1. In the year 2012-13 exports of Agri products increased by 44% and formed 20% of India's total exports. What is the growth in India's total exports from 2011-12 to 2012-13?

(1) 15% (2) 20% (3) 25% (4) 30%

2. What is the difference in exports of Agri Products and Ores & Minerals in 2011-12 in US $?

(1) 5.5 bn (2) 8.3 bn (3) 11 bn (4) 15 bn

3. In 2012-13, if the export of Ores & Minerals goes up by 33.33% and that of Others goes up by 30% as compared to previous year, then what is the value of exports of Ores & Minerals and Others put together in 2012-13 in billions of US $?

(1) 65.2 (2) 73.8 (3) 92.6 (4) 108.9

4. Due to cancellation of a large order, the exports of IT/ITES is revised downwards by 20%. If the Pie Chart is redrawn, then what will be the angle of the sector representing Ores & Minerals?

(1) 49.3 (2) 56 (3) 56.8 (4) 61

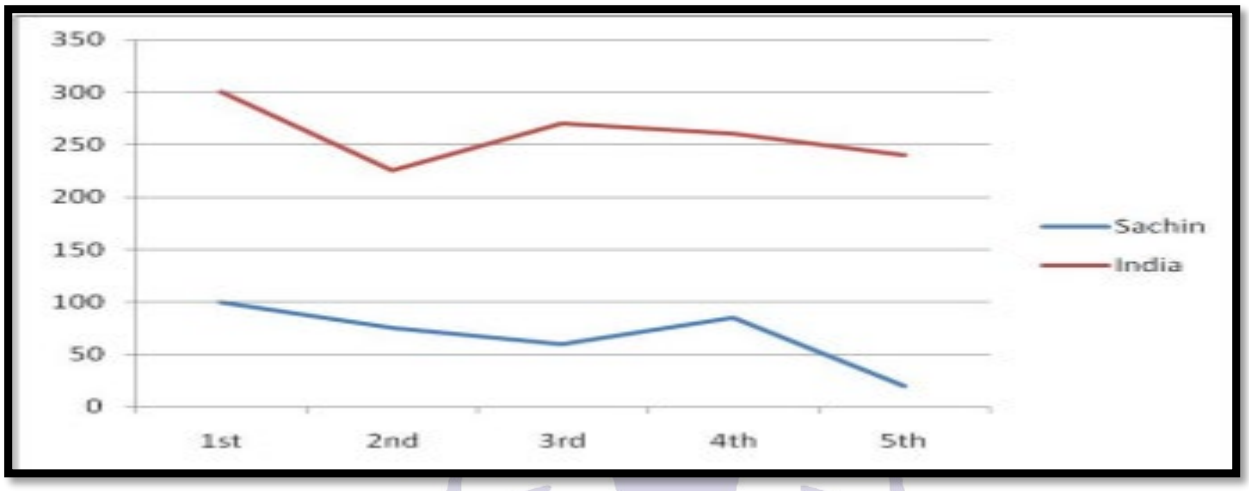
5. The Lok Ayukta of Southern States estimated that approx $ 5.5 bn of iron ore was illegally exported in 2011-12. If this amount was included in the total exports, the share of Ores & Minerals as a percentage of total exports would be?

(1) 15% (2) 16.4% (3) 17.1% (4)18.3%

6. If it is known that India's total exports grew by 20% from 2010-11 to 2011-12 and Gems & Jewellery grew by 33.33% then what is angle of Gems & Jewellery in the pie chart representing export of 2010-11?

(1) 57.6 (2) 60 (3) 64.8 (4)CBD

Directions for Questions 7 - 11: Recently the Indian cricket team played 5 one day matches against the England team. The following line diagram gives the total runs scored by India in each match and the runs scored by Sachin in these matches.



7. In these 5 matches India's highest score is what percentage more than its lowest score?

(1) 25% (2) 33.33% (3) 30% (4) 20%

8. In how many of the given matches, Sachin's percentage contribution to the total score was equal?

(1) 1 (2) 2 (3) 3 (4) 4

9. In all the five matches taken together, Sachin's total runs was approximately what percentage of India's total runs?

(1) 25% (2) 25.75% (3) 26.25% (4) 27%

10. What is the average number of runs scored by Sachin in these five matches?

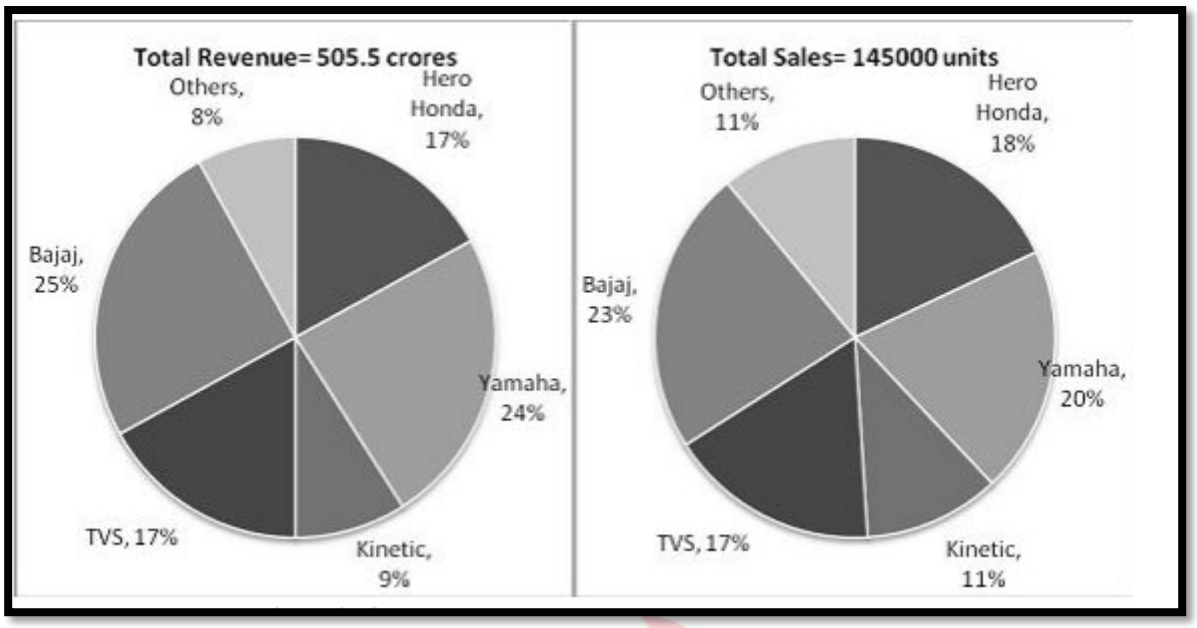
(1) 65 (2) 68 (3) 70 (4) 74

11. The average number of runs scored by Indian team is how many times the average of runs scored by Sachin?

(1) 3 (2) 3.5 (3) 3.8 (4) 4

Direction for Questions 12 - 16: Refer to the graph below:

SALES OF VARIOUS BIKE MANUFACTURERS IN JAN-MAR 2000



12. What is the average selling price (in Rs.) of a bike?

(1) 32,000 (2) 35,000 (3) 40,000 (4) 42,500

13. The company that achieves the highest realization (most expensive) for their bikes is?

(1) Bajaj (2) Yamaha (3) TVS (4) Hero Honda

14. On an average, the company whose bikes sell for the least price is?

(1) Bajaj (2) Hero Honda (3) Kinetic (4) Others

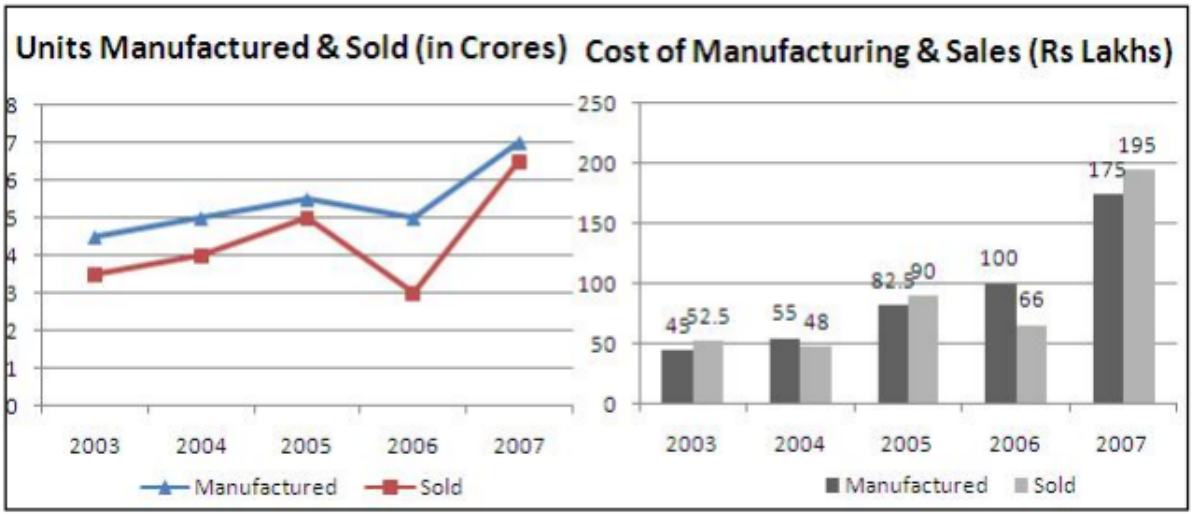
15. What is the average cost of a bike manufactured by Kinetic?

(1) 35,000 (2) 38,000 (3) 28,600 (4) 17,540

16. If TVS was to increase the price of its bikes by 10% then what would be the new share of TVS in the total revenue of the bike manufactures?

(1) 18.4% (2) 18.7% (3) 16.1% (4) 17.4%

Directions for Questions 17 - 21: Study the following graph carefully and answer the questions given below.



17. What is the ratio of the difference between the number of units manufactured and sold in the year 2005 to the difference between the number of units manufactured and sold in the year 2006?

(1) 2: 3 (2) 1: 2 (3) 1: 4 (4) 3: 5

18. What is the percentage difference between the per unit selling price and cost price in 2005?

(1) 20% (2) 25% (3) 50% (4) 9: 11

19. What is the overall profit/loss made in the given five-year period?

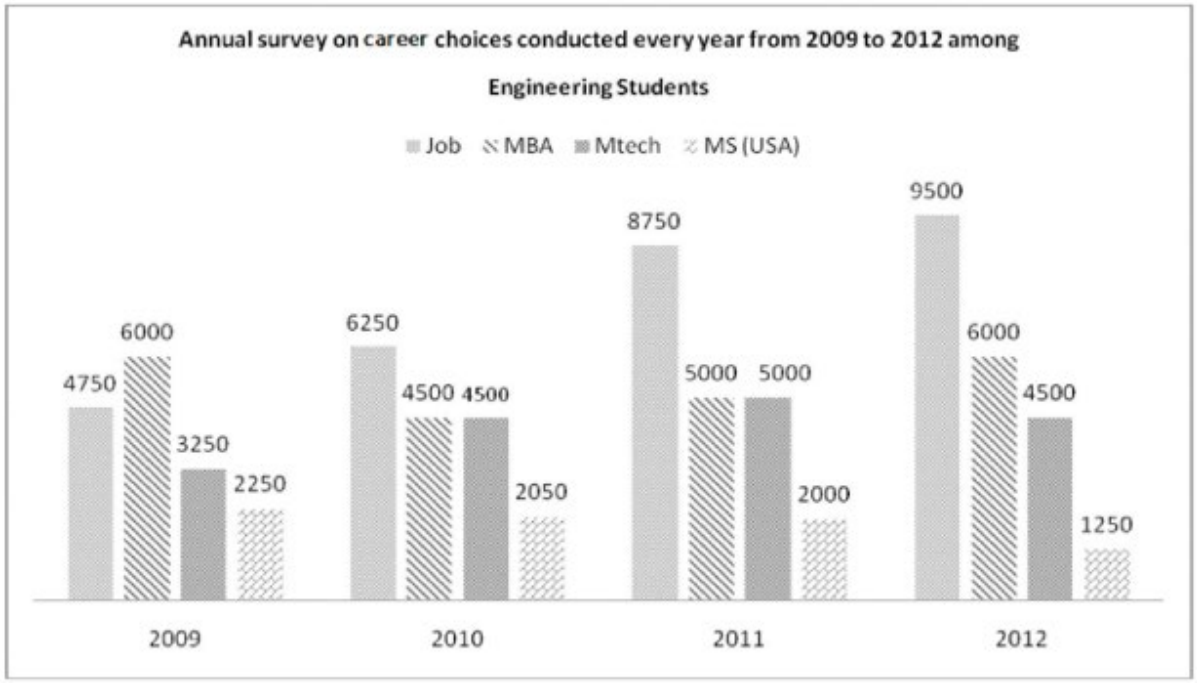
(1) Profit of 6 Lacs (2) Loss of 6 Lacs

(3) Profit of 6 Crores (4) Loss of 6 Crores

20. What is the average annual growth rate in selling price from 2003 to 2007?

(1) 100% (2) 20% (3) 25% (4) None of these

Directions for Questions 21 - 25: Answer the questions on the basis of the information given. The following Bar graph gives the student responses to an annual survey on career choices conducted every year from 2009 to 2012 among Engineering students in the city of Bangalore.



21. How many of the given career choices show a continuous trend (increase/decrease) in terms of the number of students opting for it?

(1) 4 (2) 3 (3) 2 (4) 1

22. In how many instances has the number of students choosing a particular career option increased or decreased by more than 20% over the previous year?

(1) 3 (2) 5 (3) 6 (4) 7

23. Which of the given career options has seen the least change from 2009 to 2011?

(1) MBA (2) Job (3) M.Tech (4) MS(US)

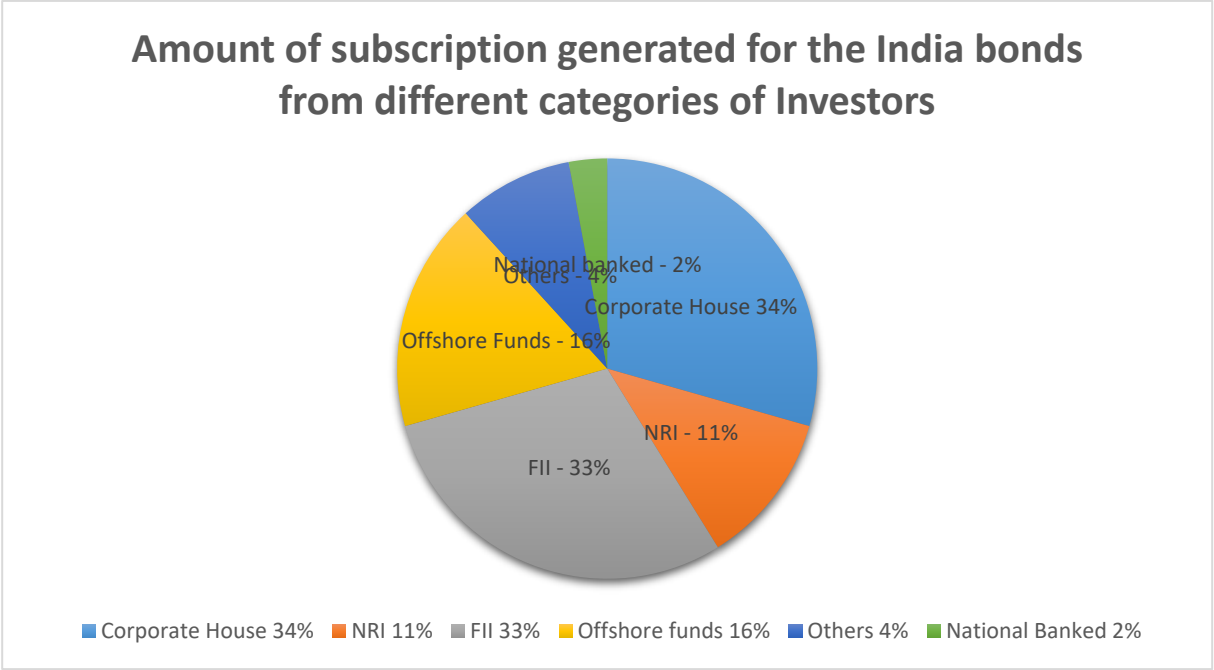
24. In the year 2011, the number of students opting for a job as a percentage of total students surveyed was? (approximately)

(1) 33% (2) 36% (3) 39% (4) 42%

25. If on an average, 2.5% of the students opting for an MBA are able to get admission into the IIMs, then how many students among those surveyed were able to obtain admission in the IIMs from 2009-12? (approx.)

(1) 538 (2) 572 (3) 590 (4)612

ASSESSMENT PROBLEMS



1. If the investment by NRI is 4000 crore, then the investment by corporate house and FII together is

   a. 24363.63 crore b. 29482.50 crore c. 30544.32 crore d. 31452.64 crore

2. How much percent of the total investment is coming from their FII or NRI?

   a. 22% b. 33% c. 44% d. 55%

3. The investment by offshore funds is how much more than the investment by NRI?

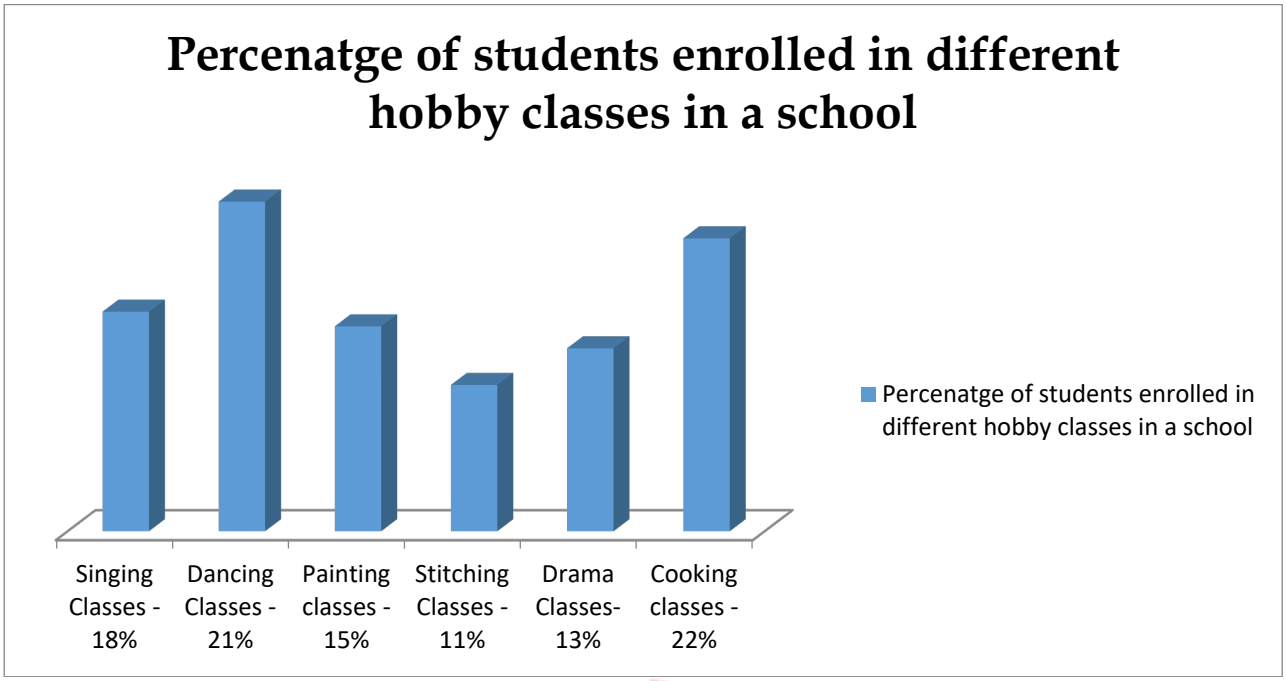
   a. 4511 crores b. 3225 crore c. 2576 crore d. CBD

4. What is the ratio of investment flows through NRI to corporate house?

   a. 8:17 b. 11:34 c. 34:11 d. 17:8

5. In the corporate sector, approximately how many degrees should be there in the central angle?

   a. 122.4° b. 136.2° c. 102° d. 150°



Total number of students = 1800

6. The number of students enrolled in cooking classes is what percent of those enrolled in dancing classes? (rounded off to two digits after decimal)
   a. 101.45% b. 104.76% c. 113.84% d. None
7. What is the total number of students enrolled in stitching and drama classes together?
   a. 684 b. 846 c. 648 d. None
8. How many students are enrolled in painting classes?
   a. 550 b. 480 c. 450 d. None
9. Number of students enrolled in painting classes is approximately what percent of those enrolled in singing classes?
   a. 78% b. 92% c. 83% d. None
10. What is the ratio of number of students enrolled in singing and dancing classes together to those enrolled in drama classes, respectively?
   a. 3:1 b. 4:7 c. 7:5 d. None

Questions 11-20: Answer the questions based on the data given in the table below:

Sales of Top Six Car Manufactures All India (in hundreds)

Mfr/Yr	2007-08	2008-09	2009-10	2010-11	2011-12
Maruti	6842	7663	9043	9766	11816

Hyundai	2242	2914	3380	3177	2933
Tata motors	2516	2365	2128	2512	2713
Mahindra	1426	1611	2303	2948	4363
Toyota	714	764	856	841	726
Honda	506	760	1072	1330	1624

11. In year 2008-09, the top 6 car manufacturers had 80% of the market share, what is the approximate market share of Mahindra?

(1) 6% (2) 8% (3) 10% (4) none of these

12. Which of the following is ranked no.3 in total sales for all the five years of given data put together?

(1) Maruti (2) Tata motors (3) Mahindra (4) Honda

13. At the end of 2007-08 Tsuneo Ohashi, the MD of Maruti, promised 100% growth in the next five years. What should be the percentage growth in 2012-13 for Maruti to make Mr. Ohashi's proclamation come true?

(1) 14.7% (2) 15.1% (3) 15.8% (4) 16.6%

14. Hyundai is expected to grow by exactly 10% in 2012-13. What should be the increase in the number of cars that Tata motors sells in 2012-13 to overtake Hyundai?

(1) 514 (2) 513 (3) 504 (4) 498

15. In the year 2009-10, by approximately what percentage are the sales of Tata Motors less than that of Hyundai?

(1) 58% (2) 49% (3) 37% (4) 33%

16. What is the difference in the market share of Maruti & Mahindra in percentage points in the year 2010-11? Assume that the given six companies are the only car manufacturers in India.

(1) 131% (2) 89% (3) 35% (4) 33%

17. Which pair of companies have shown a similar trend in sales (increase or decrease) across the five years?

(1) Maruti & Toyota (2) Tata motors & Hyundai

(3) Mahindra & Tata Motors (4) Hyundai & Toyota

18. Which company has shown the highest increase in sales in any two consecutive years?

(1) Maruti (2) Mahindra (3) Honda (4) Hyundai

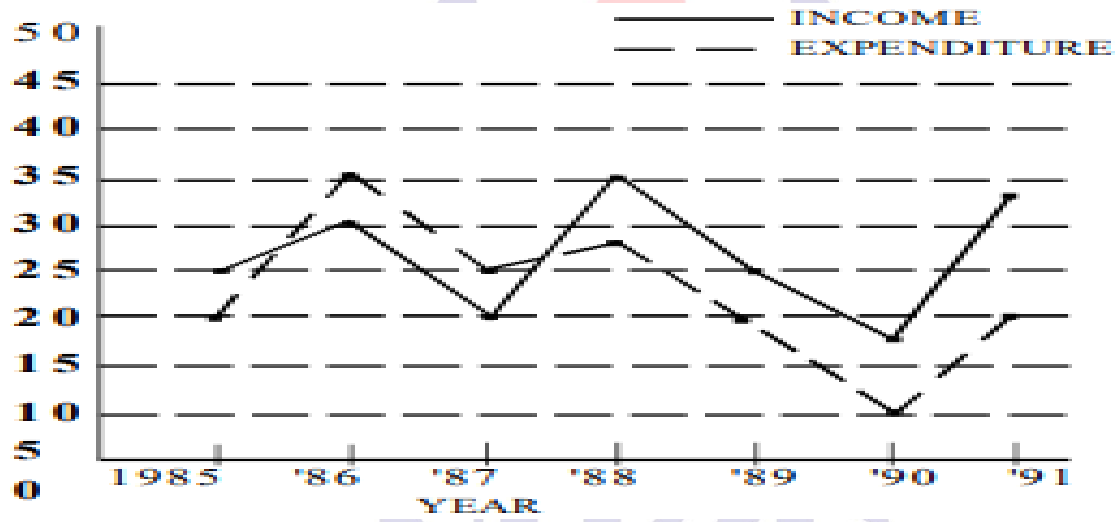
19. Which company has shown the highest percentage increase in sales in any two consecutive years?

(1) Maruti (2) Mahindra (3) Honda (4) Hyundai

20. In each of these companies the sales team is awarded a bonus if they achieve a growth of 10% or more over the previous year. In how many instances has the bonus been given in five years?

(1) 13 (2) 15 (3) 16 (4) 19

Directions (Qs. 21 - 25) : Study the following graph carefully and answer the questions given below it. Income and Expenditure of a Company over the years (Rs. in crore)



21. In which of the following years was the difference between the income and the expenditure the maximum?

1) 1988 2) 1991 3) 1986 4) 19 87

22. The income in 1987 was equal to the expenditure in which of the following years?

1) 1985 only 2) 1990 only 3) 1985, 1989 and 1991

4) 1988 and 1989

23. What was the approximate percentage drop in expenditure from 1988 to 1989?

1) 35 2) 25 3) 75 4) 40

24. What was the percentage increase in income from 1987 to 1988?

1) 175 2) 75 3)60 4)125

25. In how many of the given years was the expenditure more than the income?

1) 1 2) 3 3) 4 4) 2

Module-2

MENSURATION

A branch of mathematics that talks about the length, volume, or area of different geometric shapes is called **Mensuration**. These shapes exist either in 2-dimensions or 3-dimensions. Let's learn the difference between the two.

Differences Between 2D and 3D shapes

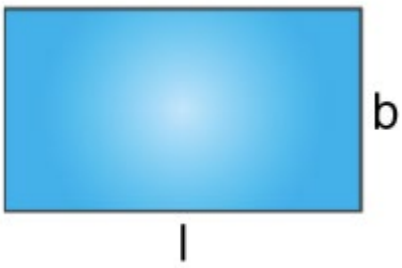
2D Shape	**3D Shape**
If a shape is surrounded by three or more straight lines in a plane, then it is a 2D shape.	If a shape is surrounded by a no. of surfaces or planes then it is a 3D shape.
These shapes have no depth or height.	These are also called solid shapes and unlike 2D they have height or depth.
These shapes have only two dimensions say length and breadth.	These are called three dimensional as they have depth (or height), breadth and length.
We can measure their area and Perimeter.	We can measure their volume, Curved Surface Area (CSA), Lateral Surface Area (LSA), or Total Surface Area (TSA).

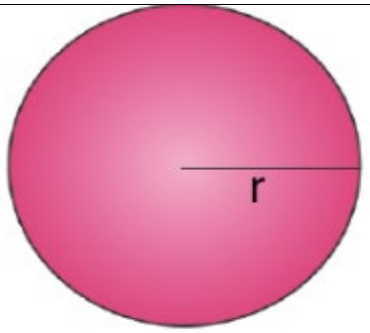
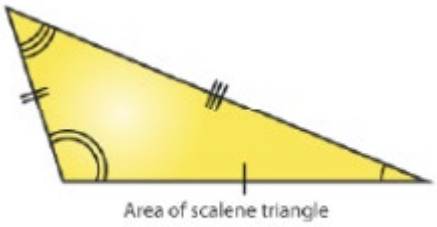
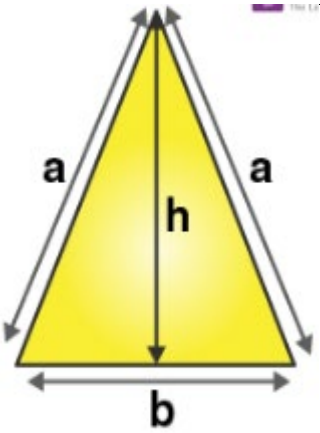
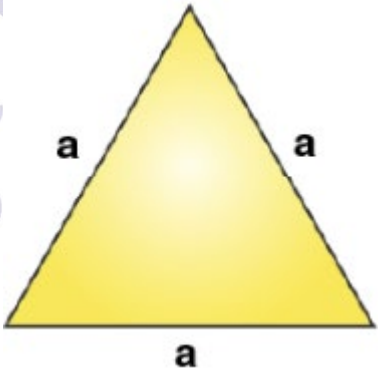
Let's learn a few more definitions related to this topic.

