28. Ans. (c)

Volume of rain water

$= \text{Area} \times \text{Height} = (1\text{ km})^2 \times 2\text{ cm}$

$= (1000\text{ m})^2 \times 0.02\text{ m} = 20000\text{ m}^3$

Quality of collected water

$= 50\%$ of 20000 m^3

$= \frac{1}{2} \times 20000 = 10000\text{ m}^3$

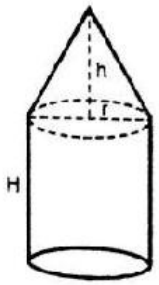
$\therefore$ Increased level in pool

$= \frac{\text{Volume collected}}{\text{Base area of pool}}$

$= \frac{10000}{10 \times 100} = 10\text{m}$

$\therefore$ The water level would be increased by 10 m.

29. Ans. (c)



Let the height of the cylinder be H and its radius = r

Then, $\pi r^2 H + \frac{1}{3}\pi r^2 h = 3 \times \frac{1}{3}\pi r^2 h$

$\therefore \quad \pi r^2 H = \frac{2}{3}\pi r^2 h \quad \text{or} \quad H = \frac{2}{3}h.$

30. Ans. (a)

Curved surface area of cylinder $= 2\pi rh$

Slant surface area of the cone

$= \pi rl = \pi \times r \times 2h = 2\pi rh$

$\therefore$ Ratio of the two surface areas

$= 2\pi rh : 2\pi rh = 1 : 1.$

31. Ans. (c)

Curved suface of the tent $= \pi rl$

$= \frac{22}{7} \times 6 \times 6.3\text{m}^2 = 118.8\text{ m}^2$

$\therefore$ Length of the canvas required

$= \frac{118.8}{2}\text{m} = 59.4\text{ m}$

32. Ans. (a)

Radius of the cone

$= r + 20\%$ of $r = 1.2\ r$

and, slant height $= 2l$

$\therefore$ Surface area of the new cone

$= 2\pi \times 1.2\ r \times 2l$

$= 2\pi \times 2.4\ rl$

Increase in surface area

$= 2\pi \times 2.4\ rl - 2\pi rl$

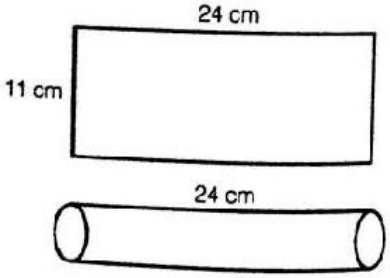
$= 2\pi \times 1.4\ rl$

Percentange increase

$= \frac{2\pi \times 1.4rl}{2\pi rl} \times 100 = 140\%$

Therefore, surface area of the cone will be increased by 140%.

33. Ans. (a)



Length of the sheet $= \frac{264}{11} = 24$ cm

When the sheet is rolled along its breadth, the width of the sheet will be equal to the circumference of the cylinder and the length of the sheet will be height of the cylinder.

Then $2\pi r^2 = 11$

Radius of cylinder formed

$= \frac{11}{2\pi} = \frac{11}{2} \times \frac{7}{22} = \frac{7}{4}$ cm

Volume of the cylinder

$= \pi r^2 h = \frac{22}{7} \times \frac{7}{4} \times \frac{7}{4} \times 24 = 231$ c.c.

14. Ans. (c)

Original volume $= \frac{4}{3}\pi r^3 = V$

New volume $= \frac{4}{3}\pi(2r)^3 = 8 \times \frac{4}{3}\pi r^3 = 8V$

Increase = 700%

15. Ans. (c)

Volume 'V' of cylinder $= \pi r^2 h$

when $h \to 0.92\ h$ then

New volume $V_{new} = \pi r^2 \times 0.92\ h$

$= 0.92\ \pi r^2 h = 0.92\ V$

Thus, Volume of the cylinder decreases by 8%.

□□□□

Circles and its Properties

Solved Examples

1. Two isoscoles triangles have equal angles and their areas are in the ratio 16:25. Find the ratio of their corresponding heights.

(a) $\frac{4}{5}$ (b) $\frac{5}{4}$

(c) $\frac{2}{3}$ (d) $\frac{5}{6}$

Solution: When triangle have euqal angles the ratio of the Areas & Heights can be given as

$\frac{\text{Area } \Delta 1}{\text{Area } \Delta 2} = \frac{(\text{Height 1})^2}{(\text{Height 2})^2}$

$\frac{16}{25} = \frac{(H1)^2}{(H2)^2}$

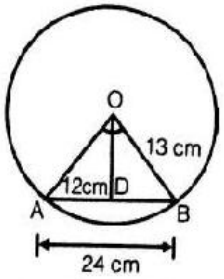
So $\frac{H_1}{H_2} = \frac{4}{5}$ and **Ans. (a)**

2. The radius of a circle is 13 cm and the length of one of its chord is 24 cm. Find the distance of the chord from centre.

(a) 10 cm (b) 8 cm

(c) 5 cm (d) 5.5 cm

Solution:



$(OB)^2 = (OD)^2 + (DB)^2$

$13^2 = (OD)^2 + (12)^2$

$(OD)^2 = 13^2 - 12^2 = 25\ cm^2$

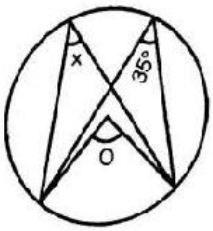
OD=5 cm

Ans. (c)

3. In figure if O is the centre of circle, find $\angle x$

(a) 35° (b) 30°

(c) 45° (d) 50°

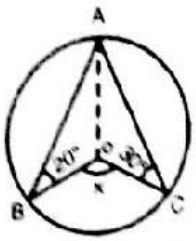


Solution: Since angle on the same segment of circle are equal so $\angle x = 35°$ **Ans. (a)**

4. Find the value of $\angle x$ in the given figure, 'O' is centre

(a) 120° (b) 130°

(c) 100° (d) 150°



Solution: $\angle OAB = \angle OBA$

$\because$ AO = OB being radius of circle

$\therefore$ $\angle OAB = 20°$

Similarly $\angle OAC = \angle OCA$, $\angle OAC = 30°$

Now $\angle BAC = 20 + 30 = 50°$

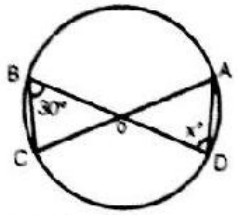
So $\angle BOC = \angle X = 2\angle BAC = \angle X = 100°$

Ans. (c)

5. Find the value of x in the figure, if it is given that AC and BD are diameters of the circle.

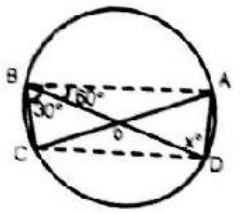
(a) 60° (b) 45°

(c) 15° (d) 30°



Solution: join A and B and C and D

Now $\angle BAD = 90°$



$\because$ Angle of Semicircle

So in ΔBAD

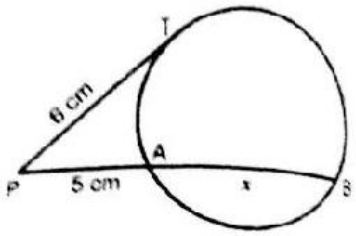
$\angle DBA = 60°$ $\angle BAD = 90°$

So $\angle ADB = \angle x = 30°$ **Ans. (d)**

6. Find the value of x in the given figure

(a) 2.2 cm (b) 1.6 cm

(c) 3 cm (d) 2.6 cm



Solution: According to Tangent - Secant Theorem

$PT^2 = PA \times PB$

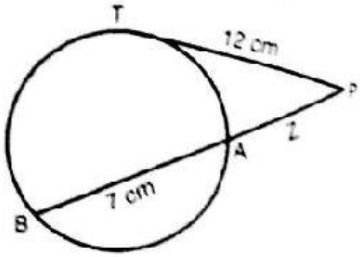
$6^2 = 5 \times (5 + x)$, $11 = 5x$

$x = \frac{11}{5} = 2.2$ **Ans. (a)**

7. Find the value of Z in the given figure

(a) 16 cm (b) 9 cm

(c) 12 cm (d) 7 cm



Solution: $PT^2 = PA \times PB$

$12^2 = Z \times (Z + 7)$

$144 = Z^2 + 7Z$

$Z^2 + 7Z - 144 = 0$, $(Z + 16)(Z - 9) = 0$

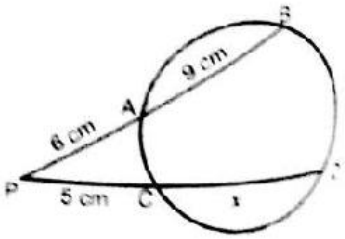
$Z = 9$, $Z = -16$ (Not possible)

Hence $Z = 9$ **Ans. (b)**

8. Find the value of x in the given figure

(a) 13 cm (b) 12 cm

(c) 16 cm (d) 15 cm



Solution: $\because$ $PA \times PB = PC \times PD$

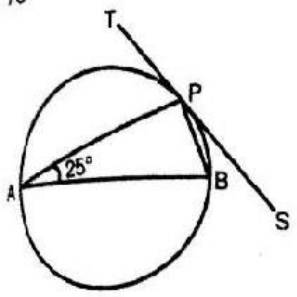
So $6 \times 15 = 5 \times (5 + x)$

$90 = 25 + 5x$, $65 = 5x$, $13 = x$ **Ans. (a)**

9. In the given figure AB is the diameter of circle and $\angle PAB = 25°$. Find $\angle TPA$

(a) 50° (b) 65°

(c) 70° (d) 45°



Solution: $\angle APB = 90°$ ($\because$ Angle of a semicircle is a right angle)

Also $\angle ABP = 65°$

[$\because$ ΔAPB $\angle A = 25°$ $\angle APB = 90°$

So $\angle ABP = 65°$]

Now $\angle TPA = \angle ABP = 65°$

[$\because$ Angles in alternate segments are equal]

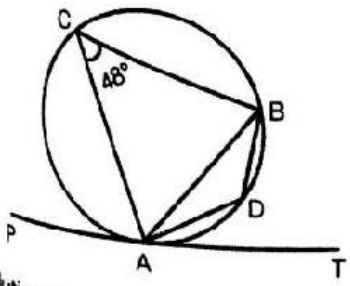
Hence

Ans. (b)

10. In the given figure find $\angle ADB$

(a) 144° (b) 132°

(c) 72° (d) 104°



Solution: In the given figure ADBC is a cyclic quadrilateral

So $\angle C + \angle D = 180°$ ($\because$ in cyclic quadrilaterals sum of opposite angles is equal to 180°)

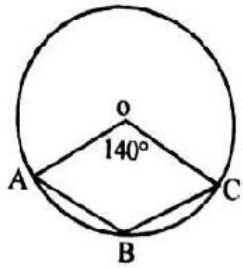
$\angle D = \angle ADB = 180° - \angle C$

$\angle ADB = 180° - 48° = 132°$ **Ans. (b)**

11. In the figure, if it is given that O is the centre of the circle and $\angle AOC = 140°$ Find $\angle ABC$

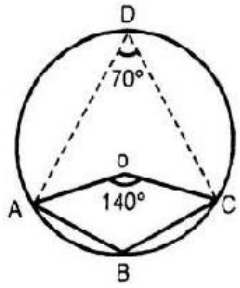
(a) 110° (b) 130°

(c) 150° (d) 105°



Solution: Join AD & CD

Now $\angle ADC = \frac{1}{2}\angle AOC$



$\angle ADC = 70°$

In the given figure ABCD is a cyclic quadrilateral So

$\angle ADC + \angle ABC = 180°$

$\angle ABC = 180° - \angle ADC$

$\because$ $\angle ADC = 70$

$\therefore$ $\angle ABC = 110°$ **Ans. (a)**

□□□□

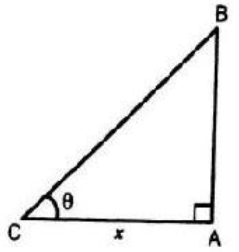
TRIGONOMETRY

Height and Distance

Solved Examples

1. The ratio of the length of a rod and its shadow is $1:\sqrt{3}$. Find the angle of elevation of the sun.

Solution: Let AB be the rod and AC be its shadow.



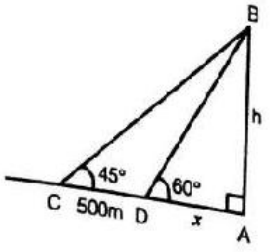
$\angle BCA = \theta$ Let $AB = x$

Then, $AC = \sqrt{3}x$

$$\therefore \tan\theta = \frac{AB}{AC} = \frac{x}{\sqrt{3}x} = \frac{1}{\sqrt{3}} = 30^\circ$$

2. A tower stands at the end of a straight road. The angles of elevation of the top of the tower from two points on the road 500 m apart are 45° and 60°, respectively. Find the height of the tower.

Solution:



Let the height of tower AB be h

Then in ΔBDA, $\tan 60^\circ = \frac{AB}{AD}$

$$\Rightarrow \sqrt{3} = \frac{h}{x} \Rightarrow x = \frac{h}{\sqrt{3}}$$

In ΔBCA, $\tan 45^\circ = \frac{AB}{AC} = \frac{h}{x+500} = 1$

$$\Rightarrow h = x + 500$$

$$\Rightarrow h = \frac{h}{\sqrt{3}} + 500$$

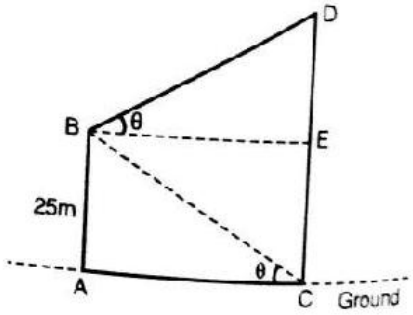
$$\Rightarrow h - \frac{h}{\sqrt{3}} = 500$$

$$\Rightarrow \left(\frac{\sqrt{3}-1}{\sqrt{3}}\right)h = 500$$

$$\text{So } h = \frac{500\sqrt{3}}{\sqrt{3}-1}$$

3. From the top of a cliff 25 m high the angle of elevation a tower is found to be equal to the angle of depression of the foot of the tower. Find the height of the tower.

Solution: Let AB be the cliff and CD be the tower.



From B, draw $BE \perp CD$

$$\frac{DE}{BE} = \tan\theta \text{ and } \frac{AB}{AC} = \tan\theta$$

$$\therefore \frac{DE}{BE} = \frac{AB}{AC}$$

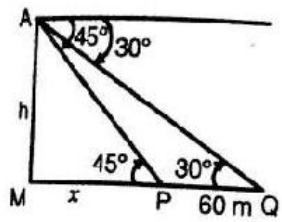
$\therefore$ $DE = AB$ ($\because$ BE = AC)

$\therefore$ $CD = CE + DE = AB + AB$

$= 2AB = 50$ m

4. Angle of depression from the top of a light house of two boats are 45° and 30° due east which are 60m apart. Find the height of the light house.

Solution: Let the boats be at points P & Q respectively



So that PQ = 60m.

Let MA be the light house.

Let h = MA

Then, $\therefore \quad \frac{h}{MP} = \tan 45° \Rightarrow \frac{h}{x} = 1$

$\therefore \quad h = x$

Again, $\frac{h}{x+60} = \tan 30° = \frac{1}{\sqrt{3}}$

$\therefore \quad x + 60 = \sqrt{3}h$

or $h + 60 = \sqrt{3}h \qquad (\because h = x)$

$\therefore \quad (\sqrt{3} - 1)h = 60$

$\therefore \quad h = \frac{60}{\sqrt{3}-1} = \frac{60(\sqrt{3}+1)}{2}$

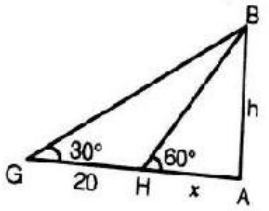
$= 30(\sqrt{3}+1)$m

5. The angle of elevation of the top of a tower at a point G on the ground is 30°. On Walking 20 m forwards the tower the angle of elevation becomes 60°. The height of the tower is equal to.

(a) $\frac{10}{\sqrt{3}}$m (b) $20\sqrt{3}$ m

(c) $\frac{20}{\sqrt{3}}$m (d) $10\sqrt{3}$ m

Solution: Let AB = h be the height of the tower.



Let AB = h, be the height of tower and AH = x then

in ΔBHA, $\tan 60° = \frac{AB}{AH}$

$\Rightarrow \quad \sqrt{3} = \frac{h}{x}$

$\Rightarrow \quad x = \frac{h}{\sqrt{3}}$

In ΔBGA, $\tan 30° = \frac{AB}{AG} = \frac{h}{x+20}$

$\Rightarrow \quad \frac{1}{\sqrt{3}} = \frac{h}{h/\sqrt{3}+20}$

$\Rightarrow \quad \frac{h}{\sqrt{3}} + 20 = \sqrt{3}h$

$\Rightarrow \quad \left(\sqrt{3} - \frac{1}{\sqrt{3}}\right)h = 20$

$\Rightarrow \quad \frac{2}{\sqrt{3}}h = 20$

$\therefore \quad h = 10\sqrt{3}$

□□□□

Practice Exercise 1

1. The angle of elevation of a moon when the length of the shadow of a pole is equal to its height, is
   (a) 30° (b) 45°
   (b) 60° (d) none of these

2. The upper part of a tree broken by the wind makes an angle of 30° with the ground and the distance from the root to the point where the top of the tree touches the ground is 10m. What was the height of the tree?
   (a) $10\sqrt{3}$ (b) $10/\sqrt{3}$
   (c) $20\sqrt{3}$ (d) None of these

3. In a rectangle, if the angle between a diagonal and a side is 30° and the length of diagonal is 6 cm, the area of the rectangle is
   (a) $9\ cm^2$ (b) $9\sqrt{3}\ cm^2$
   (c) $27\ cm^2$ (d) $36\ cm^2$

4. When the length of the shadow of a pole is equal to the height of the pole, then the elevation of source of light is
   (a) 30° (b) 45°
   (c) 60° (d) 75°

5. From the top of a light house 60 m high with its base at sea level, the angle of depression of a boat is 15°. The distance of the boat from the light house is
   (a) $60\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)m$ (b) $60\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)m$
   (c) $30\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)m$ (d) $30\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)m$

6. The angle of elevation of the top of an unfinished tower at a point distant 120 m from its base is 45°. If the elevation of the top of the same point is to be 60°, the tower must be raised to a height
   (a) $120(\sqrt{3}+1)m$ (b) $120(\sqrt{3}-1)m$
   (c) $10(\sqrt{3}+1)m$ (d) None of these

7. A person walking along a straight road towards a hill observes at two points a distance $\sqrt{3}$ km, the angles of elevation of the hill to be 30° and 60°. The height of the hill is
   (a) $\frac{3}{2}$ km (b) $\sqrt{\frac{2}{3}}$ km
   (c) $\frac{\sqrt{3}+1}{2}$ km (d) $\sqrt{3}$ km

8. A man is standing on the 8 m long shadow of a 6 m long pole. If the length of the shadow is 2.4m, then the height of the man is
   (a) 1.4 m (b) 1.6 m
   (c) 1.8 m (d) 2.0 m

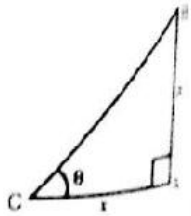
Solutions

1. **Ans. (b)**

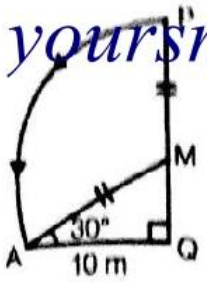
Let AB = x.
Then, AC = x

$\therefore \tan\theta = \frac{AB}{AC} = 1$

$\Rightarrow \theta = 45°$.



2. **Ans. (a)**
Let QMP be the tree. When broken by the wind its top P strikes the ground at A such that ∠QAM = 30°, AQ = 10 m and MA = MP



$$\tan 30^\circ = \frac{MQ}{AQ}$$

$$\therefore MQ = AQ \tan 30^\circ = \frac{10}{\sqrt{3}}$$

Also, $\cos 30^\circ = \frac{AQ}{AM}$

$$\therefore AM = AQ \sec 30^\circ$$

$$\Rightarrow AM = 10\left(\frac{2}{\sqrt{3}}\right) = \frac{20}{\sqrt{3}}.$$

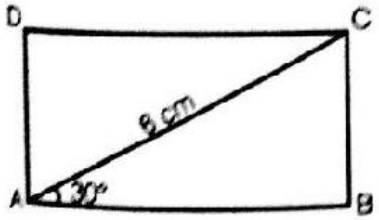
$\therefore$ Height of the tree

$$= QM + MP = QM + AM = \frac{10}{\sqrt{3}} + \frac{20}{\sqrt{3}}$$

$$= \frac{30}{\sqrt{3}} = 10\sqrt{3}\text{m}.$$

3. Ans. (b)

Let ABCD be the rectangle in which $\angle BAC = 30^\circ$ and AC = 6 cm.



$$\frac{AB}{AC} = \cos 30^\circ = \frac{\sqrt{3}}{2} \Rightarrow AB = AC \times \frac{\sqrt{3}}{2}$$

$$\therefore AB = 3\sqrt{3}\text{ cm}$$

$$\frac{BC}{AC} = \sin 30^\circ = \frac{1}{2}$$

$$\therefore BC = AC \times \frac{1}{2} = 3\text{ cm}$$

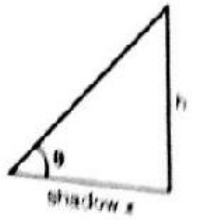
Area of the rectangle

$$= AB \times BC = 3\sqrt{3} \times 3 = 9\sqrt{3}\text{ cm}^2$$

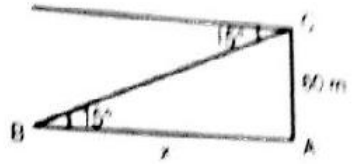
4. Ans. (b)

Since $\frac{h}{x} = \tan\theta$ and $h = x$

$\therefore \tan\theta = 1 \Rightarrow \theta = 45^\circ$



5. Ans. (b)



Here, B is the position of boat and AC is light house.

$$\Rightarrow \tan 15^\circ = \frac{AC}{AB} = \frac{AC}{x} = \left[\frac{\sqrt{3}-1}{\sqrt{3}+1}\right]$$

$$\therefore x = \frac{AC}{\tan 15^\circ}$$

$$\therefore x = 60\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)\text{m}.$$

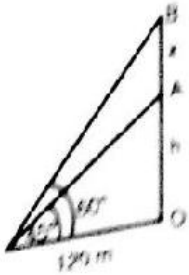
6. Ans. (b)

Let the tower be raised by x meter, then

$$\frac{h+x}{120} = \tan 60^\circ = \sqrt{3}$$

$$h + x = 120\sqrt{3}$$

Also, $\frac{h}{120} = \tan 45^\circ = 1$.



Some Standard Coding Technique

1. Proper noun should always be denoted by capital letters
   e.g. John, Merry and Paul can be codes as John – J, Merry – M, Paul – P

2. In questions where the sex of proper noun is crucial to the solving of questions, you can denote the female by under lining the capital letter used
   ex → Merry is a beautiful girl **Merry – M**
   ex → Sheena is the only girl student inher class **Sheena – S**

3. **Relationship:**
   (a) Is the Son of

   ex → Ram is the son of Mr. Pratap → $\begin{matrix} P \\ R \end{matrix}$

   (b) Is the daughter of

   ex → Sweta is daughter of Mr Pratap → $\begin{matrix} P \\ \underline{S} \end{matrix}$

   (c) Is the Parent of

   ex → A is the parent of B → $\begin{matrix} A \\ B \end{matrix}$ or $\begin{matrix} A \\ B \end{matrix}$

   (d) Is the spouse of
   ex → A is spouse of B → A — B or B — A
   [Note: Here sex of A & B is not mentioned]

   ex → Seema is wife of Rahul → R – S
   ex → Priya is wife of Rajesh R – P
   [Note: It is better to write male on the left hand side & female on the right hand side to avoid any confusion]

   (e) Is the sibling of
   ex → A is sibling of B
   1. A .. B or (A & B are brothers)
   2. A .. B or (A is sister of B)
   3. A .. B or (B is sister of A)
   4. A .. B or (A & B are sisters)

   (f) Grand father, Grand son relation
   ex → Ramesh & Param are the two sons of Mr Shiv Kumar, who is the son of Mr Sundarlal

   Su
   → Sk
   R .. P

   (Note: Shiv Kumar and Sundarlal are coded as Sk and Su to avoid any. confusion)

   (g) Where the sex of a person can not be determined according to given conditions then write it in a box
   like Q is the only son of S
   [S]
   Q
   (Here Q is male but sex of S is not mentioned, whether father or mother)

□□□□

Questions

Direction (Qs. 1 to 6): Read the following information carefully and answer the question below it.

All the six members of a family P, Q, R, S, T and U are travelling together Q is the son of R but R is not the mother of Q. P and R are a married couple. T is the brother of R. S is the daughter of P. U is the brother of Q.

1. How may male members are there in the family?
   (a) 1 (b) 2
   (c) 3 (d) 4

2. Who is the mother of Q?
   (a) S (b) U
   (c) T (d) P

3. How many children does P have?
   (a) One (b) Two
   (c) Three (d) Four

4. Who is the wife of T?
   (a) P
   (b) U
   (c) Q
   (d) can't be determined

5. Which of the following is a pair of females?
   (a) PT (b) QS
   (c) SU (d) PS

6. How is U related to S?
   (a) Father
   (b) Brother
   (c) Uncle
   (d) can't be determined

Direction (Qs. 7 to 12): Read the following information carefully and answer the question below it.

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 a married couple. Y is the brother of R. X is the daughter of P. Z is the brother of P.

7. Who is the brother-in-law of R?
   (a) P (b) Z
   (c) Y (d) X

8. Who is the father of Q?
   (a) R (b) P
   (c) Z (d) None of these

9. How many children does P have?
   (a) One (b) Two
   (c) Three (d) Four

10. How many female member are there in the family?
    (a) One (b) Two
    (c) Three (d) Four

11. How is Q related to X?
    (a) Husband (b) Father
    (c) Brother (d) Uncle

12. Which is a pair of brothers?
    (a) P and X (b) P and Z
    (c) Q and X (d) R and Y

Direction (Qs. 13 to 15) : Read the following information carefully and answer the questions given below it

P is the son of Q. R, Q's sister has a son S and daughter T. U is the maternal uncle of S.

13. How is P related to S?
    (a) Cousin (b) Nephew
    (c) Uncle (d) Brother

14. How is T related to U?
    (a) Sister (b) Daughter
    (c) Niece (d) Wife

15. How many nephew does U have?
    (a) Nill (b) One
    (c) Two (d) Three

16. Ranjan is the brother of Sachin and Manick is the father of Ranjan. Jagat is the brother of Priya and Priya is the daughter of Sachin. Who is the uncle of Jagat?
    (a) Ranjan (b) Sachin
    (c) Manick (d) None of these

Direction (Qs. 17 to 18): Read the following information carefully and answer the questions given below it.

(i) A is the father of C
(ii) E is the daughter of C.F is the spouse of A
(iii) B is the brother of C.D is the son of B.
(iv) G is the spouse of B. H is the father of G.

17. Who is the grandmother of D?
(a) A (b) C
(c) F (d) H

18. Who is the son of F?
(a) B (b) C
(c) D (d) E

Direction (Qs. 19 to 23): Read the following information carefully and answer the questions given below it.

P,Q,R,S and T are members of the same family. There are two fathers, two sons and, two wives, three males and two females in the group. The Engineer was the wife of Teacher, who was the son of a Painter. T is neither a male nor the wife of a professional. R is the youngest person in the family and S is the eldest. Q is a male

19. How is P related to Q?
(a) Husband (b) Wife
(c) Mother (d) Daughter

20. Who is the father of R?
(a) P (b) Q
(c) S (d) T

21. Whose wife is the Engineer?
(a) P (b) Q
(c) R (d) S

22. Who are the females in the group?
(a) T and P (b) Q and P
(c) R and Q (d) T and Q

23. How is the S related to T?
(a) Wife (b) Husband
(c) Father (d) Son

Direction (Qs. 24 to 28): Read the following information carefully and answer the question below it.

(i) A is the married to B and L is A's brother-in-law. A has two daughters.
(ii) I is the cousin brother of J and is the brother of K.
(iii) E and F are B's son-in-law.
(iv) E has 2 daughters and 1 son; F has 1 son and 1daughter.
(v) G and H are 2 daughter of C.
(vi) K and A share a grand daughter and grand relationship.
(vii) D is also member of this family.