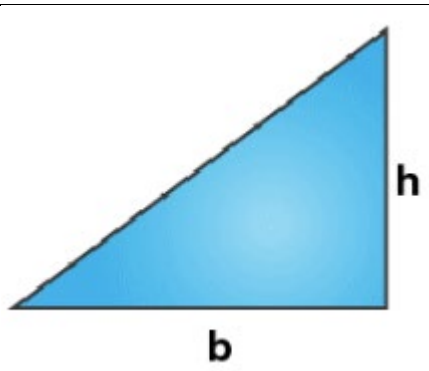
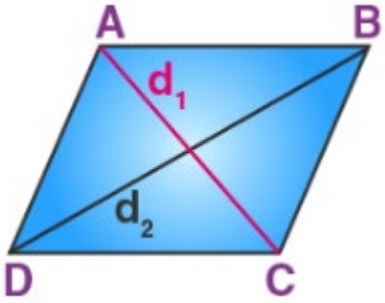
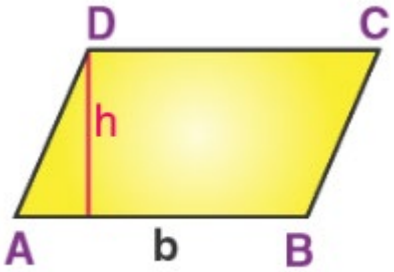
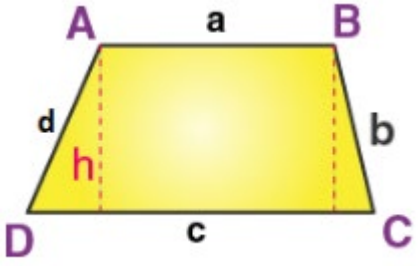
Terms	**Abbreviation**	**Unit**	**Definition**
Area	A	m^2 or cm^2	The area is the surface which is covered by the closed shape.
Perimeter	P	cm or m	The measure of the continuous line along the boundary of the given figure is called a Perimeter.
Volume	V	cm^3 or m^3	The space occupied by a 3D shape is called a Volume.
Curved Surface Area	CSA	m^2 or cm^2	If there's a curved surface, then the total area is called a

			Curved Surface area. Example: Sphere
Lateral Surface area	LSA	m^2 or cm^2	The total area of all the lateral surfaces that surrounds the given figure is called the Lateral Surface area.
Total Surface Area	TSA	m^2 or cm^2	The sum of all the curved and lateral surface areas is called the Total Surface area.
Square Unit	–	m^2 or cm^2	The area covered by a square of side one unit is called a Square unit.
Cube Unit	–	m^3 or cm^3	The volume occupied by a cube of one side one unit

Mensuration Formulas for 2D Shapes

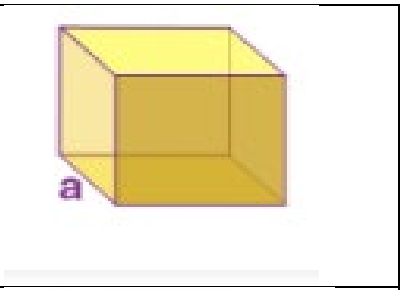
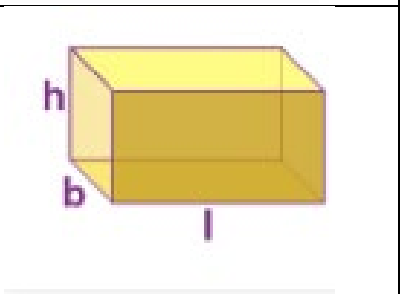
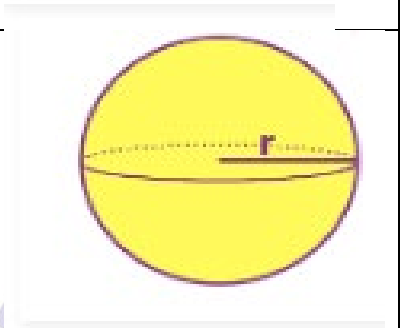
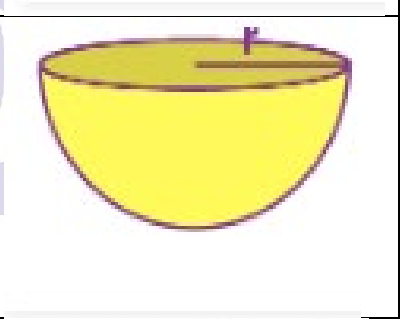
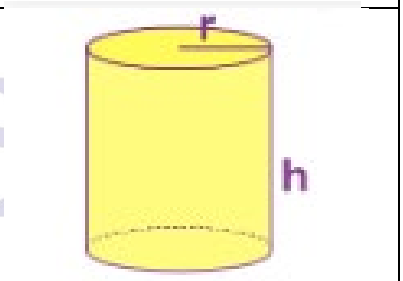
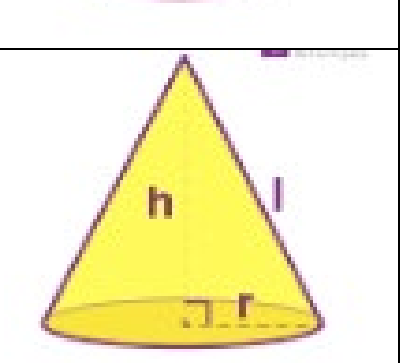
Shape	**Area (Square units)**	**Perimeter (units)**	**Figure**
Square	a^2	4a	
Rectangle	l × b	2 (l + b)	

Circle	πr^2	$2 \pi r$	
Scalene Triangle	$\sqrt{[s(s-a)(s-b)(s-c)]}$, Where, $s = (a+b+c)/2$	$a+b+c$	
Isosceles Triangle	$\frac{1}{2} \times b \times h$	$2a + b$	
Equilateral triangle	$(\sqrt{3}/4) \times a^2$	$3a$	

Right Angle Triangle	½ × b × h	b+hypotenuse+h	
Rhombus	½ × d_1 × d_2	4 × side	
Parallelogram	b × h	2(l+b)	
Trapezium	½ h(a+c)	a+b+c+d	

Mensuration Formulas for 3D Shapes

Shape	Volume (Cubic units)	Curved Surface Area (CSA) or Lateral Surface Area (LSA) (Square units)	Total Surface Area (TSA) (Square units)	Figure

Cube	a^3	LSA = 4 a^2	6 a^2	
Cuboid	l × b × h	LSA = 2h(l + b)	2 (lb +bh +hl)	
Sphere	(4/3) π r^3	4 π r^2	4 π r^2	
Hemisphere	(⅔) π r^3	2 π r^2	3 π r^2	
Cylinder	π r^2 h	2π r h	2πrh + 2πr^2	
Cone	(⅓) π r^2 h	π r l	πr (r + l)	

EXERCISE PROBLEMS:

Question 1: Find the area and perimeter of a square whose side is 5 cm.

Solution:
Given: Side = a = 5 cm
Area of a square = a2 square units
Substitute the value of "a" in the formula, we get
Area of a square = 52
A = 5 x 5 = 25
Therefore, the area of a square = 25 cm2
The perimeter of a square = 4a units
P = 4 x 5 =20
Therefore, the perimeter of a square = 20 cm.

Question 2: What is the circumference of a circle with a radius of 3.5 cm?
Solution: Given,
Radius of the circle = r = 3.5 cm
We know that,
Circumference of a circle with radius r = 2πr
Substituting r = 3.5 cm in the above formula, we get;
= 2 × (22/7) × 3.5
= 22 cm
Hence, the circumference of the circle is 22 cm.

Question 3. Find the area of an equilateral triangle whose altitude is given by (√3/2) cm.
Solution: Given,
The altitude of equilateral triangle = √3/2 cm
The formula for altitude of equilateral triangle is given by √3/2 (side)
Hence, on comparing, we get;
√3/2 = √3/2 (side)
side = 1 unit
So,
Area of equilateral triangle = √3/4 (side)2
= √3/4 (1)2
= √3/4 sq.cm.
Required, area of the triangle is √3/4 square cm.

Question 4: Find the length of the largest rod that can be kept in a cuboidal room of dimensions 10 x 15 x 6 m.
Solution: Largest rod would lie along the diagonal.
=> Length of largest rod = Length of diagonal of the room = (L2 + B2 + H2)1/2
=> Length of the largest rod = (102 + 152 + 62)1/2 = (100 + 225 + 36)1/2 = (361)1/2
=> Length of the largest rod = 19 m

Question 5: Find the number of bricks of dimension 24 x 12 x 8 cm each that would be required to make a wall 24 m long, 8 m high and 60 cm thick.

Solution: Volume of 1 brick = 24 x 12 x 8 = 2304 cm 3
Volume of wall = 2400 x 800 x 60 = 115200000 cm 3
Therefore, number of bricks required = 115200000 / 2304 = 50000

Question 6: A rectangular sheet of paper measuring 22 cm x 7 cm is rolled along the longer side to make a cylinder. Find the volume of the cylinder formed.
Solution: Let the radius of the cylinder be 'R'.
The sheet is rolled along the longer side.
=> 2 π R = 22
=> R = 3.5 cm
Also, height = 7 cm
Therefore, volume of the cylinder = π R2 H = π (3.5)2 7 = 269.5 cm3

Question 7: If each edge of a cube is increased by 10 %, what would be the percentage increase in volume?
Solution: Let the original edge length be 'a'
=> Original volume = a3
Now, new edge length = 1.1 a
=> New volume = (1.1 a)3 = 1.331 a3
=> Increase in volume = 1.331 a3 – 1 a3 = 0.331 a3
Therefore, percentage increase in the volume = (0.331 a3 / a3) x 100 = 33.1 %

Question 8: Three metal cubes of edge length 3 cm, 4 cm, 5 cm are melted to form a single cube. Find the edge length of such cube.
Solution: Volume of new cube = Volume of metal generated on melting the cubes = Sum of volumes of the three cubes
=> Volume of new cube = 3 3 + 4 3 + 5 3 = 216
=> Edge length of new cube = (216)1/3 = 6 cm

PRACTICE PROBLEMS:

1. The base of triangular field is three times its altitude. If the cost of cultivating the field at 50 per hectare be Rs. 675, then its base and height are?

   (a) 900 m and 300 m (b) 600 m and 300 m

   (c) 500 m and 200 m (d) Can't to be determined

   (e) None of these

2. The perimeter of a right triangle is 12 cm. The hypotenuse is 5 cm. The other two sides and area of the triangle are?

   (a) 3, 4 and 6 cm2 (b) 4, 3 and 12 cm2

   (c) 6, 2 and 6 cm2 (d) Can't to be determined

   (e) None of these

3. The area of a ring whose outer and inner radii are respectively 20 cm and 15 cm is?

(a) 440 cm2 (b) 550 cm2

(c) 565 cm2 (d) 675 cm2

(e) None of these

4. The minute-hand of a clock is 14 cm long. The area covered by the minute hand in 30 min is?

(a) 308 cm2 (b) 312 cm2

(c) 412 cm2 (d) 416 cm2

(e) None of these

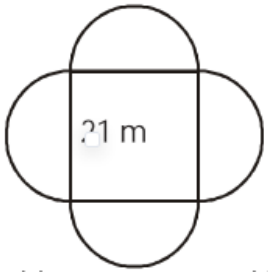
5. Two circle touch internally. The sum of their area is 116 p cm2 and distance between their centre is 6 cm. Then, the radii of the circles are?

(a) 4 cm and 9 cm (b) 5 cm and 10 cm

(c) 4 cm and 8 cm (d) 4 cm and 10 cm

(e) None of these

6. A bed of roses is like the figure given below. In the centre is a square and on each side there is a semi- circle. The side of the square is 21 m. If each rose plant needs 6m2 of space, then the number of plants in the bed is?



(a) 190 plants (b) 199 plants

(c) 201 plants (d) 200 plants

(e) None of these

7. If 'x' is the median of an equilateral triangle, then its area is?

(a) $\frac{x^2}{2}$ (b) x^2 (b) $\frac{\sqrt{3}x^2}{2}$

(d) $\frac{x^2}{\sqrt{3}}$ (e) None of these

8. A wire is in the form of a circle of radius 42 cm. It is bent into a square. The side of the square is?

(a) 33 cm (b) 66 cm

(c) 78 cm (d) 112 cm

(e) None of these

9. How many times will a wheel of diameter 105 cm rotate in covering a distance of 330 m?

(a) 100 revolutions (b) 110 revolutions

(c) 90 revolutions (d) 105 revolutions

(e) None of these

10. The length of a rectangle is increased by 60%. By what per cent would the width have to be decreased to maintain the same area?

(a) $37\frac{1}{2}\%$ (b) 60%

(c) 75% (d) 120%

(e) None of these

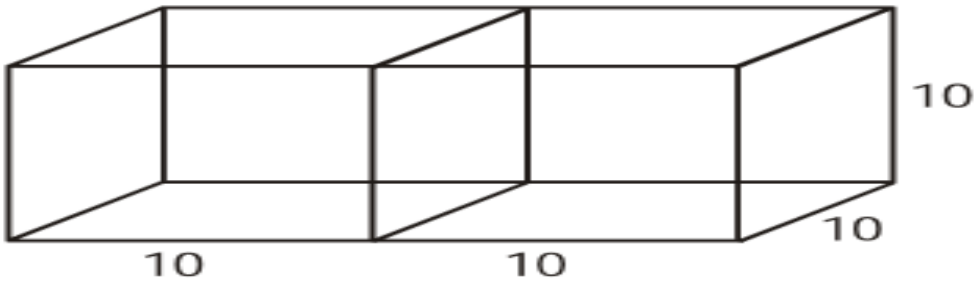
11. If the length and breadth of a rectangular plot are increased by 50% and 20% respectively, then the new area is how many times the original area?

(a)5/9 (b) 10

(c)/95 (d)7/9

(e) None of these

12. Two cubes each of 10 cm edge are joined end-to-end. Then, the surface area of the resulting cuboid is.



(a) 100 cm2 (b) 1000 cm2

(c) 2000 cm2 (d) 1500 cm2

(e) None of these

13. The areas of three adjacent faces of a cuboid are x, y and z. If its volume is V, then which is true?

(a) $V = x^3 y^2 z^2$ (b) $V^2 = xyz$ (c) $V = \sqrt[3]{xyz}$

(d) $V = \frac{x^2 y}{z}$ (e) None of these

14. The volume of a cylinder is 448 p cm3 and height 7 cm. Then, its lateral surface area and total surface area are?

(a) 349 cm^2 and 753.286 cm^2 (b) 352 cm^2 and 754.286cm^2

(c) 353 cm^2 and 755.286 cm^2 (d)351cm^2and754.682cm^2

(e) None of these

15. The radius and vertical height of a cone are 5 cm and 12 cm, respectively. Then its lateral surface area is?

(a) 202 cm2 (b) 203.1 cm2

(c) 204 cm2 (d) 204.3 cm2

(e) None of these

16. Given that the volume of a metal sphere is 38808 cm3. Then, its radius and its surface area are?

(a) 7 cm and 616 cm2 (b) 21 cm and 5544 cm2

(c) 14 cm and 2464 cm2 (d) 28 cm and 5555 cm2

(e) None of these

17. The volume of two hemispheres in the ratio 8: 27. What is the ratio of their radii?

(a) 2: 3 (b) 3: 2

(c) 1: 2 (d) 2: 1

(e) None of these

18. A copper sphere of diameter 18 cm is drawn into a wire of diameter 40 mm. Then, the length of the wire is?

(a) 243 cm (b) 343 cm

(c) 443 cm (d) 972 cm

(e) None of these

19. Each edge of a cube is increased by 50%. Then, the percentage increase in its surface area is?

(a) 125% (b) 150%

(c) 175% (d) 180%

(e) None of these

20. How many bricks each measuring 25 cm × 15 cm × 8 cm will be required to build a wall 10 m × 4 dm × 5 m when 1/ 10 of its volume is occupied by mortar?

(a) 5000 (b) 5500

(c) 6000 (d) 6500

(e) None of these

21. An equilateral triangle is cut up into smaller equilateral triangles with side 1/6 of the original. Find the number of triangles thus formed?

(a) 216 (b) 6

(c) 36 (d) 3

(e) Can't say

22. A square sheet of paper is converted into a cylinder by rolling it along its length. What is the ratio of the base radius of cylinder to the side of the square?

(a) 72: 22 (b) 7: 22

(c) 7: 44 (d) 22: 7

(e) None of these

23. A wire when bent in the form of a circle encloses an area of 1386 sq cm. What will be the enclosed area when the same wire is bent into the form of an equilateral triangle?

(a) $484\sqrt{3}$ (b) $616\sqrt{3}$ (c) $308\sqrt{3}$ (*d*)none

24. The surface area of a spherical part of a bowl with a flat circular detachable cover, excluding the cover, is 616 sq cm. The area of the cover is 38.5 sq cm. What is the volume of the bowl?

(a) 1339 cm3 (b) 1430 cm3

(c) 1570 cm3 (d) Cannot be determined

(e) None of these

25. A hemispherical bowl of internal diameter 54 cm contains a liquid. The liquid is to be filled in cylindrical bottles of radius 3 cm and height 9 cm. How many bottles are required to empty the bowl?

(a) 221 (b) 343

(c) 81 (d) 243

(e) None of these

ASSESSMENT PROBLEMS:

1. If half the diagonal of square is 5 cm, then the area of the square is:

(a) $20\sqrt{2}$ (b) 25 cm2

(b) (c) 50 cm2 (d) 100 cm2

(e) None of these

2. If the side of a square be increased by 50%, the percent increase in area is:

(a) 50 (b) 100

(c) 125 (d) 150

(e) None of these

3. The ratio of the area of a square to that of the square drawn on its diagonal is:

(a) 1: 1 (b) 1: 2

(c) 1: 3 (d) 1: 4

(e) None of these

4. The diameter of a circle circumscribing a square is 10cm. Its sides will be:

(a) 5 cm (b) 5 2 cm

(c) 10 cm (d) 10 2 cm

(e) None of these

5. If a square is inscribed in a circle, the ratio of the area of the circle and the square is:

(a)2: 1 (b) p: 2

(c) p: 1 (d) 11: 7

(e) None of these

6. A rectangular plot is 180 m2 in area. If its length is 18m then, its perimeter is?

(a) 28 m (b) 56 m

(c) 360 m (d) 60

(e) None of these

7. The side of a square exceeds the side of the another square by 4 cm and the sum of the areas of the two squares is 400 cm2. The dimensions of the square are?

(a) 8 cm and 12 cm (b) 6 cm and 10 cm

(c) 12 cm and 16 cm (d) 10 cm and 18 cm

(e) None of these

8. The area of the floor of a rectangular hall of length 40 m is 960 m2. Carpets of size 6 m × 4 m are available. Then, how many carpets are required to cover the hall?

(a) 20 (b) 30

(c) 40 (d) 45

(e) None of these

9. A lawn is in the shape of rectangle of length 60 m and width 40 m. Inside the lawn there is a footpath of uniform width 1 m bordering the lawn. The area of the path is

(a) 194 m2 (b) 196 m2

(c) 198 m2 (d) 200 m2

(e) None of these

10. What is the area of a triangle whose sides are 9 cm, 12 cm and 15 cm ?

(a) 45 cm2 (b) 54 cm2

(c) 56 cm2 (d) 64 cm2

(e) None of these

11. What is the perimeter of an equilateral triangle whose area is $4\sqrt{3}$

(a) 4 cm (b) 3 cm

(c) 12 cm (d) 7 cm

(e) None of these

12. The circumference of a circle whose area is 24.64 m2 is

(a) 17.2 m (b) 17.4 m

(c) 17.6 m (d) 18.0 m

(e) None of these

13. If the radius of a circle is decreased by 20%, then the percentage decrease in its area is?

(a) 26% (b) 32%

(c) 36% (d) 53%

(e) None of these

14. If the perimeter of a semi-circular protractor is 36 cm, then its diameter is?

(a) 6 cm (b) 7 cm

(c) 7.5 cm (d) 14 cm

(e) None of these

15. The ratio of the area of the in circle and circumcircle of a square are?

(a) 1: 1 (b) 2: 1

(c) 1: 2 (d) 3: 1

(e) None of these

16. The diagonal of a square field measures 50 m. The area of square field is?

(a) 1250 m2 (b) 1200 m2

(c) 1205 m2 (d) 1025 m2

(e) None of these

17. The circumference of a circle is 176 m. Then, its area is

(a) 2464 m2 (b) 2164 cm2

(c) 2346 cm2 (d) 2246 cm2

(e) None of these

18. In a circle of radius 42 cm, an arc subtends an angle of 72° at the centre. The length of the arc is?

(a) 52.8 cm (b) 53.8 cm

(c) 72.8 cm (d) 79.8 cm

(e) None of these

19. The perimeter of an isosceles triangle is equal to 14 cm; the lateral side is to the base in the ratio 5:4. The area of the triangle is

a. $12\sqrt{21}$ b. $32\sqrt{21}$

c. $\sqrt{21}$ d. $2\sqrt{21}$

20. The length of a rectangle is 2 cm more than its breadth. The perimeter is 48 cm. The area of the rectangle (in cm2) is?

(a) 96 cm2 (b) 128 cm2

(c) 143 cm2 (d) 144 cm2

(e) None of these

21. The cost of levelling a rectangular ground at Rs. 1.25 per sq. meter is Rs. 900. If the length of the ground is 30 meters, then the width is?

(a) 330 meters
(b) 34 meters
(c) 24 meters
(d) 18 meters
(e) None of these

22. The length of a rectangle is twice its breadth. If its length is decreased by 5 cm and breadth is increase by 5 cm, the area of the rectangle is increased by 75 cm2. then the length of the rectangle is:

(a) 20 cm
(b) 30 cm
(c) 40 cm
(d) 50 cm
(e) None of these

23. The dimensions of the floor of a rectangular hall are 4m × 3m. The floor of the hall is to be tiled fully with 8 cm × 6 cm rectangular is without breaking tiles to smaller size. The number of tiles required:

(a) 4800
(b) 2600
(c) 2500
(d) 2400
(e) None of these

24. The number of marble slabs of size 20 cm × 30 cm required to pave the floor of a square room of side 3 m, is:

(a) 150
(b) 100
(c) 25
(d) 225
(e) None of these

25. If the perimeter of a rectangular field is 200 m and its breadth is 40 m then its area is (in m2):

(a) 1200
(b) 2400
(c) 4800
(d) 6000
(e) None of these

MODULE- 3

ANALOGY, CODING AND DECODING

Almost every test of reasoning contains questions on coding. In such questions, generally one word and its code are given, and the students are required to find the logic behind it. Then they have to apply the same logic to another word.

Some of the major types of coding logics are:

1. Constant addition in the position of letters.
2. Constant subtraction in the position of letters.
3. Denoting the position of letters in the whole alphabetical order.
4. Addition of the positions of all the letters to make code for the word.
5. Constant addition and subtraction alternatively in the position of all the letters.
6. Square of the number of letters in the word.
7. Arranging the letters in the alphabetical order.
8. Arrangement of letters in the word given in reverse order.
9. Interchanging each pair of the letters, in the given word.
10. Constant addition and then reversal of the letters to form the final word.

Some important coding decoding tricks & tips:

The following method can be employed to learn the alphabetical order.

There are exactly 26 letters in English Language.

A-Z- (1 to 26),

A-1, B-2, C-3,... and so on.

A_1	B_2	C_3	D_4	**E_5**
F_6	G_7	H_8	I_9	**J_{10}**
K_{11}	L_{12}	M_{13}	N_{14}	**O_{15}**
P_{16}	Q_{17}	R_{18}	S_{19}	**T_{20}**

U_{21}	V_{22}	W_{23}	X_{24}	**Y_{25}**

Z_{26}

Solved Examples:

1) In a certain code 'MISSIONS' is written as 'MSIISNOS'. How is 'ONLINE' written in that code?

1. OLNNIE 2. ONILEN 3. NOILEN

4. LNOENI 5.ONNLIE

Sol: Option 1

First and last letter remain same. The others interchange their positions in pair of two. So, NL become LN ,IN become NI so code of ONLINE will be OLNNIE

2) In certain code 'TIGER' is written as 'QDFHS'. How is 'FISH' written in that code?

1. GERH 2. GRHE 3. GREH

4. GHRE 5. GEHR

Sol: Option 2

Reverse the word and move each letter –1. Reverse of FISH is HSIF subtract 1 from each letter of HSIF. So code of FISH become GRHE.

3)In certain code 'FROZEN' is written as 'OFAPSG'. Then how would 'MOLTEN' be written in that code?

1. OFPOMN 2. OFSMPN 3. OFUMPN

4. OFUNPM

Sol: Option 3

Reverse the word and move each letter +1. Reverse of MOLTEN is NETLOM add 1 to each letter of NETLOM. So, code of MOLTEN become OFUMPN.

4) In a certain code 'ROAR' is written as 'URDU'. How is 'URDU' written in that code?

1. VXDQ 2. XUGX 3. ROAR

4. VSOV 5. VZCP

Sol: Option 2

Each letter moves +3. Add 3 to each letter of URDU, so code of URDU will be XUGX

5) In a certain code 'LIMCA' is written as 'HJLDZ'. Which of the following words is written as 'IFWJBP'?

1. MEXICO 2. MERCURY 3. JAPAN

4. MIDNIGHT

Sol: Option 1

Each letter moves +1, -1, ... alternately except for L, which is –4. We have to find the word for the code IFWJBP. Add 4 to I then -1, +1 alternately to the remaining letters. The word will be MEXICO.

6) In certain code 'HILTON' is written as 'I H T L N O'. How is 'BILLION' written in that code?

1. IBLLION 2. IBOILLN 3. IBLLOIN

4. IBLOILN

Sol: Option 3

Letters are interchanged in each pair. So code of BI become IB, IO become OI. So code BILLION will be IBLLOIN

7)If in the English alphabet, every alternate letter from B onwards is written in small letters while others are written in capitals, then how will the 3rd day from Tuesday will be coded?

1. WeDNeSdAY 2. WEdnESdAY 3. THURSdAY

4. FrIdAY

Sol: Option 4

The small letters are b, d, f, h, j, l, n, p, r, t, v, x, z. The third day from tuesday will be friday and code will be frIdAY.

9)If the letters of the word 'CYCLINDER' are arranged alphabetically, then which letter would be farthest from the first letter of word?

1. N 2. E 3. Y 4. R

Sol: Option 3

Last letter is ‘Y’.

10)In a certain code 'CERTAIN' is coded as 'BFQUZJM'. How is 'MUNDANE' coded in that code?

1. LVMEZOD 2. NTCOMBF 3. NTOCNBF 4. LTMCZOF

Sol: Option 1

Each letter moves -1, +1 alternately. So, M - 1 = L, U + 1 = V and so on. So code for MUNDANE will be LVMEZOD

11) In a certain code 'SEQUENCE' is coded as 'FDOFVRFT. How is 'CHILDREN' coded in that code?

1. OFESJMID 2. OFSEMJID 3. OFSEJIMD 4. OFSEJMID

Sol: Option 2

Reverse the word and +1 to each letter. The reverse of CHILDREN is NERDLIHC. add 1 to each letter. Therefore, the code of CHILDREN becomes OFSEMJID

PRACTICE PROBLEMS:

Find the next term in the series:

1. 11, 42, 93, 164, 255, ?

(A) 336 (B) 633 (C) 663 (D) 366

2. 8, 64, 512, 4096, 32768, ?

(A) 2258144 (B) 262144 (C) 232554 (D) None of these

3. 82, 4, 55, 5, 94, ?

(A) 7 (B) 8 (C) 9 (D) 6

4. 1,2,3,3,5,5,7,7,9,11,11, 13,? ,?

(A) 13,15 (B) 15,13 (C) 13,17 (D) 17,13

5. 13, 43, 76, 142, 382, ?

(A) 665 (B) 664 (C) 662 (D)764

Identify the 'odd' number from the given choices:

6. 100, 121, 144, 159, 196

(A) 121 (B) 144 (C) 159 (D) 196

7. 23, 47, 97, 191, 383

(A) 47 (B) 97 (C) 191 (D) 383

8. 59, 61, 63, 71, 73

(A) 59 (B) 61 (C) 63 (D) 73

9. 11, 12, 26, 79, 328

(A) 12 (B) 26 (C) 79 (D) 328

10. 4, 6, 12, 30, 66

(A) 6 (B) 12 (C) 30 (D) 66

Identify the next character in each series from the given choices.

11. CEH, DGK, EIN, ?

(A) FKQ (B) FLO (C) GKO (D) FOK

12. B, D, G, I, L, ?

(A) M (B) N (C) O (D) P

13. JF, FM, MA, AM, MJ, ?

(A) JM (B) JF (C) JJ (D) JA

14. BAT, DCV, FEX, ?

(A) HGI (B) HGZ (C) HIJ (D) HGY

15. I, B, G, Y, ?

(A) Z (B) O (C) E (D) F

16. C4F, E6I, G9L, I13O, ?

(A) K17R (B) K18R (C) L18R (D) K18S

17. OTT, FFS, SEN, ?

(A) NNT (B) TEN (C) NMP (D) TET

18. D, I, P, Y, J, ?

(A) P (B) V (C) W (D) Z

19. DGI, KNP, PSU, ?

(A) NQT (B) NQS (C) NRT (D) NMN

20. BIP, ELR, HOT, KRV, ?

(A) NUX (B) NUY (C) MTY (D) MTX

Coding &Decoding

21. In a certain code language, if a word PEN = 35, BOOK = 43, then PAPER is?

(A) 55 (B) 56 (C) 57 (D) 58

22. In a certain code language, if APPLE is coded as 10, CABBAGE is coded as 3, then the word ORANGE will be coded as

(A) 17 (B) 6 (C) 10 (D) 11

23. If SHIP is written as PEFM, what is the code for BOAT?

(A) DQCW (B) ERDX (C) YLXQ (D) ZMYR

24. In a certain code, if SHOOT is written as TGPNU, how should WATER be written?

(A) XZUDS (B) XBUFS (C) VZSDQ (D) VBSFQ

25. If WHITE is coded as 5209823, what is the code for BLACK?

(A) 1131122 (B) 1131212 (C) 2121311 (D) 2211311

26. If in a certain code language "sim min tin" means "wild animal dangerous", "min ken pit" means "one pet animal", "kim pin pit" means "pet and will", then how will ken" be coded in that language?

(A) Pet (B) Animal (C) One (D) and

Directions (27 – 30): Study the following information arrangement carefully and answer the questions given below:

With a certain code language,

'alarm forest cuddle morning' is written as '%f6! m7 #a5 @c6',

'sight fire making criticism' is written as '#c9 @f4 %s5! m6',

'raising center recent alarm' is written as '@c6 %r6 #a5! r7',

'strike arm ignoring sight' is written as '! i8 %s5 @s6 #a3'.

27. What is the code for 'raising'?

(A)! r7 (B) @c6 (C) #a5 (D) %r6

28. What is the code for 'fire arm morning'?

(A) @c6! m6 %s5 (B) #a3! i8 @c6

(C) @f4! m7 #a3 (D) None of these

29. What does '@s6 %s5! m6' stand for?

(A) ignoring cuddle forest (B) sight morning arm

(C) making strike sight (D) strike raising fire

30. What could be the code for 'surfeit attempt alarm'?

(A) %a6 #a5 @s6 (B) #a5 %s7 %a7

(C) %s8 #a5 @s4 (D) #a5 #a3 !m4

ASSESMENT PROBLEMS:

1.If TRUTH is coded as SUQSTVSUGI, then how will LIES be coded?

(A) KMJHDFTR (B) KMHJDFRT

(C) HJDFRTKM (D) KMJHFDTR

2.If 'CHAMBER' is coded as 'XSZNYVI', how will coded word 'WLFYOV' relate to the basic word through that coding language?

(A) DOVBLE (B) DOUCLF

(C) DLUBOE (D) DOUBLE

3. If in a coded language 'PEASANT' is written as 'RQYVYHN', how will 'RANCHER' be written in the same language?

(A) PHFFPDL (B) PLDPHFF

(C) PHFFLDP (D) PFFHLDP

4. If in a certain code language 'MANUAL' is coded as '1311421112', 'TRIANGLE' is coded as '201891147125', then how will 'FIVE' be coded in that language?

(A) 65229 (B) 69225 (C) 62925 (D) 62295

5. If in a certain code language 'GOOD' is coded as '20121223', 'ONE' is coded as '121322', then how will 'FRUIT' be coded in that language?

(A) 2196187 (B) 2196178 (C) 2198167 (D) 2169187

6. In a certain code language '123' stands for 'I am servant', '279' stands for 'servant always miserable', and '684' stands for 'poverty is curse'. Then, 'miserable' stands for which numeric?

(A) 2 (B) 7 (C) 9 (D)CBD

7. In a certain code language, '493' means 'Friendship Big Challenge', '961' means 'Struggle Big Exam' and '178' means 'Exam Confidential Subject'. What does 'Confidential' stand for?

(A) 7 or 8 (B) 7 or 9 (C) 8 (D) 8 or 1

8.In a code language '157' means 'mother always lovable', '619' means 'always happy future' and '952' means 'mother very happy'. What does the word 'future' stand for in the same language?

(A) 9 (B) 6 (C) 1 (D CBD

9. In a certain code language, 'WEAVE' is written as 'FEZVX'. How WILL 'ELEVATE' be written in that code language?

(A) ELFUATF (B) FLEAUTF (C) FLEUAFT (D) FLEUATF

10.If DEMOCRATIC is written as EDMORCATCI, how CONTINUOUS will be written in the same code?

(A) OCTNNIOUSU (B) OTCNINUOUS

(C) OCNTNIUOSU (D)CONNITUOSU

11. In a certain code language 'what else can you do for me Mr Ajay' is written as 'you Mr what can Ajay else do me for'. How will 'anyone else who can do such favour to me' be written in that code language?

(A) Can to who anyone me else do favour such
(B) Can favour anyone who me else do to such
(C) Can to anyone who me else do such favour
(D) Can to anyone who me do else favour such

12. In a certain code language '975' means 'throw away garbage', '528' means 'give away smoking' and '213' means 'smoking is harmful'. Which digit in that code language means 'smoking'?

(A) 5 (B) 8 (C) 2 (D) 3

13. In a certain code, 'bi n pi' means 'some good books', 'n bat lik' means 'some real characters', 'pi lik tl' means 'many good characters'. Then what is the code of 'Many good books'

(A) tl pi bi (B) pi bat bi (C) n pi bi (D) n bat bi

14. In a certain code language, 'veny heny steny' means 'get outman'; 'steny shomy shelt' means 'out of danger'. Which is the word for 'steny' in that code language?

(A) man (B) of (C) out (D) danger

15. 165135 is to 'PEACE' as 1215225 is to

(A) LEAD (B) LOVE (C) LOOP (D) AURA

16. In a certain code language 'DESCRIBE' is written as 'FCJSDTFE'. How will 'CONSIDER' be written in that code language?

(A) SFEJTOPD (B) SEFJTOPD (C) QFETJOPD (D) QEFJTOPD

17. If FRIEND is coded as HUMJTK, how is CANDLE written in that code?

(A) EDRIRL (B) DCQHQK (C) ESJFME (D) DEQJQM

18. If the word 'LEADER' is coded as 20-13-9-12-13-26, how would you write 'LIGHT'?

(A) 20-16-17-15-27 (B) 20-15-16-18-23

(C) 20-17-15-16-28 (D) 20-16-15-17-22

19. In a certain coded language if 'MOBILE' is coded '13-U-2-O-12-I' and 'GADGET' is coded as '7- E-4-7-I-20', then how is the word 'IPHONE' coded in that language?

(A) 9-16-8-I-14-I (B) O-16-8-15-14-I

(C) O-16-8-U-14-I (D) J-16-8-P-14-F

20. If in a certain code, DIAGRAM is written as AFXDOXJ, then how can PICTURE be written in that code?

(A) NGARSPC (B) MGAQRPB (C) NFYQROC (D) MFZQROB

21. If LACK is written as 396, then BACK is written as

(A) 56 (B) 72 (C) 66 (D) 86

22. In a certain language, C is 5 and CEAT is written as 37. Then, JAPAN is

(A) 56 (B) 47 (C) 52 (D) 42

23. In a certain coding system, PAPER is written as PERPA and SUBJECT is written as JECTSUB, what should be the code for COUNCIL?

(A) NCILCOU (B) LICNOUC (C) NCOUCIL (D) NLICUOC

24. If RED is coded as 6720, then how would GREEN be coded?

(A) 16717209 (B) 1677209 (C) 9207716 (D) 1677199

25. If 'SYNDICATE' is written as 'SYTENDCAI', then how can 'PSYCHOTIC' be written?

(A) PSYICTCOH (B) PSYCOHTCI (C) PSICYOCTH (D) PSICYCOTH

26. If the code for 'KAMAL' = '1626142615', then find the code for 'NO'.

(A) 1312 (B) 13125 (C) 1213 (D) 192406

27. If 'NINE' is coded as 'OMJHOMFD', then 'LOT' is coded as

(A) MKPNUS (B) KMPNUS (C) MKNPUS (D) MKPNSU

28. In a particular code, 'IUIJT' means 'GREEN'. What does XLSQKA mean in the same code?

(A) VIOLET (B) ORANGE (C) INDIGO (D) PURPLE

29. In a certain code language, the word 'HEAD' is written as 'IFBE' and 'IRON' is written as 'JSPO'. How is the word 'JANE' be written in that code?

(A) KBOF (B) BFOB (C) KOBF (D) KBFO

30. In a certain code, LIFE is written as KMHJEGDF. How is WORD written in that code?

(A) XVPNSQCE (B) XVPNSQEC (C) VXNPQSCE (D) VXNPQSEC

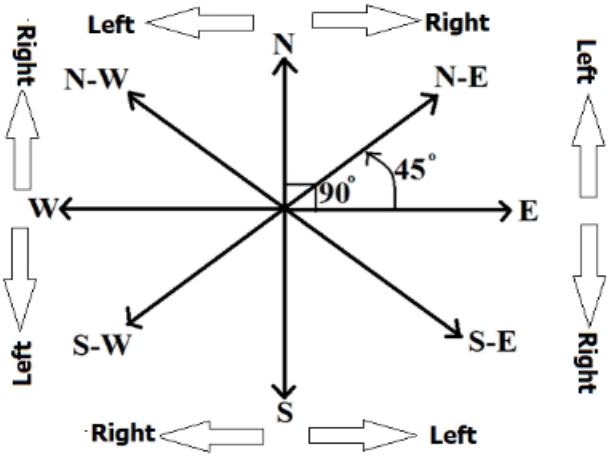
MODULE- 4

DIRECTIONS

Directions sense questions are based on two principles:

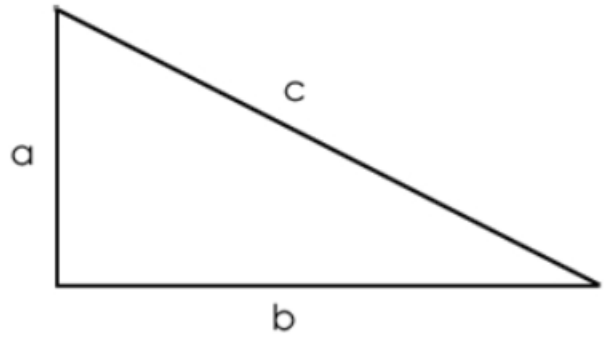
1) Distance
2) Direction

Directions:



Concept of Pythagoras Theorem:

In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.



$c^2=a^2 + b^2$

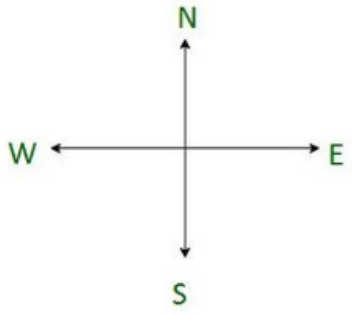
Note:

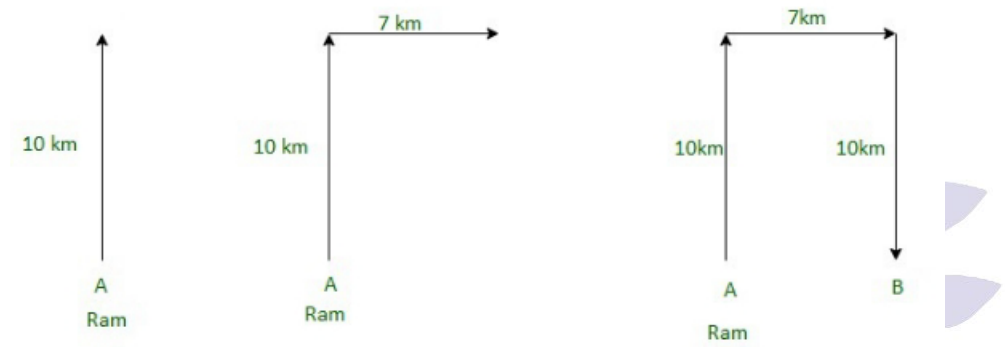
1. Whenever a person moves to his left side, he will move towards anti-clockwise direction.
2. Whenever a person moves to his right side, he will move towards clockwise direction.

SOLVED EXAMPLES:

Example 1- Ram starts from a point A walks 10 km north, then turns right and walks for 7 km, then turns right again and walks for another 10 km. And reaches point B. How far is Ram from the starting point?

Solution – Now, according to the question, and the directions in mind,

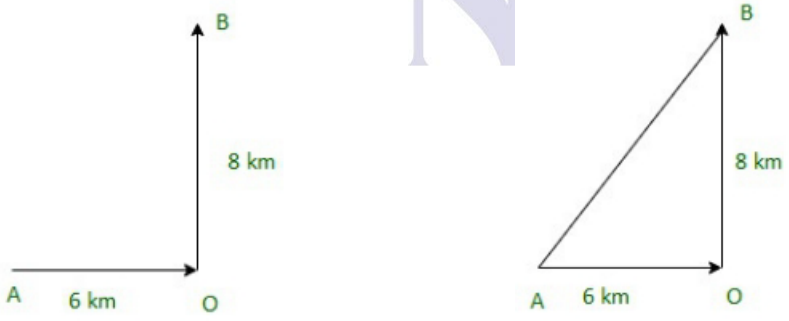




So, from the above image it is clear that ram is 7 km away from the starting point.

Example 2 – Sam started walking from point A towards East and walked for 6 km, then he turned to the left and walked for 8 km to reach point B. How far was he from the starting point?

Solution – Now, according to the question,



Now, to the Distance between A and B = $\sqrt{6^2 + 8^2}$ (By Pythagoras' theorem)

$= \sqrt{100}$

$= 10$ km

Therefore, the distance from the starting point is 10 km.

Example 3 – One morning after sunrise, Mahesh was standing facing a pole. The shadow of the pole fell exactly to his right. To which direction was he facing?

Solution – The sun rises in the East (E) in the morning.

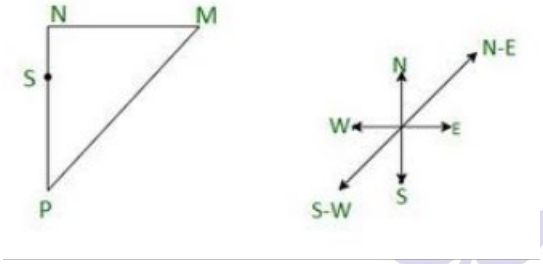
As the shadow of Mahesh falls to his right.

So he must be facing South.

Hence, the answer is the south.

Example 4 – M is in the East of N, which is in the North of S. If P is in the South of S, then in which direction of M, is P?

Solution – Let us understand through the diagram , which will clear the question more.



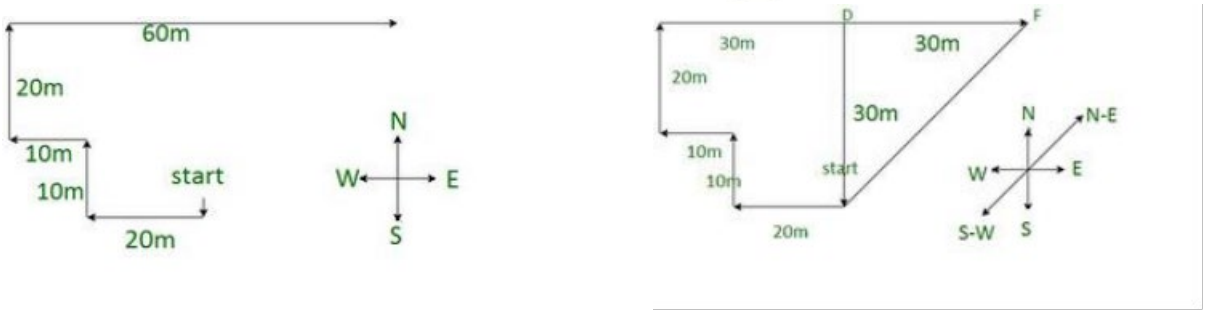
So, P is south-west of M.

Example 5 –

You are facing south. You turn right and walk 20 m , then you turn right and walk 10m. Then turn left and walk for 10 m. then turn right and walk for 20 m. Then you turn right again and walk 60 m. In which direction do you in from the starting point?

Solution –

First we have to make a sketch of all the given data and then we will analyse it to get the answer or to know the direction,



we start facing south, and after that follow the paths given in question above,

Now, we have to find a direction from the starting point.

Here, we will also find the distance from start to F, distance = $\sqrt{30^2 + 30^2}$ = 30√2. and the direction is N-E (north east).

PRACTICE PROBLEMS:

1. A direction pole was on the crossing. Due to an accident, the pole turned in such a manner, that the pointer which was showing East, started showing South. One traveller went to the wrong direction thinking it to be West. In what direction was he actually travelling?
   (A)South (B)West (C)East (D)North

2. Rahul walks 30 metres towards south then turns to his right and starts walking straight till he completes another 30 meters. Then again turning to his left he walks 20 metres. He then turns to his left and walks for 30 metres. How far is he from his initial position?
   (A)52 m (B)53m (C)60m (D)50m

3. A person moves North, then turns to his right and then again right and then finally go to left. In which direction is he moving now?
   (A)West (B)North (C)South (D)East

4. Kabul is located 2 km away to the north-west Punjab. Rohtak is located 2 km in the south-west direction from Kabul. Melghat is another place and is located 2 km away in the north-west of Rohtak. Talu is located 2 km away in the south-west direction from Melghat. In which direction is Talu from Punjab?
   (A) West (B)South (C)East (D)North

5. Arya and Bindya start from a point simultaneously. Arya moves to his East and travels 12 km, and Bindya moves to her south and travels 12 km. Arya takes a 270° anti-clock wise turn and travels 12 km. Bindya takes a 90° clock wise turn and runs 18km. Then Bindya goes 30km in same line in exactly opposite direction. Which of the following is true regarding their positions?
   A. Bindya has travelled 30 km more than Arya
   B. Both are to the south east of original position
   C. Both are at the same point
   (A) A (B) A & B (C) C & B (D) C

6. Jay starts from his house and walks 40 m north and reaches his school. There he turns right and walks 30 m and then he turns right and walks 65 m and reaches a garden. Here he turns left and walks 8 m. He again walks 25m towards his left. Then he turns 90° anti-clock wise and walks 8 m. How far is Jay from his school?
   (A)50m (B)55m (C)65m (D)60m

7. Jay starts from his house and walks 40 m north and reaches his school. There he turns right and walks 30 m and then he turns right and walks 65 m and

reaches a garden. Here he turns left and walks 8 m. He again walks 25m towards his left. Then he turns 90° anti-clock wise and walks 8 m. In which direction is Jay facing now?
(A)South (B)South east (C)west (D)Northwest

8. Uday and Manav are facing each other and talking during sunrise. Vijay was also present there. Vijay cannot bear the sun and so he is standing in shadow of Uday and is facing Uday continuously. As long as Vijay is there, he is facing Uday only and nowhere else. Uday and Manav keep talking till 6.15pm (sunset). At 6.15 pm where will be Vijay facing?
(A)West (B)East (C)North (D)South west

9. I am moving towards south. I walk 2 km and then I turn 30° anti-clock wise and walk for 15km. Now I turn 285° clock wise and walk 3 km. Then I again turn 15° clock wise and walk 0.5 km. Which direction is opposite to the direction I am facing?
(A) West (B)East (C)North (D)South

10. Jon starts driving in direction of his shadow at sunset. After going 120 km, he turns right and drives for 40 km more. Then again, he takes a 90° anti-clock wise turn and drives slowly for 30 km. Then he realizes he has taken a wrong turn and so he takes a 135° clock wise turn and drives fast for 50km. By that time, it was sunrise and Jon decided to go 180 km in direction of his shadow. After going 180 km how far is he from his start point?
(A)100 km (B)120 km (C)130 km (D)96 km

11. Town A lies to Town P's northwest at a distance of 3km. Similarly, Town D is situated at a distance of 3 km in the southeast from P. B lies to the north of D such that it is 3km east from P. C is 1.5km from P towards east. E lies towards southeast of B. F lies to the north east of E and B. If G lies in middle of C and D then where is G with respect to F?
(A)South west (B)North west (C)North east (D)South east

12. Sachin, Saurav, Sehwag and Dravid are playing Carrom. Sachin and Dravid are in one team. Saurav is sitting to the left of Dravid. Sehwag is facing South-West, then in which direction is Sachin facing?
(A)South east (B)South west (C)North (D)South

13. A watch was broken and lying on the floor. It showed the time 7.30. The hour hand pointed towards north-east. Then where will the minute hand point?
(A)South (B)East (C)West (D)South

14. Jagga walks 15m straight and then goes 20m to the left. After this he keeps on turning 90° clockwise and every time walks 18, 5 and 18 meters respectively. How far is he now from his original position?
(A)$13\sqrt{5}$ (B)$14\sqrt{2}$ (C)$13\sqrt{2}$ (D)$14\sqrt{5}$

15. There are four roads. I have come from the South and want to go to the temple. The road to the right leads me away from the coffee house while straight road leads only to a college. In which direction is the temple?
(A) North (B) East (C) South (D) West

16. A policeman left his police post and proceeded South 4 km on hearing a loud sound from point A. On reaching the place, he heard another sound and proceeded 4 km to his left to the point B. From B he proceeded left to reach another place C, 4 km away. In which direction, he has to go to reach his police post?
(A) North (B) South (C) East (D) West

17. A man starts from his house and walked straight for 10 m towards North and turned left and walked 25 m. He then turned right and walked 5 m and again turned right and walked 25 m. Which direction is he facing now?
(A) North (B) East (C) South (D) West

18. At a road crossing, there were 4 arrows denoting the four directions. But due to an accident the arrows turned in such a way that now East arrow is showing North. Ajay wanted to go towards West and followed the arrows at the crossing. In which direction is he now actually traveling?
(A)South (B)East (C)West (D)North

19. USA is 44 km to the east of India. Russia is 22 km to the south of India and Japan is 44 km north of Russia. Brazil is 22 km West of Russia. France is 44km north of Brazil. UK and Germany are 66km and 44km towards east respectively from Brazil. Peru lies between India and USA. What is distance between Japan and Brazil?
(A)$21\sqrt{5}$ (B)$22\sqrt{5}$ (C)$20\sqrt{5}$ (D)$10\sqrt{5}$

20. USA is 44 km to the east of India. Russia is 22 km to the south of India and Japan is 44 km north of Russia. Brazil is 22 km West of Russia. France is 44km north of Brazil. UK and Germany are 66km and 44km towards east respectively from Brazil. Peru lies between India and USA. Peru is in which direction from France?
(A)South west (B)North west (C)South east (D)South west

21. Ajay walks 24 km towards East and turns to right hand side and takes a drive of another 10 km. He then turning to his right (drives towards West) another 10 km. He then turns to his left & walks another 8 km. After that, he turns to his right & travels 14 km. How far is he from his initial point & in which direction?
(A) 20 km East (B)18 km south (C)16 km West (D)10 km South

22. Raju walks 80 ms towards south. Then, turns to his right & starts walking straight till he completes another 80 ms. Then, again turning to his left he walks for 60 metres. He then turns to his left & walks for 80 metres. How far is he from his initial position?
(A) 100 metres (B)60 metres (C) 20 metres (D) 140 metres

23. Varun drove his car for 80 kms due North. Then he turned left and drove for 100 kms. Again he turned left & drove yet another 80 kms. Again he turned left and drove his car 120 kms. How far do you think he actually drove his car from the initial position?
(A) 20 kms (B) 100 kms (C) 60 kms (D) None of these

24. Sandeep walks 60m to the east, then he turns left and walks for 50 m, then turns right and went 70 m and then turns right again and went 50 m. How far was Sandeep from the starting point?
(A) 90 m (B) 70 m (C) 50 m (D) 130 m

25. One morning after sunrise, Amrit was standing facing a pole. The shadow of the pole was forming on the left side. Which direction was Amrit facing?
(A) East (B) West (C) North (D) South

ASSESMENT PROBLEMS:

1. A house faces North. A man coming out of his house walked straight for 10 m, turned left and walked 25 m. He then turned right and walked 5 m and again turned right and walked 25 m. How far is he from his house?
(A)15 m (B) 55 m (C) 60 m (D) 65 m

2. John's house is 100 m North of his uncle's office. His uncle's house is located 200m West of his uncle's office. Kabir is the friend of John and he stays 100 m East of John's house. The office of Kabir is located 100 m South of his house. Then, how far is his uncle's house from Kabir's office?
(A) 200 m (B) 300 m (C) 400 m (D) 500 m

3. Rachel starts walking towards North. After walking 15 m, she turns towards South and walks 20 m. She then turns towards East and walks 10 m. Then, again she walks 5 m towards North. How far is she from her starting point and in which direction?
(A) 10 m, West (B) 5 m, East (C) 5 m, North (D) 10 m, East

4. Rohan walks a distance of 3 km towards North, then turns to his left and walks for 2 km. He again turns left and walks for 3 km. At this point he turns to his left and walks for 3 km. How many kilometres is he from the starting point?
(A) 1 km (B) 2 km (C) 3 km (D) 4 km

5. Seema walks 30 m North. Then, she turns right and walks 30 m then she turns right and walks 55 m. Then, she turns left and walks 20m. Then, she again turn left and walks 25 m. How many metres away is she from her original position?
(A) 45 m (B) 50 m (C) 66 m (D) 55 m

6. A man walks Southwards and covers 10 km distance. He, then turns to his right and walks 15 km, after which he turns to his right again and walks 10 km. What is the shortest distance from his start to end point?
(A) 35 km (B) 2 km (C) 10 km (D) 15 km

7. One day, Ravi left home and cycled 10 km Southwards, turned right and cycled 5 km and turned right and cycled 10 km and turned left and cycled 10 km. How many kilometres will he now have to cycle in straight line to reach his home?
(A) 10 km (B) 15 km (C) 20 km (D) 25 km

8. A man walks 7 km Eastwards, turns right and walks 3 km and further turns right and walks 11 km. How far is he from the starting point?
(A) 8 km (B) 3 km (C) 6 km (D) 5 km

9. A man travels 4 km due North, then travels 6 km due East and further travels 4 km due North. How far he is from the starting point?
(A) 6 km (B) 14 km (C) 8 km (D) 10 km

10. Mohan walked 30 m towards South, took a left turn and walked 15m.He, then took a right turn and walked 20m. He again took a right turn and walked 15m. How far is he from the starting point?
(A) 95 m (B) 50 m (C) 70 m (D) Cannot be determined

11. Ankit started walking towards North. After walking 30 m, he turned towards left and walked 40 m. He, then turned left and walked 30 m. He again turned left and walked 50 m. How far is he from his original position?
(A) 50 m (B) 40 m (C) 30 m (D) None of these

12. Laxman went 15 km to the West from house, then turned left and walked 20 km. He, then turned East and walked 25 km and finally turning left covered 20 km. How far is he now from his house?
(A) 15 km (B) 20 km (C) 25 km (D) 10 km

13. Madhuri travels 14 km Westwards and then turns left and travels 6 km and further turns left and travels 26 km. How far is Madhuri now from the starting point?
(A) 180 km (B) 80 km (C) 100 km (D) None of these

14. Shyam walks 6 m towards East, then turns right and walks 9 m. Again, he turns to his left and walks 6 m. At what distance is he now from his original point?
(A) 15 m (B) 21 m (C) 18 m (D) Cannot be determined

15. Ram and Shyam start walking towards North and cover 20 m. Ram turns to his left and Shyam to his right. After sometime, Ram walks to 10 m in the same direction in which he turned. On the other hand, Shyam walks only 7 m. Later, Ram turns towards his left and Shyam to his right. Both walk 25 m forward. How far is Ram from Shyam now?
(A) 10 m (B) 20 m (C) 17 m (D) 5 m

16. One evening before sunset, two friends Raman and Arjun were talking to each other face to face. If Raman's Shadow was exactly to his left side, which direction was Arjun facing?
(A) West (B) East (C) North (D) South

17. In the morning X and Y walk towards each other in a park. When they meet, Y's shadow falls towards the right side of X. In which direction was X facing?
(A) South (B) East (C) West (D) North

18. Roshan, Vaibhav, Vinay and Sumit are playing cards. Roshan and Vaibhav are partners. Sumit faces towards North. If Roshan faces towards West, then who faces towards South?
(A) Vinay (B) Vaibhav (C) Sumit (D) Data is inadequate

19. Sangitha was facing North-West direction. If she was playing carom with Sudha in the Standard seating pattern, in which direction was Sudha facing
(A) North-West (B) North-East (C) South-West (D) South-East

20. Kamal is facing South. He turns 135° in the anti-clockwise direction and then 180° in the clockwise direction. What direction is he facing now?
(A) North (B) South-West (C) East (D) North-West

21. City D is to the West of City M. City R is to the South of City D. If City K is to the East of City R, then in which direction is City K located with respect to City D?
(A) North (B) East (C) North-East (D) South-East

22. Y is in the East of X which is in the North of Z. If P is in the South of Z, then in which direction of Y, is P?
(A) North (B) South (C) South-East (D) None of these

23. If Ram's house is located to the South of Krishna's house and Govinda's house is to the East of Krishna's house, in what direction is Ram's house situated with respect to Govinda's house?