24. How is C related to I?
(a) Mother (b) Brother
(c) Aunt (d) Cousin

25. G is B's:
(a) Daughter (b) Granddaughter
(c) Grandson (d) Son

26. How is L related to D?
(a) Uncle (b) Brother
(c) Sister (d) Father

27. How is D related to E?
(a) Brother-in-law (b) Sister-in-law
(c) Daughter (d) Wife

28. How is E related to C?
(a) Daughter (b) Son-in-law
(c) Wife (d) Husband

□□□□

Solutions

Hints (1–6)

Sol. → Q is son of R
→ R is not the mother, then R is father of Q
→ P and R are married couple R – P
→ T is brother of R T .. R
P
→ S is daughter of P S
→ U is brother of Q Q .. U

Complete Solution
T .. R – P
Q .. U .. S

1. (d)
2. (d)
3. (c)
4. (d)
5. (d)
6. (b)

Sol. (7 – 12)

Y .. R – P .. Z
Q .. X

7. (b)
8. (a)
9. (b)
10. (b)
11. (c)
12. (d)

Sol.(13 to 15)

Q .. R .. U
P S .. I

13. (a)
14. (c)
15. (c)

Sol.(16)

M
R .. S
P .. J

16. (a)

Sol.(17 – 18)

A – E H
C .. B – G
E D

17. (c)
18. (a) here sex of C is not confirmed

Sol.(19 to 23)

P, Q, R, S, T

→ There are two father & two son it means relation is Grandfather, father and son

→ Engineer is wife of teacher, Tea — Engg
Teacher is son of Painter

→ Pain
Tea

I is a female and wife of Painter
Pain – I
Tea – Engg
R

→ R is youngest
It means R is Son of Tea

→ S is eldest, it means S is the grandfather
Pain — I
(S)
Tea — Engg
(Q) — P
R

now complete tree is like this
S – I
Q – P
R

19. (b)
20. (b)
21. (b)
22. (a)
23. (b)

Sol.(24 to 28)

(i). A – B .. L
d_1 ... d_2
d_1 & d_2 are daughter of A

(ii) I .. K, J is consine of I

(iii) E & F are husband of d_1 & d_2
E — d_1 .. d_2 — F

d_1 .. d_2 .. s_1, d_3 .. s_3

(iv) G & H are (d_1' & d_2') daughters of C, so naturally C is wife of E because only E has two daughters

(v) Now complete tree is

A – B .. L
E – C D – F
H .. G .. J, I .. K

24. (c)
25. (b)
26. (a)
27. (b)
28. (d)

Direction (Qs. 1 to 5): Read the following information carefully and answer the question below it.

1. If 'Rat is called Dog', 'Dog is called Mongoose', 'Mongoose' is called Lion;, 'Lion is called Snake' and 'Snake is called Elephant', which animal is reared as pet?
   (a) Rat (b) Dog
   (c) Mongoose (d) Lion

2. If Finger is called Toe, Toe is called Foot, Foot is called Thumb, Thumb is called Ankle, Ankle is called Palm and Palm is called Knee, which one finger has different name?
   (a) Thumb (b) Ankle
   (c) Knee (d) Palm

3. In a certain code language, 'kew xas huma deko' means 'she is eating apples', 'kew tepo qua' means 'she sells toys' and 'su lim deko' means 'I like apples'. Which word in that language means she and apples?
   (a) xas & deko (b) xas & kew
   (c) kew & deko (d) kew & xas

4. If 'gnr tag zog qmp' stands for 'Seoul Olympic Organising Committee, 'hydo gnr emf' stands for 'Summer Olympic Games' and 'esm sdr hyto' stands for 'Modern Games History', which would be the code for Summer?
   (a) hyto (b) gnr
   (c) emf (d) zog

5. In a certain code language, 'Pat Zoo Sim' means 'Eat Good Mangoes', 'Pus Sim Tim' means 'Mangoes and Sweets's and 'Tim Zoo Kit' means 'Purchase Good sweets', which word in the language means Good?
   (a) Zoo (b) Pus
   (c) Sim (d) Tim

Direction (Qs. 6 to 10): Read the following information carefully and answer the question below.

Δ means 'is greater than', % means 'is lesser than', $\square$ means 'is equal to', = means 'is not equal to', + means 'is a little more than', × means 'is a little less than'.

6. If $a \Delta b$ and $b + c$, then
   (a) a % c (b) c % a
   (c) c + a (d) can't say

7. If c = a and a = b, then
   (a) $b \Delta a$ (b) $c \square a$
   (c) b = a (d) can't say

8. If $a \times b$ and $b \square c$, then
   (a) c + a (b) $b \Delta c$
   (c) a + c (d) $c \square a$

9. If c % b and $b \times a$, then
   (a) $a \Delta c$ (b) $c \square a$
   (c) $b \Delta c$ (d) $c \Delta a$

10. If ac + bc then
(a) a □ c (b) b Δ c
(c) c Δ b (d) b % a

Direction (Qs. 11 to 15): Read the following information carefully and answer the question below it.
If > denotes +, < denotes −, + denotes ÷, ^ denotes ×, − denotes =, × denotes > and = denotes <, choose the correct statement in each of the following questions.

11. (a) 6 + 3 > 1 = 4 + 2 < 1
(b) 4 > 6 + 2 × 32 + 4 < 1
(c) 8 < 4 + 2 = 6 > 3
(d) 14 + 7 > 3 = 6 + 3 > 2.

12. (a) 14 > 18 + 9 = 16 + 4 < 1
(b) 4 > 3 ^ 8 < 1 − 6 + 2 > 24
(c) 3 < 6 ^ 4 > 25 = 8 + 4 > 1
(d) 12 > 9 + 3 < 6 × 25 + 5 > 6

13. (a) 13 > 7 < 6 + 2 = 3 ^ 4
(b) 9 > 5 > 4 − 18 + 9 > 16
(c) 9 < 3 < 2 > 1 × 8 ^ 2
(d) 28 + 4 ^ 2 = 6 ^ 4 + 2

14. (a) 29 < 18 + 6 = 36 + 6 ^ 4
(b) 18 > 12 + 4 × 7 > 8 ^ 2
(c) 32 > 6 + 2 = 6 < 7 ^ 2
(d) 31 > 1 < 2 = 4 > 6 ^ 7

15. (a) 7 > 7 < 7 + 7 = 14
(b) 7 ^ 7 > 7 + 7 = 7 ^ 7 > 1
(c) 7 < 7 + 7 = 6
(d) 7 + 7 > 7 = 8

Direction (Qs. 16 to 18): Read the following information carefully and answer the question below it.
In a certain code, 'il be pee' means ' roses are blue'; 'silk hee' means 'red flowers' and 'pee mit hee' means 'flowers are vegetables'.

16. How is 'red' written in that code?
(a) hee (b) silk
(c) be (d) none of these

17. How is 'roses' written in that code?
(a) il
(b) pee
(c) be
(d) can not be determined

18. How is 'vegetables are red flowers' written in this code ?
(a) pee silk mit hee
(b) silk pee hee be
(c) il silk mit hee
(d) can not be determined

Direction (Qs. 19 to 22): Read the following information carefully and answer the question below it.
Shamita is very found of collecting greeting cards. Her collection of 211 cards has a good mix of Birthday cards, New year cards, Deepawali cards, Christmas cards and even a Marriage Anniversary card. The number of Birthday cards is equal to the sum of all other except the Marriage Anniversary card. The number of New Year cards is double of Deepawali cards which in turn is double of Christmas cards.

19. The number of Birthday cards in the collection is
(a) 95 (b) 105
(c) 110 (d) 85

20. The number of Deepawali cards is
(a) 25 (b) 30
(c) 35 (d) 40

21. The number of Christmas cards is
(a) 10 (b) 15
(c) 20 (d) 25

22. The ratio of Birthday cards to Christmas cards is
(a) 7 : 1 (b) 4 : 1
(c) 2 : 1 (d) 1 : 1

Direction (Qs. 23 to 28): Read the following information carefully and answer the question below it.

Rahul's roll number in IES Exam is a number consisting of three non-zero distinct digits, such that the sum of the digits at hundred's and unit's place is equal to that half of the digit at ten's place. Also the sum of all possible three digit numbers obtained using these three digits without repetition is 2664.

23. The digits in the unit is
(a) 2 (b) 1
(c) 3 (d) can't say

24. The digits in the tens place is
(a) 6 (b) 8
(c) 9 (d) 2

25. The digit in the hundreds place is
(a) 3 (b) 6
(c) 9 (d) can't say

26. The sum of the three digits is
(a) 7 (b) 12
(c) 10 (d) 14

27. The three digit number is
(a) 138 (b) 183
(c) 381 (d) can't say

28. The three digit is number is always divisible by :
(a) 3 (b) 18
(c) 29 (d) None of these

Direction (Qs. 29 to 30): Read the following information carefully and answer the question below it

P, Q, R, S, T, U and V are seven positive integers and (P × Q × R × S × T × U × V) is odd.

29. Maximum how many of these integers can be odd?
(a) 4 (b) 5
(c) 6 (d) 7

30. Minimum how many of these integers can be even?
(a) 3 (b) 2
(c) 4 (d) 0

31. In the sequence of alphabets, which letter would be eight to the right of the letter which is sixteenth from the left ?
(a) G (b) Y
(c) Z (d) X

32. CEGJLN ___ XZB. The missing group of letters in the series are ...
(a) QSU (b) NPR
(c) PRT (d) TUX

Direction (Qs. 33 to 37): Read the following information carefully and answer the question below it.

In each of the Letter Analogy various terms of a letter series are given with one term missing as shown by (?). Choose the missing term out of the given alternatives.

33. HUA GTZ FSY ERX ?
(a) DWQ (b) DQW
(c) WDQ (d) WQD

34. DF GJ KM NQ RT ?
(a) UW (b) YZ
(c) XZ (d) UX

35. DCXW FEVU HGTS ?
(a) LKPQ (b) ABZ
(c) JIRQ (d) LMRS

36. AB DEF HIJK ? STUVWX
(a) MNOPQ (b) LMNOP
(c) LMNO (d) QRSTU

37. C G L R ?
(a) Y (b) S
(c) U (d) Z

Solutions

Answer 1 to 5:

1. (c) 'Dog' is reared as pet. But 'Dog' is called 'Mongoose'. So, a 'Mongoose' is reared as pet.
2. (b) The 'Thumb' is a finger having a different name. But 'Thumb' is called 'Ankle'. So, 'Ankle' is the finger that has a different name.
3. (c) In the 1st and 2nd statements, the common code word is kew and the common word is she. So, kew means she. In the 1st and 3rd statements, the common code is deko and the common word is apples. So, deko means apples.
4. (c) In the first and second statements, the common code word is gnr and the common word is Olympic. So, gnr means Olympic. In the second and third statements, the common code is hyto and the common word is games. So, hyto means games. Thus, in the second statement, emf means summer.
5. (a) From 1st and 3rd statements. Zoo means Good.

Answer 6 to 10:

6. (b) $a \Delta b$ and $b + c \Rightarrow a > b$ and b is a little more than c
$\Rightarrow a > c$
$\Rightarrow c < a$
i.e. c % a.
7. (c) $c = a$ and $a = b \Rightarrow c \neq a$ and $a \neq b$
$\Rightarrow b \neq a$ i.e. $b = a$.
8. (a) $a \times b$ and $b \square c \Rightarrow$ a is a little less than b and b = c.
$\Rightarrow$ a is a little less then c.
$\Rightarrow$ c is a little more than a i.e. $c + a$.
9. (a) $c \% b \Rightarrow c < b$
and $b \times a \Rightarrow$ b is a little less than a.
$\Rightarrow c < a \Rightarrow a > c$ i.e. $a \Delta c$.
10. (d) $ac + bc \Rightarrow ac > bc \Rightarrow a > b \Rightarrow b < a$ i.e. b % a.

Answer 11 to 15:

11. (c) Using the proper notations in (3), we get the statements as $8 - 4 + 2 < 6 + 3$, or $6 < 9$, which is true.
12. (b) Using the proper notations in (2), we get the statements as $4 + 3 \times 8 - 1 = 6 \div 2$, or $24 = 27$.
13. (b) Using the proper notations in (2), we get the statements as $9 + 5 + 4 = 18 \div 9$, or $16 = 18$.
14. (d) Using the proper notations in (4), we get the statements as $31 + 1 - 2 < 4 + 6 \times 7$ or $30 < 46$.
15. (a) Using the proper notations in (1), we get the statements as $7 + 7 - 7 \div 7 < 14$ or $13 < 14$.

Answer 16 to 18:

16. (b) In the second and third statements, the common code word is 'hee' and the common word is 'flowers'. So, 'hee' stands for 'flowers'. Thus, in the second statement, 'silk' stands for 'red'.
17. (d) Since from the given information, we can only find the code for 'are' in the first statement, it cannot be determined which of the remaining two codes for 'roses'.
18. (a) Clearly, the required code will consist of the same codes as in the third statement with the code for 'red' i.e. silk added to it.

Answer 19 to 22:

If, number of Christmas cards = x
Then, number of Deepawali cards = $2x$
Number of New Year cards = $4x$
and number of Birthday cards
$= x + 2x + 4x$
$= 7x$
i.e. $7x + (x + 2x + 4x) + 1 = 211$
$14x = 210$
$x = 15$
Thus, number of Birthday cards
$= 15 \times 7$
$= 105$

23.
24.
25.

Number of New Year cards
= 15 × 4
= 60
Number of Deepawali cards
= 15 × 2
= 30
Number of Christmas cards
= 15 × 1
= 15
Number of Marriage Anniversary card
= 1
Total = 211

19. (b)
20. (b)
21. (b)
22. (a) 105 : 15 = 7 : 1.

Answer 23 to 28:

Let the digits be x, y, z such that the number is $100x + 10y + z$

Thus, the other five 3 digit number which we may obtained using these 3 digits will be

$100x + 10z + y$
$100y + 10x + z$
$100y + 10z + x$
$100z + 10x + y$
$100z + 10y + x$

Now when we add all the six three digit numbers possible to be formed by these three digits:

$222(x + y + z) = 2664$ or $x + y + z = 12$

Also $x + z = y/2$ thus $y = 8$

Thus, $x + z = 4$

As the digits are non zero and distinct thus x and z have to be 1 and 3 but not necessarily in the same order. Thus we cannot say whether the number is 183 or 381.

23. (d)
24. (c)
25. (d)
26. (b)
27. (d)
28. (a)

Answer 29 to 32:

29. (d) All integer should be odd to get odd result.
30. (d) None of the integer should be even.
31. (d)
32. (a)

Answer 33 to 37:

33. (b) All the letters of each term are moved one step backward to obtain the corresponding letters of the next term.
34. (d) There is a gap of one letter between both the letters of first term, a gap of two letters between both the letters of second term and again a gap of one and two letters between the letters of third and fourth terms respectively. Besides, the last letter of each term and the first letter of next term are in alphabetical.
35. (c) First two letters of each term are in reverse order. Similarly third and fourth letters are also in reverse order. Besides, the second letter of each term is the letter next to the first letter of the proceeding term.
36. (a) The number of letters in the term goes on increasing by 1 at each step. Each term consists of letters in alphabetical. The last letter of each term and the first letter of the next term are alternate.
37. (a) There is a gap of three letters between the first and the second term, four letters between the second and the third term, and five letters between the third and the fourth term. So, there should be a gap of six letters between the fourth term and the missing term.

□□□□

Cubes and Dices

Cubes

is a type of cuboid in which all the sides length, breadth and height are equal.

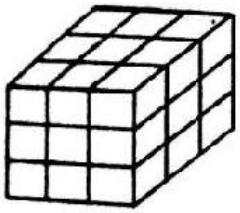


Fig. (1)

In the above Fig. (1) total number of cubes $= n^3 = 3^3 = 27$.

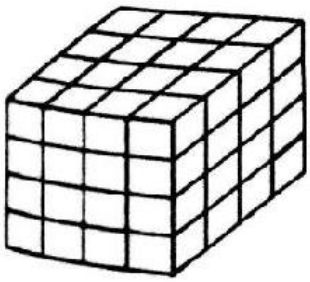


Fig. (2)

In the above Fig. (2) total number of small cubes $= n^3 = 4^3 = 64$.

If a cube of dimension $n \times n \times n$ is painted on all six surface, then smaller cubes formed will have

1. Total number of cubes $= n^3$
2. Total number of cubes painted on three sides $= 8$
3. Cubes painted on two sides $= (n-2) \times 4 \times 3$
4. Cubes painted on single side $= (n-2)^2 \times 6$
5. Cubes painted on no sides $= (n-2)^3$.

Case I when n = 3

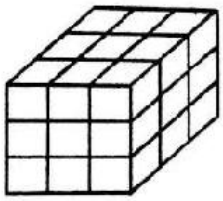


Fig. (3)

In the above Fig. (3)

1. Total number of cubes $= n^3 = 3^3 = 27$
2. Total number of cubes painted on three sides $= 8$.

3. Total number of cubes painted on two sides $(n-2) \times 4 \times 3$

$= (3-2) \times 4 \times 3 = 12$

4. Cubes painted on single side

$(n-2)^2 \times 6 = (3-2)^2 \times 6 = 6$

5. Cubes painted on no sides

$= (n-2)^3 \Rightarrow (3-2)^3 = 1.$

Case II

When n = 4

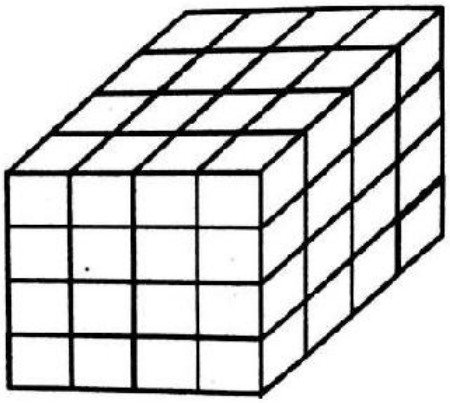


Fig. (4)

In the above Fig. (4)

1. Total number of cubes $\Rightarrow n^3 = 4^3 = 64$
2. Total number of cubes painted on three sides = 8
3. Total number of cubes painted on two sides = $(n-2) \times 4 \times 3 = (4-2) \times 4 \times 3$ = 24
4. Total number of cubes painted on single side = $(n-2)^2 \times 6 = (4-2)^2 \times 6$ = 24
5. Cubes painted on no sides $= (n-2)^3 = (4-2)^3 = 8$

Case 3

When n = 5

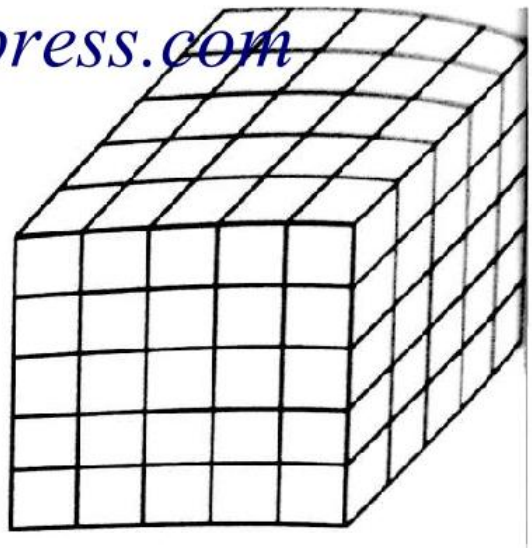


Fig. (5)

In the above Fig. (5)

1. Total number of cubes = $n^3 = 5^3 =$
2. Total number of cubes painted on three sides = 8
3. Cubes painted on two sides $= (n-2) \times 4 \times 3 = (5-2) \times 4 \times 3 =$
4. Cubes painted on single side $= (n-2)^2 \times 6 = (5-3)^2 \times 6 = 56$
5. Cubes painted on no sides $= (n-2)^3 = (5-2)^3 = 27.$

Table

		n = 3	n = 4	n = 5	n =
1	Number of cubes = n^3	27	64	125	
2	Three sides painted cubes = 8	8	8	8	
3.	Two sides painted cubes $= (n-2) \times 4 \times 3$	12	24	36	
4	Single sides painted cubes $= (n-2)^2 \times 6$	6	24	54	
5	No side painted cubes $= (n-2)^3$	1	8		

Dices

They are cubical structures in which numbers or signs from 1 to 6 are marked on sides. Problems based on dices are very simple in nature. Normally there are two cases:

Case I : Sum of numbers on opposite sides is seven.

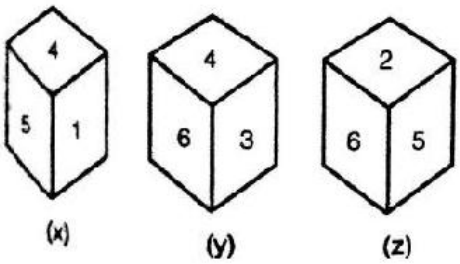
Naturally the faces opposite to each other will be

1 – 6
2 – 5
3 – 4

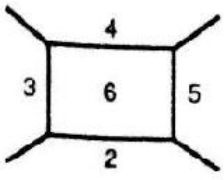
Case II : When three different positions of dice are given.

In such cases, first of all we will determine the face which is not adjacent to the given number. That number will naturally be the numbers marked on opposite face.

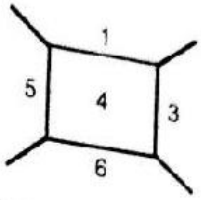
Ex.1 A dice with its face numbered 1 to 6, is shown in three different positions x, y and z.



Sol.: Find opposite faces.
Faces adjacent to 6 are



Naturally 1 is marked opposite to 6.
Faces adjacent to 4 are



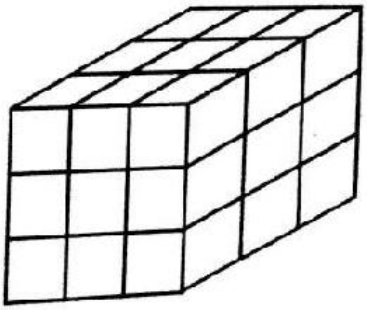
Naturally 2 will be marked opposite to 4
Thus opposite faces are
6 – 1
4 – 2
3 – 5 Ans.

□□□□

Practice Exercise: I

Direction (Qs. 1 to 5) : Read the following information carefully and answer the question below it.

A wooden cube is painted red on all the six face base. It is then cut at equal distances at right angle four times vertical (top to bottom) and two times horizontal (along the sides) as shown in the figure. Study the diagram and answer the following questions.



1. How many cubes are formed in all ?
   (a) 16 (b) 24
   (c) 27 (d) 32

2. How many cubes will have only one face painted in Red?
   (a) 4 (b) 5
   (c) 6 (d) 8

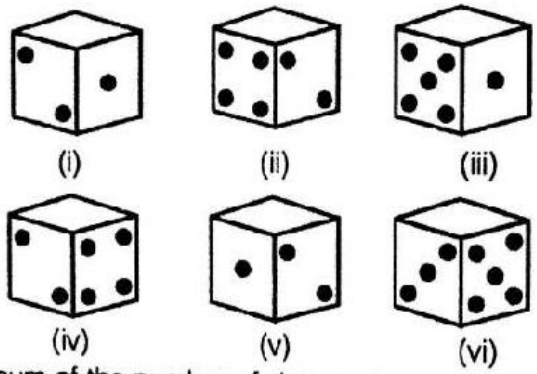
3. How many cubes will have ... painted only on ... ?
(a) 10 (b) 12
(c) 14 (d) 8

4. How many cubes will have at least three sides painted?
(a) 8 (b) 6
(c) 3 (d) 2

5. How many cubes will have no face painted at all?
(a) 1 (b) 2
(c) 3 (d) 4

Direction (Qs. 6 to 9) : Read the following information carefully and answer the question below it

Six dice with their upper faces erased are as shown:



The sum of the number of dots on the opposite faces is 7

6. If the dice (i), (ii) and (iii) have even number of dots on their bottom faces, then what would be the total number of dots on the top faces?
(a) 14 (b) 7
(c) 21 (d) 12

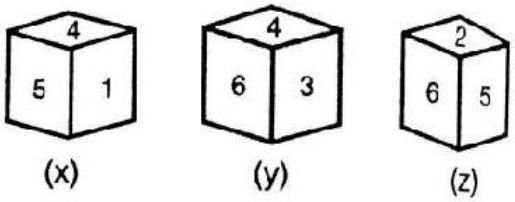
7. If dice (i), (ii) and (iii) have even number of dots on their bottom face and the dice (iv), (v) and (vi) have odd number of dots on the top faces, then what would be the difference in the total number of top face dots between these two sets?
(a) 0 (b) 1
(c) 2 (d) 3

8. ... the total number of dots on the top ... these dice?
(a) 4 (b) 6
(c) 10 (d) 12

9. If even numbered dice have even number of dots on the their top faces, what would be the total number of dots on the top faces of these dice?
(a) 18 (b) 14
(c) 12 (d) 10

Direction (Qs. 10 to 14): Read the following information carefully and answer the question below it.

A dice with it's face numbered 1 to 6, is shown in three different position X, Y and Z



10. Which number lies at the bottom face of dice X?
(a) 1 (b) 2
(c) 3 (d) 4

11. Which number lies at the bottom face of dice Y?
(a) 6 (b) 5
(c) 2 (d) 1

12. Which number lies opposite of 6?
(a) 1 (b) 2
(c) 4 (d) 5

13. Which numbers are hidden behind the numbers 6 and 5 in the dice Z?
(a) 1 & 4 (b) 1 & 3
(c) 4 & 3 (d) 1 & 2

14. Which of the hidden number adjacent to 5 in die X are common to the hidden numbers adjacent to 5 in die Z?
(a) 1 & 4 (b) 2
(c) 6 (d) None of these

Direction (Qs. 15 to 18): Read the following information carefully and answer the question below it.

A dice is prepared in following manner
(i) 1 should lie between 2 and 3
(ii) 2 should lie opposite to the 3
(iii) 4 should lie between 5 and 6
(iv) 5 and 6 should lie opposite to each other
(v) 4 should face down

15. The face opposite to 1:
(a) 2 (b) 4
(c) 6 (d) 5

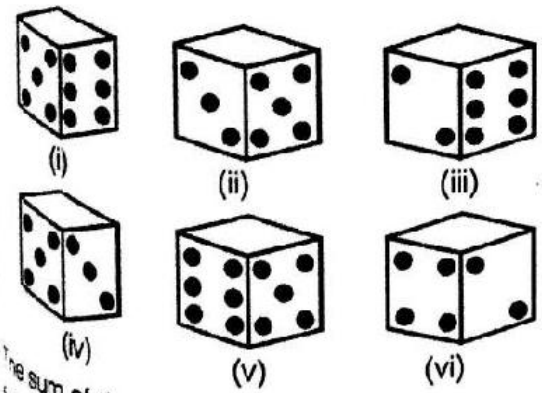
16. The upper face is:
(a) 1 (b) 6
(c) 2 (d) 5

17. The face adjacent to 5 are:
(a) 2, 6, 1, 4 (b) 1, 3, 4, 6
(c) 1, 4, 2, 3 (d) 2, 3, 4, 6

18. The face adjacent to 3 are:
(a) 5, 4, 1, 2 (b) 1, 2, 5, 6
(c) 5, 6, 4, 1 (d) 2, 6, 4, 5

Direction (Qs. 19 to 22): Read the following information carefully and answer the question below it.

Six dice with their upper faces erased are as shown:



The sum of the number of dots on the opposite faces is 7.

19. If the dice (i), (ii), (iii) have even number of dots on their bottom faces, than what would be the total number of dots on the top faces?
(a) 14
(c) 21 (b) 7
(d) 12

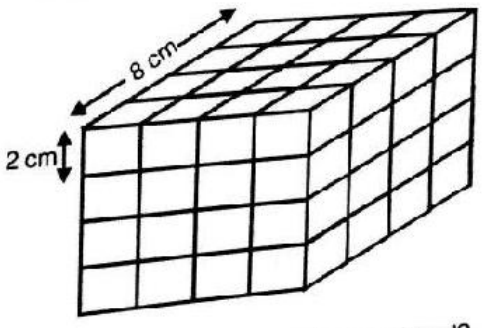
20. If dice (i), (ii), (iii) have even number of dots on their bottom faces and the dice (iv), (v), (vi) have odd number of dots on their top faces then what would be the difference in the total number of top face between these two sets?
(a) 0 (b) 1
(c) 2 (d) 3

21. If odd numbered dice have odd number on their bottom faces what would be the total number of dots on the top faces of these dice?
(a) 4 (b) 6
(c) 10 (d) 12

22. If even numbered dice have even number of dots on their top faces what would be the total number of dots on the top faces of these dice?
(a) 18 (b) 14
(c) 12 (d) 10

Direction (Qs. 23 to 32): Read the following information carefully and answer the question below it

A solid cube of each side 8 cms, has been painted red, blue and black on pairs of opposite faces. It is then cut into cubical blocks of each side 2 cms.



23. How many cubes have no face painted?
(a) 0 (b) 4
(c) 8 (d) 12

24. How many cubes will have only one face painted?

(a) 8 (b) 16
(c) 24 (d) 28

25. How many cubes will have only two face painted?
(a) 8 (b) 16
(c) 20 (d) 24

26. How many cubes will have three faces painted?
(a) 0 (b) 4
(c) 6 (d) 8

27. How many cubes will have three faces painted with different colours?
(a) 0 (b) 4
(c) 8 (d) 12

28. How many cubes will have two faces painted red & black and all other faces unpainted
(a) 4 (b) 8
(c) 16 (d) 32

29. How many cubes have only one face red and all other faces unpainted?
(a) 4 (b) 8
(c) 12 (d) 16

30. How many cubes have two faces painted black?
(a) 2 (b) 4
(c) 8 (d) None of these

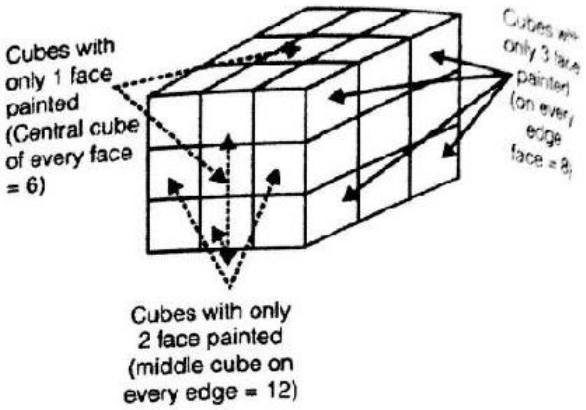
31. How many cubes have one face painted blue and one face painted red? (The other faces may be painted or unpainted)
(a) 16 (b) 12
(c) 8 (d) 0

32. How many cubes are there in all?
(a) 64 (b) 56
(c) 40 (d) 32

□□□□

Solutions

Answer 1 to 5:



And there will be a cube in the centre of these 26 (8 + 12 + 6) visible cubes. Which have none of its face painted. Hence the total no. of cubes = 9 in each of three layers = 8 + 12 + 6 + 1 = 27

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

Answer 6 to 9:

6. (b) Since in figure (i), (ii) and (iii), even number of dots lie at the bottom, so odd number of dots lie at the top. Thus 3, 1 and 3 occur at the top. Their sum is 7.
7. (c) Since in figure (i), (ii) and (iii), even number of dots lie at the bottom, so odd number of dots lie at the top. Thus 3, 1 and 3 occur at the top. Their sum is 7. In figure (iv), (v) and (vi), since odd number of dots appear on the top faces, so their top faces have 1, 3 and 1 dots respectively. Their sum is 5. Therefore the difference of the total number of top face dots = 7 − 5 = 2.
8. (d) Odd number dice are (i), (iii) and (v). Since they had odd numbers on their bottom

faces, so their are even numbers on their top faces, i.e., the numbers 4, 4 and 4 lie on their top faces. Their sum is 12.