(A) North-East (B) North-West (C) South-East (D) South-West

24. C is to the West of B and South-West of A.D is to the North-West of A and North to C and is in line with AB. In which direction from the point of A, B is located?
(A) North-East (B) South-East (C) North-West (D) South-West

25. A direction pole was situated on the road crossing. Due to an accident, the pole turned in such a manner that the pointer which was showing East, started showing South. Sita, a traveller went to the wrong direction thinking it to be West. In what direction actually she was travelling?
(A) North (B) West (C) East (D) South

MODULE-5

BLOOD RELATIONS

The questions on blood relations are an integral part of the reasoning or mental ability section of almost all the competitive exams. You will mostly see 2- 3 questions on this in the tests. Sometimes the number increases as the examiner may put a full block of 3 – 4 questions based on relationships. Before we move on to some solved problems on blood relations, let us go through some typical relations and the direct meanings of the same. In most of the questions on blood relations, the statement always gives an indirect reference to the person. Hence, it becomes really important to learn these blood relation tricks.

Blood Relation Chart

Indirect Reference	**The real relation**
Father's or Mother's Daughter	Sister
Father's or Mother's Son	Brother
Father's or Mother's Sister	Aunt
Father's or Mother's Brother	Uncle
Father's or Mother's Mother	Grandmother
Father's or Mother's Father	Grandfather
Daughter's Husband	Son-in-law
Son's Wife	Daughter – in – law
Husband's or Wife's Brother	Brother – in – law
Husband's or Wife's Sister	Sister – In – law
Brother's Daughter	Niece
Brother's Son	Nephew
Brother's Wife	Sister-in-law
Sister's Husband	Brother- in- law
Aunt's or Uncle's Son or Daughter	Cousin

You must go through this blood relation chart in a detailed manner. Do remember that paternal grandfather, paternal grandmother, father, mother, brother, and sister are considered to be blood relatives. Unless mentioned otherwise, all the relations are considered from the father's side i.e. grandfather will refer to your father's father and grandmother will refer to your father's mother unless mentioned otherwise. In statement-based relation questions, a technique called backtracking is applied.

Backtracking means starting from the last word & moving backwards. E.g.- if Nikhil said, "A is the daughter of the sister of my father's only son".

Then we start from the last information: "My father's only son → Me

Daughter of my sister → "Niece"

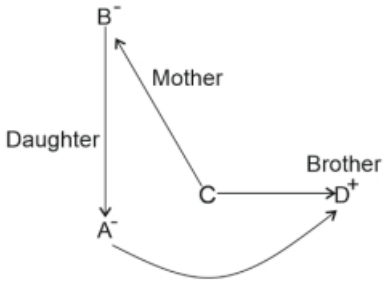
Hence A is the niece of Nikhil.

SOLVED EXAMPLES:

1) A is daughter of B. B is a mother of C. D is brother of C. What is the relation of D with A?

(A) Father (B) Grandfather (C) Brother (D) Son

Ans: C

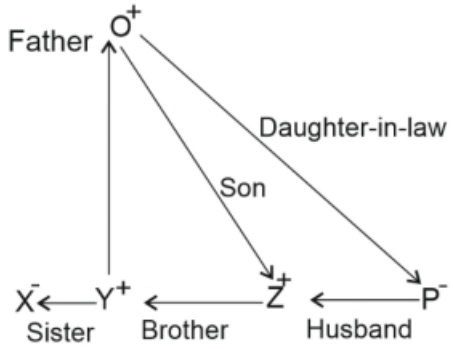


A, C, D are brother & sister with one another. Thus, answer is brother.

2) X is the sister of Y & Y is the brother of Z. Z is the husband of P & O is the father of Y. How P is related to O?

(A) Daughter-in-law (B) Sister (C) Uncle (D) Daughter

Ans: A

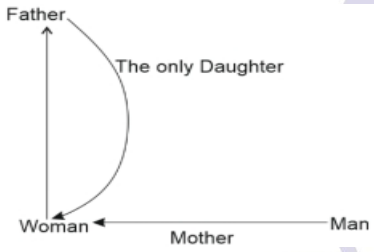


Here, related to is followed by P. i.e. Who is P to O is asked. So, P is the daughter-in-law of O.

3) A woman introduced a man & told: "His mother is the only daughter of my father.'' How that man is related to the woman?

(A) Brother (B) Son (C) Father (D) Uncle

Ans: B

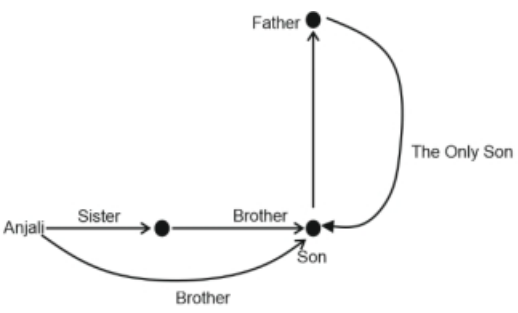


Here, the only daughter of the woman's father means she herself. Thus, the woman is a mother of that man, i.e. the man is her son.

4) Anjali says: "He is the only son of the father of my sister's brother." How is that person related to Anjali?

(A) Uncle (B) Cousin (C) Brother (D) Father

Ans: C

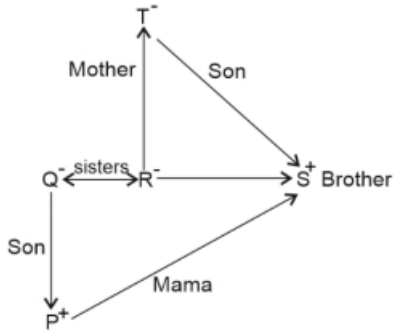


The person is Anjali's brother.

5) P is the son of Q, while Q & R are sister of each other. T is R's mother. If S is T's son, then, which of the following statement is true?

(A) T is Q's brother (B) S is P's cousin (C) Q & S are sisters (D) S is P's uncle (mama)

Ans: D

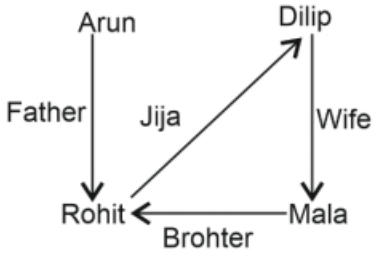


S is P's maternal uncle.

6) Arun is Rohit's father. Rohit is Mala's brother. Mala is Dilip's wife. What is the relation of Dilip with Rohit?

(A) Father (B) Uncle (C) Son (D) Brother-in-law

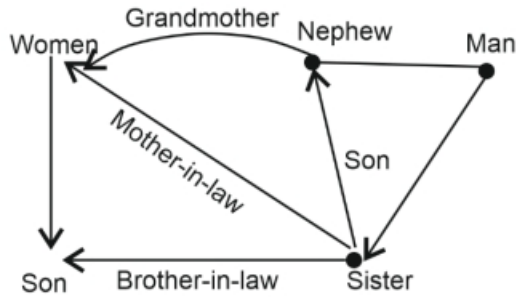
Ans: D



7) A man shows a photo & says: "The woman in the photo is the grandmother of my nephew & her son is the brother-in-law of my sister." If he has no other sister, then what is the relation of the woman in photo with the sister of that man?

(A) Mother (B) Mother-in-law (C) Cousin (D) None

Ans: B

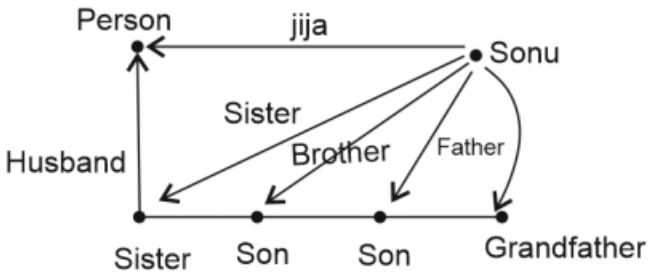


The woman in the photo is the mother-in-law of his sister

8) Sonu told Monu: "The person playing the cricket is the husband of the only daughter of the son of my grandfather's son." Who is that person to Sonu?

(A) Brother-in-law (B) Brother-in-law (C) Brother (D) Nephew

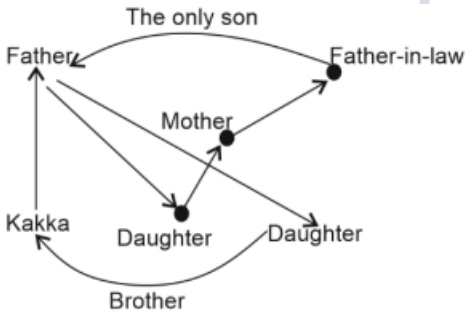
Ans: B



9) Akka showed a picture to Kakka & said that she is the only daughter of the only son of the father-in-law of the mother of your father's daughter. What is the relation of Kakka with that picture?

(A) Brother (B) Sister (C) Daughter (D) None

Ans: A



10) 'P×Q' means P is Q's wife.

'P+Q' means P is Q's son.

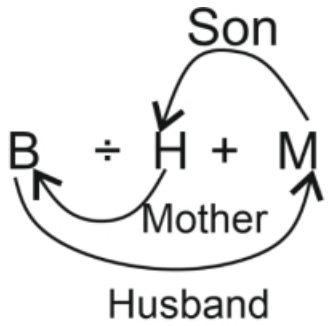
'P÷Q' means P is Q's mother.

'P-Q' means P is Q's sister.

What is the relation of M with B in 'B÷H+M'?

(A) Wife (B) Husband (C) Sister (D) Mother

Ans: B



PRACTICE EXERCISE:

1) A is the uncle of B, who is the daughter of C and C is the daughter-in-law of P. How is A related to P?
(A) Son (B) Son-in-law (C) Brother (D) None

2) Henna is daughter of Ajay. Mala, Achla's sister has a son Romi and daughter Sushila. Kamla is maternal aunt of sushila and mother of Krishna. Romi is cousin of Krishna. Krishna is brother of Heena. How is Achla related to Ajay?
(A) Cousin (B) Sister-in-law (C) Niece (D) Sister

3) A is the brother of B, C is the father of D, E is the mother of B. A and D are brothers. How is E related to C?
(A) Niece (B) Wife (C) Sister
(D) Sister-in-law

4) E is the sister of B. A is the father of C. B is the son of C. So how is A related to E?
(A) Grandfather (B) Granddaughter (C) Father
(D)Great-Grandfather

5) Introducing a man to her husband a woman said "His brother's father is the only son of my grandfather ". How is the woman related to his man?
(A) Sister (B) Daughter (C) Mother (D) Aunt

6) Pointing towards a girl Rama said that she is only child of my uncle's father's only sister's daughter. Then how is Rama related to that girl?
(A) Uncle (B) Aunt (C) Mother (D) CBD

7) Sushant said "This girl is the wife of the grandson of my mother. How is Sushant related to the girl?
(A) Husband (B) Father-in-law (C) Father (D) Grandfather

8) Jyothi said to Chitra, “Father of your daughter is the son of my brother”. How is Jyothi’s brother related to Chitra’s daughter?
(A) Son (B) Uncle (C) Grandfather (D) Grandson

9) A woman introduces a man as the son of the brother of her mother. How is the man related to the woman?
(A) Cousin (B) Niece (C) Nephew (D) Son

10) In a family, X and Y are sisters. Y is the mother of A. C is the son of A. B is the son of X. Which of die following statements is true?
(A) A is the son of X and Y. (B) B and A are cousins.
(C) X is the Father of B. (D) X is C’s Grandmother.

11) A family consists of six members P, Q, R, X, Y and Z. Q is the son of R but R is not mother of Q. P and R are married couple. Y is the brother of R. X is the daughter of P. Z is the brother of P. How many children does P have?
(A) 4 (B) 3 (C) 2 (D) 1

12) Pointing to a man in a photograph, a woman said, "His brother's father is the only son of my grandfather." How is the woman related to the man in the photograph?
(A) Aunt (B) Mother (C) Daughter (D) Sister

13) A family consists of six members P, Q, R, S, T and U. There are two married couples. Q is a doctor and the father of T. U is grandfather of R and is a contractor. S is grandmother of T and is a housewife. There is one doctor, one contractor, one nurse, one housewife and two students in the family. Which of the following is definitely a group of male members?
(A) QUP (B) UT (C) QU (D) QUT

14) Ram is brother of Rahul. Sapana is sister of Shyam. Rahul is son of Sapana. How is Ram related to Sapana?
(A) Father (B) Son (C) Grandfather (D) Grand Son

15) A is the son of B. C, B's sister has a son D and a daughter E. F is the maternal uncle of D. How many nephews does F have?
(A) 1 (B) 2 (C) 3 (D) 0

16) Q is the brother of R; P is the sister of Q; T is the brother of S; S is the daughter of R. Who are the cousins of Q?
(A) Q and T (B) S and T (C) R and P (D) P and T

17) All the six members of a family A, B, C, D, E and F are travelling together. B is the son of C but C is not the mother of B. A and C are a married couple. E is the brother of C. D is the daughter of A. F is the brother of B. Who is the mother of B?

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

18) A and B are a married couple, A being the male member. D is the only son of C, who is the brother of A. E is the sister of D. B is the daughter-in-law of F, whose husband has died. How many male members are there in the family?

(A) 2 (B) 4 (C) 1 (D) 3

19) A introduces B saying, "He is the husband of the granddaughter of the father of my father ". How is A related to B?

(A) Grand Father (B) Brother-in-law (C) Grand Son (D) Son

20) Raj Kumar told Anand, 'Yesterday I defeated the only brother of the daughter of my grandmother.' Whom did Raj Kumar defeat?

(A) Daughter (B) Grand Daughter (C) Father (D)Grand Son

Directions (21-22): Study the following information carefully and answer the questions given below: All the persons mentioned belong to one family. Z is the only sibling of Y, who has only one daughter. M is married to N. O is grandchild of Y, who is not in same generation as M. L is aunt of O. N is mother-in-law of V. V and Z are sister-in-law of each other. S is married to R but is not a female.

21) How many married couples are there in the family?

(A) one (B) two (C) three (D) four

22) How many generations are there in the given family?

(A) one (B) two (C) three (D) four

Directions (23-25): These questions are based on the following information:

'A @ B' means 'A is father of B'. 'A $ B' means 'A is mother of B'.
'A * B' means 'A is sister of B'. 'A # B' means 'A is daughter of B'.
'A = B' means 'A is son of B'

23) How is D related to H, in the given expression D @ E = T $ G * H

(A) Father (B) Mother (C) Sister (D) Son

24) Which of the following statements is/are true, if the given expression Q = W # V @ M = P is true?

(A) Q is father of M (B) V is husband of P
(C) P is grandmother of Q (D) Only (b) and (c) are true

25) What is the relation between E and W in the given expression? E @ H
$ N * P = W

(A) E is father of W (B) E is daughter of W
(C) E is father-in-law of W (D) E is brother of W

ASSESSMENT PROBLEMS

1. A girl introduced a boy as the son of the daughter of the father of her maternal uncle. The boy is girl's:
   (A) Son (B) Uncle (C) Son-in-law (D) CBD

2. Pointing out to a photograph, a man tells his friend 'She is the daughter of the only son of my father's wife'. How is the girl in the photograph related to the man?
   (A)Daughter (B) Cousin (C) Mother (D) Sister

3. X introduces Y saying, "He is the husband of the granddaughter of the father of my father. How is Y related to X?
   (A)Brother (B) Son (C) Brother-in-law (D) Son-in-law

4. Showing on to the man on the stage, Ritika said he is the brother of the daughter of the wife of my husband. How is the man on the stage related to Ritika?
   (A)Son (B) Husband (C) Cousin (D) Nephew

Directions for questions 5 to 8: Read the passage below and solve the questions based on it.

There is family of six persons A, B, C, D, E and F. Following information pertains to the members of this family: There are two married couples and the family members belong to three generations. Each member has a distinct choice of colour among green, yellow, black, white, red and blue. No lady member likes green or white colour. C, who likes black colour is the daughter-in-law of E. B is the brother of F and son of D and he likes blue. A is grandmother of F and F does not like red. There is a man liking green and his wife likes yellow colour.

5. Which of the following is one of the married couples?
   (A) CD (B) DA (C) AC (D) none

6. How many male members are there in the family?
   (A)2 (B) 3 (C) 4 (D) 1

7. F is the …….
   (A) Brother of B (B) Sister of B (C) CBD (D) none

8. Which one is the colour preference of A?
   (A)Red (B) Yellow (C) Red or yellow (D) CBD

Directions for questions 9 to 12: Read the passage below and solve the questions based on it.

In a family of six members A, B, C, D, E and F each one plays one game out of the six games snooker, Carom, Table Tennis, badminton, Bridge and Cricket. Two are married couple. B who plays carom, is daughter in law of E.A is the father of D, the Table Tennis player, and D is father of C, who plays cricket. F is the brother of (c) . Snooker is not played by a female member. E's husband plays Badminton.

9. Who among them plays bridge?
   (A)E (B) F (C) A (D) Data Inadequate

10. How is F related to A?
    (A)Granddaughter (B) Grandson (C) Son (D) Daughter

11. Who is husband of B?
    (A)D (B) A (C) C (D) cannot be determined

12. How many male members are there in the family?
    (A)Two only (B) Three only (C) Four only (D) Data inadequate

Directions for question 13 to 15: Read the information given below and solve the questions based on it. M, N, O and P are all distinct individuals. Following points give the details of their relationship:

M is the daughter of N. N is the son of O. O is the father of P.

13. Which of the following statements is true?
    (A)O is the uncle of M.
    (B)P and N are brothers.
    (C)M is the daughter of P.
    (D)If B is the daughter of N, then M and B are sisters.

14. Which among the following statements is contradictory to the above premises?
    (A)P is the father of M. (B) O has three children.
    (C)M has one brother. (D)M is the granddaughter of O.

15. If B is the son of N and B has one brother, D, then
    1.M is the sister of (D)
    2.D and N are brothers.
    3.O is the grandfather of (D)

(A)I only (B) II only (C)III only (D) I and III only

Directions for questions 16 to 18: Read the passage below and solve the questions based on it.

In a joint family of seven persons A, B, C, D, E, F and G, there are two married couples. G is a housewife and her husband is a lawyer. 'C' is the wife of 'B', 'A' is an engineer and is granddaughter of 'G'. 'D' is the father-in-law of 'C', a doctor, and father of 'E', a Professor. 'F' is A's brother and B's son.

16. How is F related to C?
(A)Son (B) Brother (C) Daughter (D) Data inadequate

17. How is B related to E?
(A)Sister (B) Uncle (C)Cousin (D) None of these

18. Who is a lawyer?
(A)B (B) F (C)D (D) CBD

Directions for questions 19 to 20: Go through the information given below and solve the questions based on it.

Prakash, Qureshi, Rajesh and Shabdesh live together in a house. Prakash lives with his (or her) parents. Qureshi lives with at least 3 persons younger than him (or her). Shabdesh lives with his mother, and is older than at least 2 persons living with him. Rajesh lives with his (or her) son and is not older than Shabdesh.

19. Total number of persons in that house is ___.
(A)3 (B) 4 (C)5 (D) 6

20. Qureshi is Prakash's ___.
(A)father (B) mother (C)son (D) grandmother

21. A @ B means A is the sister of B
A $ B means B is the mother of A
A + B means A is the brother of B
A = B means B is the father of A.
Which of the following means M is the maternal uncle of N?
(A)M = P + Q @ N (B) N + P = Q @ M
(C)N @ P $ Q @ M (D)None of these

22. M x N means M is the daughter of N;
M + N means M is the father of N;
M % N means M is the mother of N
M – N means M is the brother of N.

Given that P % Q + R – T x K, what is the relation of P to K?
(A)Daughter-in-law (B)Sister-in-law (C)Aunt (D)None

23. P + Q means P is the brother of Q;
P × Q means P is the father of Q
P – Q means P is the sister of Q.
Which of the following relations shows that I is the niece of K?
(A)K + Y + Z – I (B) K + Y x I – Z
(C)Z – I x Y + K (D) K × Y + I – Z

24. Pointing towards a girl, Mohit says, "This girl is the daughter of only a child of my father." What is the relation of Mohit's wife to that girl?
(A)Daughter (B) Mother (C)Aunt (D) Sister

25. A $ B means B is the father of A;
A # B means B is the mother of A;
A & B means B is the sister of A
A @ B means B is the husband of A
Which of the following indicates that N is the grandmother of P?
(A)P & Q # M $ N (B)P @ Q $ M # N (C)P # Q $ N & M (D) None of these

Module-6

CLOCKS & CALENDAR

CLOCKS:

- A clock is a complete circle having 360 degrees. It is divided into 12 equal parts i.e. each part is 360/12 = 30. As the minute hand takes a complete round in one hour it covers 3600 in 60 min. In 1 min. it covers 360/60 = 60/ minute.
- Also, as the hour hand covers just one part out of the given 12 parts in one hour, this implies it covers 300 in 60 min. i.e. 1/20 per minute. Therefore, the relative speed of the minute hand is 6 - (1/2) = 5(1/2) degrees.
- Every hour, both the hands coincide once. In 12 hours, they will coincide 11 times.
- The hands are in the same straight line when they are coincident or opposite to each other.
- When the two hands are at a right angle, they are 15-minute spaces apart.
- In one hour, they will form two right angles and in 12 hours there are only 22 right angles. It happens due to right angles formed by the minute and hour hand at 3'o clock and 9'o clock.
- When the hands are in opposite directions, they are 30-minute spaces apart.
- If a clock indicates 9.15, when the correct time is 9, it is said to be 15 minutes too fast. On the other hand, if it indicates 8.45, when the correct time is 9, it is said to be 15 minutes too slow.
- If both the hour hand and minute hand move at their normal speeds, then both the hands meet after $65\frac{5}{11}$ minutes.
- 22 times in a day, the hands of a clock will be in a straight line but opposite in direction.
- 44 times in a day, the hands of a clock will be straight.
- 44 times in a day, the hands of a clock are at right angles.
- 22 times in a day, the hands of a clock coincide.
- When the minute hand is behind the hour hand, the angle between two hands at M minutes past H 'o clock will be 30(H-(M/5)) + (M/2) degree.
- When the minute hand is ahead of the hour hand, the angle between the two hands at M minutes past H 'o clock will be 30(H-(M/5)) - (M/2) degree.

CALENDAR:

- In an ordinary year, there are 365 days, which means 52 * 7 + 1, or 52 weeks and one day. This additional day, is called an odd day.
- Every 100th year starting from 1st AD, is a non-leap year, but every 4th century year is a leap year. So, any year divisible by 400 will be a leap year e.g.: 1200, 1600 and 2000. And the years 1800, 1900 will be non-leap years as they are divisible by 100, but not 400.
- The concept of odd days is very important in calendars. In a century - i.e. 100 years, there will be 24 leap years and 76 non–leap years. This means that there will be 24 * 2 + 76 * 1 = 124 odd days. Since, 7 odd days make a week, to find out the net odd days, divide 124 by 7. The remainder is 5. This is the number of odd days in a century.
- 100 years give us 5 odd days as calculated above.
- 200 years give us 5 * 2 = 10 - 7 (one week) = 3 odd days.
- 300 years give us 5 * 3 = 15 - 14 (two weeks) = 1 odd day.
- 400 years give us {5 * 4 + 1 (leap century)} - 21} = 0 odd days.
- Now, if we start from 1st January 0001 AD; for 0 odd day, the day will be Sunday; for 1 odd day, the day will be Monday; for 2 odd days, it will be Tuesday; for 3 odd days, it will be Wednesday and so on**.**

Example 1:

What would be the mirror image of the clock when the time is 01:40

Solution→

We need to subtract the time ahead of 12:00 from 12:00 to get mirror image time Mirror image of 01:40

Hence,11:60 – 01:40 = 10:20

The mirror image of 1:40 would be 10:20.

Example 2:

When Rena looked at a clock, it was showing 6:00 in the morning. By how much angle will the hour's hand rotate when she again looks at the clock at 12:00 in the noon?

Solution→

In 12 hours, the hour's hand turns 360°

Hence, the difference between time = 6 hours

Therefore, the required angle = 360/12x 6 = 180°

Example-3

How many times does the 29th days of the month occur in 400 consecutive years?

Solution→

In 400 consecutive years there are 97 leap years. Hence in 400 consecutive years, February has the 29th day 97 times, and the remaining 11 months have the 29th day 400 x 11 or 4400 times.

Therefore, 29th day of the month occurs (4400 + 97) or 4497 times

Example-4

Given that on 10th November 1981 is Tuesday, what was the day on 10th November 1581

Sol: After every 400 years, the same day comes.

Thus if 10th November1981 was Tuesday, before 400 years i.e on 10th November 1581, it has to be Tuesday.

Example-5

Which year has the same calendar as 1700?

Solution→

Year :	1700	1701	1702	1703	1704	1705
Odd days :	1	1	1	1	2	1

As we know that

7 is an odd number.

So, there are 0 odd days.

The year which is coming after 1705 is having the same calendar as 1700.

Hence, 1706 has the same calendar as 1700.

PRACTICE PROBLEMS:

1. Find the angle between the hour hand and the minute hand of a clock when the time is 3.25?

   A) 47.5 degrees B) 57.5 degrees

   C)45.5 degrees D) 55.5 degrees

2. At what time between 4 and 5 o'clock will the hands of a watch point in opposite directions?

A) 54 past 4 B) (53 + 7/11) past 4

C) (54+8/11) past 4 D) (54 + 6/11) past4

3. At what time between 2 and 3 o'clock will the hands of a clock be together?

A) (9 + 10/11) min past 2 B) (10 + 10/11) min past 2

C) (11 + 10/11) min past 2 D) (12 + 10/11) min past 2

4. At what angle the hands of a clock are inclined at 15 minutes past 5?

A) 57.5 degrees B) 67.5 degrees

C) 77.5 degrees D) 87.5 degrees

5. Find at what time between 8 and 9 o'clock will the hands of a clock be in the same straight line but not together?

A) 100/11 min past 8 B) 120/11 min past 8

C) 90/11min past 8 D) 80/11 min past 8

6. The reflex angle between the hands of a clock at 10.25 is

A) $197\frac{1}{2}$ B) $167\ \frac{1}{2}$

C) $157\frac{1}{2}$ D) $187\frac{1}{2}$

7. How much does a watch lose per day, if its hands coincide every 64 minutes?

A) 32 8/11 B) 33 8/11

C) 34 8/11 D) 35 8/11

8. At what time between 5.30 and 6 will the hands of a clock be at right angles?

A) (43 + 5/11) min past 5 B) (43 + 7/11) min pats 5

C) 5 D) 7

9. How many times are the hands of a clock at right angle in a day?

A) 44 B) 54

C) 64 D) 22

10. How many times do the hands of a clock coincide in a day?

A) 20 B) 21

C) 22 D) 23

11. How many degrees will the minute hand move, in the same time in which the second hand move 5400?

A) 90 degrees B) 85 degrees

C) 60 degrees D) 45 degrees

12. At what time between 3 and 4 o'clock will the minute hand and the hour hand are on the same straight line but facing opposite directions?