9. (a) Even number dice are (ii), (iv), and (vi). They have even numbers, i.e., 6, 6, and 6 on their top faces. Their sum is 18.

Answer 10 to 14:

From fig (X) & (Y), it is clear that the numbers 5, 1, 6 and 3 cannot appear opposited 4. So, 2 lies oppoiste 4. Obviously, 3 lies opposite 5.

10. (b) Since 4 lies at the top of dice (X) and 2 lies opposite 4, so 2 lies at the bottom face of dice (X).

11. (c) Since 4 lies at the top of dice (Y) and 2 lies opposite 4, so 2 lies at the bottom face of dice (Y)

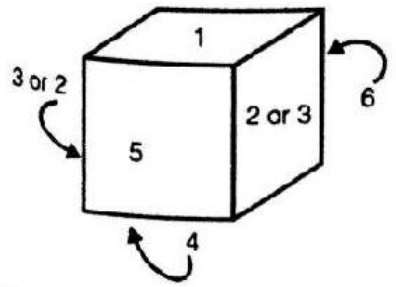
12. (a) As discussed earlier, 1 lies opposite 6.

13. (b) The numbers which are hidden behind the numbers 6 and 5 in dice (Z) are the numbers lying opposite 5 and 6 i.e. 3 and 1

14. (d) In fig (x). the hidden number behind the numbers 5 are 6 and 2 and in dice (z) numbers lying adjacent to 5 are 1 and 4 hence, common number are none.

Answer 15 to 18:

15. (b) The face opposite to 1 will be 4



16. (a) The top face must be 1 as 4 is in the bottom

17. (c) 6 is opposite to 5 hence 1, 2, 3, 4 must be adjacent to 5

18. (c) 3 is opposite to 2 hence 1, 4, 5, 6 must be adjacent to 3.

Answer 19 to 22:

Since the total number of dots on the opposite faces is 7, so, 1 lies opposite 6, 2 lies opposite 5; 3 lies opposite 4. In fig (i), since numbers 5 and 6 are visible, so 2 and 1 are hidden behind them. Hence, 3 and 4 should lie on the top & bottom. Similarly, in other figures, the top and bottom numbers are : fig. (ii) : 6 and 1; fig. (iii) : 3 and 4' fig (iv): 6 and 1; fig (v) : 3 and 4; fig (vi) : 6 and 1.

19. (b) Since, in figures (i), (ii) and (iii), even number of dots lie at the bottom, so odd number of dots lie at the top. Thus, the numbers 3, 1 and 3 occur at the top. Their sum is 7.

20. (c) Since, in figures (i), (ii) & (iii), even number of dots lie at the bottom, so odd number of dots lie at the top. Thus, 3, 1 and 3 dots lie at the top faces. Their sum is 7. Also, in figures (iv), (v) & (vi), since odd number of dots appear on the top faces, so their top face have 1, 3, and 1 dots respectively. Their sum is 5. The difference in the total number of top face dots = 7 – 5 = 2

21. (d) Odd numbered dice are (i), (iii) & (v). Since they have had odd numbers on their bottom faces, so their are even numbers on their top faces, i.e. the numbers 4, 4 and 4 lie on their top faces. Their sum is 12

22. (a) Even numbered dice are (ii), (iv) & (vi). They have even numbers i.e. 6, 6 and 6 on their top faces. Their sum is 18

Answer 23 to 32:

23. (c) Four central cubes in layer II and four central cube in layer II have no face painted. Thus, there are 8 such cubes

c) There are $(n-2)^2 \times 6 = (4-2)^2 \times 6 = 24$ such cubes.

d) There are $(n-2) \times 4 \times 3 = (4-2) \times 4 \times 3 = 24$ such cubes.

(d) Four corner cubes in layer I and four corner cubes in layer IV have three face painted. Thus, there are 8 such cubes.

(c) Four corner cubes in layer I and four corner cubes in layer IV have three face painted with different colours. Thus there are 8 such cubes.

(b) There are four cubes in layer I and four cubes in layer IV which have two faces painted red and black and all other faces unpainted. Thus, there are 8 such cubes.

29. (b) There are four cubes in layer I and four cubes in layer IV which have only one face painted red and all other faces unpainted. Thus, there are 8 such cubes.

30. (d) There can be no cubes which has two of its faces both painted with the same colour.

31. (a) There are $4 + 4 = 8$ cubes in layer 1 and $4 + 4 = 8$ cubes in layer IV which have one face painted blue and one face painted red. Thus. there are 16 such cubes.

32. (a) There are $4 \times 4 \times 4 = 64$ cubes in all.

1. Dalbir is facing south. He turns 135° in the anticlockwise direction and then 180° in the clockwise direction. Which direction is he facing now?
   (a) North-east (b) North-west
   (c) South-east (d) South-west

2. Muong a college student is facing north-west. He turns 90° in the clockwise direction and then 135° in the anticlockwise direction. Which direction is he facing now?
   (a) East (b) West
   (c) North (d) South

3. Rakesh starts walking straight towards east. After walking 75 metres, he turns to the left and walks 25 metres straight. Again he turns to the left, walks a distance of 40 metres straight, again he turns to the left and walks a distance of 25 metres. How far is he from the starting point?
   (a) 25 metres (b) 50 metres
   (c) 140 metres (d) none of these

4. Neelesh leaves for his office from his house. He walks towards East. After moving a distance of 20 m, he turns towards South and walks 10 m. Then he walks 35 m towards the West and further 5 m towards the North. He then turns towards East and walks 15 m. What is the straight distance in metres between his initial and final positions?
   (a) 0
   (b) 5
   (c) 10
   (d) cannot be determined
   (e) none of these

5. Vinod walks 20 metres towards North. He then turns left and walks 40 metres. He again turns left and walks 20 metres. Further, he moves 20 metres after turning to the right. How far is he from his original position?
   (a) 20 metres (b) 30 metres
   (c) 50 metres (d) 60 metres
   (e) none of these

6. Kuldeep starts from his house towards West. After walking a distance of 30 metres, he again turned towards right and walked 20 metres. He then turned left and moving a distance of 10 m turned to his left and walked 40 metres, turns to the left and walks 5 metres. Finally he turns to his left. In which direction is he walking now?
   (a) North (b) South
   (c) East (d) South-West
   (e) west

7. A rat runs 20' towards East and turns a right, runs 10' and turns to right, runs 9' and again turns to left, runs 5' and then turns to left, runs 12' and finally turns to left and runs 6'. Now, which direction is the rat facing?

(a) East (b) West
(c) North (d) South

8. Bhawna leaves from her home. She first walks 30 metres in North-west direction and then 30 m in South-West direction. Next, she walk 30 metres in South-east direction. Finally, she turns towards her house. In which direction is she moving?
(a) North-east (b) North-west
(c) South-east (d) South-west
(e) None of these

9. I am facing South. I turn right and walk 20 m. Then I turn right again and walk 10 m. Then I turn left and walk 10 m and then turning right walk 20 m. Then I turn right again and walk 60 m. In which direction am I from the starting point?
(a) North (b) North-west
(c) East (d) North-east

10. A man walks 1km towards East and then he turns to South and walks 5 km. Again he turns to East and walks 2 km, after this he turns to North and walks 9 km. Now, how far is he from his starting point?
(a) 3 km (b) 4 km
(c) 5 km (d) 7 km

11. From his house Sanjay went 15 kms to the North. Then he turned West and covered 10 kms. Then, he turned South and covered 5 kms. Finally, turning to East, he covered 10 kms. In which direction is he from his house?
(a) East (b) West
(c) North (d) South

12. Going 50 m to the South of her house, Radhika turns left and goes another 20 m. Then, turning to the North, she goes 30 m and then starts walking to her house. In which direction is she walking now?
(a) North-west (b) North
(c) South-east (d) East

13. Michael walks 20 m North. Then he turns right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Then he again turns left and walks 15 m. In which direction and how many metres away is he from his original position?
(a) 15 metres west (b) 30 metres east
(c) 30 metres west (d) 45 metres east

14. A child is looking for his father. He went 90 metres is the East before turning to his right. He went 20 metres before turning to his right again to look for his father at his uncle's place 30 metres from this point. His father was not there. From here he went 100 metres to the North before meeting his father in a street. How far did the son meet his father from the starting point?
(a) 80 metres (b) 100 metres
(c) 140 metres (d) 260 metres

15. The door of Aditya's house faces the East. From the back side of his house, he walks straight 50 metres, then turns to the right and walks 50 metres again. Finally he turns towards left and stops after walking 25 metres. Now, Aditya is in which direction from the starting point?
(a) South-east (b) North-east
(c) South-west (d) North-west

16. Two buses start from the opposite points of a main road, 150 kms apart. The first bus runs for 25 kms and takes a right turn and then runs for 15 kms. It then turns left and runs for another 25 kms and takes the direction back to reach the main road. In the meantime, due to a minor breakdown, the other bus has run only 35 kms along the main road. What would be the distance between the two buses at this point?

(a) 65 kms (b) 75 kms
(c) 80 kms (d) 85 kms

17. X and Y start moving towards each other from two places 200 m apart. After walking 60 m, Y turns left and goes 20 m, then he turns right and goes 40 m. He then turns right again and comes back to the road on which he had started walking. If X and Y walk with the same speed, what is the distance between them now?
(a) 20 m (b) 30 m
(c) 40 m (d) 50 m

18. Five boys are standing in a row facing East. Deepak is to the left of Sameer, Tushar and Shailendra. Sameer, Tushar and Shailendra are to the left of Sushil. Shailendra is between Sammer and Tushar. If Tushar is fourth from the left, how far is Sameer from the right?
(a) First (b) Second
(c) Third (d) Fourth
(e) Fifth

19. After walking 6 km, I turned right and covered a distance of 2 km, then turned left and covered a distance of 10 km. In the end, I was moving towards the north. From which direction did I start my journey?
(a) North (b) South
(c) East (d) West

20. A postman was returning to the post office which was in front of him to the north. When the post office was 100 metres away from him, he turned to the left and moved 50 metres to deliver the last letter at Shantivilla. He then moved in the same direction for 40 metres, turned to his right and moved 100 metres. How many metres was he away from the post office.
(a) 0 (b) 90
(c) 150 (d) 100
(e) None of these

21. A boy rode his bicyle northwards, then turned left and rode one km and again turned left and rode 2 km. He found himself exactly one km west of his starting point. How far did he ride northwards initially?
(a) 1 km (b) 2 km
(c) 3 km (d) 5 km

Direction (Qs. 22 to 26): Read the following information carefully and answer the questions given below it:

(i) Six flat on a floor in two rows facing North and South are allotted to P, Q, R, S, T and U.
(ii) Q gets a North facing flat and is not next to S.
(iii) S and U get diagonally opposite flats
(iv) R, next to U, gets a South facing flat and T gets a North facing flat

22. Which of the following combinations get South facing flats?
(a) QTS (b) UTP
(c) URP (d) Data inadequate
(e) None of these

23. Whose flat is between Q and S?
(a) T (b) U
(c) R (d) T
(e) None of these

24. If the flats of T and P are interchanged, whose flat will be next to that of U?
(a) P (b) Q
(c) R (d) T
(e) None of these

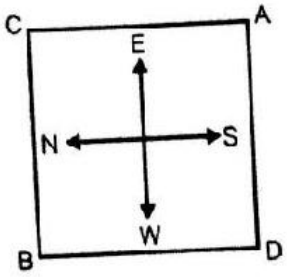
25. The flats of which of the other pairs than SU is diagonally opposite to each other?
(a) QP (b) QR
(c) PT (d) TS
(e) None of these

26. To arrive at the answers to the above questions, which of the following statements can be dispensed with?

(a) None (b) (i) only
(c) (ii) only (d) (iii) only
(e) None of these

27. Anju started walking positioning her back towards the sun. After sometime, she turned left, then turned right and then towards the left again. In which direction is she going now?
(a) North or South (b) East or West
(c) North or West (d) South or West

Direction (Qs. 28 to 32): The following question are based on the diagram given below showing four persons stationed at the four corners of a square piece of plat as shown.



28. A starts crossing the field diagonally. After walking half the distance, he turns right, walks some distance and turns left. Which direction is A facing now?
(a) North-east (b) North-west
(c) North (d) South-east
(e) South-wast

29. From the original position given in the above figure, A and B move one arm length clockwise and then cross over to the corner diagonally opposite; C and D move one arm length anti-clockwise and cross over the corner diagonally opposite. The original configuration ADBC has now changed to
(a) CBDA (b) BDAC
(c) DACB (d) ABCD
(e) BCAD

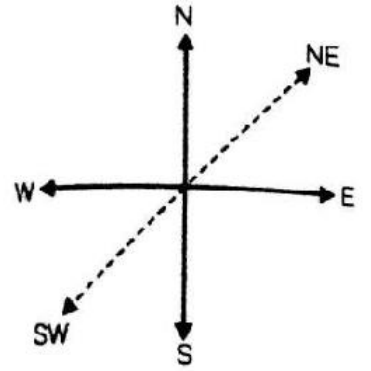
30. From the original position, B and D move one and a half length of sides clockwise and anticlockwise respectively. Which one of the following statements is true?
(A) B and D are both at the midpoint between A and C
(B) D is at the midpoint between A and C and B at the corner originally occupied by A.
(C) B is at the midpoint between A and C and D at the corner originally occupied by A.
(D) B and D are both at the midpoint between A and D.
(E) B is at the midpoint between A and C and D at the midpoint between original position of B and C.

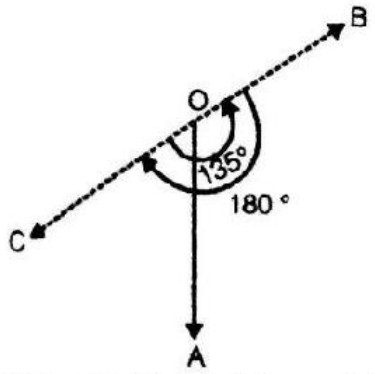
31. From the positions in original figure, C and A move diagonally to opposite corners and then one side each clockwise and anticlockwise respectively. B and D move two sides each clockwise and anticlockwise respectively. Where is A now?
(a) At the north-west corner
(b) At the north-east corner
(c) At the south-east corner
(d) at the south-west corner
(e) Midway between original position of B and D

32. After the movements given in Q.31 above, who is at the north-west corner?
(a) A (b) B
(c) C (d) None of these

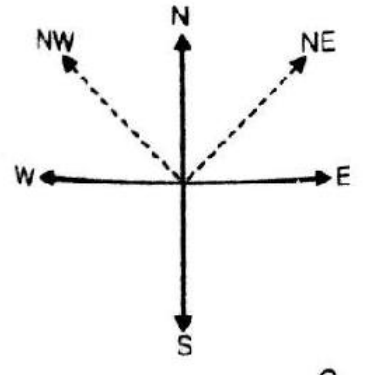
33. A square field ABCD of side 90 m is so located that its diagonal AC is from north to south and the corner B is to the west of D. Muong and Thames start walking along the sides from B and C respectively in the clockwise and anticlockwise direction with speeds of 8 m/s and 10 m/s. Where shall they cross each other the second time?
(a) On AD at a distance of 30 m from A
(b) On BC at a distance of 10 m from B
(c) On AD at a distance of 30 m from D
(d) On BC at a distance of 10 m from C

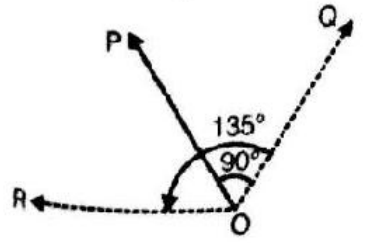
1. (a) As shown in Fig. 1, Dalbir initially faces in the direction OA, On moving 135° anticlockwise, he faces in the direction OB. On further moving 180° clockwise, he faces in the direction OC, which is South-west.



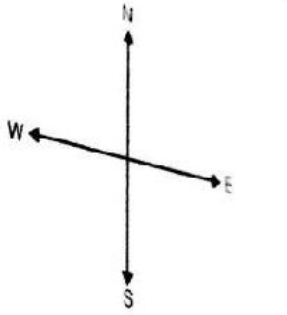


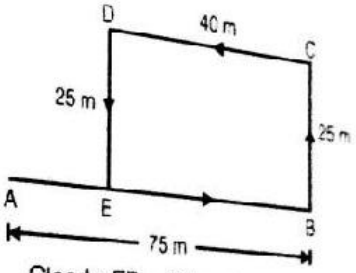
2. (b) As shown in Fig. 2, Muong initially faces in the direction OP. On moving 90° clockwise, he faces in the direction OQ. On further moving 135° anti-clockwise, he faces in the direction OR, which is West.





3. (d) The movement of Rakesh are as shown in Fig.

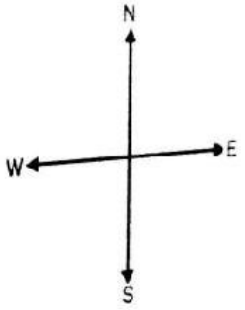


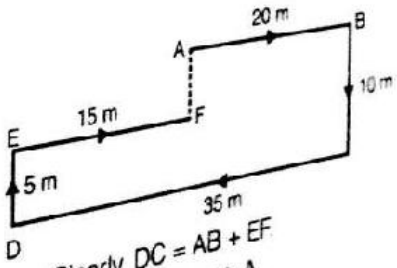


Clearly, EB = DC = 40 m.

∴ Rakesh's distance from the starting point A = (AB – EB) = (75 – 40) m = 35 m.

4. (b) The movement of Neelesh from A to F are as shown in Fig.





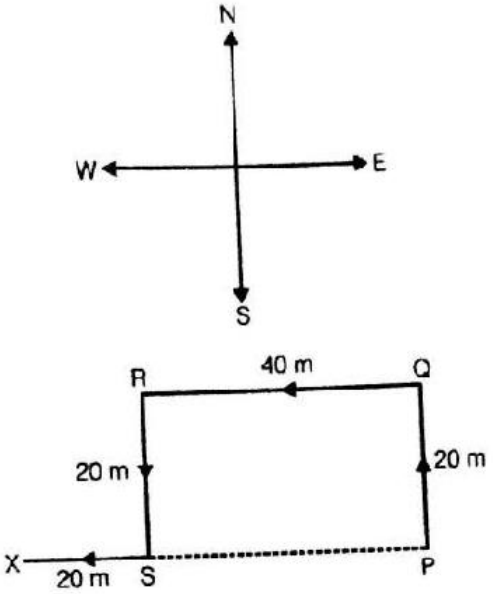
Clearly, DC = AB + EF

∴ F is in line with A.

Also, AF = (BC – DE) = 5 m.

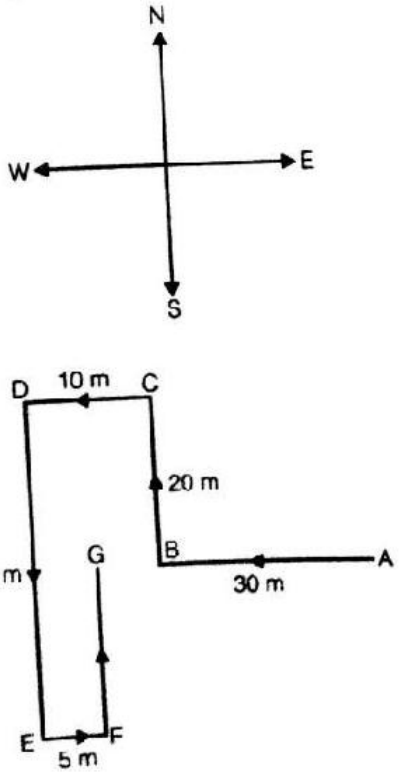
So, Neelesh is 5 metres away from his initial position.

5. (d) The movements of Vinod are as shown in Fig.



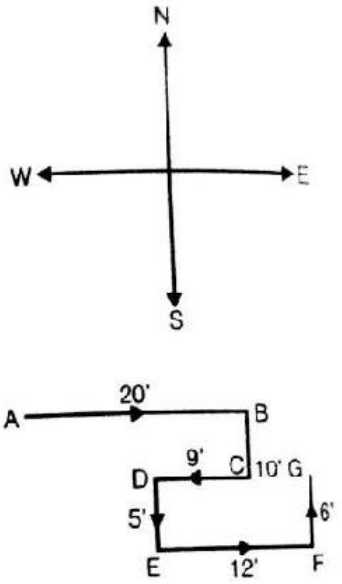
Clearly; Vinod's distance from his initial position P ⇒ PX = (PS + SX)
= (QR + SX)
= (40 + 20) m = 60 m.

6. (a) The movement of Kuldeep are as shown in Fig. from A to G.



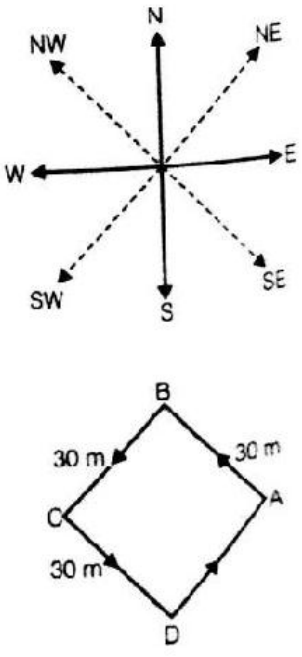
Clearly, Kuldeep is finally walking in the direction FG i.e, North

7. (c) The movements of the rat from A to G are as shown in Fig.

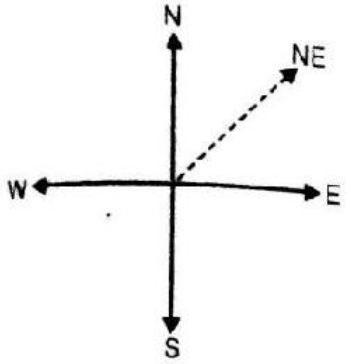


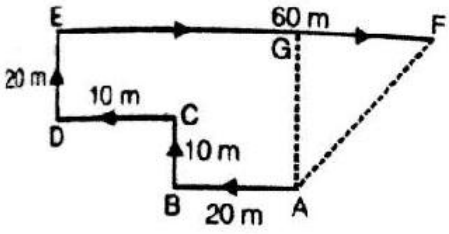
Clearly, it is finally walking in the direction FG i.e, North

8. (a) The movements of Bhawna are as shown in Fig. (A to B, B to C, C to D, D to A). Clearly, she is finally moving in the direction DA i.e, North-east

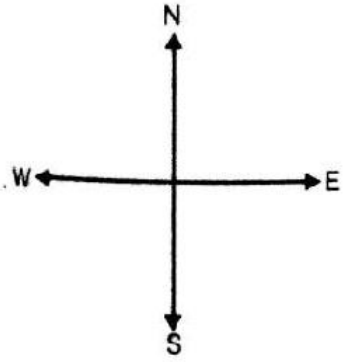


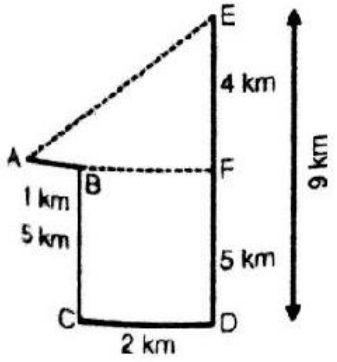
The movements of the person are from A to F, as shown Fig. Clearly, the final position is F which is to the North-east for the starting point A





(c) The movements of the man are as shown in Fig. (A to B, B to C, C to D, D to E).

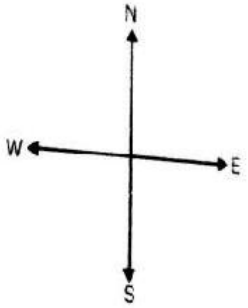


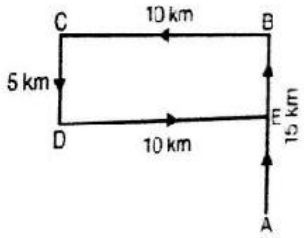


Clearly, DF = BC = 5 km.
EF = (DE – DF) = (9 – 5) km = 4 km.

BF = CD = 2 km
AF = AB + BF = AB + CD = (1 + 2) km
= 3 km
∴ Man's distance from starting point A
= AE = $\sqrt{AF^2 + EF^2} = \sqrt{3^2 + 4^2}$
= $\sqrt{25}$ = 5 km

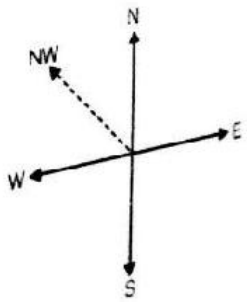
11. (c) The movements of Sanjay are as shown in Fig. (A to B, B to C, C to D and D to E).

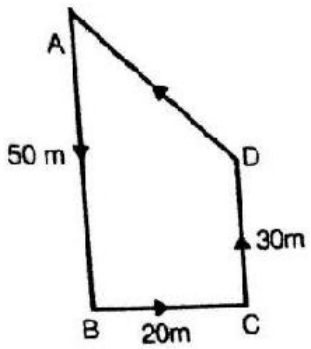




Clearly, his final position is E which is to the North of his house at A.

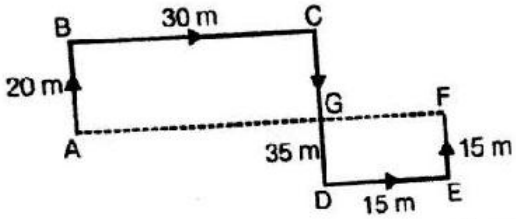
12. (a) The movements of Radhika are as shown in Fig. (A to B, B, to C, C to D and D to A).





Clearly, she is finally moving in the direction DA i.e. North-west.

13. (d) The movement of Michael from A to F are as shown in Fig.



Since CD = AB + EF, so F lies in line with A

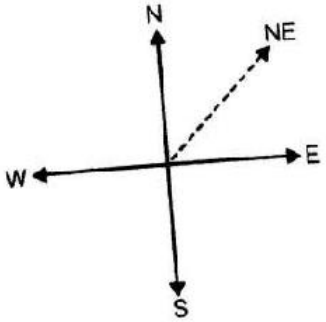
∴ Michael's distance from original position A

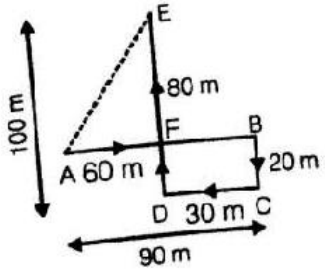
= AF = (AG + GF)

= (BC + DE) = (30 + 15) = 45 m.

Also, F lies to the east of A

14. (b) The movements of the child from A to E are as shown in Fig.





Clearly, the child meets his father at C

Now, AF = (AB – FB) = (AB – DC)

= (90 – 30) m = 60 m

EF = (DE – DF) = (DE – BC)

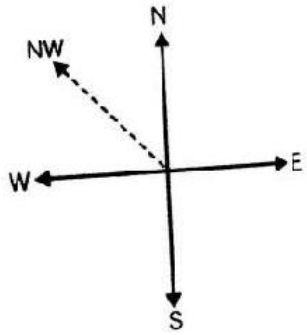
= (100 – 20) m = 80 m

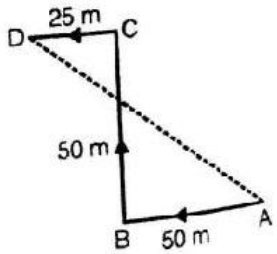
$$AE = \sqrt{(AF)^2 + (EF)^2}$$

$$= \sqrt{60^2 + 80^2} = 100 \text{ m}$$

15. (d) Since Aditya's house faces towards East and he walks from backside of his house it means that he starts walking towards West. Thus, the movements of Aditya are as shown in Fig. (A to B, B to C, C to D)

Clearly, Aditya's final position is D which is to the North-west of the starting point A.





16. (a) Let X and Y be two buses.

Bus X travels along the path PA, AB, BC, CD

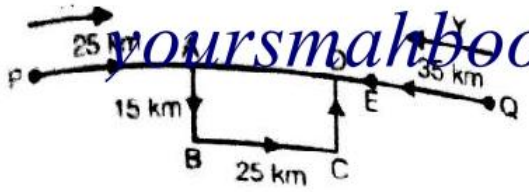
Now, AD = BC = 25 km

Bus Y travels 35 km upto E

∴ Distance between two buses

= PQ – (PD + QE)

= [150 – (50 + 35)] = 65 km



17. (c) Clearly Y moves 60 m from Q upto A, then 20 m upto B, 40 m upto C and then upto D.

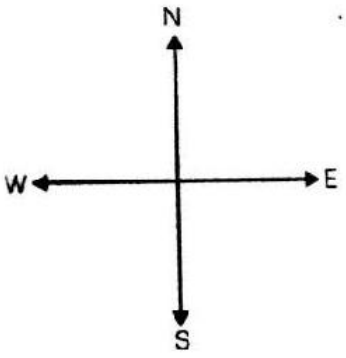
So, AD = BC = 40 m.

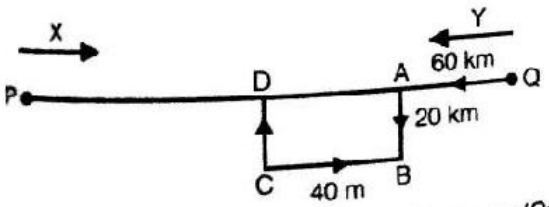
QD = (60 + 40) m = 100m.

Since X and Y travel with the same speed, X will travel the same distance along the horizontal as Y travels in the same tiem i.e. (60 + 20 + 40 + 20) = 140 m.

So, X travels 140 m upto A.

∴ Distance between X and Y = AD = (100 – 60) m = 40 m.





18. (d) Deepak (D) is to the left of Sameer (Sm), Tushar (T) and Shailendra (Sh) means D, Sm, T, Sh.

Sameer, Tushar and Sailendra are to the left of Sushil (Su) means Sm, T, Sh, Su.

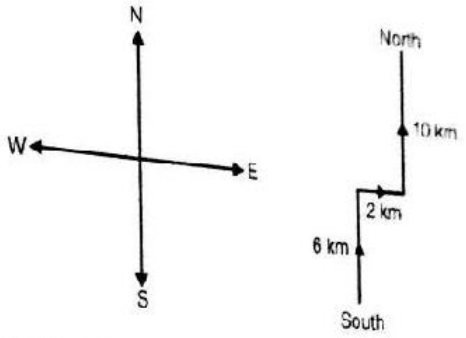
Shailendra is between Sameer and Tushar means Sm, Sh, T.

Tushar is fourth from the left means □□□T.

Combining all the arrangements, we have D, Sm, Sh, T, Su.

So Sameer is fourth from the right.

19. (b) Clearly, the route is as shown in the adjoining diagram. Thus, I started the journey from the South and moved northwards



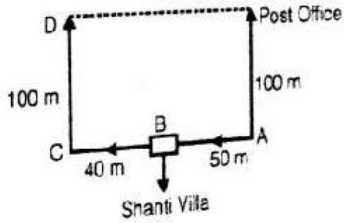
20. (b) Clearly, the route of the postman is as shown.

So, at the final point the distance of postman from post office

= PD = AC

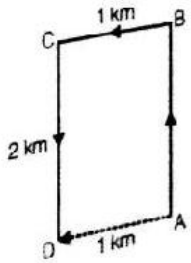
= AB + BC

= 50 + 40 = 90 m



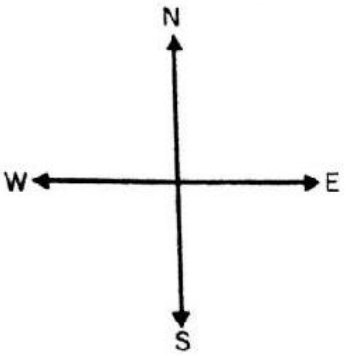
21. (b) Clearly, the boy rode from A to B, to C and finally upto D. Since D lies to the west of A, so required distance

= AB = CD = 2 km



Answer 22 to 26

Q gets a North-facing flat and is not next to S means



(South facing flats) ↓

Q		S

(North facing flats) ↑

S and U get diagonally opposite flats means

U		
Q		S

R, next to U, gets a South facing flat and T gets a north facing flat means

U	R	P
Q	T	S

So, the arrangement is:

South facing flats U R P

North facing flats Q T S

22. (c) The South facing flats are U, R, P

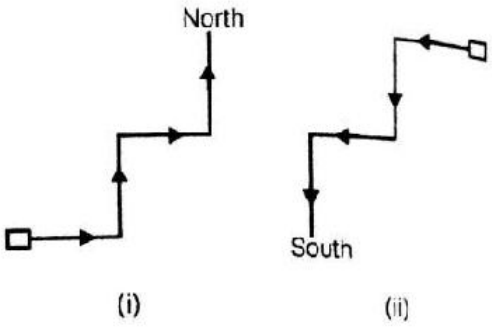
23. (a) T's flat is between Q and S

24. (c) The flat next to U's flat is of R, which remains unchanged if the flats of T and P are interchanged

25. (a) The diagonally opposite pairs are SU and QP

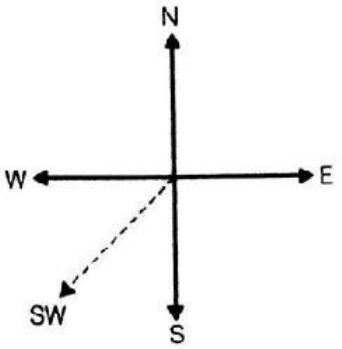
26. (a) Clearly, all the statements are necessary to answer the given questions

27. (a) Clearly, there are two possible movements of Anju as shown below.

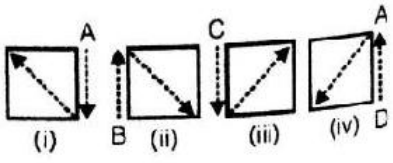


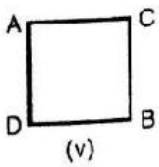
Thus, Anju is finally moving towards either North or South

28. (b) Clearly, the route of A is as shown Comparing it with the given diagram, the direction of A will be north-west



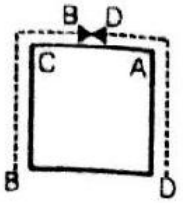
29. (a) Clearly, (i), (ii), (iii) and (iv) show the movements of A, B, C, and D respectively while the new arrangement so obtained is shown in (v). So, the congiruration changes to CBDA.



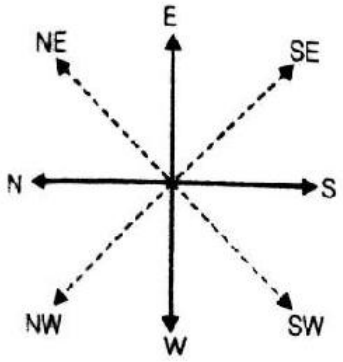


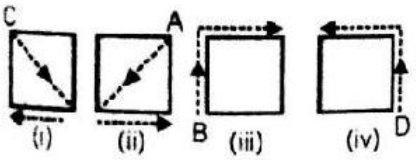
(Final Position)

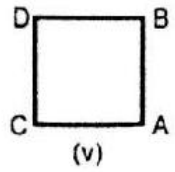
30. (a) The movements of B and D are clearly shown in the adjoining diagram
So, statements (a) is true.



31. (d) The movements of A, C, B, and D are shown in figures (i), (ii), (iii) and (iv) respectively. The final configuration is shown in (v). Comparing (v) with the given diagram, A is in the south-west corner.



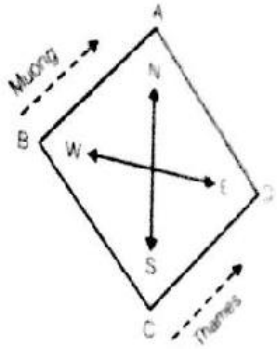




(Final Position)

32. (c) Clearly, C is at the north-west corner

33. (a) Clearly, the arrangement is as shown in the adjoining diagram.



It is given that
Muong's speed = 8 m/s
Thames's speed = 10 m/s
It is clearly visible from the above figure that to meet for the first time they have to cover a distance of 270 m i.e three arms length of the field.
BA + AD + CD = 90 + 90 + 90 = 270 m
Since they are running in clockwise and anticlockwise direction respectively, they have to cover a distance of 360 m (i.e. 4 arms length of the field) for their second meeting from the first meeting point
Thus, total distance to be covered for their second meeting = 270 + 360 = 630 m

$$\text{Time required} = \frac{630}{8+10} = \frac{630}{18}$$

= 35 seconds
Distance covererd by Muong in clockwise direction in 35 seconds = 35 × 8 = 280 m
Distance covered by Thames in anticlockwise direction in 35 seconds
= 35 × 10 = 350 m
Thus, Muong and Thames will meet on BC at a point 10 m from C and 80 m from B

Data Interpretation

Executive member, managers and personnel at different level in the various organizations are required to analyse different sets of datas. Balance sheet, Records of Annual General Meeting, Quarterly Report etc. require interpretation of various datas. On the basis of the given sets of datas future projections can be made. There after corrective action can be taken at regular intervals.

Mainly there are following sets to represent datas.

- **Graph**
- **Table**
- **Bar Diagrams**
- **Pie Charts**
- **Miscellaneous Figures etc.**

Graph

Graph is the simplest way to represent data. Single set or multiple sets of datas can be shown in a graph.

Normally following things are required to analyse.

- Increase in profit in absolute terms
- Increase in profit in percentage term
- Growth rate of the given duration
- Average annual growth rate
- Average profit
- Capacity utilisation
- In case of trade, Trade Deficit and Trade Surplus etc

Lets have an example of graph

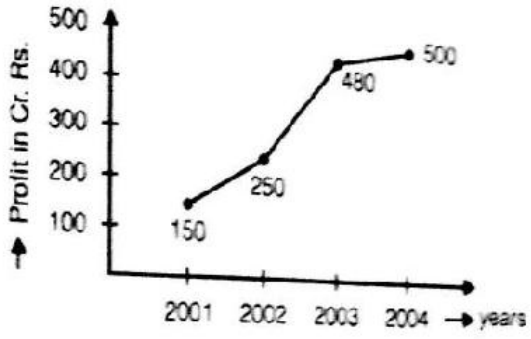


Fig. (I) Balance Sheet of ABC corporation.

On the basis of the given balance sheet of ABC corporation we can calculate following things

1. Increase in profit in absolute terms

   2001-02 250-150 = 100 Cr.

   2002-03 480-250 = 230 Cr.

   2003-04 500-480 = 20 Cr.

- The highest absolute increment in profit is observed during financial year 2002-03 i.e. 230 cr.
- The least absolute increment in profit is observed during financial year 2003-04 i.e. 20 cr.

2. Percent increase in profit

   2001-02 $\frac{250-150}{150} \times 100 = 66.66\%$

2002-03 $\frac{480-250}{250}\times 100 = 92\%$

2003-04 $\frac{500-480}{480}\times 100 = 4.16\%$

- The highest profit increment in percentage term is for financial year 2003-03 i.e. 92%.
- The minimum profit increment in percentage term is for financial year 2003-04 i.e. 4.16%

3. Growth rate for the duration 2001-04
[Growth rate for the duration]

$$= \frac{\text{Final year's Profit} - \text{Base year's profit}}{\text{Base year's profit}}$$

$$\Rightarrow \frac{500-150}{150}\times 100 = 233\%$$

4. Average Annual Growth Rate

$$= \frac{\text{Increase in profit for the duration}}{\text{Base years profit}} \times \frac{100}{\text{Number of years}}$$

in the above example

$$\frac{500-150}{150}\times\frac{100}{3}$$

$$= \frac{350}{150}\times\frac{100}{3} = 66.66\%$$

Note: Number of years (in duration term) is 3 i.e. 2001-02, 2002-03 & 2003-04.

5. Average profit $= \frac{\text{Sum of profits of the duration}}{\text{Total number of years}}$

$$\Rightarrow \frac{150+250+480+500}{4} = \frac{1380}{4} = 345.$$

Note: Here for calculating average profit number of years is 4 i.e. 2001, 2002, 2003 and 2004.

Capacity Utilisation

$$\text{Capacity utilisation} = \frac{\text{Total Production}}{\text{Total Capacity}} \times 100$$

Ex.1 The total capacity of Tata Nano car plant in Gujarat is 150 car per day. In the month of April 2009 the plant manufactured at the rate of 120 car a day. Due to sharp increase in demand in May 2009 Tata company decided to increase the production to 200 car a day. Find the capacity utilisation in the month of April and May 2009.

Sol.: Capacity utilisation in April 2009

$$= \frac{120}{150} \times 100 = 80\%$$

Capacity utilisation in May 2009

$$= \frac{200}{150} \times 100 = 133\%$$

Ex.2 The manufacturing capacity of Nokia's plant based in Yokohama Japan is 3,00,000 cellphones per day. In the month of March 2009 there was slump in demand due to recession and capacity utilisation came down to 30%. Find the production of cellphones in March 2009.

Sol.: Capacity utilisation

$$= \frac{\text{Total Production}}{\text{Total Capacity}} \times 100$$

Total production in march 2009 =

$$\frac{\text{Capacity Utilisation} \times \text{Total Capacity}}{100}$$

$$\Rightarrow \frac{30\times 3,00,000}{100}$$

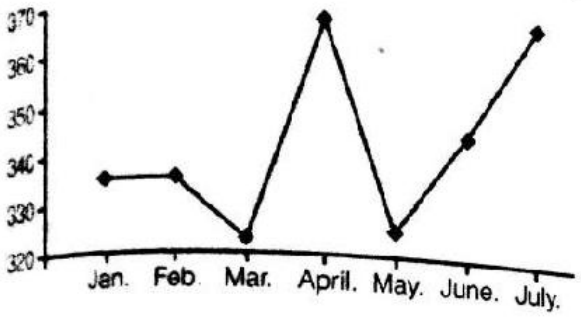
$\Rightarrow$ 90,000 Ans.

□□□□

Practice Exercise: I

Direction (Qs. 1 to 5) : Refer to the graph (Fig.) and answer the questions given below that

(Consumer price index in 1993-1994)



1. Which month showed the highest absolute difference in the Consumer Price Index (CPI) over the previous month?
   (a) March (b) April
   (c) May (d) July

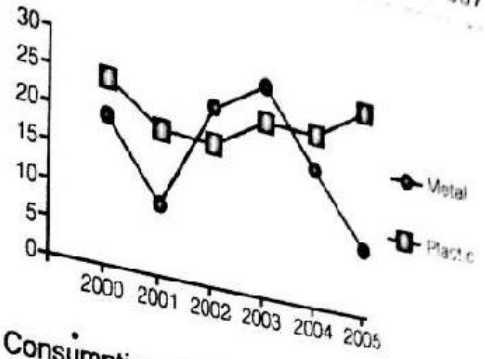
2. Which month showed the highest percentage difference in the CPI over the previous month?
   (a) March (b) April
   (c) May (d) July

3. For how many month was the CPI greater than 350?
   (a) One (b) Two
   (c) Three (d) Four

4. In how many months was there a decrease in the CPI?
   (a) One (b) Two
   (c) Three (d) Four

5. The difference in the number of months in which there was an increase in the CPI and the number of months in which there was a decrease was:
   (a) One (b) Two
   (c) Three (d) Four

Direction (Qs. 6 to 11) : Study the following graph to answer the given questions:



Consumption of Metals versus plastics in the given Years for Car manfucaturing (in thousands tonnes)

The graph shows the trend of consumption of metals and plastic in the production of cars between 2000-05.

6. The number of years for which the consumption of Metals was less than the consumption of Plastic over the given time period was.
   (a) One (b) Two
   (c) Three (d) Four

7. The total consumption of plastic (for car manufacturing) divided by the total consumption of Metal (for car manufacturing) over the period will give a ratio closest to:
   (a) 4 : 3 (b) 5 : 4
   (c) 6 : 5 (d) 7 : 4

8. Which item and for which year shows the highest percentage change in consumption over the previous year?
   (a) Metal 2003 (b) Plastic 2003
   (c) Metal 2002 (d) Plastic 2005

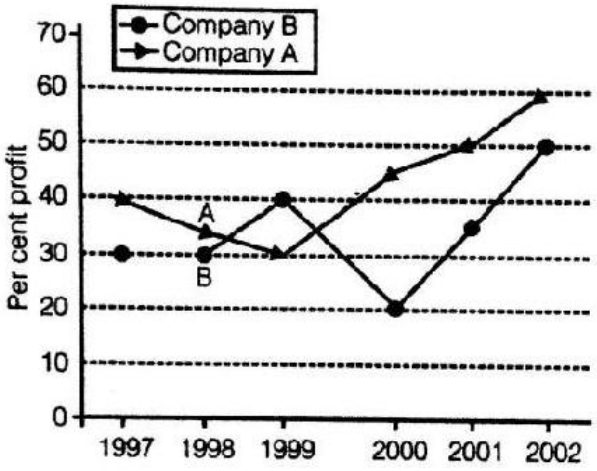
9. For the given two data series, how many years have shown decrease in consumption (for both the items individually)?
   (a) One (b) Two
   (c) Three (d) Four

10. Which year showed the highest percentage increase in the total consumption of the two?
    (a) 2001 (b) 2002
    (c) 2003 (d) 2004

11. Which year showed the highest percentage decrease in the total consumption of the two?
(a) 2001 (b) 2002
(c) 2004 (d) 2005

Direction (Qs. 12 to 16): Study the following graph to answer the given questions:

Percent profit earned by two companies over the given years:



12. If the expenditure of Company B in 2000 was Rs. 200 crore, what was its income?
(a) Rs. 240 crore
(b) Rs. 220 crore
(c) Rs. 160 crore
(d) Cannot be determined
(e) None of these

13. If the income of Company A in 2002 was Rs. 600 crore, what was its expenditure?
(a) Rs. 360 crore
(b) Rs. 480 crore
(c) Rs. 375 crore
(d) Cannot be determined
(e) None of these

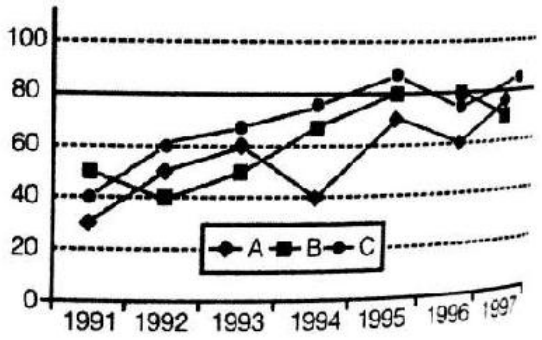
14. If the income of Company B in 1998 was Rs. 200 crorers, what was its profit in 1999?
(a) Rs. 21.5 crore
(b) Rs. 153 crore
(c) Rs. 46.15 crore
(d) Cannot be determined
(e) None of these

15. If the income of the two companies in 1998 were equal, what was the ratio of their expenditures?
(a) 1 : 2
(b) 26 : 27
(c) 100 : 67
(d) Cannot be determined
(e) None of these

16. What is the percent increase in profit for company B from year 2000 to 2001?
(a) 75 (b) 175
(c) 42.86
(d) Cannot be determined
(e) None of these

Direction (Qs. 17 to 21): Study the following graph carefully and answer the questions given below it.

Imports of 3 companies over the years (Rs. in crore)



17. In which of the following years, the imports made by Company A was exactly equal to it's average imports
(a) 1992 (b) 1993
(c) 1994 (d) 1995
(e) None of these

18. In which of the following years was the difference between the imports made by Company B and C the maximum?
(a) 1995 (b) 1994
(c) 1991 (d) 1992
(e) None of these

19. In which of the following years was the imports made by Company A exactly half of the total imports made by Company B and C together in that year?
(a) 1992 only (b) 1993 only
(c) 1992 and 1993 (d) 1995 only
(e) None of these

20. What was the percentage increase in imports by Company B from 1992 to 1993?
(a) 10 (b) 25
(c) 40 (d) 20
(e) None of these

21. In which of the following years was the total imports made by all the three companies together the maximum?
(a) 1996 only (b) 1997 only
(c) 1995 only (d) 1995 & 1997 only
(e) None of these

Solutions

Answer 1 to 5:

1. (b)
2. (b) Visually clear that it is April
3. (b) April and July – Two.
4. (b) The CPI drecreased in March and May
5. (a) The CPI increased in three months (April , June and July) while it decreased in two months (March and May).
6. (d) Visully seen as 4.
7. (b) 145 : 115 = 29 : 23 is closest to 5 : 4
8. (c) Metals in 2002 is more than doubling over it's 2001 value.
9. (a) 2001 is the only year which satisfy the condition
10. (b) 50% in 2002
11. (a) 33.33% between 2000 to 2001.
12. (a) Income of Company B in 2000

$= 200 \times \frac{120}{100} = \text{Rs. } 240 \text{ cr.}$

13. (c) Expenditure of Company A in 2002

$= 600 \times \frac{100}{160} = \text{Rs. } 375 \text{ cr.}$

14. (d) We can not find out the amount of profit in 1999, as we do not know the income and expenditure of A and B in the year 1999, therefore option (d) is the correct choice.

15. (b) Ratio of their expenditures

$= \frac{100}{135} \times \frac{130}{100} = 26. : 27.$

16. (d) Reqd. % increase $= \frac{35-20}{20} \times 100$

$= 75\%.$

17. (e) Average imports made by company A

$= \frac{30+50+60+40+70+60+75}{7}$

$= \frac{385}{7} = 55$

In none of the given years the imports is exactly equal to 55 (crore). Hence, the answer is (e)

18. (d) By visual inspection it is clear that 1992 is the desired year (as the distance between two points is the maximum in 1992).

19. (a) By observation

$\left(\text{as } 50 = \frac{40+60}{2}\right)$, 1992

Only is the desired year. You do no need any calculation see the year where the point A lies exactly in the middle of points of B and C

20. (b) Reqd percentage increase

$$= \frac{50 - 40}{40} = 25\%$$

21. (c) The total imports (in crore) made by all the three companies together : From the height of the points we observe that the total heights of three points is the maximum either in 1995 or 1997. If you observe carefully our clear answer is 1995, but to be sure we find actual values for the two years.

In 1995 = 70 + 80 + 85 = 235

In 1997 = 75 + 70 + 85 = 230

Clearly, 1995 is the desired year.

□□□□

I Practice Exercise: I

Direction (Qs. 1 to 5): Study the following Table carefully and answer the questions given below

Production of main crops in India (in million tonnes)

Crops \ Years	91-92	92-93	93-94	94-95	95-96	96-97
Pulses	20.5	22.4	24.6	23.5	27.8	28.2
Oilseeds	32.4	34.6	40.8	42.4	46.8	52.4
Rice	80.5	86.4	88.2	92.6	94.2	90.8
Sugarcane	140.8	150.2	152.2	160.3	156.4	172.5
Wheat	130.2	138.4	146.8	141.6	152.2	158.4
Coarse grain	45.6	52.8	60.4	62.2	58.2	62.8
Sum	450	484.8	513.2	522.8	535.6	565.1

1. Production of sugarcane in 1993-94 was approximately what percentage of production of rice in 1992-93?
   (a) 50 (b) 75
   (c) 150 (d) 125
   (e) 175

2. Production of what type of crop was going to increase in each year in the given years?
   (a) Rice (b) Pulse
   (c) Sugarcane (d) Oilseeds
   (e) None of these

3. What was the average production of pulse in the given years?
   (a) 26.8 million tonnes
   (b) 20.5 million tonnes
   (c) 24.5 million tonnes
   (d) 22.5 million tonnes
   (e) None of these

4. Production of oilseeds was what percentage of the total crops produced in the year 1991-92?
   (a) 7.2 (b) 8.4
   (c) 2.7 (d) 6.4
   (e) None of these

5. In which of the following years the total production of oilseeds in the years 1994-95, 1995-96 and 1996-97 was equal to the production of wheat?
   (a) 1993-94 (b) 1994-95
   (c) 1996-97 (d) 1992-93
   (e) None of these

Direction (Qs. 6 to 10): The table given below shows production of five types of cars by a company in the years 1989 to 1994. Study the table and answer questions.

Production of cars by a company

Year→ Type ↓	1989	1990	1991	1992	1993	1994	Total
P	8	20	16	17	21	6	88
Q	16	10	14	12	12	14	78
R	21	17	16	15	13	8	90
S	4	6	10	16	20	31	87
T	25	18	19	30	14	27	133
Total	74	71	75	90	80	86	476

6. In which year the production of cars of all types taken together was approximately equal to the average of the total production during the period (1989-94)?
(a) 1989 (b) 1991
(c) 1993 (d) 1994

7. In which year the total production of cars of types P and Q together was equal to the total production of cars of types R and S together?
(a) 1990 (b) 1991
(c) 1994 (d) None of these

8. During the period 1989-94, in which type of cars was a continuous increase in production?
(a) P (b) Q
(c) R (d) S

9. The production of which type of cars was 25% of the total production of all types of cars during 1993?
(a) S (b) R
(c) Q (d) P

10. The per cent increase in total production of all types of cars in 1992 to total in 1991 was?
(a) 15 (b) 20
(c) 25 (d) 30

Direction (Qs. 11 to 15): These questions are based on the data given in the following table shown.

Investment made by the five companies over the years (in lakh of rupees)

Company	Years 1998	1999	2000	2001	2002
I	20	21	50	35	75
II	29	31	23	46	42
III	31	29	27	22	16
IV	33	14	33	37	48
V	15	17	32	39	47
	128	112	165	179	228

11. Which company made more than 25 per cent of the total investment made by all the companies in 2001?
(a) I (b) II
(c) IV (d) None of these

12. For which company, has the amount of investment made increased continuously over the years?
(a) I (b) II
(c) III (d) None of these

13. For which company has the amount of investment made decreased continuously over the years?
(a) V (b) IV
(c) III (d) None of these

14. In which year, the amount of investment made was the least as compared to average investment made by all the companies over the years?
(a) 1998 (b) 1999
(c) 2000 (d) None of these

15. In which year, the percentage change in the total amount of investment made is the highest over its immediately proceeding year?
(a) 2002 (b) 2000
(c) 2001 (d) None of these

Direction (Qs. 16 to 20): The following five questions are to be answered on the basis of the following table:

Weight Distribution in the Average Adult

Organs	Weight (in grams)
Muscles	30,000
Skeleton	10,000
Blood	5,000
Gastrointestinal Tract	2,000
Lungs	1,000
Liver	1,700
Brain	1,500

(b) More than 51 kg
(c) 50,000 grams (d) Less than 50 kg
(e) None of these

... the weight of the skeleton is represented as S, then the weight of the liver can be represented as
(a) 1.7 S (b) 0.17 S
(c) 17 S (d) 71 S
(e) None of these

... The ratio expressed in decimals of the weight of the blood to the weight of the gastrointestinal tract is
(a) 0.4 (b) 4.0
(c) 2.5 (d) 0.25
(e) None of these

... The ratio expressed in decimal for weight of the brain to the weight of the mucles is
(a) 0.50 (b) 0.15
(c) 0.20 (d) 0.05

... The ratio expressed in decimal of the weight of the brain to the weight of the lungs is
(a) 1.5 (b) 0.15
(c) 15.0 (d) 5.1
(e) 15.0

Direction (Qs. 21to 25): The figures for a country's Foreign Trade for the years 1990-91 to 1996-97 are given in the following table. Answer these questions on the basis of the information given:

A Country's Foreign Trade
(Rupees in Crores)

Year	Exports	Imports	Trade Deficit
1990-91	6711	12549	5838
1991-92	7806	13608	5802
1992-93	8803	14293	5490
1993-94	9771	15831	6060
1994-95	11855	17173	5318
1995-96	10420	18371	7951
1996-97	12550	20063	7513

... Which of the following showed an increase every year?
(a) Exports (b) Imports
(c) Trade deficit (d) All of these

22. The ratio of imports to exports was maximum in the year
(a) 1990-91 (b) 1996-97
(c) 1995-96 (d) 1992-93

23. The percentage increase in exports was maximum in the year
(a) 1990-91 (b) 1996-97
(c) 1994-95 (d) 1993-94

24. The total trade deficit for the last five years is ?
(a) Rs 28,508 crore (b) Rs. 32,332 crore
(c) Rs. 44,322 crore (d) Rs. 33,232 crore

25. The difference between imports and exports was maximum in the year
(a) 1995-96 (b) 1996-97
(c) 1994-95 (d) 1993-94

Direction (Qs. 26 to 30): Study the following data apropos Indian population movements to answer these questions :

Year	Population in millions	Percentage Decadal Increase
1901	240	–
1911	260	8.33
1921	252	-3.1
1931	290	15.1
1941	330	13.8
1951	390	18.2
1961	460	17.95
1971	700	23.9
1981	870	22.8
1991		24.3

26. The maximum and minimum percentages of decadal increase are

(a) 24.3 and 8.33 (b) 23.9 and –3.1
(c) 22.8 and 15.1 (d) 18.2 and 13.8
(e) None of these

27. The percentage decadal increase is almost the same between the years
(a) 1931-41; 1941-51
(b) 1941-51;1951-61
(c) 1951-61;1961-71
(d) 1961-71; 1971-81
(e) None of these

28. The percentage increase of population in 1971 with population of 1941 as the base year is nearly
(a) 52 (b) 63
(c) 65 (d) 73
(e) 81

29. The ratio of increase in population between 1901 and 1941 to the increase in population between 1951 and 1991 is nearly
(a) 3/10 (b) 4/17
(c) 3/16 (d) 5/21
(e) 1

30. The percentage increase in population over the entire period is nearly ..... times the percentage decadal increase between 1961 and 1971
(a) 9 (b) 11
(c) 10 (d) 12
(e) 7

Solutions

Answer 1 to 5:

1. (e) Required percent $= \frac{152.2}{86.4} \times 100 \approx 175\%$ (Approx).