A) 3:15 2/8 B) 3:49

C) 3:49 1/11 D) 3:51

13. In every 60 minutes, the minute hand gains -------- minutes on the hour hand

A) 53 B) 54

C) 55 D) 56

14. Today is Monday. After 61 days, it will be:

A) Tuesday B) Monday

C) Sunday D) Saturday

15. What was the day on 15th august 1947?

A) Friday B) Saturday

C) Sunday D) Thursday

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

A) Monday B) Friday

C) Sunday D) Tuesday

17. The last day of a century cannot be

A) Monday B) Wednesday

C) Tuesday D) Friday

18. The calendar for the year 1988 is same as which upcoming year?

A) 2012 B) 2014

C) 2016 D) 2010

19. What is 90 days from today?

Hints: Today is 20th January 2017, Sunday

A) 18th April, Friday B) 20th April, Saturday

C) 21th April, Sunday D) 19th April, Saturday

20. If July 9th,2013 falls on Sunday then Jan 7th,2014 falls on which day?

A) Sunday B) Saturday

C) Monday D) Friday

21. If every seconds Saturday and all Sundays are holidays in a 30 days' month beginning on Saturday, then how many working days are there in that month? (Month starts from Saturday)

A) 25 B) 22

C) 24 D) 23

22. Given that on 9th August 2017 is Saturday. What was the day on 9th August 1617?

A) Saturday B) Sunday

C) Friday D) Monday

23. Which year has 366 days?

A) 1900 B) 1200

C) 2500 D) 1700

24. The calendar for the year 2018 will be the same for the year

A) 2023 B) 2027

C) 2029 D) 2022

25. 26 January 1950 which day of the week?

A) Monday B) Wednesday

C) Thursday D) Tuesday

ASSESSMENT PROBLEMS:

1. In 16 minutes, the minute hand gains over the hour hand by -

A) 16 deg B) 80 deg

C) 88 deg D) 94 deg

2. A watch which gains uniformly, is 5 min, slow at 8 o'clock in the morning on Sunday and it is 7 min fast at 8 a.m. on following Monday. when was it correct?

A) 6pm on Sunday B) 20 min past 7pm on Wednesday

C) 15min past 7pm on Wednesday D) none of these

3. A clock is set right at 5 a.m. The clock loses 16 minutes in 24 hours. What will be the true time when the clock indicates 10 p.m. on 4th day?

A) 11pm B) 12pm

C) 1pm D) 2pm

4. The angle between the minute hand and the hour hand of a clock when the time is 8:30

A) 80 Degrees B) 75 Degrees

C) 60 Degrees D) 105 Degrees

5. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 o'clock, the true time is:

A) 4pm B) 5pm

C) 6pm D) 7pm

6. A clock is set right at 10 a.m. on Monday. The clock loses 15 min. in 24 hrs. What will be the true? time when the clock indicates 4 am on the following Saturday?

A) 5:12 am B) 5:32 am

C) 6:32 am D) 5:48 am

7. What when the time is 6:32, then what is the angle b/w the hour hand & the minute hand of a clock?

A. 2° B. 4°

C. 8° D. 12°

8. If the minute's hand and seconds' hand of a clock are 25 minutes apart. What will be the angle formed between them?

A) 110° B) 120°

C) 135° D) 150°

9. How many leap years do 300 years have?

A) 75 B) 74

C) 72 D) 73

10. On what dates of July.2004 did Monday fall?

A) 6,10,21,30th B) 12,7,19,28th

C) 5,10,24,17th D) 5, 12, 19, 26th

11. If today is Saturday, what will be the day 350 days from now?

A) Saturday B) Friday

C) Sunday D) Monday

12. If it was Tuesday on 3rd Jan, 2006. What was the day on Jan 3, 2010?

A) Wednesday B) Sunday

C) Saturday D) Tuesday

13. What was the day on 15th August, 2010?

A) Monday B) Sunday

C) Saturday D) Tuesday

14. How many days will there be from 26th January, 1996 to 15th May, 1996(both days included)?

A) 110 B) 111

C) 112 D) 113

15. If the day before yesterday was Saturday, what day will fall on the day after tomorrow?

A) Friday B) Tuesday

C) Thursday D) Wednesday

16. If the seventh day of a month is three days earlier than Friday, what day will it be on the nineteenth day of the month?

A) Sunday B) Tuesday

C) Wednesday D) Monday

17. How many days are there in x weeks' x days?

A) 7x * x B) 8x

C) 14x D) 7

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

A) 2nd,9th,16th,23rd B) 4th,11th,18th,25th

C) 12th,18th,27th,6th D) 1st,8th,15th,22nd

19. Which two months in a year have the same calendar?

A) October, December B) April, November

C) June, October D) April, July

20. It was Tuesday on Feb 8, 2005. What was the day of the week on Feb 8, 2004?

A) Monday B) Thursday

C) Friday D) Sunday

21. What was the day on 28th May, 2006?

A) Wednesday B) Thursday

C) Friday D) Sunday

22. What was the day of the week on 16th June, 1999?

A) Saturday B) Monday

C) Wednesday D) Thursday

23. Pinky was born on 29th, Feb 2016 which happened to be a Monday. If she lives to be till 2099, how many birthdays would she celebrate on a Monday?

A) 1 B) 2

C) 3 D) 5

24. If it was Thursday on Aug 15, 2012, then what was the day on June 11, 2013?

A) Wednesday B) Monday

C) Saturday D) Tuesday

25. The last day of a century cannot be:

A) Saturday B) Monday

C) Wednesday D) Friday

NHCE

Module-7

SEATING ARRANGMENT

Introduction

- In seating arrangement, we are generally asked to arrange a group of people according to the given conditions. They may have to be seated around a table, the table could be of any shape-circular, square, rectangular, pentagonal or any other. To solve seating arrangement problems on the basis of the information given in the equation.

- It is one of the important part of the reasoning section for any competitive exam . In this part, questions are based on set of information containing set of conditions which gives hidden information followed by set of questions.

- These type of questions judge the ability of a candidates to analyze the information and solve the questions by the help of pictorial figures.

CONCEPTS:

(1) Linear arrangement: - In this arrangement, there can be single row or parallel rows facing each other or opposite.

(i) Left ⟷ Right

(Directions if the people are facing north)

(ii) Right ⟷ Left

(Directions if the people are facing South)

(iii) Right ⟷ Left

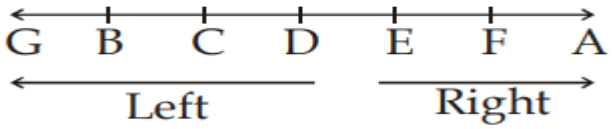
Left ⟷ Right

(Directions if the people are seating parallel to each other facing south and North)

Example: A, B, C, D, E, F, and G are sitting in a row facing the North.

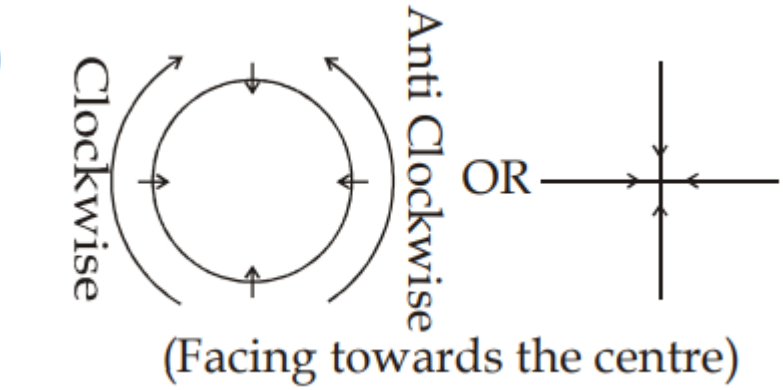
1. F is to the immediate right of E.
2. E is 4th to the right of G.
3. C is neighbor of B and D
4. Person who is third to the left of D is at one of the ends.

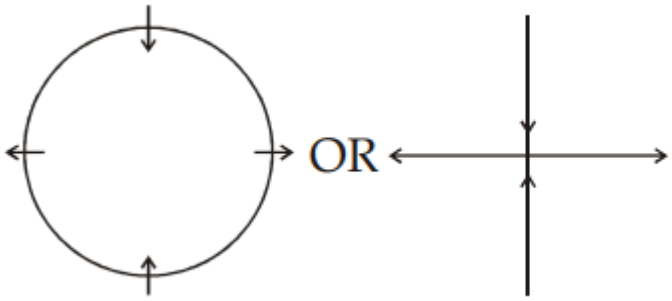
SOLUTION:



(2) Circular Arrangement: In this Arrangement, people are sitting around a circle facing towards or outside the center.

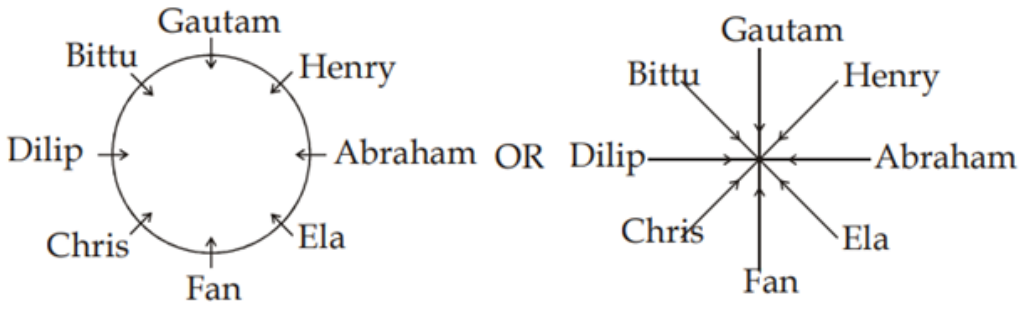
(i)





(ii)
(People sitting around the circle facing towards and outside the center)

Example: 2
Abraham, Bittu, Chris, Dilip, Ela, Fan, Gautam and Henry are sitting around a circle facing towards the center. Dilip is second to the left of Fan and third to the right of Henry. Abraham is second to the right of Fan and immediate neighbor of Henry. Chris is second to the right of Bittu and Fan is third to the right of Bittu. Gautam is not an immediate neighbor of Fan.



PRACTICE PROBLEMS:

Directions (1–6): Study the following information and answer the questions given below:

M, N, P, R, T, W, F and H are sitting around a circle facing at the centre. P is third to the left of M and second to the right of T. N is second to the right of P. R is second to the right of W who is second to the right of M. F is not an immediate neighbor of P.

1. Who is to the immediate right of P?
(a) H (b) F (c) R
(d)Data inadequate (e) None of these

2. Who is to the immediate right of H?
(a) R (b) F (c) M
(d)Data inadequate (e) None of these

3. Who is to the immediate left of R?
(a) P (b) H (c) W
(d) T (e) Data inadequate

4. Who is third to the right of H?
(a) T (b) W (c) R
(d) F (e) Data inadequate

5. Who is second to the right of F?
(a) M (b) R (c) T
(d) Data inadequate (e) None of these

6. In which of the following is the first person sitting in between the second and the third person?
(a) NHM (b) PHN (c) TRP
(d) TWF (e) None of these

Directions (7-11): Study the following information carefully to answer these questions

Eight friends Savita, Nutan, Amita, Nisha, Rani, Jyoti, Meeta and Anjali are sitting around a circle facing the centre. Savita is second to the right of Anjali, but is not a neighbour of Amita. Nisha is third to the left of Amita but is not next to Savita. Jyoti is second to the right of Rani and third to the left of Meeta.
7. Who is second to the left of Anjali ?
(a) Nutan (b) Rani (c) Amita
(d) Meeta (e) None of these

8. Who is to the immediate right of Nisha ?
(a) Jyoti (b) Nutan (c) Meeta
(d) Jyoti or Nutan (e) None of these

9. Which of the following is the correct position of Rani ?
(a) To the immediate right of Anjali
(b) To the immediate left of Anjali
(c) To the immediate right of Savita
(d) Next to Jyoti (e) None of these

10. Which of the following pairs represent the immediate neighbours of Nisha ?
(a) Jyoti and Meeta (b) Nutan and Meeta
(c) Savita and Jyoti (d) Nutan and Jyoti
(e) None of these

11. Who is to the immediate left of Savita ?
(a) Jyoti (b) Anjali (c) Rani
(d) Meeta (e) None of these

Directions (12-16): These questions are based on the basis of following information.
Study it carefully and answer the questions.
Eight executives J, K, L, M, N, O, P, and Q are sitting around a circular table for a meeting. J is second to the right of P who is third to the right of K. M is second to the left of O who sits between P and J, L is not a neighbour of K or N.

12. Who is to the immediate left of L?
(a) Q (b) O (c) K
(d) N (e) None of these

13. Who is to the immediate left of K?
(a) N (b) J (c) Q
(d) Cannot be determined (e) None of these

14. Which of the following is the correct position of N?
(a) Second to the right of K (b) To the immediate left of K
(c) To the immediate right of M (d) To the immediate right of K
(e) None of these

15. Who is third to the right of P?
(a) L (b) J (c) Q
(d) N (e) None of these

Directions (15-20): Study the following information carefully and answer the given questions:

Eight Friends P, Q, R, S, T, V, W and Y are sitting around a square table in such a way that four of them sit at four corners of the square while four sit in the middle of each of the four sides. The ones who sit at the four corners face the centre while those who sit in the middle of the sides face outside. P who faces the centre sits third to the right of V. T, who faces the centre, is not an immediate neighbor of V. Only one person sits between V and W. S sits second to the right of Q. Q faces the centre. R is not an immediate neighbor of P.

15. Who sits second to the left of Q?
(a) V (b) P (c) T
(d) Y (e) Cannot be determine

16. What is the position of T with respect to V?
(a) 4th to the left (b) 2nd to the left (c) 3rd to the left
(d) 3rd to the right (e) 2nd to the right

17. Four of the following five are alike in a certain way and so form a group. Which if the one that does not belong to that group?
(a) R (b) W (c) V
(d) S (e) Y

18. Which of the following will come in place of the question mark based upon the given seating arrangement?
WP TR QW RS?
(a) YT (b) VY (c) VQ
(d) PY (e) QV

19. Which of the following is true regarding R?
(a) R is an immediate neighbor of V
(b) R faces the centre
(c) R sits exactly between T and S
(d) Q sits third to left of R (e) None is true

Directions (20-25): Study the following information to answer the given questions
J, P, Q, R, S, T,U and V are four married couples sitting in a circle facing the centre, the profession of the males within the group are lecturer, lawyer, doctor and scientist. Among the males, only R (the lawyer) and V (the scientist) are sitting together. Each man is seated besides his wife. U, the wife of the lecturer is seated second to the right of V. T is seated between U and V. P is the wife of the doctor. Q is not the doctor. S is a male.

20. Which of the following is P's position with respect to S?
(a) Second to the right (b) Second to the left
(c) Immediate right (d) Immediate left
(e) Third to the left

21. Which of the following is J's position with respect to T?
(a) Third to the left (b) Fourth to the right
(c) Third to the right (d) Opposite T
(e) Second to the right

22. Which of the following is not true regarding the couples?
(a) P is the wife of S (b) T is the wife of Q
(c) R is the husband of J
(d) J and S are seated adjacent to each other

23. The wives of which two husbands are immediate neighbours?
(a) UT (b) SR (c) VQ
(d) RV (e) None of these

24. Four of the following are alike in a certain way based on their seating

position in the above arrangement and so form a group. Which is the one that does not belong to the group?

(a) RSJ (b) TRV (c) UTV
(d) SQP (e) PUQ

25. Who is the Lawyer's wife?

(a) T (b) P (c) J
(d) U (e) None of these

ASSESSMENT PROBLEMS:

Directions (1-25): Study the following information to answer the given questions:

Ten people are sitting in two parallel rows containing five people each, in such a way that the there is an equal distance between adjacent persons. In row-1 P, Q, R, S and T are seated and all of them are facing South. In row-2 A, B, C, D and E are seated and all of them are facing North. Therefore, in the given seating arrangement each member seated in a row faces another member of the other row. D sits third to the left of A. P faces immediate neighbor of D. R sits second to the right of P. Only one person sits between Q and S. B and E are immediate neighbors of each other. E does not face P and Q.

1. How many persons are seated between Q and T?

(a) None (b) One (c) Two
(d) Three (e) Cannot be determined

2. Four of the following five are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

(a) R (b) S (c) C
(d) T (e) A

3. Who amongst the following represent the people sitting exactly in the middle of the rows?

(a) P, E (b) S, D (c) S, A
(d) A, R (e) P, B

4. Which of the following is true regarding B?

(a) A and C are immediate neighbours of B
(b) B sits at one of the extreme ends of the line
(c) Q faces B
(d) T is an immediate neighbor of the person facing B (e) D sits to the immediate left of B

5. Four of the following five are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

(a) T – E (b) Q – C (c) S – B
(d) R – A (e) P – D

6. Who amongst the following faces S?

(a) A (b) B (c) C
(d) D (e) E

Directions (7-11): Study the following information carefully and answer the questions given below:
In a building, there are thirteen flats on three floors – II, III and IV. Five flats are unoccupied. Three managers, two teachers, two lawyers and one doctor occupy the remaining flats. There are at least three flats on any floor and not more than six flats on any floor. No two persons of the same profession stay on any floor. On the II floor, out of four flats, one occupant is the lawyer and he has only one neighbor. One lawyer lives one floor below the other. The doctor is not the neighbor of any of the lawyers. No flat is unoccupied on the III floor.

7. How many flats are occupied on the IV floor?
(a) Two (b) Three (c) Four
(d) Data inadequate (e) None of these

8. How many flats are there on the III floor?
(a) Three (b) Four (c) Five
(d) Three or four (e) None of these

9. What is the combination of occupants in the II floor?
(a) Lawyer, Teacher (b) Manager, Teacher
(c) Manager, Doctor (d) Lawyer, Manager
(e) Teacher, Doctor

10. Who among the following is the neighbor of the other lawyer?
(a) Teacher (b) Manager
(c) Both Manager and Teacher
(d) Data inadequate
(e) None of these

Directions (11-14): Read the following information carefully and answer the questions given below:
A, B, C, D, E, F and G are seven students in a class. They are sitting on three benches I, II and III in such a way that there are at least two of them on each bench and there is at least one girl on each bench. C, a girl student, does not sit with A, E and D. F, a boy student, sits with only B. A sits with his best friend on bench I. G sits on bench III. E is brother of C.

11. On which bench do three students sit?
(a) I (b) II (c) III
(d) I or II (e) None of these

12. How many girl students are there?
(a) 3 (b) 4 (c) 3 or 4
(d) Data inadequate (e) None of these

13. Who sits with C?
(a) B (b) D (c) E
(d) G (e) None of them

14. Which of the following is a group of girls?
(a) BAC (b) BCD (c) BFC
(d) CDF (e) None of these

Directions (15-20): Study the following information carefully and answer the questions given below:
Eight boys A, B, C, D, E, F, G and H are sitting around a circle facing the centre. Each one of them have different occupation viz. Doctor, Shopkeeper, Banker, Architect, HR and Business Man, Engineer, Lawayer. It is not necessary that they are sitting alphabetically. F is sitting between B and C. Doctor is sitting immediately right of H, who is a lawyer. C is third to left of doctor but he is neither shopkeeper nor banker. E is an architecture and is sitting immediately right of HR who is sitting second to the right of B, a shopkeeper. Banker is second to left of shopkeeper. G is either businessman or banker and is sitting second to the right of A.

15. Who is a doctor?
(a) A (b) G (c) H
(d) Cannot be determined (e) None of these

16. How many persons are sitting between C and D?
(a) 2 (b) 3 (c) 4
(d) 1 (e) 5

17. Who is fourth to the right of shopkeeper?
(a) Banker (b) Doctor (c) Lawyer
(d) HR (e) Architect

18. How many persons are sitting between Doctor and Engineer?
(a) 3 (b) 4 (c) 2
(d) 1 (e) Cannot be determined

19. In which of the following pairs is the person sitting to the immediate right of the second person?
(a) BF (b) EH (c) DA
(d) DG (e) None of these

20. Which of the following pairs does not match according to arrangement?
(a) CBF (b) CHE (c) EAH
(d) AGD (e) DGA

Directions—(21-25) Study the following information carefully and answer the questions given below it.

P, Q R, S, T, U and V are travelling in three cars Indica, Esteem and Indigo with at least two in each car. There are three female members among them with at least one in each car. T is not travelling in Indica. R is travelling in Esteem with only his best friend V. Q is not travelling with either P or S and his best friend U is travelling in Indica. S is not travelling in Indigo.

21. Which of the following definitely represents a group of male members?

(a) RQP (b) RQU (c) RQUP
(d) RQPS (e) Data inadequate

22. In which car is Q travelling?
(a) Indica (b) Indigo (c) Esteem
(d) Cannot be determined (e) None of these

23. In which of the following cars are three of them travelling?
(a) Indigo (b) Esteem (c)Indica
(d) Cannot be determined (e) None of these

24. In which car is P travelling?
(a) Indica (b) Esteem (c) Indigo
(d) Cannot be determined (e) None of these

25. Which of the following represents the three female members?
(a) STV (b) PTV (c) UTV
(d) Data inadequate (e) None of these

Module-8

VENN DIAGRAM

In Venn diagram set of elements are represented by diagram. The usual depiction makes use of a rectangle as the universal set and circles for the sets under consideration.

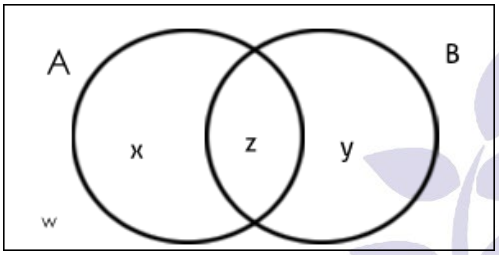
Let's take a look at some basic formulas for Venn diagrams of two and three elements.

n (A ∪ B) = n(A) + n (B) - n (A∩ B)

n (A ∪ B ∪ C) = n(A) + n (B) + n (C) - n (A ∩ B) - n (B ∩ C) - n (C ∩ A) + n (A ∩ B ∩ C)

And so on, where n(A) = number of elements in set A.

Venn Diagram in case of two elements



Where; X = number of elements that belong to set A only

Y = number of elements that belong to set B only

Z = (A ∩ B) = number of elements that belong to set A and B both

W = number of elements that belong to none of the sets A or B

From the above figure, it is clear that,

n(A) = x + z ;

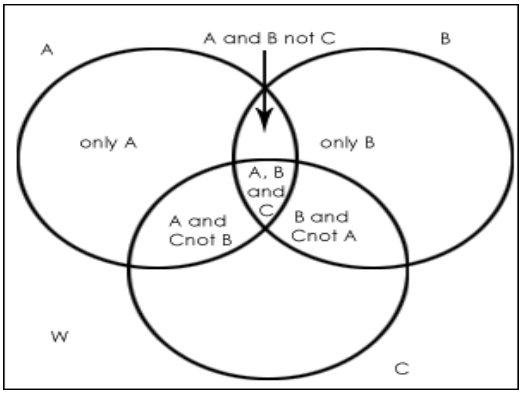
n (B) = y + z ;

n(A ∩ B) = z;

n (A ∪ B) = x +y+ z.

Total number of elements = x + y + z + w

Venn Diagram in case of three elements



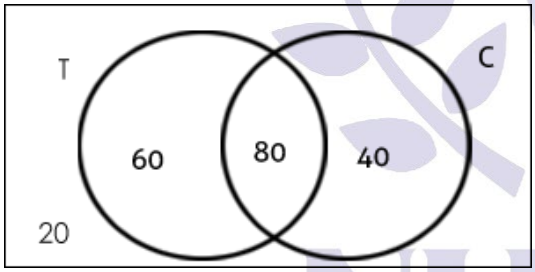
Where, W = number of elements that belong to none of the sets A, B or C

Solved Examples:

Example 1: In a college, 200 students are randomly selected. 140 like tea, 120 like coffee and 80 like both tea and coffee.

- How many students like only tea?
- How many students like only coffee?
- How many students like neither tea nor coffee?
- How many students like only one of tea or coffee?
- How many students like at least one of the beverages?

Solution: Here, T = tea and C = coffee.



- Number of students who like only tea = 60
- Number of students who like only coffee = 40
- Number of students who like neither tea nor coffee = 20
- Number of students who like only one of tea or coffee = 60 + 40 = 100
- Number of students who like at least one of tea or coffee = n (only Tea) + n (only coffee) + n (both Tea & coffee) = 60 + 40 + 80 = 180

Example 2: In a survey of 500 students of a college, it was found that 49% liked watching football, 53% liked watching hockey and 62% liked watching basketball. Also, 27% liked watching football and hockey both, 29% liked watching basketball

and hockey both and 28% liked watching football and basketball both. 5% liked watching none of these games.

- How many students like watching all the three games?
- Find the ratio of number of students who like watching only football to those who like watching only hockey.
- Find the number of students who like watching only one of the three given games.
- Find the number of students who like watching at least two of the given games.

Solution:

n(F) = percentage of students who like watching football = 49%

n(H) = percentage of students who like watching hockey = 53%

n(B)= percentage of students who like watching basketball = 62%

n (F ∩ H) = 27% ; n (B ∩ H) = 29% ; n(F ∩ B) = 28%

Since 5% like watching none of the given games so, n (F ∪ H ∪ B) = 95%.

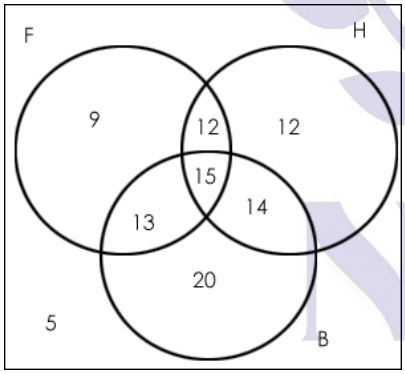
Now applying the basic formula,

95% = 49% + 53% + 62% -27% - 29% - 28% + n (F ∩ H ∩ B)

Solving, you get n (F ∩ H ∩ B) = 15%.

Now, make the Venn diagram as per the information given.

Note: All values in the Venn diagram are in percentage.



- Number of students who like watching all the three games = 15 % of 500 = 75.
- Ratio of the number of students who like only football to those who like only hockey = (9% of 500)/(12% of 500) = 9/12 = 3:4.
- The number of students who like watching only one of the three given games = (9% + 12% + 20%) of 500 = 205
- The number of students who like watching at least two of the given games=(number of students who like watching only two of the games)

+(number of students who like watching all the three games)= (12 + 13 + 14 + 15)% i.e. 54% of 500 = 270.

Example 3: For the purposes of a marketing research, a survey of 1000 women is conducted in a town. The results show that 52 % liked watching comedies, 45% liked watching fantasy movies and 60% liked watching romantic movies. In addition, 25% liked watching comedy and fantasy both, 28% liked watching romantic and fantasy both and 30% liked watching comedy and romantic movies both. 6% liked watching none of these movie genres.

Find:

1. How many women like watching all the three movie genres?
2. Find the number of women who like watching only one of the three genres.
3. Find the number of women who like watching at least two of the given genres.