2. (d) Clearly visible from the table.

3. (c) Average production of pulse
$$= \frac{20.5+22.4+24.6+23.5+27.8+28.2}{6}$$
$$= \frac{147.0}{6} = 24.5 \text{ million tonnes}$$

4. (a) Required percentage $= \frac{32.4}{450} \times 100$
$= 7.2\%$

5. (b) Total production of oilseeds in the give years
$= 42.4 + 46.8 + 52\,4 = 141.6$
Which is equal to the production of whea in 1994-95.

6. (c) Average production for the even perio
$$(1989\text{-}94) = \frac{476}{6} = 79.33 \approx 80$$

7. (d) Answer will be 1993

8. (d) It is clearly visible from the table.

9. (a) 25% of 80 = 20 = production of S's car i 1993

10. (b) Required per cent increase
$$= \frac{90-75}{75} \times 100 = 20\%$$

11. (b) $\frac{179 \times 25}{100} \approx 45$

12. (d) For company V, it is clearly visible from the table.

13. (c) For company III, it is clearly visible from the table.

14. (b)

15. (b) Percentage change in the total amount of investment made in 2000 over 1999
$$= \frac{53}{112} \times 100 = 47.32\%$$

16. (b) 51200 gm = 51 kg 200 gm

17. (b) S = 10000
∴ Weight of Liver = 1700
$$= \frac{S}{10000} \times 1700 = 0.17\,S.$$

18. (c) $\frac{5}{2} = 2.5$

$\frac{1500}{30000} = \frac{1}{20} = .05$

$\frac{1500}{1000} = \frac{3}{2} = 1.5.$

It is clearly visible from the table that import is increasing every year.

The ratio of imports to exports in the year

1990-91 $= \frac{12549}{6711} = 1.87$

1996-97 $= \frac{20063}{12550} = 1.60$

1995-96 $= \frac{18311}{10420} = 1.76$

1992-93 $= \frac{14293}{8803} = 1.62$

Percentage increase in exports in

1996-97 $= \frac{12520 - 10420}{10420}$

$\times 100 = 20.15\%$

1994-95 $= \frac{11855 - 9771}{9771} \times 100 = 21.33\%$

1993-94 $= \frac{9771 - 8803}{8803} \times 100 = 11\%$

24. (b) 5490 + 6060 + 5318 + 7951 + 7513
= Rs. 32332 crore

25. (a) The difference between the imports and export is nothing but trade deficit. It is clearly visible from the table that trade deficit is maximum in the year 1995-96

26. (e) 24.3 and –3.1

27. (b) 18.2 and 17.95

28. (d) $\frac{570 - 330}{330} \times 100 = \frac{240}{330} \times 100$

$= 72.73\% \approx 73\%$

29. (c) $\frac{(330 - 240)}{(870 - 390)} = \frac{90}{480} = \frac{3}{16}$

30. (b) % decadal increase in population between 1961-1971 is 23.9%
% decadal increase over the entire period i.e. between 1901-1991

$\Rightarrow \frac{870 - 240}{240} \times 100 = 262.5\%$

$\Rightarrow \frac{262.5}{23.9} \approx \frac{263}{24} \approx 11$ times

□□□□

Bar Diagrams

Mainly there are six types of Bar Diagrams.

- Simple Bar Diagrams
- Multiple Bar Diagrams
- Compound Bar Diagrams
- Percent Bar Diagrams
- Horizontal Bar Diagrams
- Floating Bar Diagrams etc.

Simple Bar Diagrams

Simple Bar Diagram is similar to graph. Only one set of data can be represented in a simple Bar Diagram. It is different from graph only in an aspect that, in place of points, there are bars which represent values of respective years.

Ex.1

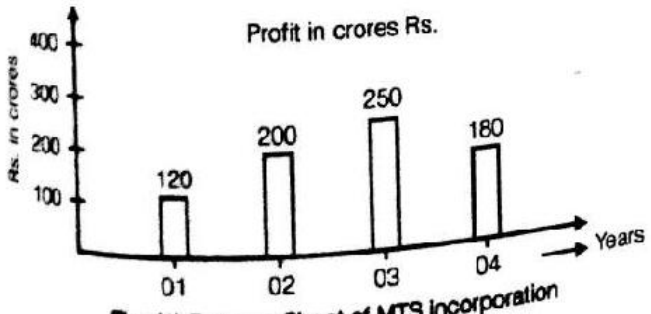


Fig. (1) Balance Sheet of MTS incorporation

Sol.: From the Bar Diagram given in Fig. (1) We can determine following things

1. Percent increment in profit

$$2001-02 \Rightarrow \frac{80}{120}\times 100 = 66.66\%$$

$$2002-03 \Rightarrow \frac{50}{200}\times 100 = 25\%$$

$$2003-04 \Rightarrow \frac{-70}{250}\times 100 = -28\%$$

- Maximum increase in profit was observed in financial year 2001-02.
- Minimum decrease in profit was observed in financial year 2003-04.

2. Average profit $= \frac{120+200+250+180}{4}$

$$= \frac{750}{4} = 187.5 \text{ crore}$$

3. Annual average growth rate

$$= \frac{180-120}{120}\times\frac{100}{3}$$

$$= \frac{60}{120}\times\frac{100}{3} = 16.66\%$$

Multiple Bar Diagrams

In Simple Bar Diagrams only one set of data can be represented. To represent multiple set of data for different years, we use multiple bar diagrams.

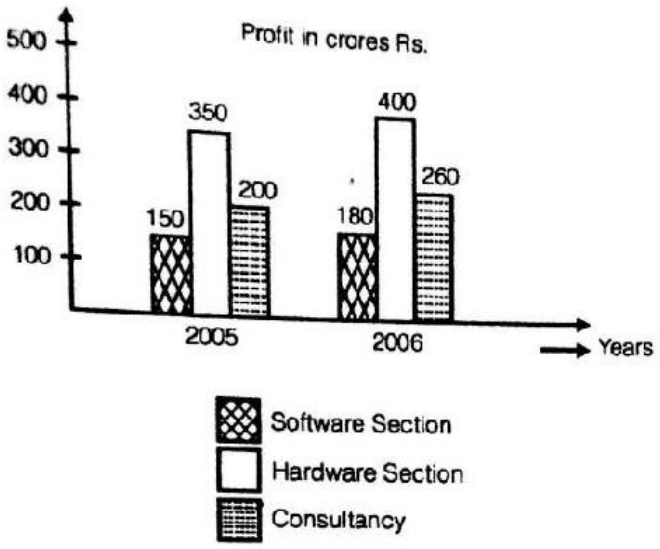


Fig. (2) Balance Sheet of Megha-soft for two financial years 2005 and 2006.

From the multiple bar diagram shown in Fig. (2) we can calculate following things

1. Sectional Growth

(a) Software section 180 – 150 = 30 Cr.

(b) Hardware section 400 – 350 = 50 Cr.

(c) Consultancy 260 – 200 = 60 Cr.

- Highest absolute increase in profit is observed by consultancy section.
- Minimum absolute increase in profit is observed by software section

2. Growth rates in percent terms.

$$\text{Software section} \Rightarrow \frac{180-150}{150}\times 100 = 20\%$$

$$\text{Hardware section} \Rightarrow \frac{400-350}{350}\times 100 = 14.28\%$$

$$\text{Consultancy} \Rightarrow \frac{260-200}{200}\times 100 = 30\%$$

- Minimum growth is observed by Hardware section
- Maximum growth is observed by consultancy section.

3. Growth rate of megha soft for the duration 2005-06.

$$\frac{\text{Profit in 2006} - \text{Profit in 2005}}{\text{Profit in 2005}}\times 100$$

$$\Rightarrow \frac{(180+400+260)-(150+350+200)}{(150+350+200)}\times 100$$

$$\Rightarrow \frac{840-700}{700}\times 100$$

$$= \frac{140\times 100}{700} = 20\%$$

Compound Bar Diagrams

Compound Bar Diagrams are similar to Multiple Bar Diagrams. The only difference between these two Bar Diagrams is that in Compound Bar Diagram a single Bar Diagram is subdivided into different parts, while multiple bars are used in Multiple Bar Diagrams. Compound Bar Diagrams are also known as compound sub-divided Bar Diagrams.

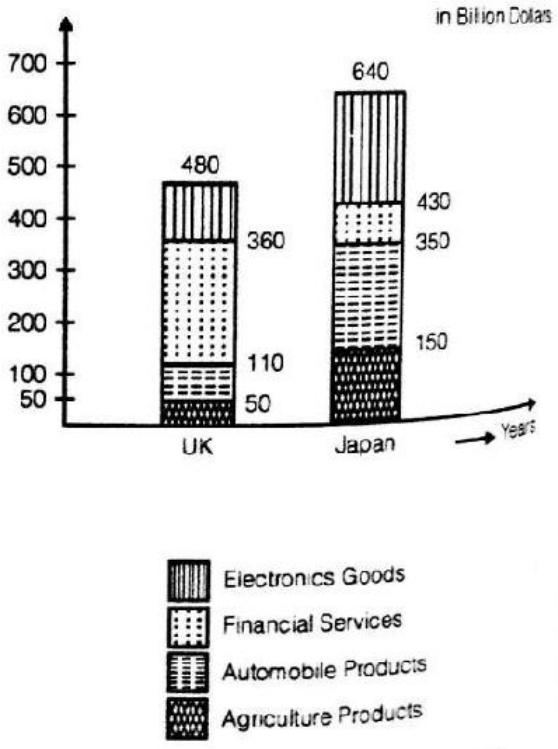


Fig. Export Basket of two countries UK and Japan for year 2005 in $ billion

...the Compound Bar Diagrams we can answer ...wing set of questions.

Ex. 1. Export of Agriculture product of UK is how much percent of export of Automobile product of Japan?

Sol. Export of Agriculture product of UK
= $ 50 billion

Export of Automobile product of Japan
= $ 200 billion

$$= \frac{50}{200} \times 100 = 25\%$$

Ex. 2. Export of Automobile product of Japan is how many times than that of UK.

Sol. Automobile Export of Japan
= $ 200 billion

Automobile Export of UK = $60 billion

$$= \frac{260}{60} = \frac{10}{3} \text{ Ans.}$$

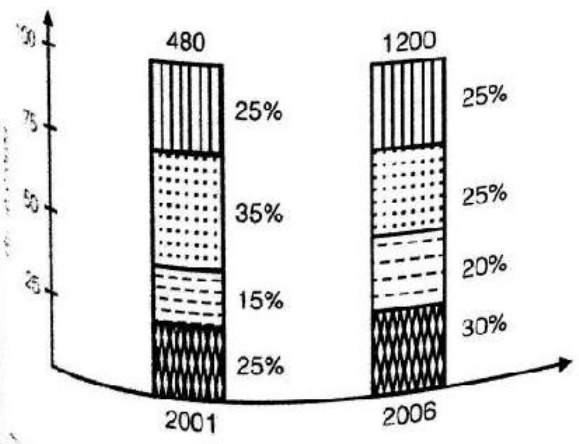
Ex. 3. Total export given in Fig. of Japan is how much percentage higher than that of UK?

Sol. $$= \frac{640 - 480}{480} \times 100$$

$$= \frac{160}{480} \times 100 = 33.33\%$$

Percent Bar Diagrams

Percent Bar Diagram is similar to Compound Bar Diagram. The only difference is that the height of bars are equal and represent hundred percent in percent bar diagram, whereas heights of different bars in compound bar diagrams may or may not be equal.



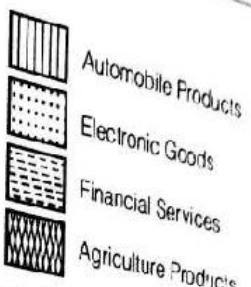


Fig. Export Basket of Japan for financial year 2001 and 2006 in billion dollars.

From the above figure we can calculate following things.

(1) Percent increment in export from Japan for the given duration 2001-06

$$= \frac{1200 - 480}{480} \times 100 = 150\%$$

(2) Export from Japan for financial year 2001 consist of

- $ 120 billion for Automobiles
- $ 158 billion for Electronic Goods
- $72 billion for financial services
- $120 billion for Agriculture product

(3) Export Basket of Japan for financial year 2006 consists of

- $ 300 billions for automobiles
- $ 300 billions for electronic goods
- $ 240 billion for financial services
- $ 360 billion for agriculture product

(4) Export of financial services in year 2006 is how many times than that of export of electronic goods in 2001?

Sol. Export of financial services in 2006 = 240
Export of electronic goods in 2001 = 158

$$\frac{240}{158} = 1.518 \text{ Times approx.}$$

Horizontal Bar Diagrams

Horizontal Bars are similar to simple bar diagrams. The only difference is that in case of horizontal bar, representation is horizontal whereas vertical bars are used for simple bar diagram. Horizontal bar diagram is used in cases when we requires to represent data sets for

comparatively large number of years. All the calculation and observation of both the Bar Diagrams are similar.

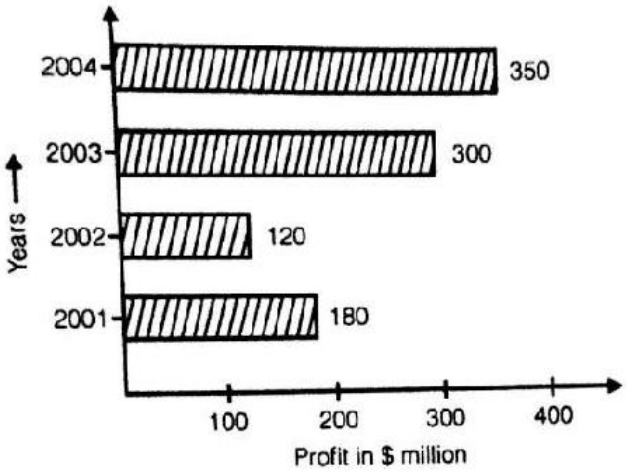


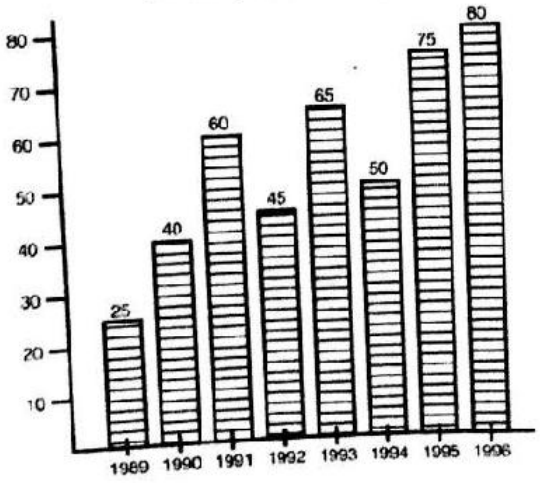
Fig. (5) Profits of Tamasha.com for four consecutive financial year.

□□□□

Practice Exercise: I

Direction (Qs. 1 to 5): Study the following graph carefully and answer the questions given below:

Production of foodgrains by a State over the years (' 000 tons)



1. The average production of 1990 and 1991 was exactly equal to the average production of which of the following pairs of years?
   (a) 1991 and 1992 (b) 1992 and 1994
   (c) 1993 and 1994 (d) 1994 and 1995
   (e) None of these

2. What was the difference in the production of foodgrains between 1991 and 1994?
   (a) 10000 tons (b) 15000 tons
   (c) 500 tons (d) 5000 tons
   (e) None of these

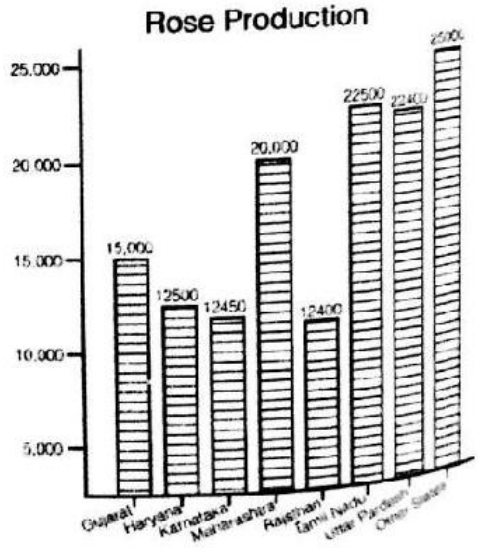
3. In which of the following years was the percentage increase in production from the previous year the maximum among the given years?
   (a) 1991 (b) 1993
   (c) 1995 (d) 1990
   (e) None of these

4. In how many of the given years was the production of foodgrains more than average production of the given years?
   (a) 2 (b) 3
   (c) 4 (d) 1
   (e) None of these

5. What was the percentage drop in the production of foodgrains from 1991 to 1992?
   (a) 15 (b) 20
   (c) 25 (d) 30
   (e) None of these

Direction (Qs. 6 to 10): Study the following graph carefully and answer the questions given below

Rose Production



6. Which of the following state(s) contribute(s) is less than 10 % in the total rose production?
(a) Only Rajasthan
(b) Rajasthan, Karnataka
(c) Rajasthan, Karnataka, Haryana
(d) Rajasthan, Karnataka, Haryana and Gujarat
(e) None of these

7. By what percentage rose production of other States is more than that of the Maharashtra?
(a) 25 (b) 30
(c) 20 (d) 15
(e) None of these

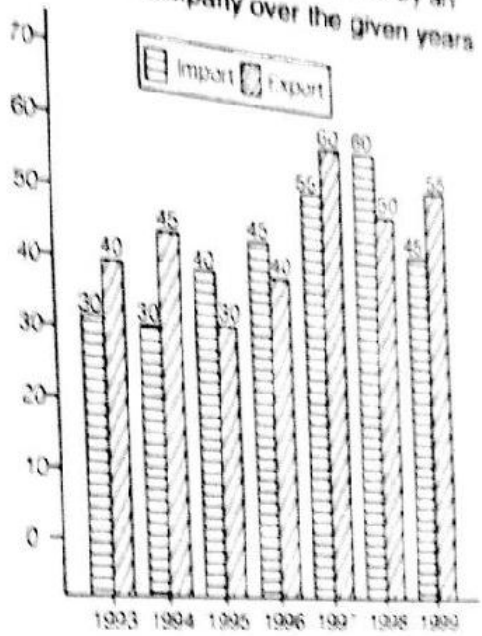
8. What is the approximate average production of roses (in thousands) across all the states?
(a) 21 (b) 20
(c) 19 (d) 18
(e) 17

9. Approximately what percentage of the total rose production is shared by the other States?
(a) 10 (b) 20
(c) 30 (d) 40
(e) 35

10. If total percentage contribution of the States having production of roses below twenty thousand is considered, which of the following statements is true?
(a) It is little above 40%
(b) It is exactly 35%
(c) It is below 35%
(d) It is little below 30%
(e) None of these

Direction (Qs. 11 to 15): Study the following graph carefully and answer the questions given below it.

Import and Export of spare parts by an automobile company over the given years



11. During which year the percentage rise/fall in imports from the previous year is the lowest?
(a) 1994 (b) 1998
(c) 1997 (d) 1995
(e) None of these

12. What is the ratio of total imports to total exports for all the given years together?
(a) 31 : 35 (b) 35 : 31
(c) 65 : 63 (d) 63 : 65
(e) None of these

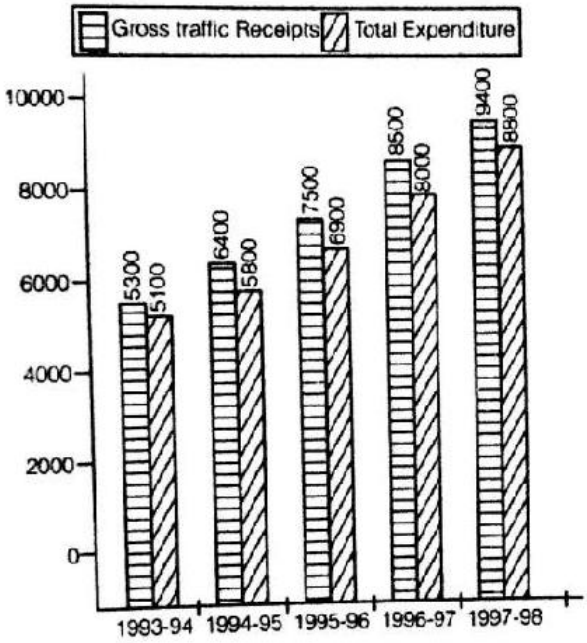
13. In which of the following pairs of years the total import is equal to total export in the same pair of years?
(a) 1996-1997 (b) 1993-1998
(c) 1998-1999 (d) All of these

14. The total exports in the year 1995, 1996 and 1998 together are what per cent of the total import during the same period? (rounded to two decimal places)
(a) 102.41 (b) 102.14
(c) 98.33 (d) 98.67
(e) None of these

15. Which of the following pairs of years and the per cent increase in the export over the previous year is correctly matched?
(a) 1996-14.29 (b) 1997-40
(c) 1995-33.33 (d) 1994-11.11
(e) None of these

Direction (Qs. 16 to 20): These questions are based on the following bar graph. Read the graph and answer the questions

Finances of XYZ Railway



16. What is the percentage increase in the gross traffic receipts in 1995-96 as compared to 1993-94?
(a) 33.9% (b) 41.5%
(c) 20.7% (d) 17%

17. If profit = gross traffic receipts–total expenditure then in 1996-97, what percentage of gross traffic receipts is the profit made?
(a) 5.9% (b) 6.4%
(c) 7.2% (d) 8%

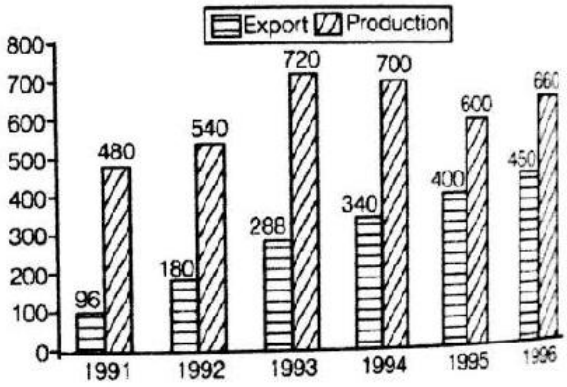
18. In which year was the profit as a percentage of gross traffic receipts the highest?
(a) 1997-98 (b) 1996-97
(c) 1995-96 (d) 1994-95

19. In order to make a profit of 10%, what should have been the gross traffic receipts (in Rs crore) in 1994-95, total expenditure remaining the same?
(a) 5667 (b) 5878
(c) 6444 (d) 7667

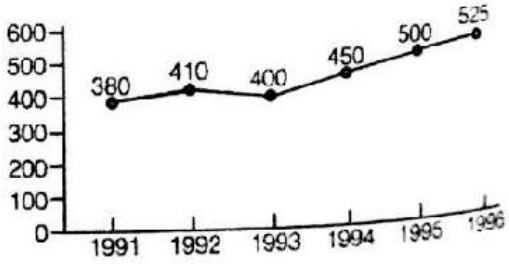
20. By what amount (in Rs. croroe) has the expenditure increased over the period 1993-94 to 1997-98?
(a) 4100 (b) 3900
(c) 3850 (d) 3700

Direction (Qs. 21 to 28): Study the following graph to answer these questions:

Tea in India (in million kg)



Per Capita Availablity in gm



21. Which year shows the maximum percentage of export with respect to production?
(a) 1992 (b) 1993
(c) 1996 (d) 1995

22. The population of India in 1993 was
(a) 800 million (b) 1080 million
(c) 985 million (d) 900 million

1994 was
(a) 97.22 (b) 3
(c) 35 (d) None of these

26. The average proportion of tea exported to the tea production, over the period is
(a) 0.87 (b) 0.47
(c) 0.48 (d) 0.66

27. What is the first half decade's average per capita availability of tea?
(a) 457 gms (b) 535 gms
(c) 446 gms (d) 430 gms

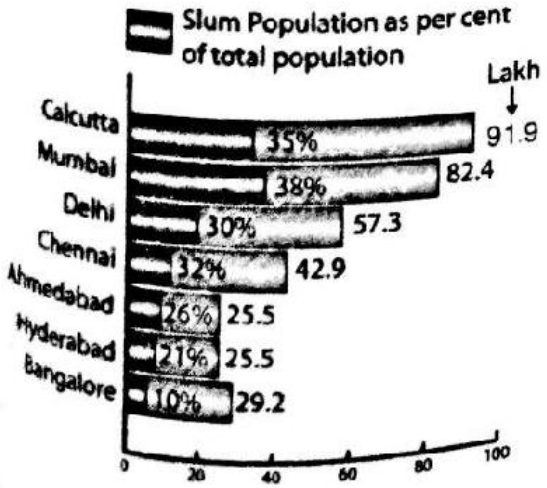
28. In which year was the per capita availability of tea minium?
(a) 1996 (b) 1994
(c) 1991 (d) None of these

29. In which year, there was minimum percentage of export with respect to production?
(a) 1991 (b) 1992
(c) 1993 (d) 1994

30. In which year we had maximum quantity of tea for domestic consumption
(a) 1994 (b) 1991
(c) 1993 (d) 1996

Direction (Qs. 29 to 36): Study the following to answer these questions

Slum Population in Metropolis : 1991



total population of Calcutta in 1991 was approximately
(a) 30 lakh (b) 31 lakh
(c) 32 lakh (d) 33 lakh

30. The difference in the slum population of Bangalore and Hyderabad was
(a) 4.1 lakh (b) 3.71 lakh
(c) 2.43 lakh (d) 2 lakh

31. The city with the highest slum population was
(a) Mumbai (b) Calcutta
(c) Delhi (d) Chennai

32. Two cities with nearly equal slum population were
(a) Ahmedabad and Hyderabad
(b) Delhi and Chennai
(c) Hyderabad and Bangalore
(d) Mumbai and Calcutta

33. The slum population of Delhi was more than 3 times the slum population of
(a) Hyderabad (b) Ahmedabad
(c) Banglore (d) Channai

34. The slum population of all the seven cities nearly equalled the total population of
(a) Calcutta and Banglore
(b) Delhi and Chennai
(c) Delhi and Hyderabad
(d) Mumbai and Ahmedabad

35. The ratio of slum population to total population in Calcutta is ..... times the same ratio in Bangalore
(a) 3 (b) 3.5
(c) 4 (d) 5

36. In terms of slum population, the second city with least population was
(a) Delhi (b) Bargalore
(c) Ahmedabad (d) Hyderabad

□□□□

Solutions

Answer 1 to 5:

1. (e) Average production in 1990 and 1991

$$= \frac{40+60}{2} = 50 \text{ thousand tonnes}$$

2. (a) Required difference
= 60 – 50 = 10,000 tonnes.

3. (d) Percentage increase in production in year 1999 over 1989 is

$$= \frac{15}{25} \times 100 = 60\%$$

4. (c) Average production

$$= \frac{25+40+60+45+65+50+75+80}{8}$$

$$= \frac{440}{8} = 55.$$

Production in
1991 = 60
1993 = 65
1995 = 75
1996 = 80 (' 000 tonnes)

5. (c) Required percentage drop

$$= \frac{60-45}{60} \times 100 = 25\%$$

6. (c) Total rose production
= (15 + 12.5 + 12.45 + 20 + 12.4 + 22.4 + 22.5 + 25) × 1000 = 142250
Percentage production of rose in the States (the lowest four states)

Rajashtan	Karnataka	Haryana	Gujarat
8.71	8.75	8.78	10.54

7. (a) Required percentage

$$= \frac{25-20}{20} \times 100 = 25\% \text{ (more)}$$

8. (d) Total production of rose by all the states
= 142250

$$\therefore \text{Average} = \frac{142250}{8 \times 1000} \approx 18 \text{ thousand}$$

9. (b) Required percentage

$$= \frac{25}{142.25} \times 100 \approx 20\%$$

10. (e) It is 36.8% approximately.

11. (a) Rise/fall of import for year 1994 is zero.

12. (e)

13. (d) Obvious from the chart

14. (e) Total exports in the years 1995, 1996 and 1999 = 35 + 40 + 55 = 130 crore
Total imports in the years 1995, 1996 and 1999 = 40 + 50 + 55 = 135 crore

$$\text{Now required \%} = \frac{130 \times 100}{135} = -96.29\%$$

15. (e)

16. (b) $\frac{7500-5300}{5300} \times 100 = 41.5\%$

17. (a) In year 1996-97, Gross traffic receipt = 8500, total expenditure = 8000.

$$\frac{8500-8000}{8500} \times 100 \approx 5.9\%$$

18. (d)

19. (c) Let Gross traffic receipt be Rs. x

$$\therefore x - x \times 10\% = 5800$$

$$\therefore x = \frac{5800 \times 10}{9} = \text{Rs. } 6444.4$$

20. (d) 8800 – 5100 = 3700.

21. (c) In 1991, $\frac{96}{480} \times 100 = 20\%$

In 1992, $\frac{180}{540} \times 100 = 33\frac{1}{3}\%$

In 1993 $\frac{288}{720} \times 100 = 40\%$

In 1994, $\frac{340}{700} \times 100 = 48.57\%$

In 1995, $\frac{400}{600} \times 100 = 66.66\%$

In 1996, $\frac{450}{660} \times 100 = 68.18\%$

22. (b) 720 – 288 = 432 million = Total availability of tea in 1993

Population of India

$$= \frac{\text{Total availability of Tea}}{\text{Per capita availability of Tea}}$$

$$= \frac{432}{0.4} = 1080 \text{ million.}$$

23. (c)

24. (c) Average tea exported during 1991–1996 = 1754 million kg.