Let's represent the data above in a more digestible way using the Venn diagram formula elements:

n(C) = percentage of women who like watching comedy = 52%

n(F) = percentage of women who like watching fantasy = 45%

n(R)= percentage of women who like watching romantic movies= 60%

n(C∩F) = 25%; n(F∩R) = 28%; n(C∩R) = 30%

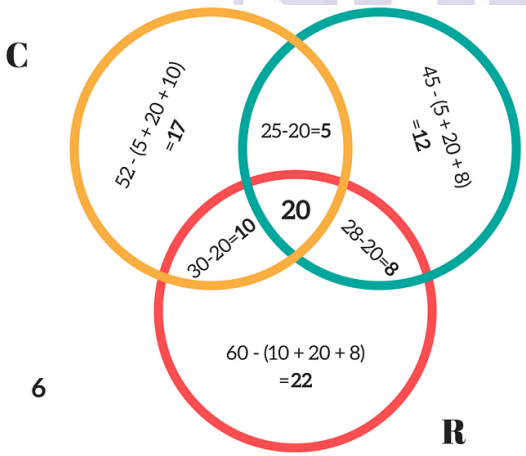
Since 6% like watching none of the given genres so, n (C ∪ F ∪ R) = 94%.

Now, we are going to apply the Venn diagram formula for 3 circles.

94% = 52% + 45% + 60% – 25% – 28% – 30% + n (C ∩ F ∩ R)

Solving this simple math equation, lead us to:

n (C ∩ F ∩ R) = 20%



The number of women who like watching all the three genres = 20% of 1000 = 200.

Number of women who like watching only one of the three genres = (17% + 12% + 22%) of 1000

= 510

The number of women who like watching at least two of the given genres = (number of women who like watching only two of the genres) +(number of women who like watching all the three genres)

= (10 + 5 + 8 + 20) % i.e. 43% of 1000 = 430.

PRACTICE PROBLEMS:

Directions for questions 1 and 5: Answer the questions on the basis of the following data.

Within a group of 240 employees in a company, 100 work on Marketing, 110 work on Finance and 140 work on HR related issues. It is also known as 30 work both Marketing and Finance, 50 work on both Finance and HR whereas 50 work on HR and Marketing while 20 work Marketing, Finance as well as HR related matters?

1) How many employees' work in only on Finance related issues?

(1) 40 (2) 50 (3) 60 (4) 45

2) How many employees work on either Finance or Marketing?

(1) 170 (2) 190 (3) 180 (4) 150

3) How many employees do not work on Marketing?

(1) 140 (2) 110 (3) 100 (4) 160

4) How many work on neither Finance nor HR related matters?

(1) 30 (2) 20 (3) 40 (4) 50

5) How many employees do not work on matters on the three matters?

(1) 0 (2) 10 (3) 20 (4) None of these

Directions for questions 6 and 10: Answer the questions on the basis of the following data.

In a colony there are viewers of three different TV channels. It was found that 35 people watch jug – mug channel, 45 people watch Tun – Mun channel and 15 people watch khat – pat channel. 14 people watch at least two channels among given channels. 3 people watch all the three channels. Every person in the colony watches at least one channel.

6) How many people do not watch all the three channels?

(1) 72 (2) 3 (3) 75 (4) None of given

7) How many persons watch at most one channel?

(1) 64 (2) 74 (3) 11 (4) 22

8) What is the number of residents in the colony?

(1) 100 (2) 78 (3) 68 (4) 94

9) If the number of persons who like only Jug – Mug is equal to 26, then how many persons are there in the colony, which like both Tun – Mun and Khat – Pat but not jug – mug.

(1) 4 (2) 5 (3) 15 (4) 14

10) How many persons watch exactly one channel?

(1) 60 (2) 72 (3) 64 (4) 58

Directions for questions 10 and 13: Answer the questions on the basis of the following data.

In a colony each resident likes at least one of following three circus programs – comedy circus, action circus and dance circus. 37% like comedy circus, 47% like action circus and 50% like dance circus. It is also known that 11% of the residents like both comedy circus and dance circus, 11% of the residents like both comedy circus and action circus, 15% like both action circus and Dance circus, while 15 residents like all the three programs.

10) How many residents like either comedy circus or dance circus?

(1) 380 (2) 200 (3) 400 (4) 325

11) How many residents do not like action circus?

(1) 140 (2) 110 (3) 100 (4) None of these

12) How many residents like either action or comedy circus but not dance circus?

(1) 300 (2) 250 (3) 210 (4) 400

13) The number of residents who like exactly one channel is what percentage of the number of residents who like dance circus?

(1) 100% (2) 150 (3) 138% (4) 128%

14) In a group of persons travelling in a bus, 6 persons can speak Tamil, 15 can speak Hindi and 6 can speak Gujarati. In that group, none can speak any other language. If 2 persons in the group can speak two languages and one person

can speak all the three languages, then how many persons are there in the group?

A) 21 B) 22 C) 23 D) 24

15) In a town of 500 people, 285 read The Hindu and 212 read Indian Express and 127 read Times of India, 20 read The Hindu and Times of India and 29 read The Hindu and Indian Express and 35 read Times of India and Indian express. 50 read no newspaper. Then how many read only one paper?

A) 123 B) 231 C) 312 D) 321

16) Out of 120 students in a school, 5% can play all the three games Cricket, Chess and Carroms. If so happens that the number of players who can play any and only two games is 30. The number of students who can play the Cricket alone is 40. What is the total number of those who can play Chess alone or Carroms alone?

A) 45 B) 44 C) 46 D) 24

17) Main street high school has 10 members on its football team and 14 members on its science club. 5 members at the school belong to both the football and science teams. How many students belong to only science club team or football team?

A) 9 B) 14 C) 24 D) 21

18) Study the following information carefully and answer the question given below.

In a club of 30 people, all of them belong to at least one group - Chess, Drama and Art.6 people belong only to the Art group. 5 people belong to all three groups. 2 people have joined the Chess and the Art group but not the Drama group. 15 people belong to the Art group. 2 people have joined only the Chess group. 3 people have joined only the Drama group.

How many people have belonged to the Chess group?

(A) 21 (B) 13 (C) 19 (D) 20

19) Study the following information carefully and answer the question given below.

In a club of 30 people, all of them belong to at least one group - Chess, Drama and Art.6 people belong only to the Art group. 5 people belong to all

three groups. 2 people have joined the Chess and the Art group but not the Drama group. 15 people belong to the Art group. 2 people have joined only the Chess group. 3 people have joined only the Drama group.

How many people belong to exactly one group?

(A) 11 (B) 10 (C) 14 (D) 12

PRACTICE PROBLEMS

In this type, two, three or four different groups could be given with some elements common to two or more groups. Let us observe the diagram given below. Directions for questions 1 and 2:

Read the following information and answer the questions. In a class of 50 students it is known that students drink either tea or coffee. 22 drink tea.

1. How many students drink coffee but not tea, if each student drinks at least one of the two drinks?

   (1) 15 (2) 22 (3) 28 (4) 23

2. How many students drink only coffee?

   (1) 28 (2)10 (3) 12 (4) CBD

3. In an exam, 250 students passed in English or Mathematics and 150 students passed in English. What is the number of students that passed only in Mathematics if it known that no student failed in both subjects?

   (1) 150 (2) 23 (3) 100 (4) None of these

4. A and B are two sets such that $n(A - B) = 48 + x$, $n(B - A) = 5x$ and $n(A \cap B) = x$, if $n(A) = n(B)$ find x

   (1) 7 (2) 12 (3) 8 (4) None of these

5. How many numbers between 1 to 100 that are divisible by 2, 3 and 5?

   (1) 76 (2) 72 (3) 74 (4) None of these

6. How many people read all the three newspapers?

   (1) 20 (2) 15 (3) 23 (4) 41

7. How many people read exactly one newspaper?

   (1) 96 (2) 91 (3) 89 (4) 276

Directions for questions 8 to 10: In a survey of the newspaper reading habits of Tambaram Municipality among 380 people, it was found that 130 citizens read The Hindu, 140 read The Indian Express and 129 read Times of India. 29 read The Hindu and The Indian Express, 35 read The Indian Express and Times of India and 20 read The Hindu and Times of India. 50 people do not read any of the newspapers.

8. How many people read at most two newspapers?

(1)365 (2)8 (3) 30 (4) 28

9. In an examination, 62% of the candidates passed in Economics, 42% in Commerce and 12% in both. What is the number of candidates that failed in both the subjects if the total strength of the class is 100 students?

(1) 14 (2) 20 (3) 19 (4) 8

10. In a class there are 10 students who play football and hockey, 7 students who do not play football or hockey, 23 students who play hockey and 20 students who play football. How many students are there in the class?

(1) 54 (2) 58 (3) 40 (4) 60

Directions for the questions 11 to 12: During a survey the following information was noted: 24 people wore black shoes, 28 people wore a black cap, 20 people wore both of these things while 2 persons wore neither of these things.

11. How many people were surveyed?

(1) 30 (2) 34 (3) 20 (4) 42

12. How many people wear a black cap but do not wear black shoes?

(1) 12 (2) 8 (3) 28 (4) 4

Directions for questions 13 to 17: A survey was conducted in an English department of a college and the following was noted:

51 teachers admired Shakespeare, 49 admired Mark Twain, 60 admired George Elliot, 34 admired Shakespeare and Mark Twain, 32 admired Mark Twain and George Elliot, 36 admired Shakespeare and George Elliot, 24 admire all the authors and 1 teacher did not admire any of the three authors.

13. How many teachers were surveyed?

(1) 85 (2) 50 (3) 72 (4) 83

14. How many teachers admired only George Elliot?

(1) 36 (2) 11 (3) 16 (4) 12

15. How many admire Mark Twain or George Elliot?

(1) 88 (2) 77 (3) 66 (4) 55

16. How many admire exactly one of the authors?

(1) 12 (2) 28 (3) 28 (4) 23

17. How many admire exactly two of the authors?

(1) 30 (2) 13 (3) 25 (4) 14

Directions for questions 18 to 20: In a class 150 students speak English, 125 students speak Hindi and 55 students speak both the languages. Each student speaks at least one language.

18. What is the number of students who speak at least one language?

(1)1 (2) 150 (3) 220 (4) 275

19. Find the number of students who speak at most one language?

(1)25 (2) 180 (3) 120 (4) 165

20. Find the number of students who speak exactly one language?

(1) 175 (2)195 (3) 35 (4) None

21. A teacher was teaching the topic Venn diagram. She drew two circles on the board and was trying to represent numbers between 1 and 10 (both included). She told the class that one circle represented odd numbers and on the other circle represented prime numbers. How many numbers are common to both the circles?

(1) 5 (2) 6 (3) 3 (4) None of these

22. The total number of ice creams eaten by the children in Aakash nursery school on Friday was 150. The vanilla and chocolate ice creams eaten are in the ratio 2:3. The difference between the number of the ice creams was 12. Each child ate at least one icecream and at most two ice creams. What is the number of children in the school?

(1) 32 (2) 50 (3) 33 (4) CBD

Directions for questions 23 to 25: Read the following information and answer the questions.

A survey was conducted among 510 music lovers. Each person likes at least one among the devotional songs of Iyappan, Perumal, Murugan and Amman. Among them 200 people like Iyappan songs, 210 people like Perumal songs, 200 people like Murugan songs and 210 people like Amman songs. 10 people like all songs sung by all the four singers and 40 people like only Iyappan songs. The number of people who like any one combination of any three singers is 30. Also the number of people who like any one combination of any two singers is 20.

23. How many people like Perumal songs only?

(1) 50 (2) 10 (3) 18 (4) 20

24. How many people songs of Iyappan and Murugan?

(1) 90 (2) 100 (3) 90 (4) 60

25. How many people like only Amman songs?

(1) 20 (2) 50 (3) 60 (4) 40

Module-9

SYLLOGISM

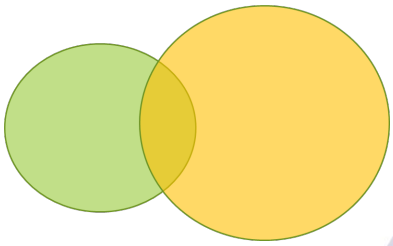
Syllogism is a "Greek" word that means inference or deduction.

Syllogism is part analytical reasoning. It consists of some statements, and we need to deduce conclusion out the given statements. The statements and conclusions may seem to be illogical, but while solving questions related to syllogism, we must assume the given statements to be 100% true.

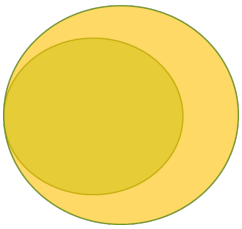
Types of statements:

1. **SOME A ARE B.**

CASE-1

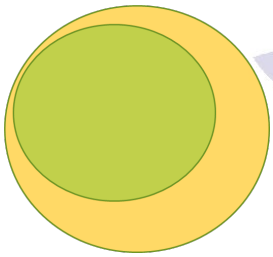


CASE-2

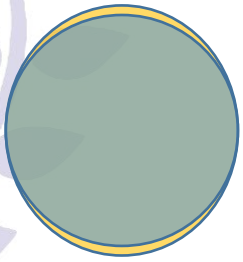


2. **ALL A ARE B.**

CASE-1

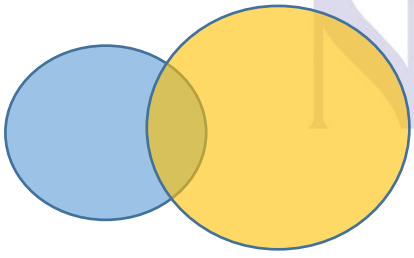


CASE-2

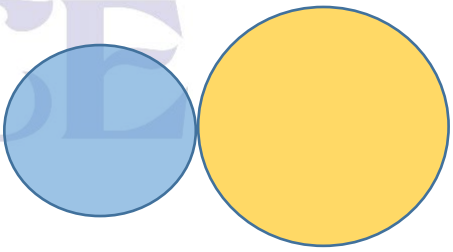


3. **SOME A ARE NOT B.**

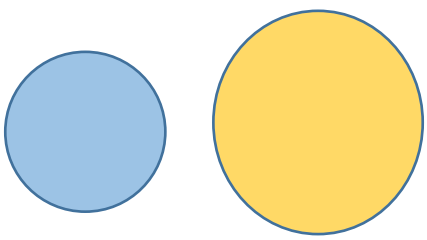
CASE-1



CASE-2



4. **NO A ARE B.**



Statement	**Definite Conclusion**	**Possible Conclusion**
All A are B	All A are B Some A are B . Some B are A	All B are A Some B are not A
Some A are B	Some A are B Some B are A	All A are B All B are A Some A are not B Some B are not A
Some A are not B	Some A are not B	Some A are B No A is B No B is A Some B are not A All B are A
No A is B	No A is B No B is A Some A are not B Some B are not A	No possibility is true

SOLVED EXAMPLES:

Question 1:

Directions: In the following question, three statements are given followed by three conclusions I, Il, and Ill. You have to consider the given statements to be true, even if they seem to be at variance with commonly known facts. Read all the conclusions and decide which of the following logically follows from the given statements disregarding the commonly known facts.

Statements: No panda is a dog. Some pandas are crow. All dogs are animals.

Conclusion:

I. Some dogs are crow.

II. Some crow are pandas.

III. Some animals are not pandas.

Solution: From the Venn diagram we get,

I. Some dog are crow =>False (No direct relation given hence, false)

II. Some crow are panda => True (Some panda are crow hence, some crow are panda is True)

III. Some animals are not pandas =>True (All dogs are animals and No dog is a panda. so those animals which are dog can never be panda hence, true)

Thus, only conclusion II and III follow.

Question 2: Statements: **Conclusions:**

I.	Some tables are chairs.	Some chairs are not Sofa.
II.	Only a few chairs are sofas.	All tables can be cupboards.
III.	No sofa is a cupboard.	No chair is a cupboard.

Solution: Conclusions: Some chairs are not Sofa =>True (As only a few chairs are sofa which means the rest of the chairs are not sofa. Hence true)

All table can be cupboard is a possibility =>True (Possibility is true as shown below)

No chair is a cupboard => False (It is possible but not definite)

Thus, the correct answer is "Only conclusion I and II follow".

DIRECTIONS *for questions 3 – 5:* In each of the questions below are given three statements followed by four conclusions numbered I, II, III and IV. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. Read the conclusions and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.

1) Statements: Some eyes are ears. Some ears are lungs. All lungs are hands

Conclusion:

I. Some hands are eyes.

II. Some hands are ears

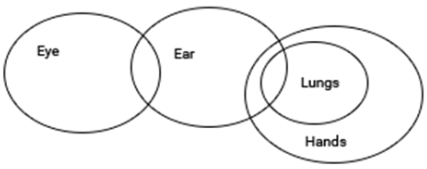
III. Some lungs are eyes

IV. No hand is eye

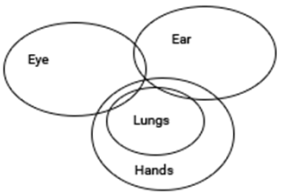
1. None follow
2. Only IV follows
3. Only II follows
4. Only III follows

Answer: 3

Explanation:



OR



From the diagram, II definitely follows.

2) Statements: All liquids are solids. Some solids are gases. All gases are clouds

Conclusion:

I. Some clouds are solids — II. Some clouds are liquids

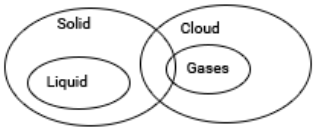
III. Some gases are liquids — IV. Some solids are clouds

1. None follows — 2. Only I and II follow

3. Only III and IV follow — 4. Only I and IV follow

Answer: 4

Explanation:



Clearly from the diagram I and IV are true.

3) Statements: All Gold are Platinum. No Platinum is silver. Some Diamonds are silver.

Conclusion:

I. Some Diamonds are Gold — II. Some Diamonds are Platinum

III. Some Gold are Silver — IV. No Silver is Gold

1. Only I follows — 2. Only III follows

3. Only IV follows — 4. Only II and IV follows

Answer Key: 3

Explanation

:

From the diagram we see all the possibilities. Clearly only IV is true for all possibilities

PRACTICE PROBLEMS

Directions:

A. If only conclusion I follows. **B. If only conclusion II follows.**

C. If either conclusion I or II follows. **D. If neither conclusion I nor II follows.**

1) Statements:

1. No toffee is coffee.
2. No sweet is toffee.

Conclusions:

1. No coffee is sweet.
2. All sweets are coffee.

2) Statements:

1. All medals are awards.
2. All rewards are medals.

Conclusions:

1. All rewards are awards.
2. All awards are medals.

3) Statements:

1. Some trees are plants.
2. All bushes are plants.

Conclusions:

1. At least some trees are bushes.
2. Some trees are definitely not bushes.

4) Statements:

1. All bottles are glasses.
2. No cup is a glass.

Conclusions:

1. No bottle is a cup.
2. At least some glasses are bottles.

5) Statements:

1. All windows are doors.
2. All entrances are windows.
3. No gate is a door.

Conclusions:

1. At least some windows are gates.
2. No gate is an entrance.

6) Statements:

1. Some plants are mountains.
2. All plants are rivers.

Conclusions:

1. All mountains are plants.
2. At least some mountains are rivers.

7) Statements:

1. All planets are stars.
2. All meteors are planets.
3. No orbit is a star.

Conclusions:

1. All meteors are stars.
2. No planet is an orbit

8) Statements:

1. No month is a year.
2. Some years are weeks.

Conclusions:

1. No weeks is a year.
2. Some weeks are years.

9) Statements:

1. All jungles are tigers
2. Some tigers are horses.

Conclusions:

1. Some tigers are jungles.
2. All horses are jungles.

10) Statements:

1. All pens are pencils
2. No pencil is an eraser

Conclusions:

1. No eraser is a pen
2. No pen is an eraser

11) Statements:

1. Some men are good
2. Some men are wise

Conclusions:

1. Some wise men are good.
2. Some good men are wise.

12) Statements:

1. No colour is a paint.
2. No colour is a varnish.

Conclusions:

1. No varnish is a paint
2. At least some varnishes are paints

13) Statements:

Some squares are circles.

1. No circle is a triangle.
2. No line is a square.

Conclusions:

1. All squares being triangles is a possibility.
2. No square is a line.

14) Statements:

1. Some squares are circles.
2. No circle is a triangle.
3. No line is a square.

Conclusions:

1. All squares can never be triangles
2. II. Some lines are circles.

15) Statements:

1. Some red are colours.
2. No red is a paint.
3. All colours are black.

Conclusions:

1. Some black being paints is a possibility.
2. II. All paints being black is a possibility.

16) Statements:

1. Some mice are keyboards.
2. No keyboard is a key.
3. All keys are rings.

Conclusions:

1. Some mice are rings.
2. II. All rings being mice is a possibility.

17) Statements:

1. Some red are colours.
2. No red is a paint.
3. All colours are black

Conclusions:

1. Some colours are not paints.
2. II. All red being black is a possibility.

18) Statements:

1. All stickers are cups.
2. No cup is a wire.
3. All wires are bulbs.

Conclusions:

1. No wire is sticker
2. II. No bulb is cup.

19) Statements:

1. All stickers are cups.
2. No cup is a wire.
3. All wires are bulbs.

Conclusions:

1. All stickers being bulbs is a possibility.
2. II. No bulb is a sticker.

20) Statements:

1. No toffee is coffee.
2. No sweet is toffee.

Conclusions:

1. No coffee is sweet.
2. All sweets are coffee.

ASSESSMENT PROBLEMS

Each question consists of two statements, write the logical conclusion that follows from the given Statements.

	Statements		
1	All A's are B's. All C's are D's.	**9**	All trainees work infactories. Some trainees are apprentices.
2	All pens are pencils. All pencils are erasers.	**10**	All sports are famous. Some sports are dangerous.
3	All cats are rats. All rats are cats.	**11**	All books are pencils. Some pens are books.
4	Some engineers are doctors.	**12**	No train is a tram.

Some doctors are researchers.

5 All cows are donkeys.

Some donkeys are buffaloes.

6 Some A's are not B's.
Some B's are not C's.

7 Not all animals are dangerous.
Some animals are man eaters.

8 All politicians are wealthy.
Some politicians are not educated.

Some trains are not buses.

13 Some lights are tubes.
Many fans are lights.

14 No pig is a horse.
No horse is a monkey

15 All Indians are patriotic.
Some Indians are NRIs.

In each question, there is a premise followed by two premises labeled (I) and (II). Study the statements and mark your answer choice as per the instructions given below

Mark your answer as:

(1) If only conclusion (I) follows.
(2) If only conclusion (II) follows.
(3) If both conclusions (I) and (II) follow.
(4) If neither conclusion (I) nor conclusion (II) follows.

16) Statements:

1. All clocks are fans.
2. Some fans are walls

Conclusions:

1. Some fans are clocks.
2. Some clocks are not walls.

17) Statements:

1. All tables are cars.
2. Some dusters are tables.

Conclusions:

1 Some cars are not dusters.
2 Some dusters are cars.

18) Statements:

1. Some teachers are adults.
2. Some adults are poets.

Conclusions:

1. Some teachers are poets.
2. Some poets are teachers.

19) Statements:

1. All politicians are intelligent.
2. Some women are politicians.

Conclusions:

1 Some women are intelligent.

2 All who are intelligent are women.

20) Statements:

1. All politicians are intelligent.
2. Some women are politicians.

Conclusions:

1. Some women are intelligent.
2. All who are intelligent are women.

21) Statements:

1. No scientist is a teacher.
2. Some teachers are researchers.

Conclusions:

1 Some scientists are not researchers.

2 Some researchers are not scientists.

22) Statements:

1. Some books are pens.
2. No pen is a pencil.

Conclusions:

3. Some books are not pencils.
4. Some pens are not pencils.

23) Statements:

1. All mangoes are apples.
2. Some grapes are apples.

Conclusions:

1 All apples are mangoes.

2 Some apples are mangoes.

24) Statements:

1. All radios are mobile phones.
2. Some mobile phones are music systems.

Conclusions:

1. No music system is a radio.
2. Some radios are music systems.

25) Statements:

1. All trees are flowers.
2. All flowers are grasses.

Conclusions:

1 All trees are grasses.

2 Some flowers are grasses.

MODULE- 10

DATA SUFFICIENCY

CONCEPTS:

Data Sufficiency means you need to check whether the data given in the two statements is sufficient to answer the question asked or not. You need to find a unique answer to the question asked. More than one answer is not allowed.

SOLVED EXAMPLES:

DIRECTIONS for the following questions:

Mark (1) if the question can be answered by 'A' alone but cannot be answered by 'B' alone

Mark (2) if the question can be answered by 'B' alone but cannot be answered by 'A' alone

Mark (3) if the question cannot be answered by 'A' or 'B' alone but can be answered by combining the two statements.

Mark (4) if the question can be answered by 'A' alone and 'B' alone

Mark (5) if the question cannot be answered by 'A' or 'B' alone and cannot be answered even by combining the two statements.

Example 1: What is the value of 'x'?

A : $x^2 = 64$ B. $x^3 = 512$

Solution: Following the steps mentioned earlier, we see that statement 'A' is not sufficient to answer the question as from statement 'A', we get 2 values of 'x' as - 8 and + 8. Statement 'B' is sufficient as we get x = 8. As this is a unique solution, so the answer is 2nd option.

Example 2: Is x odd?

A : 3x - 12 = 12 B. 2x + 16 = 24

Solution: If we follow the steps of solving a Data Sufficiency question, from statement 'A'; we get the value of 'x' as 8. This statement is sufficient to answer the question as we are getting a unique answer as "No".

Also, from statement 'B', we get the value of 'x' as 4. This statement is also sufficient to answer the question as we are getting a unique answer as "No".

Since, we are getting unique answers from both statements individually, so the answer is 4th option.

Example 3: What is the distance between Chandigarh and Delhi?

A. Karnal is 130 km from Chandigarh. B. Delhi is 120 km from Karnal.

Solution: Just by looking at the statements, we can infer that a unique answer can be obtained by combining the two statements.

But this answer is based on two assumptions: Chandigarh, Karnal and Delhi are in a straight line and Karnal lies between Chandigarh and Delhi. Even if it is given that these 3 cities are in straight line, still we have 2 possible answers to this question, even after combining the two statements i.e. 250 km and 10 km.

Since, we are not getting any unique answer even on combining the two statements, so answer is (5) .

PRACTICE PROBLEMS:

DIRECTIONS for questions (1 - 16):

Mark (1) if the question can be answered by 'A' alone but cannot be answered by 'B' alone

Mark (2) if the question can be answered by 'B' alone but cannot be answered by 'A' alone

Mark (3) if the question cannot be answered by 'A' or 'B' alone but can be answered by combining the two statements.

Mark (4) if the question can be answered by 'A' alone and 'B' alone

Mark (5) if the question cannot be answered by 'A' or 'B' alone and cannot be answered even by combining the two statements.

1) How many children are there between Priya and Rashmi in a row of children?

I: Priya is fifteenth from the left in the row

II: Rashmi is exactly in the middle and there are ten children towards her right

2) How is 'A' related to 'B'?

I: Q's sister 'A' is married to B's father

II: 'B' and 'X' are children of 'P' who is wife of 'A'

3) When will Mohan celebrate his birthday this year?

I: Mohan's birthday is between March 13 and 15, March 13 is Wednesday.

II: It is not on Friday.

4) What is the code for 'clouds' in the code language?

I: In the code language, 'clouds is blue' is written as 'se ra fa'.

II: In the same code language, 'make it blue' is written as 'se ga zo'.

5) In which year was Rahul born?

I: Rahul at present is 25 years younger to his mother.

II: Rahul's brother, who was born in 1964, is 35 years younger to his mother.

6) If the current year is 2020, In which year was Gopal born?

I: Gopal is 6 years older than Dev.

II: Dev was born in 1982.

7) How much money was invested by Ajay?

I: Total amount received by Bharat after 3 years is Rs.4800 at compound interest.

II: Bharat and Ajay invested their amount at the rate of 10% per annum.

8) Number of females from village 'C' in all the years together is what percent of the total number of employees from village 'C' in all the years together?

I: Total number of employees from village 'C' in 2017 is 280 and the ratio of the number of females to males from 'C' in 2017 is 4: 3.

II: 60% of the total number of employees from village 'C' in 2014 to 2017 is males.

9) What is Bhana's rank in a class of 44 students?

I: Kamal whose rank is 17th in the class, is ahead of Preti by 6 ranks, Preti being 7 ranks ahead of Bhana.

II: Suman is 26 ranks ahead of Bhana and Priya is 6 ranks behind Bhana while Savita stands exactly in the middle of Suman and Priya in ranks, her rank being 17.

10) Who is paternal uncle of 'P'?

I: 'P' is brother of 'L', who is the daughter of 'Q', who is the sister of 'N', who is the brother of 'S'.

II: 'M' is brother of 'K', who is the husband of 'L', who is the mother of 'G', who is the sister of 'P'.

11) Who amongst 'P', 'Q', 'R', 'S', 'T' and 'U' is the tallest?

I: 'P' is taller than 'R' and 'T' but not as tall as 'U', who is taller than 'Q' and 'S'.

II: 'R' is third in height in ascending order and not as tall as 'U', 'P' and 'Q', 'Q' being taller than 'P' but not the tallest.

12) Do 'X', 'Y', and 'Z' stand in a straight line?

I: 'F' is 2 km towards the south of 'E'. 'K' is 5 km towards the west of 'F'. 'X' is 2 km towards the north of 'F'. 'Y' is 3 km towards the east of 'E' and 'Z' is 4 km towards the east of 'Y'.

II: 'X' is 2 km towards the north of 'L'. 'K' is 4 km towards the west of 'L'. 'S' is 1 km towards the south of 'K'. 'M' is 2 km towards the west of 'S'. 'Y' is 3 km towards the north of 'M' and 'Z' is 2 km towards the north of 'W'.

13) Which direction is Preeti facing?

I: If Gagan, who is currently facing east, turns 90 degree towards his right, he would face a direction exactly opposite to the direction Preeti is facing.

II: If Priya, who is currently facing south, turns left, walks 1 km and then takes a left turn again, she would face the same direction as Preeti.

14)A bought 40 books at Rs 40 each. He sold 'y' of them at Rs. 35 each and remaining at Rs. 45

each. Did he make a profit?

(I) $y > 20$ **(II)** $y < 25$

15)What is the sum of 2 numbers?

I. The LCM of the numbers is 51 **II**. One of the numbers is 17

16) Is $(a^2 - b^2)$ even?

I. (a + b) is odd **II.** (a - b) is odd

17) How many pages of the book 'Harry potter did James Bond read on Sunday?

(I) The book has 492 pages out of which two-thirds were read by him before Sunday.

(II) James Bond read the last 40 pages of the book on the morning of Monday.

18) What is the shortest distance between Bangalore and Chennai?

(I) Chennai is 340 km away from Salem.

(II) Bangalore is 186 km away from Salem.

19) What is Nisha's age if today is her mother's birthday?

(I) Nisha will be half as old as her father on 25th September 2014.

(II) Nisha's mother was born in 1968, 2 years after Nisha's father.

20) A sells to B at x% profit and B sells it to C at y% profit. Who makes more money - A or B?

(I) x > y. **(II)** x = y.

21) Eight persons are standing in two parallel rows, such that four persons stand in row-X facing north and four stand in another row i.e. row-Y facing south. In this way, person in one row faces the person of other row.
Who faces C?

(I) A is second to the right of B, who is an immediate neighbor of D. E stands in row-Y and faces G, who is immediate left of H. C is on the immediate right of the one who faces A.

(II) F stands at the left end in row-Y. A is facing I, who is second to the left of E. A stands in row-X. C and F are the immediate neighbors of I.

22) In a fair, there are six types of rides viz. Roller Coaster, Ferris wheel, Fast Forward, Mad Bull, Big Beat and Loco Motion which are priced differently. Their prices ranged between Rs. 70 and Rs. 150.

What is the price of the ride which is priced second lowest?

(I) Loco Motion was priced 25 rupees higher than Big Beat. Roller Coaster was priced Rs. 110, which was not the highest price, but was higher than the price of Ferris Wheel.

(II) Big Beat was priced Rs. 80, which is just lower than that of Ferris Wheel, whose price is a multiple of 5. Only two rides were priced below Rs. 100. Big Beat and Mad Bull share the maximum difference of prices. The price of Loco Motion was 10 rupees more than that of Ferris Wheel.

23) Six batsmen are doing net practice on six days of a week starting from Monday to Saturday. Only one player practices on one day. Dhoni practices on which day?

(I) Virat practices just before Dhoni, who is not the last one to practice. Rohit practices on the first day of the week immediately followed by Shikhar.

(II) Rohit and Virat practice at a gap of one day such that Rohit practices on Monday. Dhoni practices just before Rahul.

24) Six laptop brands viz. Apple, Lenovo, Acer, Dell, Sony and Hp have different ratings from 1 to 6. No two laptop brands have same rating. Rating 1 being the highest and 6 being the lowest. Which laptop brand is rated 3rd?

(I) Apple is rated higher than Lenovo, whose rating is just lower than Sony. Dell's rating is ahead of two laptops only, one of them is Lenovo.

(II) No other laptop brand has a better rating than Hp. Acer is rated higher than Apple, which is rated higher than at least two laptops

25) What is the birth date of Mona's mother?

(I) Mona's father remembers that his wife's birthday is after 20th and before 23rd February.

(II) Mona's brother remembers that his mother's birthday was after 21st but before 25th February.

ASSESSMENT PROBLEMS

Directions (1-5): Each of the questions below, consist a question and three statements numbered I, II and III. You have to decide whether the data provided in the statements are sufficient to answer the question. Read the three statements and Give answer.

1. There are seven persons i.e. A, B, C, M, K, T and L in a family. Find that K is the paternal uncle of T?

I. M is brother of K and is married to L, who is mother of A. A is sister of T.

II. B is brother of A. C is the only son of K.

III. B is the only son of K, who is the brother-in-law of L. C is sister of B

a) If the data in statement I and II together are sufficient to answer the question, while the data in statement III are not required to answer the question.

b) If the data in statement I and III together are sufficient to answer the question, while the data in statement II are not required to answer the question.

c) If the data in statement II and III are sufficient to answer the question, while the data in statement I are not required to answer the question.

d) If the data in all three statements I, II and III together are necessary to answer the question.

e) If the data in all the statements, I, II and III even together are not sufficient to answer the question.

2. Who among M, N, P, Q, R and S is the heaviest?

I. P is heavier than only two of them. S is heavier than R and Q.

II. R is lighter than both Q and N but N is heavier than P but lighter than both S and M.

III. S is lighter than M.

3. There are six persons A, B, C, D, E and F sitting in a row facing north. Who among the following sits 2nd to the right of C?

I. C sits 2nd to right of the one who sits at the left end of the row. A does not sit any of the extreme end.

II. A sits on the immediate left of B, who sits 4th to the right of C.

III. D sits 2nd to the left of E. D sits at one of the ends.

4. How many sons does M have?

I. N is brother G. A is sister of N. K is mother of B.

II. G is the brother B, who is the son K.

III. M is married to K.

5. What does the code 'lz' stands for in the given coded language?

I. In a language, 'Sun water roof' is coded as 'am nl or' and 'food room plate' is coded as 'st od wa'

II. In a language, 'stem plant leave' is coded as 'er az op' and 'food plate water' is coded as 'od st nl'

III. In the language, 'flower air Sun' is coded as 'pa am lz' and 'food plant leave' is coded as 'az od er'

Directions (6-8): Each of the questions below consists of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and Give answer-

6. How is T related to K?

I. K is the only daughter of L and J.

II. R's sister J has married to T's brother L, who is the only son of his parents.

a) 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.

b) If the data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.

c) If the data either in statement, I alone or in statement II alone are sufficient to answer the question.

d) If the data given in both statements, I and II together are not sufficient to answer the question.

e) If the data in both statements, I and II together are necessary to answer the question.

7. How is M related to N?

I. P, who has only two kids M and N, is the mother-in-law of Q, who is the sister-in-law of N.

II. R, the sister-in-law of M, is the daughter-in-law of S, who has only two kids M and N.

8. Which train did Sailesh catch to go to office?

I. Sailesh did not catch the 10.40 a.m. train or any train after that time.

II. Sailesh missed his usual train of 10.30 a.m. A train comes in every 5 minutes.

a) 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.

b) If the data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.

c) If the data either in statement, I alone or in statement II alone are sufficient to answer the question.

d) If the data given in both statements, I and II together are not sufficient to answer the question.

e) If the data in both statements, I and II together are necessary to answer the question.

Directions (9-13): Each of the questions below consists of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statement are sufficient to answer the question. Read both the statements and give answer:

9. There are six members P, Q, R, S, T, and U in a family, how is T related to S?

I. S is son of R. P and U are child of Q. T is grandfather of P.

II. R is mother-in-law of Q, who is a female member. S has no brother.

10. What is the distance between point P and Q?

I. Point S is 4m away in east direction from point P. Point T is in 2m north of point S.

II. Point Q is in north-west of point T.

11. What will be the code of 'Engineer'?

I. 'some smarts are wise' is written as 'HV3 HH5 ZV2 DV3' in that code language.

II. 'scientists are genius' is written as 'HH9 ZV2 TH5' in that code language.

12. Who among A, B, C, D, E earns highest salary?

I. C's salary is higher than A's salary, whose salary is higher than E's salary. D's salary is in the denomination of 10.

II. C is not getting the salary as much as B and D get. The one who gets 2nd highest salary, his salary is 5568rs.

13. M, N, O, P, R, and Q are sitting in a circular table. How many persons are facing opposite to the centre?

I. There is only one person sitting between P and Q. R is not an immediate neighbour of Q, who sits immediate left of P.

II. O sits second to the left of R. N is not an immediate neighbour of R, but faces outside the centre. O faces inside the centre.

Directions (14-15): Each of the questions below consists of a question and some statements given below it. You have to decide the data provided in which of the statements are sufficient to answer the questions and choose your answer accordingly.

14. B is in which direction with respect to A?

I. A is in north direction with respect to Z. Z is in north west direction from X. B is in west direction with respect to X.

II. Z is south direction from A. X is in south west direction from Z. B is in east direction from X.

III. X is in east direction from Z. B is in south direction from X. A is in north east direction from Z.

a) Only I and II b) Only I and III c) Any two of the three

d) All I, II and III e) Data insufficient

15. A is in which direction with respect to B?

I. A is to the East of M who is south of N.

II. A is to the North-East of R.

III. M is in north of R, who is to the West of B.

a) Only I and II b) Only III c) Any two of the three

d) All I, II and III e) none

Directions: Each of the questions below consists of a question and three statements numbered I, II and III given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read all the statements and give answer:

16. A person can purchase three articles with Rs. 49. What is the price of costliest article?

I. The cost price of two articles each is Rs. 1 less than the cost price of costliest article.

II. The cost price of two articles is same.

III. The cost price of costliest article is 6.25% more than the cost price of cheapest article.

a) Either statement I alone or statements II and III together are sufficient.

b) Only statement III is sufficient.

c) Only statement I and II together are sufficient.

d) Only statement I and III together are sufficient.

e) None of these

17. Shatabdi Express leaves Patna at 8:00 am for Delhi. At what time will it reach Delhi?

I. For the first 100 km it travels at the speed of 250 km per hour and maintains the same speed during the entire journey.

II. It has 5 stoppages in between Delhi and Patna.

III. Before every stoppage, it covers a same distance of 240 km

a) Either statement III alone or statements I and II together are sufficient.

b) Only statement III is sufficient.

c) Only statement I and II together are sufficient.

d) Only statement I, II, and III together are sufficient.

e) None of these

18. What is the sum of the age of Ram and Mohan?

I. The age of Ram is 6 years more than the age of Mohan.

II. 40% of the age of Mohan is equal to 30% of the age of Ram.

III. The ratio between half of the age of Ram and one third of the age of Mohan is 2:1.

a) Either statement III alone or statements I and II together are sufficient.

b) Only statement III is sufficient.

c) Only statement I and II is sufficient.

d) Only statement I, II, and III are sufficient.

e) None of these

19. In a kilometer race, by how many meters Chandu beats Chandan?

I. In a kilometer race, Chandu beats Chandan by 100 meters.

II. The respective ratio of the speed of Chandan and Chandu is 4:3.

III. In a kilometer race, Chandan beats Chandu by 150 meters.

a) Either statement III alone or statements I and II together are sufficient.

b) Only statement III is sufficient.

c) Only statement I and II is sufficient.

d) Only statement I, II, and III are sufficient.

e) None of these

20. A metal block of density 'D' and mass 'M', in the form of a cuboid, is beaten into a thin square sheet of thickness 't', and rolled to form a cylinder of the same thickness. Find the inner radius of the cylinder.

I. Cuboid has dimensions 10cm x 5 cm x 12 cm

II. Thickness 't' = 1.5cm

III. Mass of block, M = 216kg

a) Either statement III alone or statements I and II together are sufficient.

b) Only statement III is sufficient.

c) Statement I and Statement II together are sufficient.

d) Only statement I, II, and III together are sufficient.

e) None of these

DIRECTIONS (Q. Nos. 21-25) Each of the questions below consists of a question and two statements numbered I and II given below. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements. Give answer.

(a) 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.

(b) If the data in Statement II alone are sufficient to answer the question, while the data in Statement I alone are not sufficient to answer the question.

(c) If the data either in Statement I alone or in Statement II alone are sufficient to answer the question.

(d) If the data given in both the Statements I. and II together are not sufficient to answer the question

(e) If the data in both the Statements I and II together are necessary to answer the question

21. How many people are sitting in a circle, where all the people are facing the center?

I. K sits third to the right of L. M is an immediate neighbour of K. Only three people sit between L and M.

II. N sits third to the left of M. Only one person sits between N and K. K is an immediate neighbour of M.

22. How far and in which direction is Point B with respect to Point A?

I. Point G is 6 m to the East of Point A. Point C is 9 m to the North of Point G. Point F is 3 m to the West of Point C. Point B is 6 m away from Point F.

II. Point M is 8 m to the West of Point B. Point R is 8 m to the South of Point M. Point A is 11 m to the East of Point R. Point C is to the North-East of Point A.

23. How far is Point M from Point K?

I. Point D is 5m to the South of Point P. Point M is 8 m to the West of Point D. Point S is 2.5m to the North of Point M. Point O is 10 m to the East of Point S. Point K is 2.5 m to the South of Point O.

II. Point K is 10 m to the East of Point M. Point U is 8m to the West of Point M. Point D is to the East of Point M. Point M is the midpoint of the lines formed by joining Points U and D.

24. Amongst the people viz. A, B, C, D, E and F sitting around a circular table facing the centre, who sits second to the right of A?

Statements

I. A sits second to the right of F. Only two people sit between A and D. B is neither an immediate neighbour of D nor F.

II. Only one person sits between A and F (either from left or right). Only two people sit between F and B. C sits next to the immediate neighbour of B.

25. Among six people viz. C, D, E, F, G and H sitting in a straight line with equal distance, between each other and facing North, who sits second to the left of G?

I. C sits third from the left end of the line. Only one person sits between C and H. Only two people sit between E and G. G sits at one of the position to the right of E.

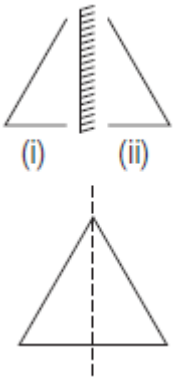
II. E sits third to the left of G. G does not sit at any extreme end of the line. More than three people sit between H and F. F sits at one of the positions to the right of H.

NHCE

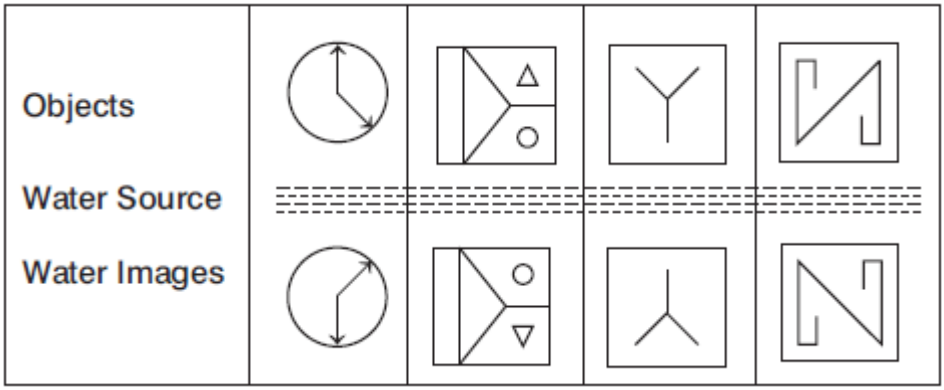
Module-11

NON-VERBAL REASONING

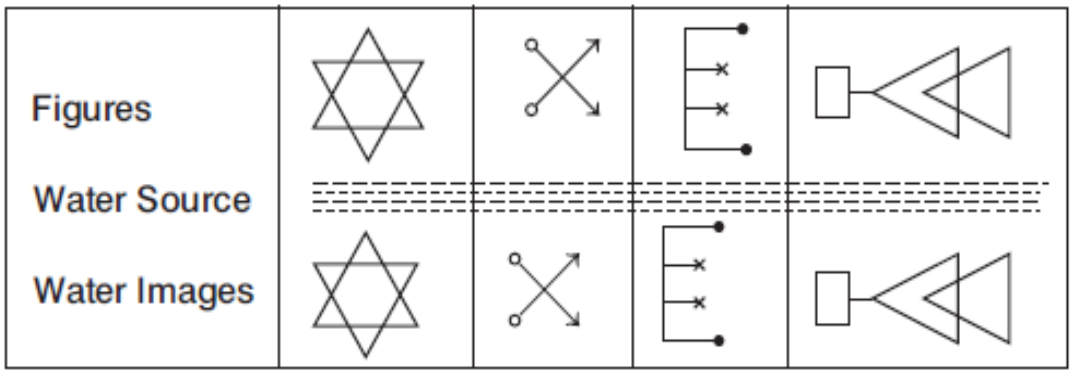
Mirror image is the image or the reflection of an object into a mirror when that object is placed near to or in front of it. In case of standard form of mirror image i.e., when the mirror is placed vertically, the object gets laterally inverted. In other words, the Left Hand Side (LHS) and Right Hand Side (RHS) of the object interchange their places while top and bottom remain the same. Let us see an example to get a better idea about
the concept of mirror images Here, fig. (ii) is the mirror image of fig. (i). On combining these two figures we get a triangle shaped which is symmetrical along an imaginary line which is used in place of the mirror.



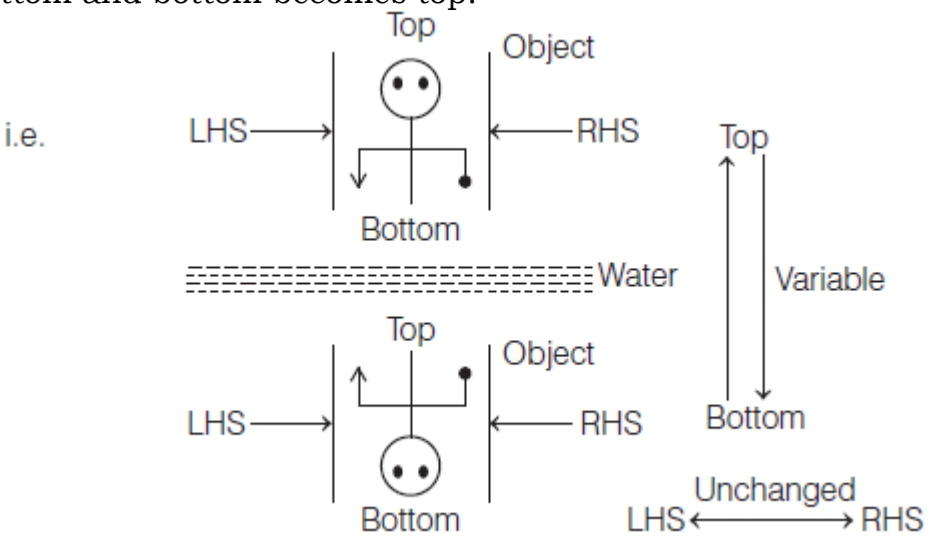
WATER IMAGE:
The image formed by reflection of an object in water is called its water image. It is the vertically inverted form of the given object. The water image of the figure looks like its mirror image when the mirror is placed horizontally at
its bottom. Mostly the water image of a figure is different from the original figure which is because of the dissimilarity in the upper and lower half of the figure. This can be better understood with the help of several different water images of figures which are given below Example of water images which are different from their figures



Sometimes the water image of figure is identical to the original figure. This is the case when the upper half of the figure is similar to the lower half of the figure but in opposite direction. This can be better understood with the help of several identical water images of figures which are given below Example of water images which are identical to their figures



From the given examples, it is clear that in the water image, (LHS) and (RHS) remain unchanged while upper and lower parts get interchanged which means top becomes bottom and bottom becomes top.



PRACTICE PROBLEMS:

In each of the following questions you are given a combination of alphabets and/or numbers followed by four alternatives (1), (2), (3) and (4). Choose the alternative which is closely resembles the mirror image of the given combination.

1. Choose the alternative which is closely resembles the mirror image of the given combination.

ANS43Q12

(1) AN$4ƐQ1Ƨ (2) Ƨ1Q$4ƐNA

(3) $NAƐ4QƧ1 (4) 1ƧQ4Ɛ$NA

2. Choose the alternative which is closely resembles the mirror image of the given combination.

TARAIN1014A

(1) A4101NIARAT (2) A101♦NIARAT

(3) A101♦TARAIN (4) A♦101NIARAT

3. Choose the alternative which is closely resembles the mirror image of the given combination

MALAYALAM

(1) MALAYALAM (2) MAJAYAJAM

(3) WALAYALAM (4) MALAYALAM

4. Choose the alternative which is closely resembles the mirror image of the given combination.

EFFECTIVE

(1) ƎVITCƎFFƎ (2) EVITCEFFE

(3) ƎFFƎCTIVƎ (4) ƎVITCƎFƎ

5. Choose the alternative which is closely resembles the water-image of the given combination.

NUCLEAR

(1) ЯAƎLCUN (2) NUCLƎAR

(3) NUCLƎAR (4) NUCLEAR

6. Choose the alternative which is closely resembles the water-image of the given combination.

GR98AP76ES

(1) GR69AP19ES (2) GR88AP19ES

(3) GR88AP19ES (4) GR88AP19ES

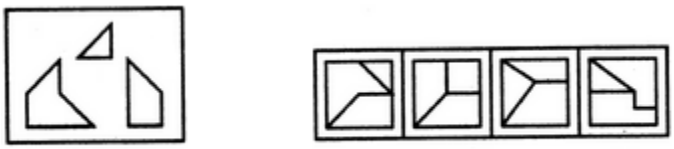
7. Choose the alternative which is closely resembles the water-image of the given combination.

DISC

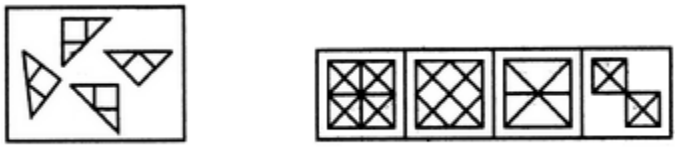
(1) CSID (2) ↄSIↃ

(3) DISC (4) DISC

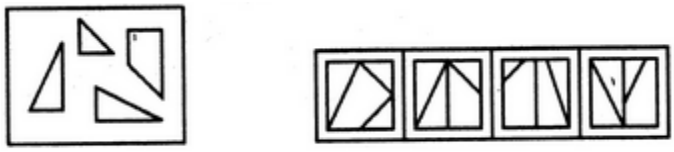
8. Find out which of the figures (1), (2), (3) and (4) can be formed from the pieces given in figure (X).



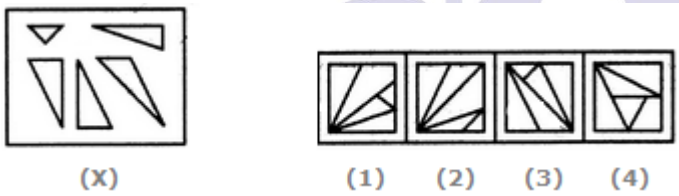
9. Find out which of the figures (1), (2), (3) and (4) can be formed from the pieces given in figure (X).



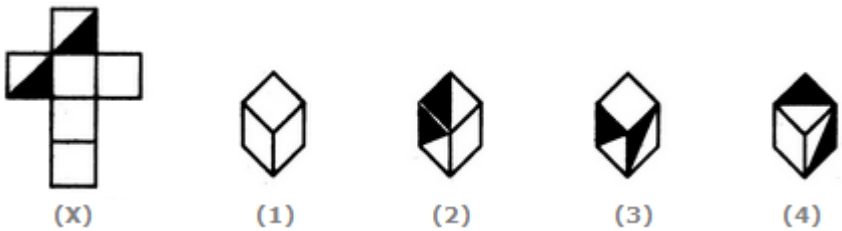
10. Find out which of the figures (1), (2), (3) and (4) can be formed from the pieces given in figure (X).



11. Find out which of the figures (1), (2), (3) and (4) can be formed from the pieces given in figure (X).

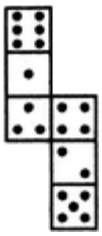


12. Choose the box that is similar to the box formed from the given sheet of paper (X).



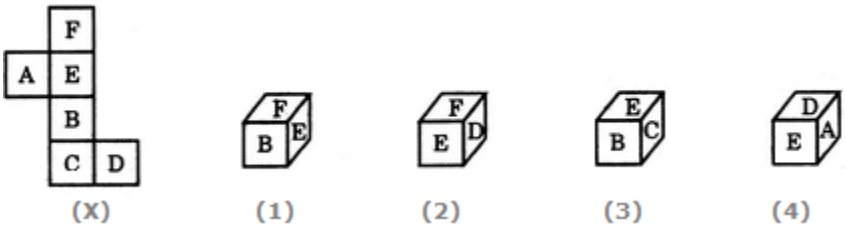
A. 1 and 4 only B. 3 and 4 only C. 1 and 2 only D. 2 and 3 only

13. How many dots lie opposite to the face having three dots, when the given figure is folded to form a cube?



A. 2 only B. 4 only C. 5 only D. 6 only

14. Choose the box that is similar to the box formed from the given sheet of paper (X).



A. 1 only B. 2 only C. 1 and 3 only D. 1, 2, 3 and 4 only

15. Choose the box that is similar to the box formed from the given sheet of paper (X).

A. 1 only B. 2 only C. 3 only D. 4 only

16. Identify the figure that completes the pattern.

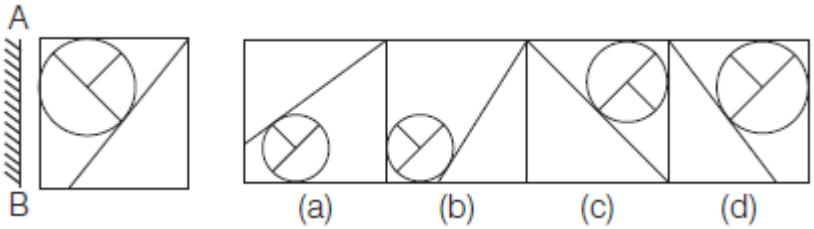
17. Identify the figure that completes the pattern.

18. Identify the figure that completes the pattern.

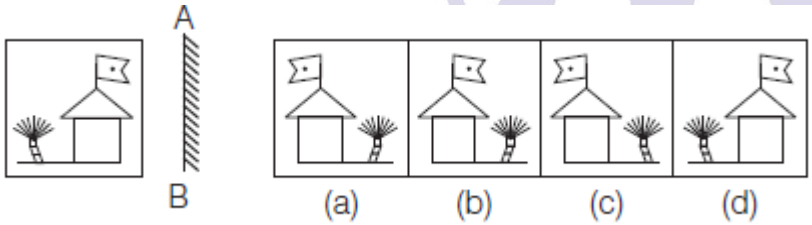
19. Identify the figure that completes the pattern.

20. Identify the figure that completes the pattern.

21.



22.