Average tea produced during 1991–1996 = 3700 million kg

$$\therefore \text{ Required ratio} = \frac{1754}{3700} = 0.47.$$

25. (d) Per capita availability of tea from 1991 to 1995

= 380 + 410 + 400 + 450 + 500 = 2140 gm

∴ Average per capita availability

$$= \frac{2140}{5} = 428 \approx 430 \text{ gm.}$$

26. (c) Clearly visible from the graph that it is 380 gm in year 1991.

27. (a) In 199• $\frac{96}{480}$ × 100 = 2•%

28. (c)

In 1991, 480 – 96 = 384 ••• lakh tonnes

In 1993, 720 – 288 = 432 ••• lakh tonnes

In 1994, 700 – 340 = 360 ••• lakh tonnes

In 1996, 660 – 450 = 210 ••• lakh tonnes

29. (c) 35% of 9• 9 = 32.•65 ≈ 32 lakh

30. (c) 21% of 25.5 – 10% of 29.2

= 5.355 – 2.920 = 2.435 lakh

31. (b) Slum Population in

Calcutta = 32.165 lakh

Mumbai = 31.3132 lakh

Delhi = 17.190 lakh

Chennai = 13.728 lakh

Ahmedabad = 6.630 lakh

Hyderabad = 5.355 lakh

Bangalore = 2.920 lakh

32. (d)

33. (a)

34. (d) Total slum population of seven cities put together = 110 lakhs which is approximately equal to population of Mumbai and Ahemadabad put together

35. (b) $\frac{\text{Ratio of Slum population in Calcutta}}{\text{Ratio of Slum population in Bangalore}}$

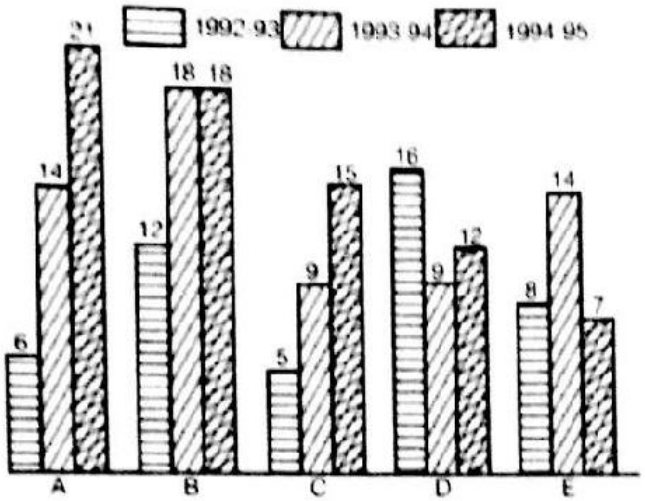
$$= \frac{35}{10} = 3.5$$

36. (d)

□□□□

II Practice Exercise. II

Direction (Qs. 1 to 5): Study the diagram carefully and answer the questions given below it



Cotton production of some states in ,000 tonnes

1. The production of state D in 1993-94 is how many times its production in 1994-95?
   (a) 1.33 (b) 0.75
   (c) 0.56 (d) 1.77

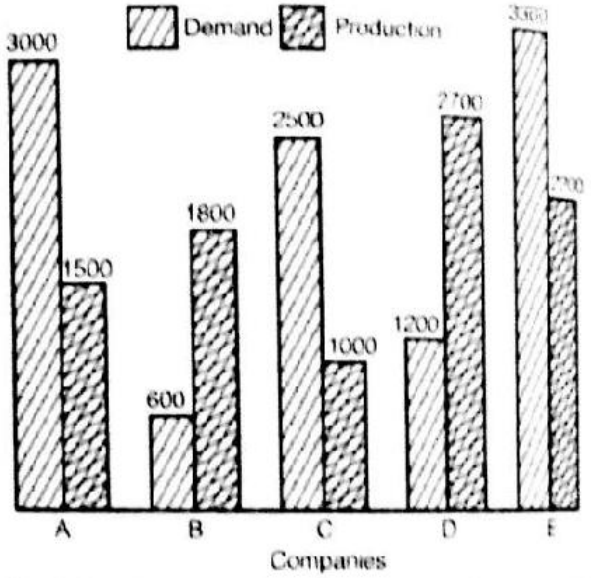
2. In which of the states there is a steady increase in the prodution of cotton during the given period?
   (a) A & B (b) A & E
   (c) B only (d) D & E

3. How many tonnes of cotton was produced by state E during the given period?
   (a) 2900 (b) 29000
   (c) 290000 (d) 29000000

4. How many states showing below average production in 1992-93 showed above average poduction in 1993-94?
   (a) 4 (b) 2
   (c) 3 (d) 1

5. Which of the following statements in false?
   (a) States A and E showed the same production in 1993-94
   (b) There was no improvement in the production of cotton in state B during 1994-95
   (c) State A has produced maximum cotton during the given period
   (d) Production of States C and D together is equal to that of state B during 1993-94

Direction (Qs. 6 to 10): Study the diagram carefully and answer the question given below it



6. What is the ratio of companies having more demand than production to those having more production than demand?
   (a) 2 : 3 (b) 4 : 1
   (c) 2 : 2 (d) 3 : 2

7. What is the difference between average demand and average production of the five ocmpanies taken gotether?
   (a) 1400 (b) 400
   (c) 280 (d) 138

8. The production for comapny D is approximately how many times that of production of company A?
   (a) 1.8 (b) 1.5
   (c) 2.5 (d) 1.11

9. The demand for company B is approximately what percent of the demand for company E?
   (a) 4 (b) 24
   (c) 20 (d) 60

10. If company A desires to meet the demand by purching T.V. sets from a single compnay, which one of the following companies can meet the need adequately?
(a) B (b) C
(c) D (d) None of these

Direction (Qs. 11 to 15): Study the following bar charts (Figs) before answering the questions

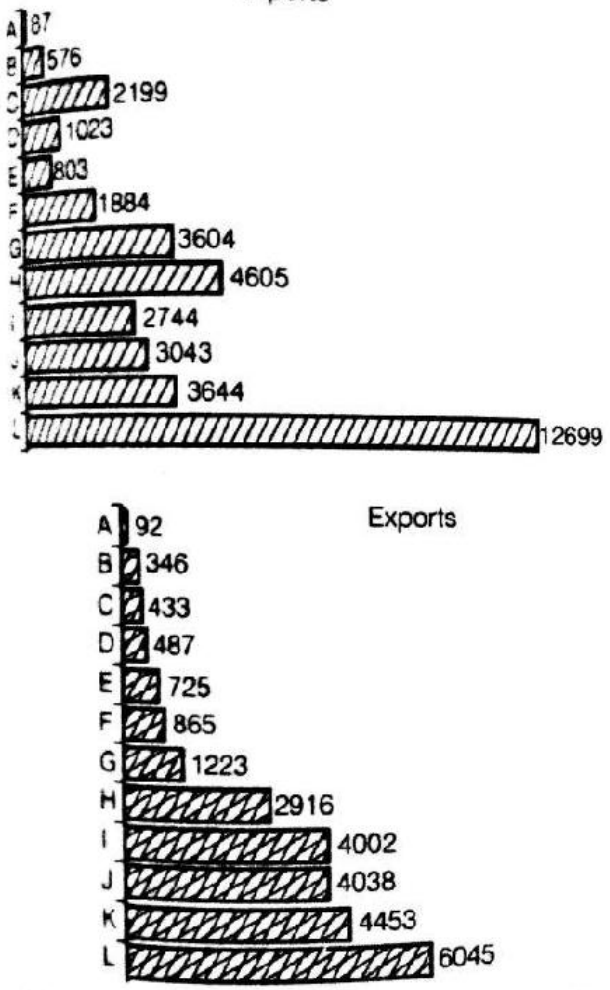


Fig. Foreign Trade by countries for year 1993-94

11. How many countries exhibited a trade surplus?
(a) 5 (b) 4
(c) 3 (d) 6

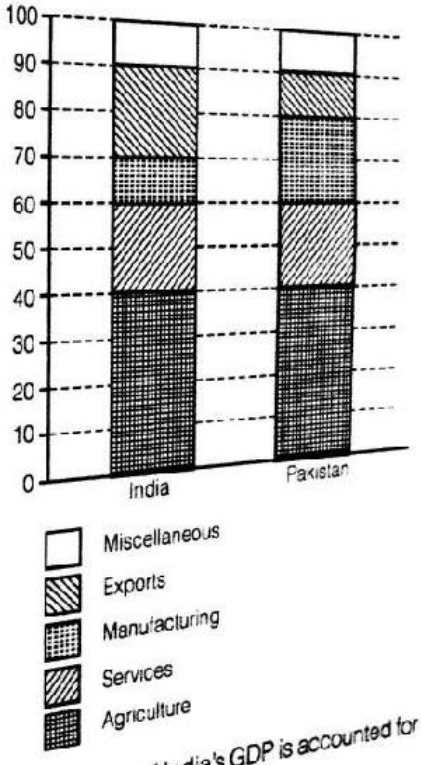
12. The higest trade deficit was shown by which country?
(a) C (b) G
(c) G (d) L

13. The ratio of Exports to Imports was highest for which country?
(a) A (b) I
(c) J (d) K

14. The total trade deficit/surplus for all the countries put together was?
(a) 11286 surplus (b) 11286 deficit
(c) 10286 deficit (d) None of these

15. The ratio of the maximum exports to the minimum imports was closest to:
(a) 64 (b) 69
(c) 74 (d) None of these

Direction (Qs. 16 to 20): Shows the compositions of the GDP of two countries (India and Pakistan)



16. What fraction of India's GDP is accounted for by services?
(a) 6/33 (b) 1/5th
(c) 2/3rd (d) None of these

17. If the total GDP of Pakistan is Rs. 10,000 crore, then the GDP accounted for by Manufacturing is

(a) Rs 200 crore (b) Rs 600 crore
(c) Rs 2,000 crore (d) Rs 6,000 crore

18. If the total GDP of India is Rs 30,000 crores, then the GDP accounted for By Agriculture, Services and Miscellaneous is
(a) Rs. 18,500 crore (b) Rs 18,000 crore
(c) Rs. 21,000 crore (d) Rs. 15,000 crore

19. Which country accounts for higher earning out of Services and Miscelianeous together?
(a) India
(b) Pakistan
(c) Both spend equal amounts
(d) Cannot be determined
(e) None of these

20. If the total GDP is the same for both the countries then what percentage is Pakistan's income through agriculture more than India's income through services?
(a) 100% (b) 200%
(c) 133.33% (d) None of these

Solutions

Answer 1 to 5:

1. (b) $\frac{9}{12} = \frac{3}{4} = 0.75$

2. (b) Clearly, there is a steady increase in the production of cotton duriong the given period in case of states A and C.

3. (b) $(8 + 14 + 7) \times 1000 = 29000$ tonness

4. (b) Average production in 1992-93

$$= \frac{6+12+5+16+8}{5} = 9.4$$

Average production in 1993-94

$$= \frac{14+18+9+9+14}{5} = 12.8$$

In the year 1992-93
State A, C & E showed below average production, out of which only two states i.e. A & E showed production above average in 1993-94.

5. (c) During the given period, state B has produced 48000 tonnes while state A has produced only 41000 lakhs tonnes.
Hence, statement (c) is false

6. (d) The companies having more demand than production are A, C, E. Their number is 3. The companies having more production than demand are B and D. Their number is 2. So required ratio is 3 : 2.

7. (c) Average demand

$$= \left(\frac{3000+600+2500+1200+3300}{5}\right)$$

$= 2120.$
Average production

$$= \left(\frac{1500+1800+1000+2700+2200}{5}\right)$$

$= 1840.$
$\therefore$ Difference in average demand & production = $(2120 - 1840) = 280$.

8. (a) $\frac{2700}{1500} = 1.8$ times

9. (b) $\frac{600}{2500} \times 100 = 24\%$

10. (c) Short fall in A's production
$= 3000 - 1500 = 1500$
This short fall of 1500 can be met by company D because D's excess production is $2700 - 1200 = 1500$.

11. (b) Import – Export = Trade deficit
Export – Import = Trade surplus
Out of a total of 12 countries, 8 showed a deficit while 4 showed a surplus

ually it is clear that L has highest trade ficit.

as a ratio of 4002/2744 = 1.45, which the highest.

um of Import – Sum of Export = Trade eficit which is equal to 11286.

045/87 ≈ 69.48 ≈ 69.

Service accounts for 20%, i.e., 1/5th of he GDP of India

20% of 10000 = 2000 crores

18. (c) (40 + 20 + 10) % of 30,000 = Rs. 21,000 crore.

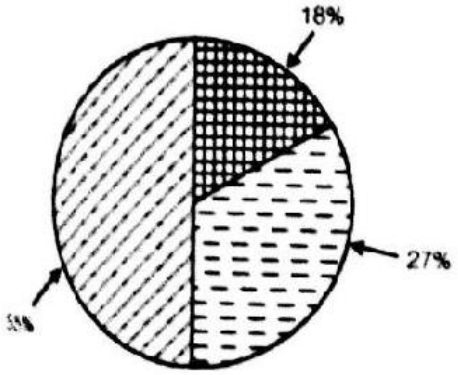
19. (d) Although the percentage on Service and Miscellaneous put together is equal for both the countries, we cannot comment on this since we have no data about the respectivee GDPs of India & Pakistan.

20. (a) Let the GDPs of India and Pakistan be x then Pakistan's income through agriculture = 40% of x = 0.4x.
India's income through service = 20% of x = 0.2x.
0.4x is 100% more than 0.2x.

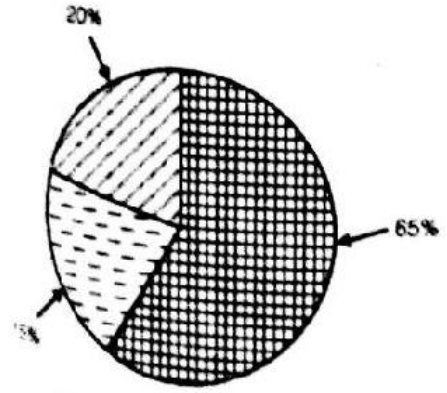
□□□□

Charts are also known as circular charts. It
esents datas in a very simple and lucid form
pial interpretation become easier.
s have a glimpse of Indian Economy through
Charts.

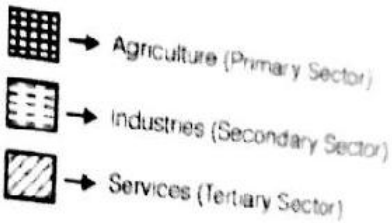
Chart:I



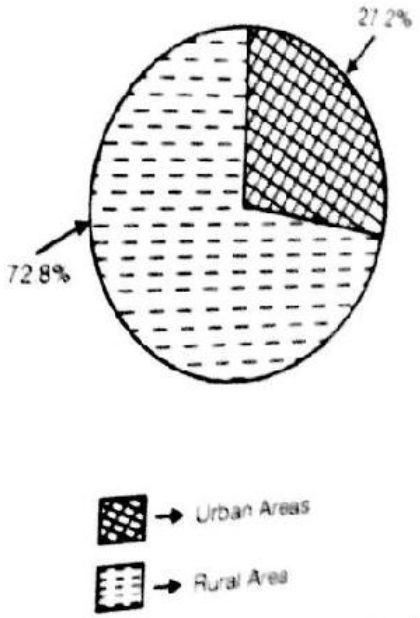
Conbribution to GDP in Indian Economy
(Financial Year 2008-09)



Work force employed in
erence sectors in Indian Economy
(Financial Year 2008-09)

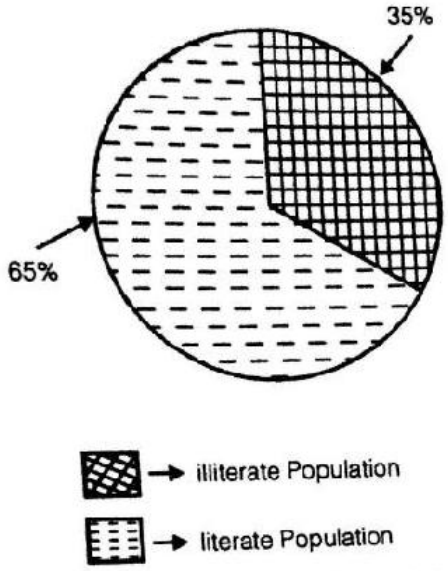


Pie-Chart:II



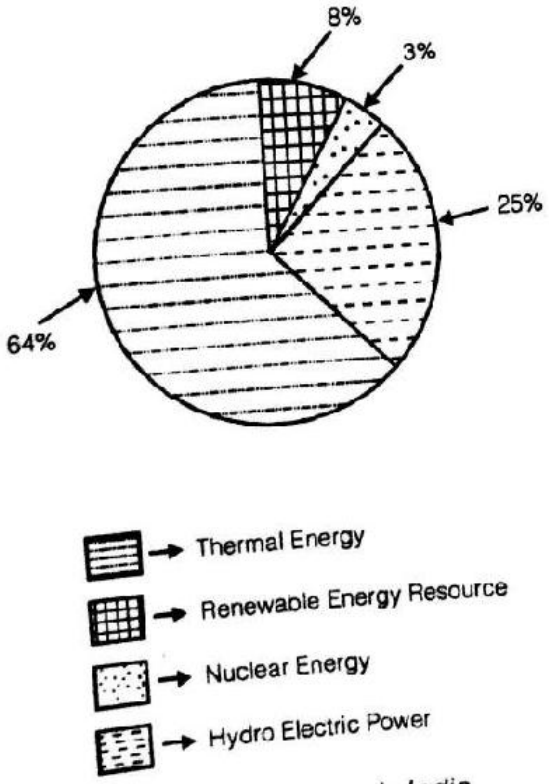
Demographic composition of Indian pop
living in Urban & Rural areas
according to census 2001

Pie-Chart:III



Literacy rates of Indian Population according to census 2001.

Pie-Chart:IV



Source of Power in India (Installed Capacity)

Pie Chart-I

Shows that Indian Economy is basically an agrarian Economy. Though the share of services [Tertiary Sector] is 55% yet number of people employed in this sector is merely 20%. Share of agriculture is merely 18% yet approximately two third of population is still dependent on agriculture to support their livelihood.

Contribution of industries is 27% and approximately 15% people are employed in industries.

Pie Chart-II

It shows that more than 2/3 of our population are living in rural areas. Urban population is still less than 1/3. It need urgent attention to provide facilities of urban amelities in rural areas. Rural development should be given top most priorities. Urban areas should be made more accessible for rural people, so that they can earn better & enjoy healthy life.

Pie Chart-III

Literacy rate is shown in pie chart III. It reveals that even after getting 60 years of independence more than one-third of our population do not know how to read and write, forget about their awareness. We need to devolve more resources & constitutional power to local bodies and state government so that they can increase their efforts to improve literacy rates. Since more than two-third population are living in rural areas education in rural areas need complete overhaul. More financial resources, training of teachers, skill formation and capacity building should be given urgent attention.

Pie Chart-IV

It shows composition of different resources for power generation. We are still dependent much on Thermal Power to fulfil over energy demands. Nuclear energy and renewable resources of energy contributes merely 3% and 8% respectively. The Indo-US nuclear agreement [illegible]

agreement) and nuclear agreements with other countries like France, Russia and Japan etc. can definitely improve the condition. We will be able to generate more nuclear energy in near future. Renewable energy resources like solar energy, wind energy, Geo-thermal energy can definitely contribute more towards our energy security. These are non-exhaustible resources of energy and can fulfil our energy needs for thousands of years.

Pie-Chart

There are two type of Pie Charts

1. Pie-Charts represented in Angular form
2. Pie-Charts represented in Percent form

Conversion

$\because$ 100% = 360°

$\therefore$ 1% = $\frac{360}{100}$ = 3.6°

Similarly

$\because$ 360° = 100%

$\therefore$ 1° = $\frac{100}{360} = \left(\frac{10}{36}\right)°$

Let us have an example on Angular form.

Example-I

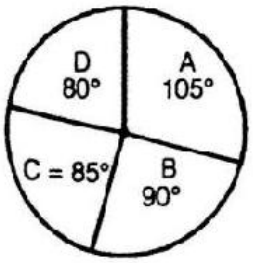


Fig. 5

Sectionwise composition of 720 students in a class in MADE EASY

From fig. 5 we can answer following questions.

1. Students in section A is how many percent more than that in section B?

Sol. Section A = 105°
Section B = 90°

$\Rightarrow \frac{105-90}{90} \times 100$

$\Rightarrow \frac{15}{90} \times 100$

$\Rightarrow$ 16.66% Ans.

2. Students in section A is how many times than that of students in section D?

Sol. Students in A = 105°

Students in D = 80°

$\frac{105}{80} = \frac{21}{16} = 1.3125$ Ans.

3. Difference between studetns in section C and Section D is how many times the difference between students in Section A and B.

Sol. Difference between C & D $\Rightarrow$ 85° − 80° = 5°
Difference between A & B
$\Rightarrow$ 105° − 90° = 15°

$\Rightarrow \frac{[C-D]}{[A-B]} = \frac{5}{15} = \frac{1}{3}$ times Ans.

4. Number of students in All the section
360° = 720 students

1° = $\frac{720}{360}$ = 2 students

Section A = 105° = 210 students
Section B = 90° = 180 students
Section C = 85° = 170 students
Section D = 80° = 160 students

5. Percent composition of students
360° = 100%

1° = $\frac{100}{360}$%

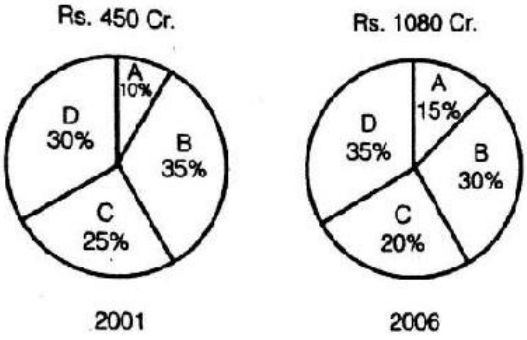
Section A = 105° = $\frac{105 \times 100}{360}$% = 29.167%

Section B = 90° = $\frac{90 \times 100}{360}$ = 25%

$$\text{Section C} = 85° = \frac{85 \times 100}{360} = 23.611\%$$

$$\text{Section D} = 80° = \frac{80 \times 100}{360} = 22.22\%$$

Example-2



Pie-Chart in above figures represent sectional composition of a firm "V.G. com" in financial years 2001 and 2006.

We can have following observations

1. **Sectional composition of the firm in 2001 is**
   Section A = 10% = 45 Cr.
   Section B = 35% = 157.5 Cr.
   Section C = 25% = 112.5 Cr.
   Section D = 30% = 135 Cr.
2. **Sectional Composition of the firm in financial year 2006 is**
   Section A = 15% = 162
   Section B = 30% = 324
   Section C = 20% = 216
   Section D = 35% = 378
3. **Growth Rate**
   Section A :
   45 to 162

$$\Rightarrow \frac{162-45}{45} \times 100 = 260\%$$

   Section B :
   157.5 to 324

$$\Rightarrow \frac{324-157.5}{157.5} \times 100 = 92\%$$

Section C :
112.5 to 216

$$\Rightarrow \frac{216-112.5}{112.5} \times 100 = 105.7\%$$

Section D : 135 to 378

$$\Rightarrow \frac{378-135}{135} \times 100 = 180\%$$

- Highest growth rate for the given duration 2001-2006 is observed by section A.
- Minimum growth rate for the given duration 2001-2006 is observed by section C.

4. **Growth rate for the duration 2001-2006 is**

$$\frac{1080-450}{450} \times 100 = 140\%$$

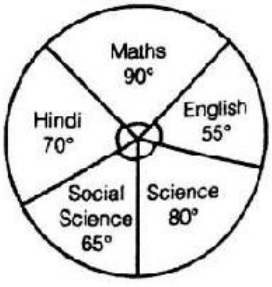
5. **Average Annual Growth rate for duration 2001-2006 is**

$$\frac{1080-450}{450} \times \frac{100}{5} = 28\%$$

□□□□

I Practice Exercise: I

Direction (Qs. 1 to 7): These questions are to be answered on the basic of the following pie chart which gives marks scored by a student in different subjects-English, Hindi, Mathematics, Science and Social Science in an examination. Assuming that the total marks obtained for the examination are 540 answer the following questions:



1. The marks scored by the student in Hindi and Mathematics exceed the marks scored in English and Social Science by
   (a) 60 (b) 75
   (c) 40 (d) 30

2. The subject in which the student scored 22.2% marks is
   (a) Hindi (b) Science
   (c) Social Science (d) English

3. The subject in which the student scored 105 marks is
   (a) Mathematics (b) Hindi
   (c) Science (d) Maths

4. The marks obtained in the three subjects : English, Science and Social Science are what percentage of the total?
   (a) 45% (b) $44\frac{4}{9}\%$
   (c) 55% (d) $55\frac{5}{9}\%$

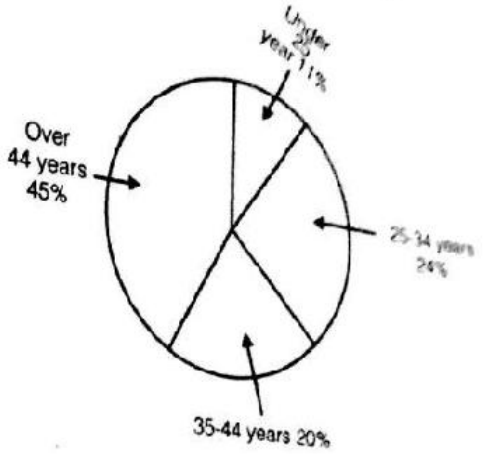
5. The marks obtained in Mathematics are what percentage of the total marks?
   (a) 20% (b) 30%
   (c) 35% (d) 25%

6. The difference of marks between English and Social Science is the same as between
   (a) Science and Hindi
   (b) Hindi and Social Science
   (c) English and Hindi
   (d) Social Science and Science

7. The aggregate marks obtained by the students averaged over the 5 subjects is
   (a) 72 (b) 108
   (c) 90 (d) 75

Direction (Qs. 8 to 12): Use the following chart to answer these questions on the age-wise distribution of personal income of a country in the year 2002.

Rs. 2499.4 Billions = 100%



8. In 2002, what was the approximate personal income, in billions of rupees, of the age-group 35-44 years?
   (a) 500 (b) 600
   (c) 1125 (d) None of these

9. About how many degrees are there in the central angle devoted to the personal income of the age group 35-44
   (a) 20 (b) 40
   (c) 72 (d) None of these

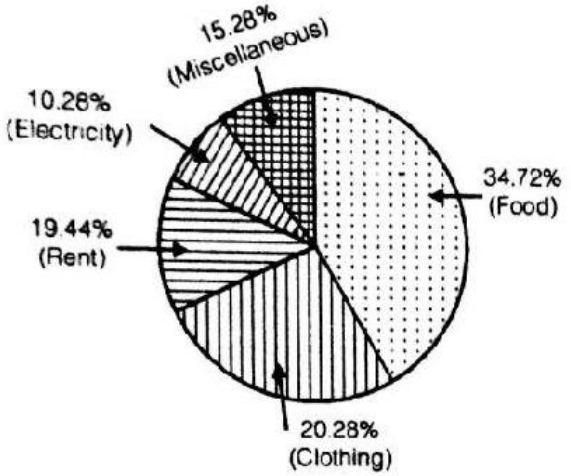
10. What is the ratio of the personal income of the age group 25-34 to that of the age-group 35-44?
    (a) 9 : 4 (b) 5 : 6
    (c) 8 : 15 (d) None of these

11. If the total income in 2002 was 20 percent greater than it was in 2000, then what was the approximate total personal income in 2000 (in billions of rupees)?
    (a) 2200 (b) 2100
    (c) 2000 (d) None of these

12. If the total income in the year 2007 is projected to be one-and-a-half time of its current size, then what is the assumed annual compound rate of growth in income (in percent)?

(a) 20
(c) 15
(b) 25
(d) None of these

Direction (Qs. 13 to 17): These question are based on the following pie chart showing percentage of money spend on household items by a representative family :



13. The ratio between the money spent on Rent and Food is
(a) 1 : 2
(b) 7 : 5
(c) 14 : 25
(d) None of these

14. If the income of a family is Rs. 12000 p.m. then the difference between the expenditure (in rupees) on Clothing and Electricity is nearly
(a) 8700
(b) 4400
(c) 3300
(d) None of these

15. If the income of a family is Rs. 20,000 p.m. then the ratio of the expenditure on Rent and Miscellaneous items is
(a) 3 : 2
(b) 7 : 5
(c) 7 : 6
(d) None of these

16. If the income of a family increase by Rs. 1000 p.m., then the, amount spent (in rupees) on Electricity should increase by nearly
(a) 100
(b) 200
(c) 300
(d) None of these

17. If the income of a family is Rs. 8000 p.m., then the approximate difference of the expenditure on Electricity and Miscellaneous items is (in percent)
(a) 18
(b) 12
(c) 5
(d) None of these

Direction (Qs. 18 to 22): Study the following information to answer the given questions.
Percentage of students in various courses (A,B,C,D,E,F) in the pie chart-I and percentage of girls in pie Chart-II
Total students : 1200
(800 girls + 400 boys)

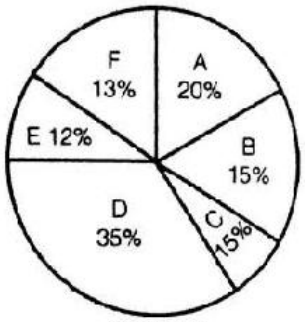


Chart-I

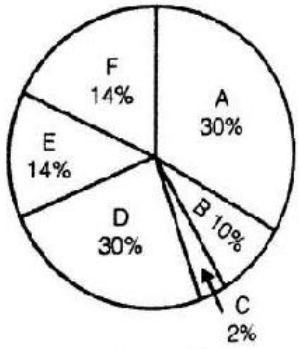


Chart-II

18. For course D, what is the respectively ratio of boys and girls?
(a) 3 : 4
(b) 4 : 5
(c) 3 : 5
(d) 5 : 6
(e) None of these

19. For which pair of course is the number of boys the same?
(a) E and F
(b) A and D
(c) C and F
(d) B and D

20. For course E, the number of girls is how much per cent more than the number of boys for course E?

(a) 5 : 2
(c) 4 : 5
(b) 2 : 5
(d) 5 : 4

26. Graph shows that the maximum amount was spent on
(a) Food
(c) Clothing
(b) Housing
(d) Others

27. If the total expenditure of the family for the year 1999 was Rs. 46000, the family saved during the year
(a) Rs. 1500
(c) Rs. 6900
(b) Rs. 5000
(d) Rs. 306 approx

Solutions

Answer 1 to 5:

1. (a) Marks scored in Hindi and Maths

$$= \frac{160}{360} \times 540 = 240$$

Marks scored in English and Social Science

$$= \frac{120}{360} \times 540 = 180$$

$240 - 180 = 60$

2. (b) $100\% = 360°$

$$22.2\% = \frac{360}{100} \times 22.2 = 79.92° \approx 80°$$

3. (b) $540 = 360°$

$$105 = \frac{360}{540} \times 105 = 70°$$

$70°$ is shown here for Hindi.