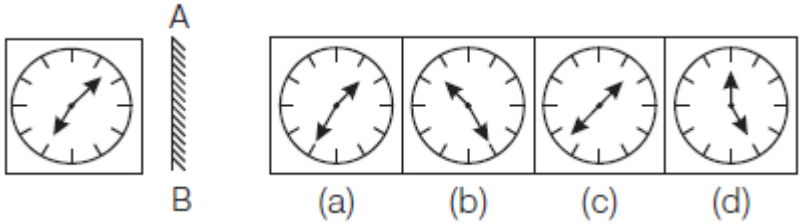


23. When seen through a mirror, a clock shows 8: 30. The correct time is

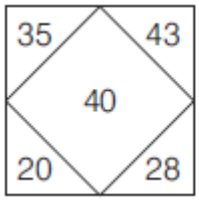
(a) 2: 30 (b) 3: 30

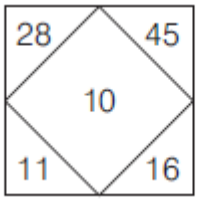
(c) 5: 30 (d) 8: 30

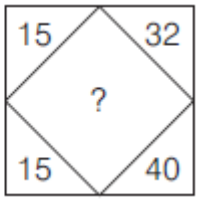
24.



25.



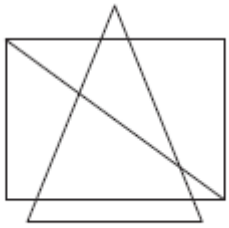




(a) 25 (b) 28 (c) 35 (d) 38

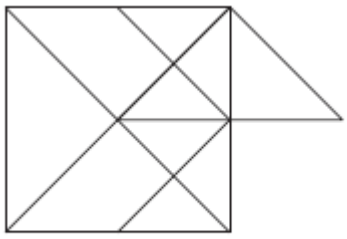
ASSESSMENT PROBLEMS:

1. How many triangles are there in the given figure?



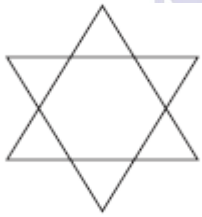
(a) 6 (b) 12 (c) 10 (d) 8

2. How many triangles are there in the following figure?



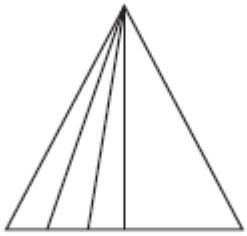
(a) 22 (b) 18 (c) 21 (d) 20

3. Count the number of triangles in the following figure.



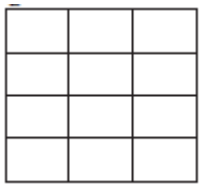
(a) 6 (b) 7 (c) 8 (d) 9

4. How many triangles are there in the following figure?



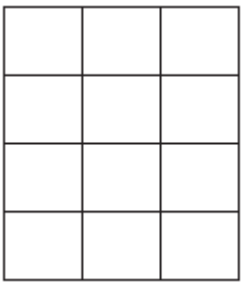
(a) 5 (b) 12 (c) 9 (d) 10

5. How many rectangles are there in the following figure?



(a) 48 (b) 60 (c) 61 (d) 56

6. How many squares are there in the following figure?



(a) 20 (b) 22 (c) 21 (d) 24

In each of the following questions, which number/character will complete the given pattern, when placed at the sign of interrogation (?).

7.

25	17	41
32	83	11
26	?	31

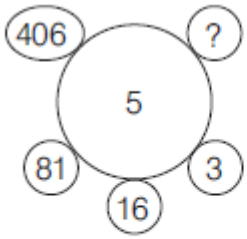
(a) 26 (b) 25 (c) 34 (d) 38

8.

5	9	14	20
9	17	27	?

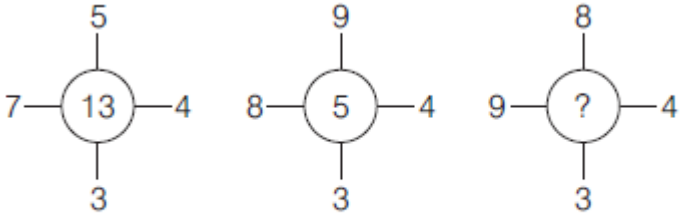
(a) 35 (b) 37 (c) 39 (d) 41

9.



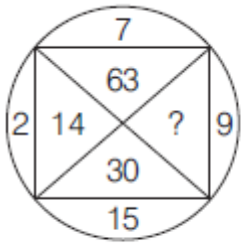
(a) 2031 (b) 731
(c) 1625 (d) 1
(e) None of these

10.



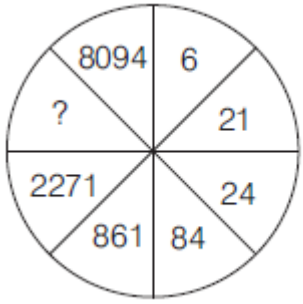
(a) 12 (b) 15 (c) 18 (d) 14

11.



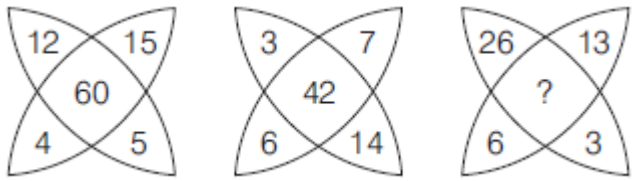
(a) 33 (b) 145 (c) 135 (d) 18

12.



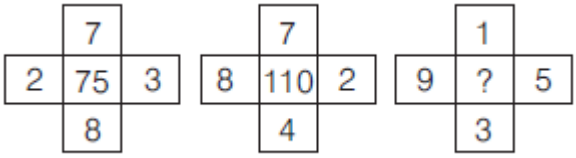
(a) 2245 (b) 2454 (c) 2154 (d) 2254

13.



(a) 19 (b) 29 (c) 78 (d) 48

14.



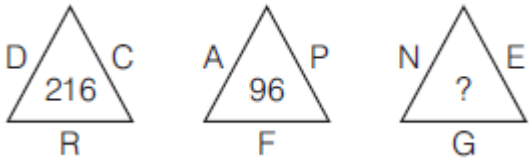
(a) 18 (b) 8 (c) 56 (d) 64

15.

D	T	24
N	E	19
L	?	14

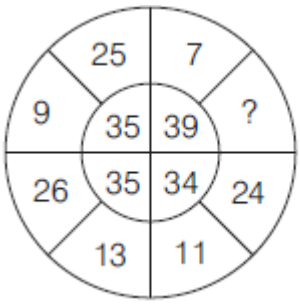
(a) M (b) B (c) S (d) W

16.



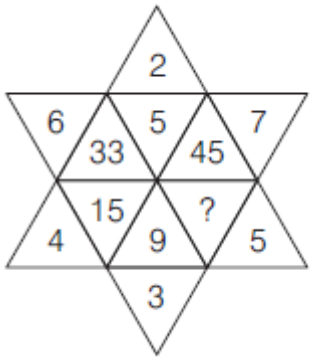
(a) 835 (b) 88 (c) 490 (d) 75

17.



(a) 28 (b) 36 (c) 81 (d) 49

18.



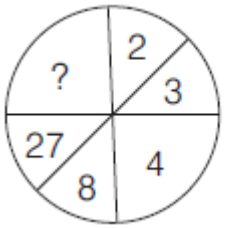
(a) 20 (b) 23 (c) 25 (d) 28

19.

AC_4	BD_6	EG_{12}
HJ_{18}	KM_{29}	?
QS_{36}	TV_{38}	WY_{76}

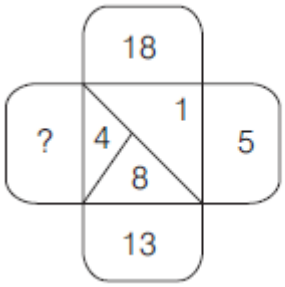
(a) NP_{24} (b) OQ_{40} (c) NP_{49} (d) PQ_{68}

20.



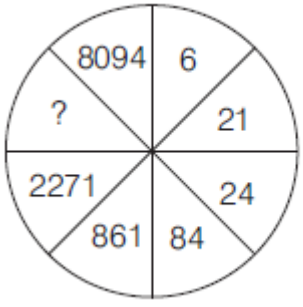
(a) 56 (b) 49 (c) 45 (d) 64

21.



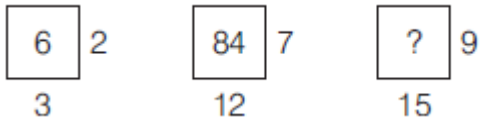
(a) 13 (b) 11 (c) 10 (d) 17

22.



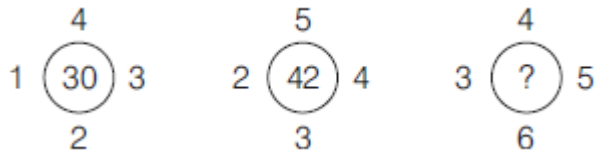
(a) 2245 (b) 2454 (c) 2154 (d) 2254

23.



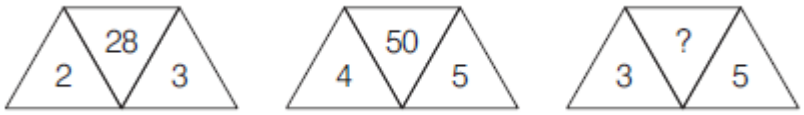
(a) 135 (b) 167
(c) 221 (d) 141

24.



(a) 54 (b) 45 (c) 35 (d) 53

25.



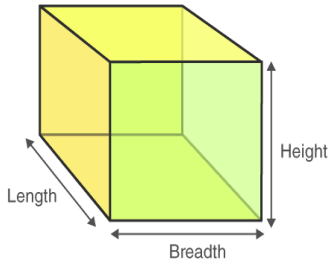
(a) 35 (b) 40 (c) 49 (d) 53

Module-12

CUBES AND CUBOID

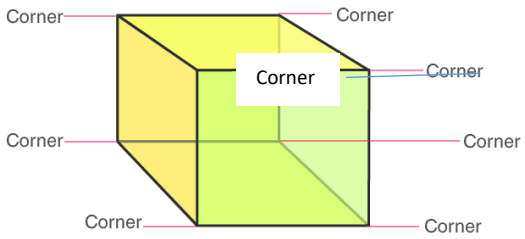
Basic Structure of a Cube

A cube is a 3-dimensional structure with three sides (length, width, and height) where all the sides equal (length = width= height). The word cube is derived from the Arabic word ”Kaba” a large cube-shaped structure.



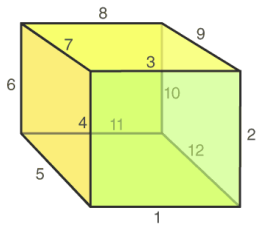
A cube has 6 faces: The faces appear at front, back, right, left, top and bottom.

Cube has 8 vertices: The corner points are called vertices. There are four vertices on the top face and four more at the bottom face.



Cube has 12 Edges:

The line which connects the two vertices is called edges. There are twelve edges in a cube. Four on the top surface and four at the bottom and four more vertical lines connecting the opposite vertices of top and bottom face.



Summary:

A cube has:	Faces	Vertices	Edges

	6	8	12

Surface Area of Cube

A cube is a 3-dimensional representation of a square. Since dimensions of all the three sides, i.e. length, breadth, and height of a cube are equal, they are referred to as sides and is indicated by a symbol 's'. The total surface area of a cube is:
The surface area of a cube = (area of one square) *6

The surface area of a cube = (s*s)*6

The surface area of a cube = 6

The sum of areas of 4 constituting squares (faces) gives the lateral surface area of the cube.

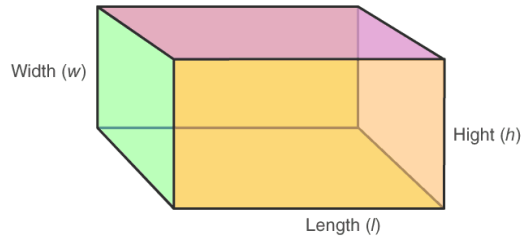
The lateral surface area of a cube = 4*(area of one square)

The lateral surface area of a cube = 4*(s*s)

The lateral surface area of a cube = 4

What is Cuboid?

A cuboid is a 3-dimensional structure with three sides where all the sides are not equal. The three sides are the length, width, and height. All of its faces are rectangles A cuboid also has 6 faces, 8 vertices, and 12 edges.



The total surface area (TSA) of a cuboid is the sum of the areas of its 6 faces:

To explore Directions in detail, check at the linked article.

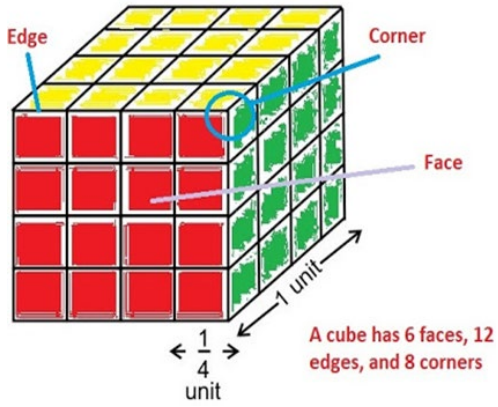
Lateral Surface Area of Cuboid

The lateral surface area of a cuboid is the sum of the area of only four rectangles.

Lateral Surface Area of Cuboid = Area of left side face +
Area of right side face +
Area of front Face +
Area of back Face

Creation of Rubik's cube

If we divide a cube into the size part of its side, we get smaller cubes. A cube Shown below, which is painted on all the sides and then cut into 1/4th of its original face. Each small cube is known as "unit cube".



Ex: If we cut a cube to form three rows and three columns on each face then the total number of unit cubes will be = 3*3*3 = 27.

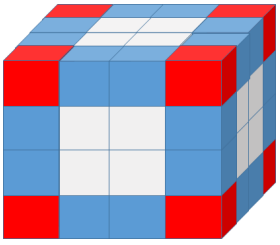
Following is the list of unit cube generation based on the division of a bigger cube:

Rows on each side	Columns on each side	Unit cubes
2	2	8
3	3	27
4	4	64
5	5	125
6	6	216
7	7	343

Evaluation of Cube with 'n' sides painted

Observe the cube shown. It has been divided into ¼ of its original side length. Hence the total number of smaller or unit cubes formed will be 64.

***Question 1*:** How many unit cubes have only three sides painted?



***Solution*:**

The cubes with three of their sides painted lie at the vertices of the cubes (The cubes coloured in red). There are eight such cubes. Hence the answer is eight.

***Question 2*:** How many cubes have only two sides painted?

***Solution*:**

The cubes with two sides painted lie at the edges (the cubes coloured in blue). Evaluate such cubes for one tip and multiply the result by 12.(as there are 12 edges in a cube). From the figure, it is clear that there are two blue cubes at an edge. Hence the total number of such cubes will be 2*12 = 24.

***Alternate solution*:**

The value of n for the given cube 4. Substituting it in the formula we get

12 x(4-2) = 24.

Question 3: How many cubes have only one side painted?

***Solution*:**

The cubes with only one side painted always lie at the surface. Evaluate the number of such faces at each surface and multiply the result by six. As there are six faces in a cube. From the figure, it is clear that there are four white cubes at the surface. Hence the total number of such cubes will be 6*4 = 24.

Question 4: How many cubes have no side painted?

Solution:

The cubes at the inner core part of the cube will not have any side painted. Evaluating it every time for different cubes is a tedious task. The simple and easiest approach is by analyzing the pattern.

In 2*2*2 cube there are zero cubes that have no side painted. Whereas in 3*3*3 cube There is only one cube at the core part which has no sides painted.

Cube type	Non painted cube
2*2*2	0
3*3*3	1
4*4*4	8
5*5*5	27
6*6*6	64
7*7*7	125

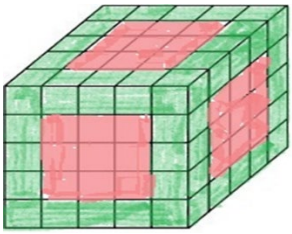
The logical pattern from the table follows that the total number of cubes with no side painted will always be equal to the cube of natural numbers.

Question 5:

Directions: A cube of side 10 cm is coloured red with a 2 cm wide green strip along all the sides on all the faces. The cube is divided into 125 smaller cubes of equal size. Answer the following questions based on this statement.

1. How many cubes have three green faces each?
2. How many cubes have one face red and an adjacent face green?
3. How many cubes have at least one face coloured?
4. How many cubes have at least two green faces each?

Solution:



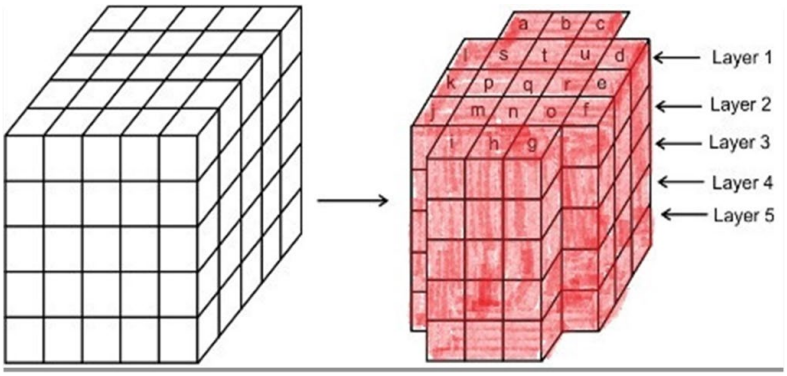
1. All the corner cubes are painted green. So there are 8 cubes with 3 sides painted with green.
2. There is no cube having one face red and an adjacent face green as all the green painted cubes got paint on at least 2 faces.
3. Let us calculate the number of cubes with no painting.
   By formula (i.e) $(n-2)^3 = 27$
   Therefore, there are 125 – 27 = 98 cubes having at least one face coloured.
4. From the total cubes, Let us subtract the cubes with red painting, cubes with no painting.125 – (9 x 6) – 27 = 44

Question 6:

Directions: One hundred and twenty-five cubes of the same size are arranged in the form of a cube on a table. Then a column of five cubes is removed from each of the four corners. All the exposed faces of the rest of the solid (except the face touching the table) are coloured red. Now, answer these questions based on the above statement:

1. How many small cubes are there in the solid after the removal of the columns?
2. How many cubes do not have any coloured face?
3. How many cubes have only one red face each?
4. How many cubes have two coloured faces each?
5. How many cubes have more than 3 coloured faces each?

Solution:



1. Since out of 125 total number of cubes, we removed 4 columns of 5 cubes each, the remaining number of cubes = 125 – (4 x 5) = 125 – 20 = 105.
2. Cubes with no paintings lie in the middle. So cubes which are below the cubes named as s, t, u, p, q, r, m, n, o got no painting. Since there are 4 rows below the top layer, total cubes with no painting are (9 x 4) = 36.
3. There are 9 cubes named as m, n, o, p, q, r, s, t and u in layer 1, and 4 cubes (in columns b, e, h, and k) in each of the layers 2, 3, 4 and 5 got one red face. Thus, there are 9 + (4 x 4) = 25 cubes.
4. The columns (a, c, d, f, g, i, j, l) each got 4 cubes in the layers 2, 3, 4, 5. Also in layer 1, h, k, b, e cubes got 2 faces coloured. so total cubes are 32 + 4 = 36
5. There is no cube in the block having more than three coloured faces. There are 8 cubes (in the columns a, c, d, f, g, i, j and l) in layer 1 which have 3 coloured faces. Thus, there are 8 such cubes.

PRACTICE PROBLEMS

1. A cube is given 6 cuts. Find the maximum possible number of cubes.

   (1) 7 (2) 15 (3) 24 (4) 27

2. A cube is subjected to 11 cuts. What is the maximum number of pieces possible?

   (1) 12 (2) 22 (3) 40 (4) 100

3. If a cube is given 12 cuts, what is the difference between the maximum and minimum number of cuboids possible?

   (1) 13 (2) 112 (3) 125 (4) None of these

4. A cube is given 6 cuts, which of the following cannot be the number of cuboids possible?

   (1) 27 (2) 7 (3) 22 (4) 20

5. A cube is decorated with 80 glittering marbles, with one marble at every corner, five marbles at each edge and ‘x’ marbles at the centre of each face. Find ‘x’

   (1) 3 (2) 12 (3) 6 (4) 8

6. What is the minimum number of cuts needed to get 64 cubes from a cube?

   (1) 63 (2) 9 (3) 12 (4) 24

7. We need to carve out 125 identical cubes from a cube. What is the minimum number of cuts needed?

   (1) 12 (2) 24 (3) 36 (4) 124

8. By giving how many cuts, can a person get 100 cuboids?

   (1) 99 (2) 11 (3) 18 (4) More than one

9. Which of the following is the minimum number of cuts needed to get 180 pieces?

   (1) 16 (2) 8 (3) 32 (4) 179

10. Which of the following cannot be the number of cuts to get 50 cuboids?

    (1) 25 (2) 49 (3) 9 (4) 16

11. In a die, 3 and 4 are marked adjacent to 2, 6 and 4 are adjacent to 2, 1 and 2 are adjacent to 3. What is the number opposite to 2?

    (1) 6 (2) 1 (3) 5 (4) 3

12. It is decided to make a cuboid of dimensions 10 cm * 12 cm * 14 cm using a cube of dimensions 2cm * 2 cm * 2 cm. How many cubes are needed?

    (1) 120 (2) 420 (3) 210 (4) 840

Directions for 13-16:

A cube is painted on all the faces with green colour. After painting, the cube is cut into 216 pieces.

13. How many cubes have 3 faces painted?

    (1) 9 (2) 8 (3) 7 (4) 6

14. How many cubes have 2 faces painted?

    (1) 44 (2) 46 (3) 48 (4) 50

15. How many cubes have 1 face painted?

    (1) 96 (2) 90 (3) 92 (4) 94

16. How many cubes have no face painted?

    (1) 60 (2) 63 (3) 65 (4) 64

Directions for 17-20:

A cube is painted on all the faces with red colour. After painting, the cube is cut into 180 pieces.

17. How many cuboids have no face painted?

    (1) 48 (2) 49 (3) 50 (4) 51

18. How many cuboids have 2 faces painted?

(1) 48 (2) 47 (3) 46 (4) 44

19. How many pieces have the maximum number of faces painted?

(1) 6 (2) 8 (3) 7 (4) 9

20. How many cuboids have 1 face painted?

(1) 81 (2) 83 (3) 80 (4) 82

Directions for 21-25:

I have a cuboid of dimensions 4 cm * 3 cm * 5 cm. In this, the opposite faces of dimensions 4 cm * 5 cm are painted in red colour. Opposite faces of dimensions 4 cm * 3 cm are painted in blue colour and opposite faces of dimensions 5 cm * 3 cm are painted in green colour. Now this cuboid is cut in such a way that the cubes of dimensions 1 cm * 1 cm * 1 cm are formed.

21. What is the total number of cubes possible?

(1) 30 (2) 60 (3) 80 (4) 24

22. How many cubes have all the three colours?

(1) 8 (2) 10 (3) 12 (4) 14

23. How many cubes have no colour?

(1) 0 (2) 2 (3) 4 (4) 6

24. How many cubes have only two colours, red and green on their two faces?

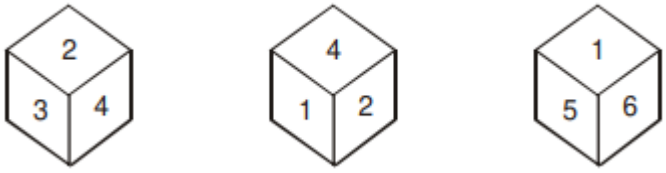
(1) 8 (2) 12 (3) 16 (4) 20

25. How many cubes have only one colour?

(1) 12 (2) 16 (3) 22 (4) 28

ASSESSMENT PROBLEMS

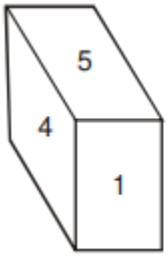
1. Three views of a cube are given below

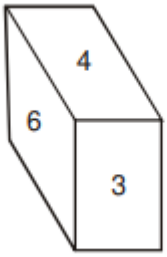


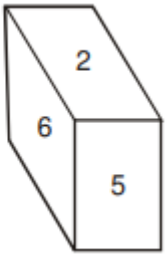
Which number is opposite face number 4 ?

(a) 1 (b) 5 (c) 6 (d) CBD

Direction for Questions 2 - 4: These questions are to be answered on the basis of the three of a cube given below :







2. Which number is at the bottom face of figures?

(a) 3 (b) 2 (c) 6 (d) 1

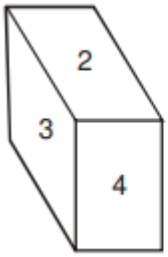
3. Which number is the opposite face of 4?

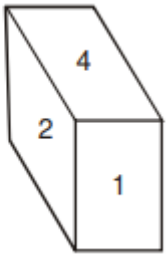
(a) 2 (b) 3 (c) 6 (d) 1

4. Which number is on the face opposite to 1 ?

(a) 3 (b) 2 (c) 6 (d) 4

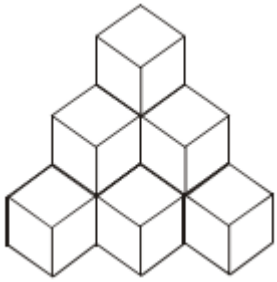
5. Two positions of dice are shown below find out which number is opposite to 4.





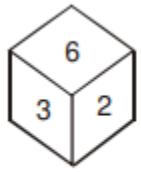
(a) 3 (b) 6 (c) 5 (d) None of these

6. How many cubes are there in the following figure ?

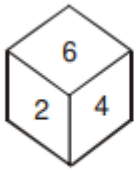


(a) 6 (b) 10 (c) 12 (d) 8

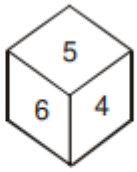
7. Which number is on the face opposite to 6 in the dice whose 4 views are given below?



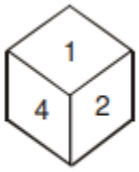
(a) 1



(b) 2



(c) 3



(d) 4

8. Three views of the same cube are shown below ?

The figure on the face opposite to X is :

(a) Pentagon (b) Circle (c) Question Mark (d) Rectangle

Direction for Questions 9 to 12: A solid cube is painted on all the six faces cut into 512 smaller identical pieces. Answer the following questions on basis of the above data

9. How many smaller pieces will have three faces painted?

(a) 6 (b) 8 (c) 5 (d) 4

10. How many smaller pieces will have two faces painted?

(a) 85 (b) 76 (c) 80 (d) 92

11. How many smaller pieces will have one face painted?

(a) 214 (b) 216 (c) 240 (d) 135

12. How many smaller pieces will have no face painted?

(a) 215 (b) 132 (c) 216 (d) 145

Direction for Questions 13 to 16: A solid cube is painted on all the six faces and cut into 80 smaller but identical pieces.

Answer the following questions on basis of the above data:

13. How many smaller pieces will have three faces painted?

(a) 6 (b) 8 (c) 12 (d) 16

14. How many smaller pieces will have two faces painted?

(a) 12 (b)36 (c) 45 (d) 28

15. How many smaller pieces will have one face painted?

(a) 34 (b) 32 (c) 40 (d) 36

16. How many smaller pieces will have no face painted?

(a) 15 (b) 36 (c)12 (d) 20

Direction for Questions 17 to 21: A solid cube is painted on all the six faces in such a way that two opposite faces are painted black, two opposite faces are painted red and two opposite faces are painted silver. This cube is then cut into 125 smaller but identical pieces. Answer the following questions on basis of the above data

17. How many smaller pieces will have three colours painted on its faces?

(a) 12 (b) 16 (c) 8 (d) 4

18. How many smaller pieces will have black and red colours painted on its faces?

(a) 12 (b) 20 (c) 25 (d) 45

19. How many smaller pieces will have red or silver colours painted on them?

(a) 80 (b) 15 (c) 18 (d) 16

20. How many smaller pieces will have either only black or only silver colour painted on it faces?

(a) 75 (b) 96 (c) 36 (d) 60

21. How many smaller pieces will have at least three colours or no colour painted on its faces?

(a) 60 (b) 35 (c) 48 (d) 65

Direction for Questions 22 to 25:

A solid cube is painted on all the six faces in such a way that two adjacent faces are painted black, two adjacent faces are painted white and two adjacent faces are painted silver. This cube is cut into 512 smaller identical pieces. Answer the following questions on basis of the above data:

22. How many smaller pieces will have three colours painted on its faces?

(a) 0 (b) 8 (c) 2 (d) 6

23. How many smaller pieces will have black and silver painted on its faces?

(a) 12 (b) 22 (c) 54 (d) 15

24. How many smaller pieces will have white or black but not both painted on its faces?

(a) 196 (b) 192 (c) 186 (d) 182

25. How many smaller pieces will have either only white or only black painted on its faces?

(a) 144 (b) 156 (c) 158 (d) None of these