4. (d) English + Science + Social Science
$55° + 80° + 65° = 200°$
$360° = 100\%$

$$200° = \frac{100}{360} \times 200 = 55\frac{5}{9}\%$$

5. (d) Maths $= 90°$

$$90° = 90 \times \frac{100}{360} = 25\%$$

6. (a) Difference in English and Social Science
$= 65 - 55 = 10°$.
It is same as that of difference between Science and Hindi.

7. (b)

$$\text{Average} = \frac{360°}{5} = 72°$$

$360° = 540$

$$72° = \frac{540}{360} \times 72 = 108$$

8. (a) 20% of 2499.4 billions

$$= \frac{2499.4}{5} = 499.88 = 500 \text{ billion.}$$

9. (c) 35-44 years = 20%

$$20\% = 20 \times \frac{360}{100} = 72°$$

10. (d) $\frac{24}{20} = 6:5$ is the required ratio.

11. (b) Total personal income in 2002 = 2499.4 billion

Total personal income in 2000 = x, say

$\therefore \quad x + 20\%$ of $x = 2499.4$

$$\Rightarrow x = \frac{5}{6} \times 2499.4 = 2082.83 \approx 2100.$$

12. (d) Total income project in the year 2007 = 150, when the income in the year 2002 was 100. First of all we will determine Average Annual Growth Rate, which is

$$\frac{50}{100} \times \frac{100}{5} = 10\%$$

Compound rate of growth will be ≤ 10

Note: For same growth Annual Compound Grwoth Rate will be less than or equal to Average Annual Rate of Growth.

13. (c) Ratio between the money spent on rent and food

$$= \frac{19.44}{34.72} = \frac{1944}{3472} = \frac{14}{25}.$$

14. (d) In% term difference between expenditure on clothing and expenditure on electricity = 20.28 – 10.28 = 10%

$\Rightarrow$ 10% of 12000 = 1200.

15. (d) Required ratio = $\frac{19.44}{15.28} = 1.27$,

Whatever the family income may be

16. (a) Amount on electricity will increase by Rs. 102.80 ≈ Rs. 100.

17. (c) Required difference will be 15.28% – 10.28% = 5%, whatever the family income may be

18. (a) Total no. of students for course D = 35% of 1200 = 420

No. of girl students for course D = 30% of 800 = 240

No. of boy students for course D = 420 – 240 = 180

Reqd. ratio = 180 : 240 = 3 : 4

19. (c) No. of boys of difference course are

A = 0; B = 100; C = 44; D = 180; E = 32, F = 44. Clearly for courses C & F number of boys are same.

20. (a) No. of girls for course E = 14% of 800 = 112

No. of boys for course E = 32

$$\text{Required \%} = \frac{112-32}{32} \times 100 = 250\%$$

21. (d) Number of boys in course A is 0.

22. (b) No. of girls in courese C = 2% of 800 = 16

23. (b) 23% of 46000 = Rs. 10580

24. (a) Spending on clothing & Housing

= 10 + 15 = 25%,

25% of 46000 = Rs. 11500

25. (d) Required ratio = 15 : 12 = 5 : 4

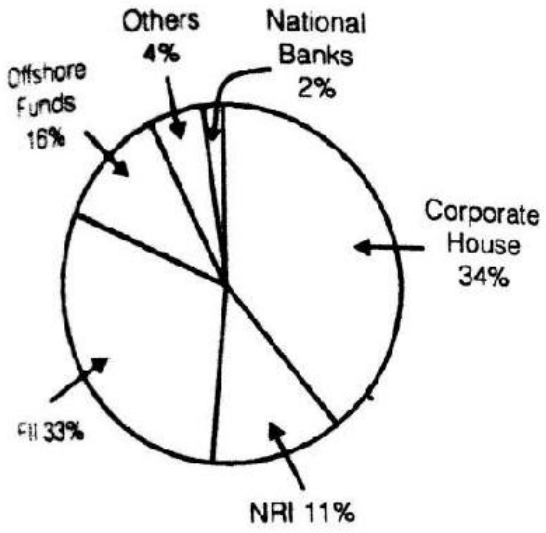
26. (a) 23% was spent on food.

27. (c) 15% of 46000 = Rs. 6900

□□□□

II Practice Exercise: II

Direction (Qs. 1 to 7): The following pie chart shows the amount of subscription generated for the India Bonds from different categories of investors.



1. If the investments by NRI's are Rs. 4,000 crore, then the investment by corporate houses and FIIs together is:
   (a) 24,000 crore (b) 24,363 crore
   (c) 25,423.4 crore (d) 25,643.3 crore

2. What percentage of the total investment is coming from either FIIs or NRIs?
   (a) 33% (b) 11%
   (c) 44% (d) 22%

3. If the total investment other than by FII and corporate house is Rs. 335,000 crore, then the investment by NRIs and Offshore funds will be (approximately) :
   (a) 274, 100
   (b) 285, 600
   (c) 293, 000
   (d) Cannot be determined

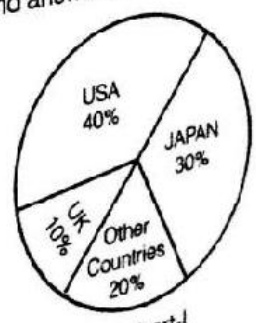
4. What is the approximate ratio of investment flows into India Bonds from NRIs to corporate houses?
   (a) 1 : 4
   (b) 1 : 3
   (c) 3 : 1
   (d) Cannot be determined

5. In the corporate sector, approximately how many degrees should be there in the central angle?
   (a) 120 (b) 121
   (c) 122 (d) 123

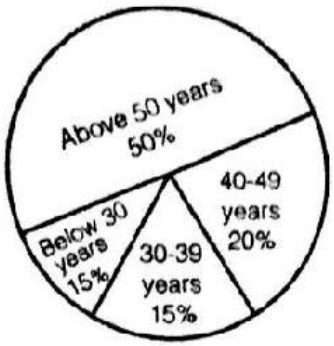
6. If the total investment flows from FIIS were to be doubled in the next year the investment flows from all other sources had remained constant at their existing levels for this year, then what would be the proportion of FII investment in the total investment flows into India Bonds in the next year? (Approximately)
   (a) 40% (b) 50%
   (c) 60% (d) 70%

7. If the inflow from the FIIs after the doubling (Of Question 6) where to the tune of US$ 500 million what would be the total investment into India Bonds next year (in US$ millions)
   (a) 1000
   (b) 1500
   (c) 800
   (d) Cannot be determined

Direction (Qs. 8 to 13): Pie-chart-I and Pie-chart-II exhibit the distribution of the overseas tourist traffic from India. The two charts show the tourist distribution by country and the age wise traffic of the tourist respectively. Study the charts carefully and answer the question which flow.



Pie-chart-I



Pie-chart-II

8. What percentage of the India tourist went to either USA or UK?
   (a) 40% (b) 50%
   (c) 60%1125 (d) 70%

9. The ratio of the number of Indian tourists that went to USA to the number of Indian tourists who were below 30 years of age is
   (a) 2 : 1
   (b) 8 : 3
   (c) 3 : 8
   (d) Cannot be determined

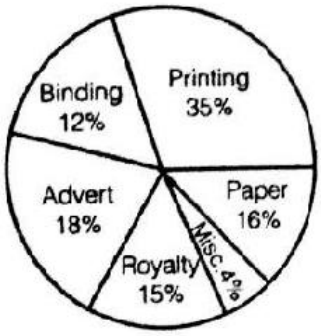
10. If amongst other countries, Switzerland accounted for 25% of the Indian tourist traffic, and it is known from official Swiss records that a total of 25 lakh Indian tourist had gone to Switzerland during the year, then find the number of 30-39 years-old Indian tourists who went abroad in that year
    (a) 18.75 lakh (b) 25 lakh
    (c) 50 lakh (d) 75 lakh

11. For Question 10, what was the volume of traffic of Indian tourists in the US?
    (a) 150 lakh (b) 125 lakh
    (c) 200 lakh (d) None of these

12. For Questions 10 and 11, what can be inferred about the number of 50 + year-old who visited UK during the year?
    (a) At least 25 lakh
    (b) Exactly 25 lakh
    (c) At least 10 lakh
    (d) Cannot be determined

13. Solve question 12 assuming that the a distribution of overseas Indian tourists a uniform for all the countries
    (a) At least 25 lakh
    (b) Exactly 25 lakh
    (c) At least 10 lakh
    (d) Cannot be determined

Direction (Qs. 14 to 18): Pie Chart given bel shows the expenditure incurred in bringing ou book by a publisher



Study the graph carefully and answer t questions given below

14. What is the central angle of the sector for t cost of the paper?
    (a) 22.5° (b) 16°
    (c) 54.8° (d) 57.6°

15. If the cost of printing is Rs. 17500, t royalty is
    (a) Rs. 8750 (b) Rs. 7500
    (c) Rs. 3150 (d) Rs. 6300

16. If the miscellaneous charges are Rs 90 the advertisement charges are
    (a) Rs. 13500 (b) Rs. 20000
    (c) Rs. 40500 (d) Rs. 1800

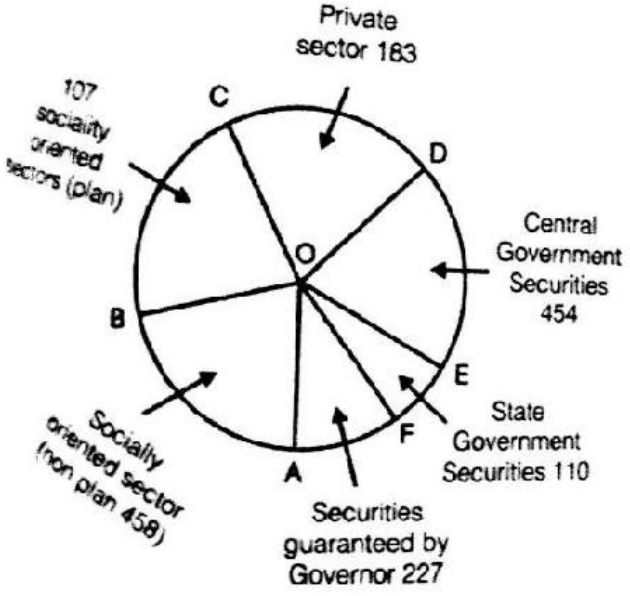
17. If 5500 copies are published a miscellaneous expenditure on them amo to Rs. 5544 and the publisher earns a pr of 25%, then marked price of each copy

(a) Rs. 25.20 (b) Rs. 37.50
(c) Rs. 31.50 (d) Rs. 30

18. Royalty on the book is less than the advertisement charges by

(a) 3% (b) $16\frac{2}{3}\%$
(c) 20% (d) None of these

Direction (Qs. 19 to 23): The gross investment of Life Insurance Corporation of India (in crores of rupees) in different sectors are shown in the pie chart given below :



On the basic of the above information answer the following questions.

19. The percentage of gross investment in States Government Securities is nearly
(a) 7.1% (b) 7.8%
(c) 8.6% (d) 9.2%

20. The magnitude of ∠AOC is nearly
(a) 103° (b) 132°
(c) 126° (d) 115°

21. The investment in socially oriented sectors (plan and non plan) is ..... than the investment in Government securities (Central and State) by
(a) More, 4 crore (b) More, 1 crore
(c) More, 111 crore (d) Less, 106 crore

22. The investment in private sectors is nearly percent higher than the investment in State Government Securities?
(a) 66 (b) 54
(c) 46 (d) 40

23. The ratio of the area of the circle above OF to the area of the circle below it is, nearly
(a) 1 (b) 0.966
(c) 0.94 (d) 0.92

Solutions

Answer 1 to 5 :

1. (b) $(67/11) \times 4000 = 24363.6$

2. (c) $33 + 11 = 44$

3. (a) Investment other than NRI and corporate houses is 33% = 335000. Also investment by offshore funds and NRIs is equal to 27%. Hence, $27 \times 335000/33 = 274,100$

4. (b) 11 : 34 is approximately equal to 1 : 3

5. (c) $34 \times 3.6 = 122.4$ (since 1% = 3.6 degrees)

6. (b) FIIs currently account for 33 out of 100. If their value is doubled and all other investments are kept constant then their new value would be 66 out of 133 → approximately equal to 50%

7. (a) 500 million would be approximately 50% of the total investment. Then 1000 million will be the total investment.

8. (b) 40 + 10 = 50% (from the first chart)

9. (b) 40 : 15 = 8 : 3

10. (d) Let total Indian tourist traffic be x. Then $20\% = 0.2x$ is from other countries. It is given that 25% of $0.2x = 0.05x = 25$ Lakhs.
⇒ x = 500 lakhs

30-39 years = 15% of x
= 15% of 500 Lakhs = 75 Lakhs

11. (c) US accounts for 40% of 500 Lakhs = 200 Lakhs.

12. (d) Nothing can be said about the age break-up of the Indian tourists who have gone to any destination. Hence, cannot be determined.

13. (b) If the age distribution is uniform, then 50 + year-olds who went to UK., i.e., 25 lakh based on Swetzerland's value from question 10.

14. (d) Central angle for the cost of the paper

$$= \left(\frac{16}{100}\times 360\right)^\circ = 57.6^\circ.$$

15. (b) 35% = 17500

$$1\% = \frac{17500}{35} = 500$$

Royalty = 15% = 15 × 500 = Rs. 7500

16. (c) 4% = 9000

$$1\% = \frac{9000}{4}$$

Then avertisement charge

$$18\% = \frac{9000}{4}\times 18 = \text{Rs. } 40500$$

17. (c) 4% = 5544

$$100\% = \frac{5544\times 100}{4} = 138600$$

$$\Rightarrow \text{Expenditure per copy} = \frac{138600}{5500} = \text{Rs. } 25$$

MRP when 25% profit is incurred
25 + 6.25 = Rs. 31.25

18. (b) Let royalty be Rs. 15. Then, advertistment charges = Rs. 18.

$$\therefore \text{Required percentage} = \left(\frac{3}{18}\times 100\right)\%$$

$$= 16\frac{2}{3}\%$$

19. (a) Total investment = (458 + 107 + 183 + 454 + 110 + 227) crores = 1539 crores

$$\therefore \text{Required percentage} = \left(\frac{110}{1539}\times 100\right)\%$$

= 7.1%

20. (b) $\angle AOC = \left[\frac{(458+107)\text{ crores}}{1539\text{ crores}}\right]$

$$= \left(\frac{565}{1539}\times 360\right) = 132.16^\circ$$

Investment in government securities (central and state) = 454 + 110 = 464 crores

21. (b) Investment in socially oriented sectors = (458 + 107) crores = 565 crores.
∴ Investment in socially oriented sectors is more than investment in Government securities by 1 crore.

22. (a) Investment in Private Sector = 183 crores
Investment in State Government Securities = 110 crores.

$$\therefore \text{Required excess} = \left(\frac{73}{110}\times 100\right)\%$$

= 66%

23. (c) Required Ratio

$$= \frac{(183+454+110)}{107+458+227} = \frac{747}{792}$$

$$\Rightarrow \frac{83}{88} = 0.943$$

□□□□

Puzzles

A puzzle is a problem on enigma that tests the ingenuity of the solver. In a basic puzzle one is intended to piece together objects (puzzles pieces) in a logical way in order to come up with the desired shape, picture or solution.

Solutions to puzzles may require recognizing patterns and creating a particular order. People with a high inductive reasoning aptitude may be better at solving these puzzles than others.

Types of Puzzles

The large number of puzzles that have been created can be divided into various categories for example logical puzzle using chess board. Other categories include

- Mathematical problem such as the missing square puzzle
- Picture puzzle
- Connect the dots
- Logical puzzle like Sudoko.
- Spot the difference etc.

Let have a glimpse of different types of puzzles

Numbers

Ex 1 In a ten digit number first digit represent number of one present in the number. Second digit represent number of two present in the number. Similarly, third digit represent number of three present in the number and so on till ninth digit. which represent number of nine present in the number. Last digit represent number of zero present in the number. Find that number.

Sol.: Let the ten digit number be

a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_0

The smallest possible ten digit number is 1,00,00,00,000

We will go on modifying this number, since last digit represent number of zeros it should be 9.

1st step : 1,00,00,00,009.

Since we have only 8 zeros last digit should be 8.

IInd step : 1,00,00,00,008

Since number of "8" present in the above case is one the next modification will be.

IIIrd step : 1,00,00,00,108

Here number of zeros are only seven so

IVth step : 1,00,00,00,107.

Here, since the number of "7" present is one so next modification will be

Vth step : 1,00,00,01,007.

Here, since number of "1" present is two so the next modification will be

VIth step : 2,00,00,01,007
Number of "2" present is be one so next modification will be
VIIth step : 2,10,00,01,007
Here, since number of zeros present is six so next modification will be
VIIIth step : 2,10,00,01,006.
Here, since number of "6" present is 1 so next modification will be
IXth step : 2,10,00,10,006.
This number 2,10,00,10,006 satisfy all the condition so this is the desired number.

Triangles

Ex.2 Find out the total number of triangles in the given figure.

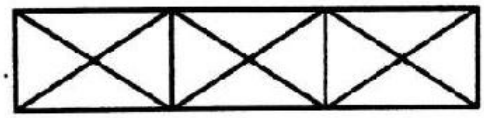


Fig. (1)

Sol. First of all we will count single triangle.
Number of single triangle = 12

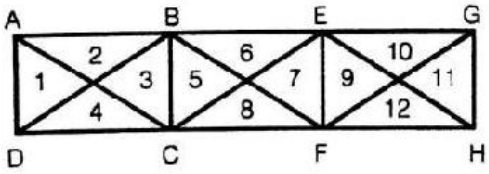


Fig. (2)

Now, we will count triangle made by joining two triangles for example in the below given fig. (3) we have 4 triangles made by joining two single triangles.

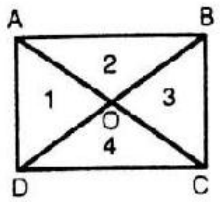


Fig. (3)

$\Delta ADB = \Delta 1 + \Delta 2$
$\Delta ADC = \Delta 1 + \Delta 2$
$\Delta BDC = \Delta 3 + \Delta 4$
$\Delta ABC = \Delta 2 + \Delta 3$

So in the given fig. (2) we will have 12 su
"double triangles.
Now, we will count number of triangles made
joining four tirnalges.

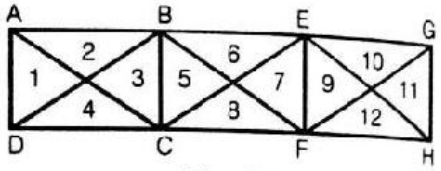


Fig. (4)

$\Delta ACE = \Delta 2 + \Delta 3 + \Delta 5 + \Delta 6$
$\Delta DBF = \Delta 4 + \Delta 3 + \Delta 5 + \Delta 8$
$\Delta CEH = \Delta 8 + \Delta 7 + \Delta 9 + \Delta 12$
$\Delta BFG = \Delta 6 + \Delta 7 + \Delta 9 + \Delta 10$
So we have
12 "Single triangle"
12 "Double triangle" and
4 "Four triangle"
$\Rightarrow$ 28 triangles Ans.

Ex.3 Find number of triangles present in give
Fig. (5).

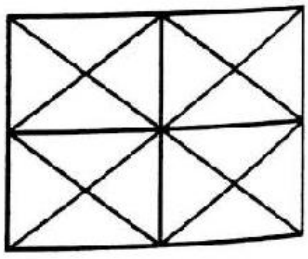


Fig. (5)

Sol. Number of "Single triangles" present
the Fig. (6) are 16.

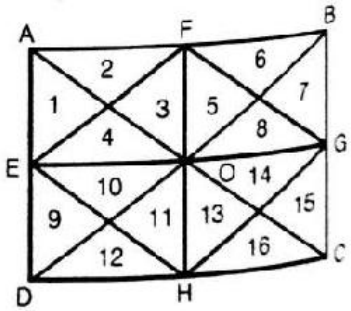


Fig. (6)

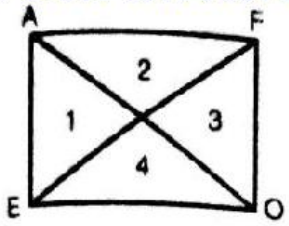


Fig. (7)

Now, we will find number of double triangles in Fig. (7) which is equal to 4 i.e.

$\Delta AFE = \Delta 1 + \Delta 2$

$\Delta AFO = \Delta 2 + \Delta 3$

$\Delta FOE = \Delta 3 + \Delta 4$

$\Delta AEO = \Delta 1 + \Delta 4$

So total "double triangle" in fig. (6) are 16."

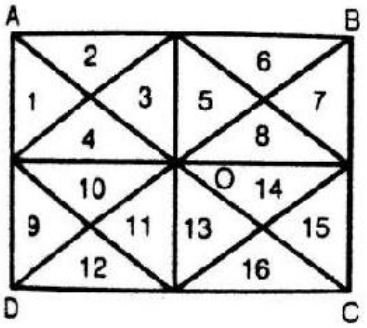


Fig. (8)

Number of "Four triangle" will be 4.

$\Delta AOD = \Delta 1 + \Delta 4 + \Delta 10 + \Delta 9$

$\Delta AOB = \Delta 2 + \Delta 3 + \Delta 5 + \Delta 6$

$\Delta BOC = \Delta 7 + \Delta 8 + \Delta 14 + \Delta 15$

$\Delta DOC = \Delta 12 + \Delta 11 + \Delta 13 + \Delta 16$

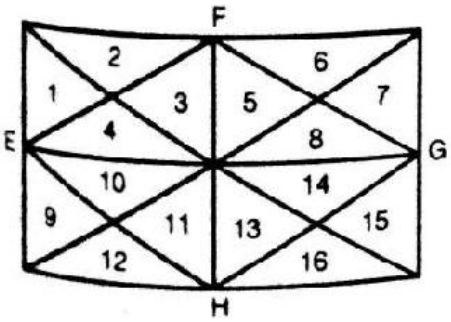


Fig. (9)

Number of "Four triangle" will be 4

$\Delta EFH = \Delta 3 + \Delta 4 + \Delta 10 + \Delta 11$

$\Delta EFG = \Delta 4 + \Delta 3 + \Delta 5 + \Delta 8$

$\Delta FGH = \Delta 5 + \Delta 8 + \Delta 14 + \Delta 13$

$\Delta EHG = \Delta 10 + \Delta 11 + \Delta 13 + \Delta 14$

In fig. (9) Number of "Eight Triangles" will be 4

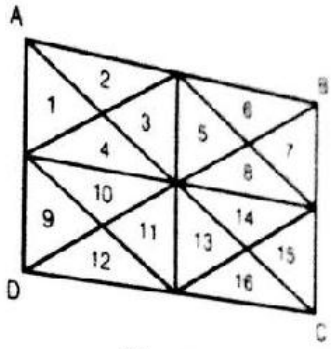


Fig. (10)

$\Delta ABC = \Delta 2 + \Delta 3 + \Delta 5 + \Delta 6 + \Delta 7 + \Delta 8 + \Delta 14 + \Delta 15$

$\Delta BCD = \Delta 7 + \Delta 8 + \Delta 14 + \Delta 15 + \Delta 16 + \Delta 13 + \Delta 11 + \Delta 12$

$\Delta ADC = \Delta 1 + \Delta 4 + \Delta 9 + \Delta 10 + \Delta 11 + \Delta 12 + \Delta 13 + \Delta 16$

$\Delta ADB = \Delta 1 + \Delta 2 + \Delta 3 + \Delta 4 + \Delta 5 + \Delta 6 + \Delta 9 + \Delta 10$

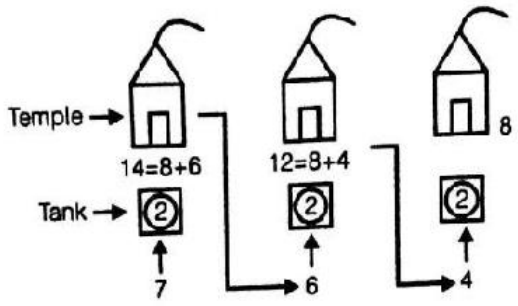
So, total number of triangles will be

$16 + 16 + 4 + 4 + 4 = 44$ Ans

Temple and Tank

Ex.4 There are three temples near Tanjaur. In front of all temples there are one tank each. Kavitha, a lady deity went to a temple with certain number of flower. She washed flowers in tanks in front of first temple and it became doubled. She devoted 8 flower in that temple and moved to second temple. She again washed remaining flowers and again became doubled. She devoted 8 flowers in the second temple. She again washed remaining flowers in third tank in front of the last temple and devoted 8 flowers. Then she was left with no flowers. How many flowers Kavitha initially had?

Sol.



(1) We will start solving it from back side. After devoting 8 flowers in third temple Kavitha had no flowers. It means before washing in third tank she had 4 flowers.

(2) It also shows that she had 12 flower before devoting 8 flower in second temple.

(3) From this information we come to know that she had 6 flowers before washing it in second tank.

(4) It means she had (8 + 6) = 14 flowers before devoting to first temple.

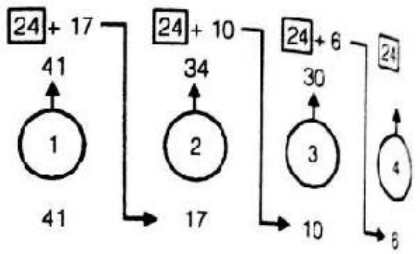
(5) Now we can easily get the number of flower she initially had before washing in first tank.

(6) From the above Fig. we can easily find solution in a simple and lucid manner.

Cat and Mouse

Ex.5 There are four holes numbered 1, 2, 3 and 4. The unique properties of these holes is that number of mouse become double, triple and four times after entering into hole number 2, 3 and 4 respectively. While it remains same if they enter in first hole. One cat is running in search of few mouse. To save themselves from cat, mouse entered in first hole and came out. 24 of them become diet of cat. They respectively entered into second, third and fourth hole and come with double, triple and four times in number. After their exit from each hole i.e. second third and fourth, 24 mouse become diet of cat each time. At the end there is no mouse left. Find the initial number of mouse before entering into first hole.

Sol.:

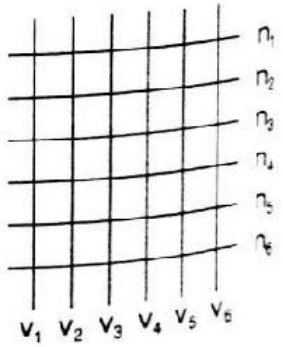


- From the fig it is clear that before entering into fourth hole there were 6 mouse.
- 30 mouse came out of fourth hole because 24 become diet of cat and 6 remained.
- before entering into third hole there were 10 mouse.
- 34 i.e. 24 + 10 mouse came out of second hole, 24 become diet of cat and 10 remained.
- 17 mouse entered into second hole.
- 41 mouse came out of first hole.
- There were 41 mouse before entering into first hole.

Rectangles

Ex.6 Six parallel horizontal lines are intersecting perpendicularly to six verticle parallel lines. Find number of rectangles formed after such intersection.

Sol.:



Here V_1 to V_6 represent six parallel vertical lines and h_1 to h_6 represent six parallel horizontal lines.

To form a rectangle we need to select any two horizontal parallel lines which intersect any two vertical parallel lines.

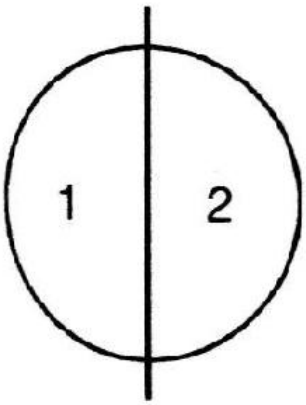
Thus

$6C_2 \times 6C_2 = 15 \times 15 = 225$

225 rectangle will be formed.

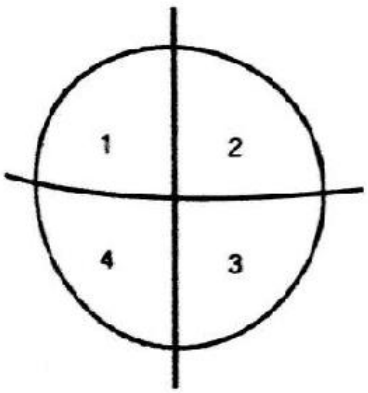
Birthday Cake

In a Birthday party there is a cake of negligible thickness, which is to be cut into different pieces. How many maximum pieces are possible if five cuts are made?



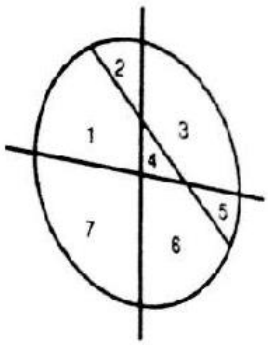
[Fig. First cut]

Total pieces = 1 + 1 = 2



[Fig. Second cut]

Total pieces = 1 + 1 + 2 = 4



[Fig. Third cut]

Total pieces = 1 + 1 + 2 + 3 = 7

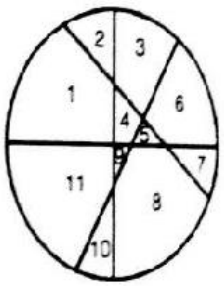


Fig. Fourth cut

Total pieces = 1 + 1 + 2 + 3 + 4 = 11

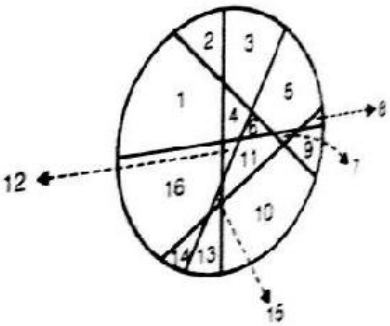


Fig. Fifth cut

Total pieces will be

= 1 + 1 + 2 + 3 + 4 + 5 = 16 Ans.

Similarly, for n cuts we get

1 + 1 + 2 + 3 + 4 .... n pieces

$\Rightarrow$ 1 + Σn pieces.

$\Rightarrow$ $1 + \frac{n(n+1)}{2}$ pieces.

Intersecting Lines

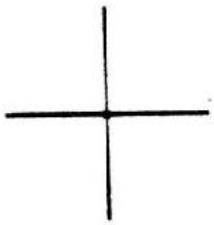
Ex. 8 Five lines are intersecting each other. Find maximum intersecting points possible.

Sol.

1. Single line

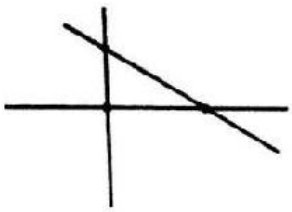
no intersecting points

2. Two lines



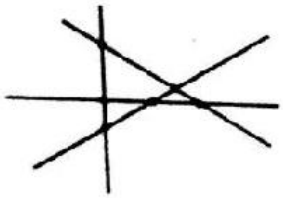
One intersecting point $\Rightarrow 0 + 1 = 1$

3. Three lines



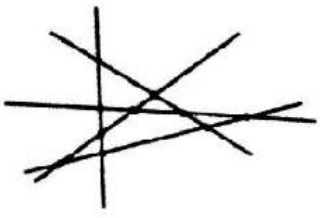
Three intersecting points $\Rightarrow 0 + 1 + 2 = 3$

4. Four lines



Six intersecting points $\Rightarrow 0 + 1 + 2 + 3 = 6$

5. Five Lines



Ten intersecting points

$\Rightarrow 0 + 1 + 2 + 3 + 4 = 10$

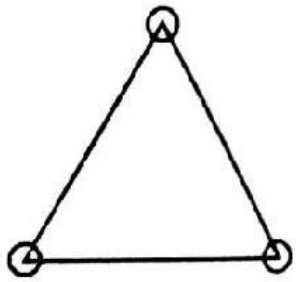
Similarly, for n intersecting lines maximum intersecting points will be

$0 + 1 + 2 + 3 + \ldots (n-1) = \Sigma(n-1)$

Coins

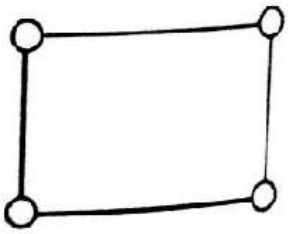
Ex.9 Ten coins are to be placed in five lines in such a manner that each line contains four coins.

Sol. 1. Triangles



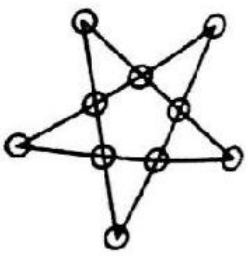
Triangle represents a figure in which three coins are placed in three lines such that each lines containes two coins.

2.

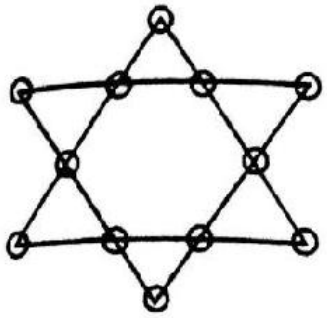


Square or rectangle represents a figure in which four coins are placed in four lines such that each lines contains two coins

3.



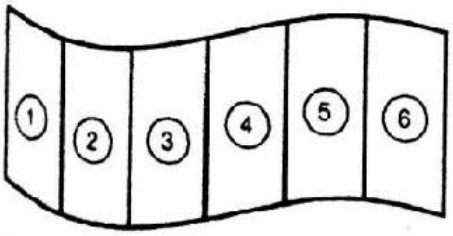
Star represents a figure in which ten coins are placed in four lines such that each lines contains four coins.



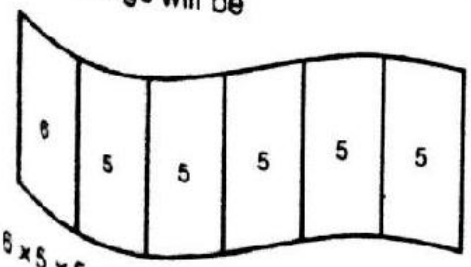
Similarly we can observe in above figure that twelve coins are present in six lines such that each line contains four coins.

The Flag

Flag of a nation consists of six different strips How many such flags can be possible if we use six colours to fill the strips such that no two consequetive strips will have same colours?



First strip can be filled with any six colours. Next strip can be filled with any five colours other than the colour filled in strip one Successive strips will also be filled in the same manners. Number of possible flags will be



$6 \times 5 \times 5 \times 5 \times 5 \times 5 = 18750$ Ans.

□□□□

I Practice Exercise 1

Direction (Qs. 1 to 3): Read the following information carefully and answer the questions below it.

Rahul brought some sweets on his 21st birthday He offered one less than the half of total number of sweets in the temple near the house. He also gave one sweet each to 3 beggars sitting on the stairs of 'temple'. On the way back to home, he stopped a big group of poor children and gave them half of what was left with him. After reaching home he shared of the remaining two pieces of sweets with his younger brother.

1. How many sweets did he originally had?
   (a) 8 (b) 10
   (c) 12 (d) 14

2. How many sweets did he offered in the temple?
   (a) 3 (b) 4
   (c) 5 (d) 6

3. How many sweets did he gave to poor children?
   (a) 1 (b) 2
   (c) 30 (d) 42

Direction (Qs. 4 to 8): Read the following information carefully and answer the question below it.

Study the pyramid of the letters given below and answer the questions

B
M T R
G C S N P
Y Q H K E A I
J F U W X O V Z D

4. Which letter is missing in the pyramid?
   (a) F (b) I
   (c) L (d) P

5. If letters where to be studied vertically, which two letters happen to be neighbours that occur together in alphabetical order
   (a) WX (b) PR
   (c) UV (d) ST

6. In order to form word, one of the letters in the pyramid is always followed by one particular letter and that letter is just underneath it. Which is not this pair?
   (a) NE (b) PA
   (c) ZI (d) QU

7. Two letters in the above pyramid have exactly the same number of letters between them horizontally as they have in the alphabetical order. Which are they?
   (a) Y and Q (b) V and X
   (c) N and P (d) E and K

8. If all the horizontal lines were to be studied separately which neighbours in the alphabetical order are the farthest?
   (a) F and U (b) Q and Y
   (c) C and S (d) H and Q

Direction (Qs. 9 to 16): Read the following information carefully and answer the question below it.

The Selection Committee of a campany laid down the following criteria of selection for the post of Manager-Accounts:

(i) The candidate must be a post-graduate in Commerce.

(ii) The candidate must have completed 21 years and should not be more than 35 years as on 31-07-1996.

(iii) If the candidate does not satisfy the criterion in (i) above but has completed his CA examination he will be referred to Director – Finance, who can allow the candidate to appear in the interview if otherwise eligible.

(iv) If the candidate fulfils all the criteria mentioned in (i) and (ii) above, he/she be called for group discussion.

(v) The candidate must get 50% marks qualify in the group discussion.

(vi) If the candidate qualifies in the gro discussion he/she will be called interview.

(vii) The candidate must get 30% marks the interview (out of 50) to get fina selected.

Based on the above criteria, decide whi of the following course of action shou be taken in the case of candida described in each of the followir questions.

Mark answer as:

(a) If the candidate can be selected;

(b) If the candidate is to be referred Director – Finance;

(c) If the candidate can be called fo group discussion;

(d) If the candidate can be called fo interview;

(e) If the candidate cannot be selected

9. Mr. Das is M.Com and his date of birth i 30-06-1961.

10. Mrs. Krishnamurthy is a qualified CA and wa 25 years old on 31-07-1996.

11. Mr. Kant, a post-graduate with Commerce obtained 70% marks in group discussion and secured 20 marks in Interview. He was 35 years as on 31-07-1996.

12. Mrs. Desai is a post-graduate in Economics and her date of birth is 3-04-1965.

13. Mr. Patel, a post-graduate was permitted by Director - Finance. He was born on 30-05 -1963. He obtained 12 marks in interview.

14. Mr. Mathur is Ph.D in Commerce and was 34 years old on 1-08-1995. He obtained 14 marks in interview.

...y is a commerce graduate, has passed ...A examination and was born on ...1974.

... Subramaniam whose date of birth is ...5-1965 is a post graduate with Commerce ...has obtained 60% marks in the interview.

...on (Qs. 17 to 21): Read the following ...on carefully and answer the questions

...small children Sonu, Monu and Tonu went ...nic with their dog Jhony. They carried with ...ew chocolates, which none of them ...ually counted on their way. They rested ...a tree and slept for a while. After some ...nu woke up, gave one chocolate from the ...ony and distributed the remaining into ...ual parts, ate his share and slept. After ...me Monu woke up, gave one chocolate ...and distributed the remaining into three ...rts. ate his share and slept. After some ...u woke up and repeated the same. A ...r all of them woke up together, gave one ...te from the total to Jhony and divided the ...g chocolates among them and each one ...are. By chance we know that the total ...of chocolates were less than 150 in the ...g and they didn't break any chocolate.

...many chocolates were in the beginning?
...
...
(b) 84
(d) 79

...at is the difference in the number of ...colates eaten by Monu and Tonu?
...
...
(b) 11
(d) 18

...at is the difference in the number of ...olates eaten by Sonu and Tonu?
...
...
(b) 15
(d) 18

... and Tonu ate the chocolates in the
(a) 13 : 11
(c) 4 : 3
(b) 9 : 7
(d) 5 : 4

21. How many more chocolates did monu eat, than Jhony?
(a) 20
(c) 32
(b) 27
(d) 36

Direction (Qs. 22 to 26) : Read the following information carefully and answer the question below it

Atul, Bhupinder, Charles and Deepak are four brothers playing a game where the loser doubles the money of each of the other players. They plyed four games and each brother lost one game in alphabetical order. At the end of the fourth game each brother had Rs. 64.

22. Who started with the lowest amount?
(a) Atul
(c) Charles
(b) Bhupinder
(d) Deepak

23. What was the amount left with Charles at the end of the second round?
(a) 72
(c) 132
(b) 144
(d) 136

24. How many rupees did Bhupinder start with?
(a) 64
(c) 68
(b) 136
(d) 72

25. At the end of the fourth round, who had the max. profit? (max. wining vis-a-vis opening amount)
(a) Atul
(c) Charles
(b) Bhupinder
(d) Deepak

26. Who had the minimum deviation from the opening amount?
(a) Atul
(c) Charles
(b) Bhupinder
(d) Deepak

Direction (Qs. 27 to 29): Read the following information carefully and answer the questions below it.

Life was not easy before Aryabhatta. Zero was not invented and also people could not multiply

numbers. Thus mathematics had only 9 digits (1 to 9) and after that came 11 and so on. Find the answer to following operations in mathematics used then.

27. What is 7 + 11 + 3 =?
(a) 20 (b) 21
(c) 22 (d) 23

28. What is 21 + 29 + 1 =?
(a) 50 (b) 51
(c) 52 (d) 54

29. What is 15 + 5 + 1 + 9 =?
(a) 30 (b) 31
(c) 32 (d) 33

Direction (Qs. 30 to 34): Read the following information carefully and answer the question below it.

Rahul was at a crossroads in his life. He went to an astrologer to learn what the future held for him. The astrologer explained that Rahul had many choices to make and he could only expalin what each choice lead to. On leaving the astrologer, Rahul could could take bus routes 213 or 231 to go to his next stop. The first led to a choice between two jobs and the second to a choice between two areas of business.

In all four cases, Rahul would go abroad and continue the same work. Rahul would marry a woman whose name begins with 'P' if he either took a job in production or had a business in readymade garments. Rahul would go to the US if he either had a job in marketing or a business in spare parts manufacture.

30. If Rahul has a wife called Priya and a production job, which bus did he take?
(a) 213
(b) 231
(c) (1) or (2)
(d) cannot be determined

31. If Rahul took bus number 231 and married Rohini, what work does he do?
(a) marketing job
(b) production job
(c) garments business
(d) spare parts business

32. If Rahul took bus number 213 and is married to Rehana, which country does he live in?
(a) India (b) UK
(c) US (d) Canada

33. If Rahul has a spare parts business, which of the following could be his wife's name?
(a) Priya (b) Prachi
(c) Savita (d) Any of these

34. If Rahul works in Australia, which of the following is possible?
(a) Production job or spare parts business
(b) Production job, married to Poorva
(c) Garments business, married to Shruti
(d) Marketing job or garments business

Solutions

Answer 1 to 3:

Let the number of sweets be x.

Number of sweets left with him after devoting in Temple.

$$= x - \left(\frac{x}{2} - 1\right) = \frac{x}{2} + 1$$

Number of sweets left with him after giving to the baggers $= \frac{x}{2} - 2$

Number of sweets left with him after giving to the poor children $= \frac{1}{2}\left(\frac{x}{2} - 2\right) = \frac{x}{4} - 1$

Number of sweets left with him after giving to his brother $= \frac{x}{4} - 2 = 1$

This gives $x = 12$

Answer 4 to 8 :

(c) L is missing in the pyramid

(d) PR are not occurring together in alphabetical order. WX and UV are not vertical neighbours in a given pyramid. ST occur together in alphabetical order and are also vertical neighbours in the given pyramid.

(c)

(b) Y and Q; N and P; E and K are horizontal neigbours in the given pyramid, but none of these pairs occur together in alphabetical order. Both in the pyramid and in alphabetical order V and X are separated by exactly one letter.

(c) F and U are separated by 14 letters in an alphabetical order, while Q and Y are separated by 7 letters; C and S are separated by 15 letters and H and Q are separated by 8 letters. Hence C and S are the farthest away from each other among given pairs.

Answer 9 to 16:

(e) Condition (ii) is not satisfied

(b) All the conditions of eligibility are satisfied

(a) All conditions are satisfied

(e) condition (i) is not satisfied

(e) Mr. Patel satisfies all the five condition except conditon (vii)

(e) Mr. Mathur satisfies all the five condition except conditon (vii)

(b) According to condition (iii) he should be refered to Director - Finance.

(a) Once called for interview he will be selected.

Answer 17 to 21:

Let the number of chocolates in the beginning be x.

So when Sonu woke up,

he left $\frac{2}{3}(x-1)$ for the others.

When Monu woke up he left.

$$\frac{2}{3}\left[\frac{2}{3}(x-1)-1\right]=\frac{4x-10}{9}$$

while Tonu left = $\frac{8x-38}{27}$

Finally they divided $\frac{8x-38}{27}-1-1$ into three equal parts.

So, $\frac{8x-38-27}{27}$ or $\frac{8x-65}{27}$ was divided into three equal parts. This means

$\frac{8x-65}{27}$ is divisible by 3 or $8x-65$ is a multiple of 81. Let $8x-65=81n$ where n is an integer

So $81n + 65$ should be divisible by 8. It has to be an even number, so 81n should be odd number. Trying with 1, 3, 5 ..... we get 7 and 15 as the two initial possible number but n = 15 will give us an initial starting number x = 160, which is not acceptable. So, n = 7 is the accepted value. So in the beginning there were 79 chocolates with the given conditions. We can distribute them accordingly. The table below shows number of chocolates eaten by each.

	Sonu	Monu	Tonu
Johny	1		
First	26		

Second		17		1
Third			11	1
Last	/	/	/	1
	33	24	18	4

17. (d)

18. (a)

19. (b)

20. (c)

21. (a)

Answer 22 to 26.

The four brothers play in such a way that the loser doubles the money of the other players and they lose in an alphabetical order. Thus, working backwards we will obtained following table

	A	B	C	D
At the beginning	132	68	36	20
After Ist round	8	136	72	40
After IInd round	16	16	144	80
After IIIrd round	32	32	32	160
After IVth round	64	64	64	64

Now all question can be answered with the help of this table.

22. (d)

23. (b)

24. (c)

25. (d)

26. (b)

Answer 27 to 29.

Replace 10 by 11, 20 by 22 and so on.

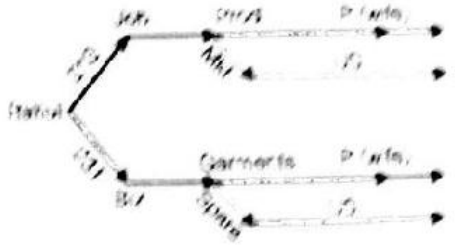
27. (c) 7 + 11 + 3 is actually 7 + 10 + 3 = 20, which is 22.

28. (c) 21 + 29 + 1 is actually 19 + 27 + 1 = 47 which is 52.

29. (c) 15 + 5 + 1 + 9 actually 14 + 5 + 1 + 9 = 29 which is 32.

Answer 30 to 34.

Draw a tree of possibilities for the predictions. You can read the answer from the tree.



From the above tree we can solve all the questions very easily.

30. (a)

31. (d)

32. (c)

33. (c)

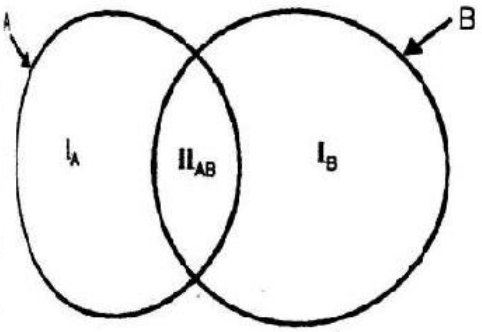
34. (b)

□□□□

Venn Diagrams

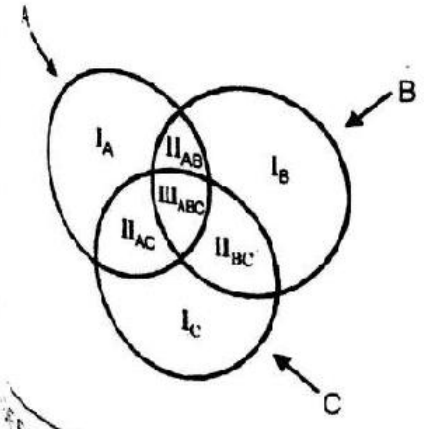
Diagrams are pictorial way of representation set of articles. There are different regions needs proper understanding for solving ems based on logical venn diagrams.

se I : When there are only two articles



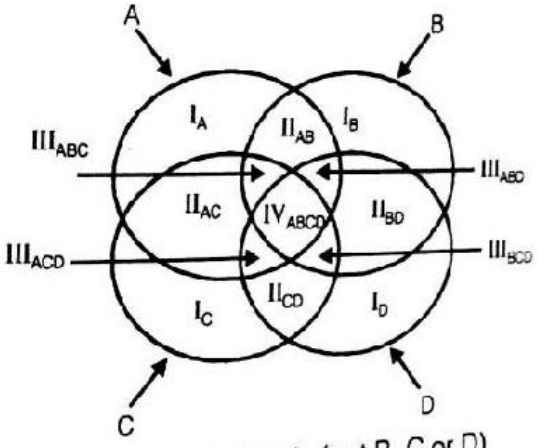
I_A represents A only. (i.e. not B)
I_B represents B only (i.e. not A)
II_{AB} represents A and B only i.e. both A

se II : When there are only three articles

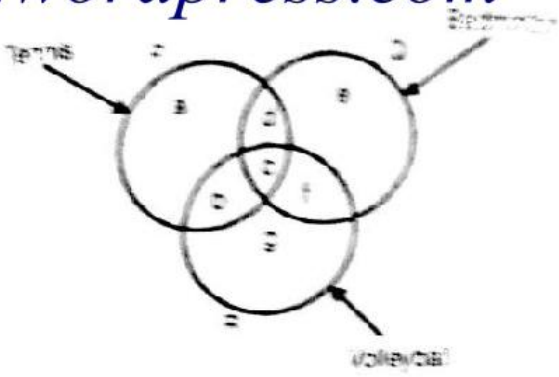


Here I_A represent A only (not B or C)
I_B represents B only (not A or C)
I_C represents C only (not A or B)
II_{AB} represents A and B only (not C)
II_{BC} represents B and C only (not A)
II_{AC} represents C and A only (not B) and
III_{ABC} represents A, B and C only i.e. region which is common to A, B and C.

Case III : When there are only four articles



I_A represents A only (not B, C or D)
I_B represents B only (not A, C or D)
I_C represents C only (not A, B or D)
I_D represents D only (not A, B or C)
II_{AB} represents A and B only (not C or D)
II_{AC} represents A and C only (not B or D)
II_{BD} represents B and D only (not A or C)
II_{CD} represents C and D only (not A or B)
III_{ABC} represents A, B and C only (not D)
III_{BCD} represents B, C and D only (not A)



On the basis of the above figure, answer the questions given below.

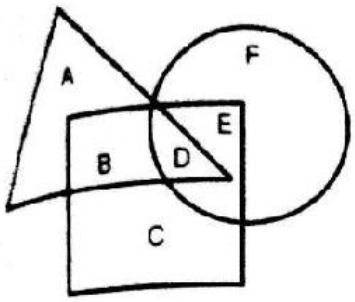
2. Which letter represents the set of persons who play all the three games?
(a) b (b) c
(c) f (d) g

3. Which letter represents the set of persons who play Tennis and Volleyball but not Badminton?
(a) g (b) e
(c) c (d) b

4. Which letter represents the set of persons who play Tennis but neither Badminton nor Volleyball?
(a) a (b) b
(c) c (d) d

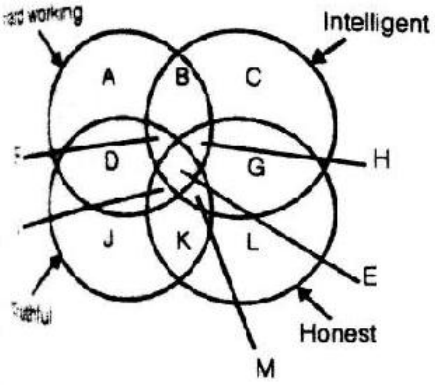
5. Which letter represents the set of persons who play Tennis and Badminton but not Volleyball?
(a) b (b) d
(c) c (d) f

6. In the given figure, the triangle represents girls, the square represents sports persons and the circle represents coaches. The portion in the figure which represents girls who are sports persons but not coaches is the one labelled



(b) B
(d) E

...ction (Qs. 7 to 11) : Below is given a figure ...ur intersecting circles, each representing a ...up persons having the quality written against ...dy the figure carefully and answer the ...ions that follow.



...e region which represents the people who ...e intelligent, honest and truthful but not hard ...rking is denoted by
... E
... M
(b) F
(d) I

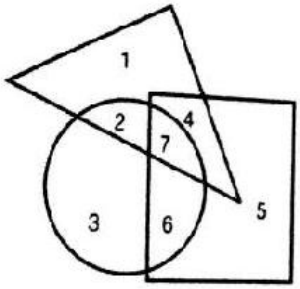
...e people possessing all the qualities are ...presented by
... I
... F
(b) H
(d) E

...e region which represents people who are ...t honest but possess all other three ...alities, is denoted by
... B
... F
(b) d
(d) I

10. People who are not hard working, intelligent and truthful are represented by
(a) G
(b) H
(c) K
(d) L

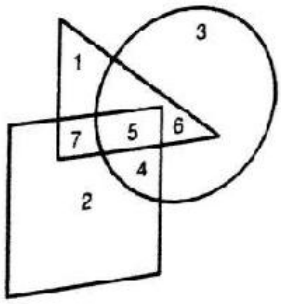
11. People who are not honest and truthful but are hard working and intelligent both, are represented by
(a) E
(b) B
(c) M
(d) I

12. If Tall is equivalent to circle, Armymen to triangle and Strong to square, indicate which number will represent strong armymen?



(a) 3
(b) 4
(c) 5
(d) 6

Direction (Qs. 13 to 15): The following questions are based on the diagram given below. In the diagram, the triangle stands for graduates, square stands for membership of professional organisation and the circle stands for membership of social organisation. Read each statement and find out the number (s) to represent the people covered by the given statement.

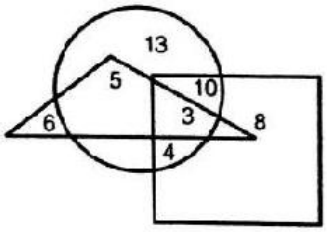


13. Number of graduates in social organisations
(a) 1 (b) 5
(c) 6 (d) 5 and 6

14. Number of a graduates in social organisations only
(a) 3 (b) 4
(c) 5 (d) 6

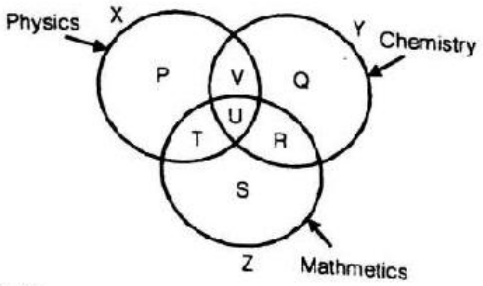
15. Number of graduates in professional organisation
(a) 5 and 7 (b) 5, 6 and 7
(c) 6 and 7 (d) 4, 5 and 6

16. In the following diagram, square represents women, triangle represents sub-inspectors of police and circle represents graduates. Which numbered area represents women graduate sub-inspector of police?



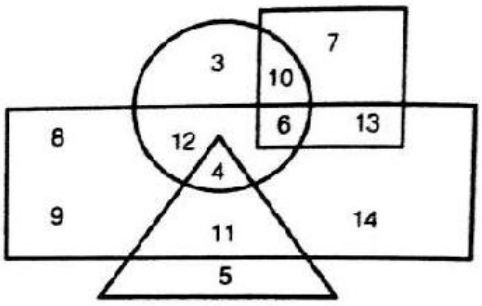
(a) 5 (b) 3
(c) 8 (d) 13

17. The diagram below represents the student who study Physics, Chemistry and Mathematics. Study the diagram and identify the region which represents the students who study Physics and Mathematics but not Chemistry.



(a) T
(b) P + T + S
(c) V
(d) P + T + S + R + U + V

Direction (Qs. 18 to 25) : The following questions are based on the diagram given below:



(1) Rectangle represents males
(2) Triangle represents educated
(3) Circle represents urban
(4) Square represents civil servants

18. Who among the following is an educated male who is not an urban resident?
(a) 4 (b) 5
(c) 9 (d) 11

19. Who among the following is neither a civil servant nor educated but is urban and not a male?
(a) 2 (b) 3
(c) 6 (d) 10

20. Who among the following is a female, urban resident and also a civil servant?
(a) 6 (b) 7
(c) 10 (d) 13

21. Who among the following is an educated male who hails from urban area?
(a) 4 (b) 2
(c) 11 (d) 5

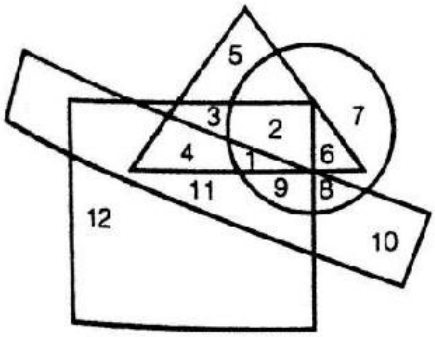
22. Who among the following is uneducated and also an urban male?
(a) 2 (b) 3
(c) 11 (d) 12

23. Who among the following is only a civil servant but neither a male nor urban oriented and uneducated?
(a) 7 (b) 8
(c) 9 (d) 14

24. Who among the following is a male, urban oriented and also a civil servant but not educated?
(a) 13 (b) 12
(c) 6 (d) 10

25. Who among the following is a male civil servant, who is neither educated nor belongs to urban area?
(a) 7 (b) 13
(c) 4 (d) 1

Direction (Qs. 26 to 35): In the following figure, the circle stands for employed, the square stands for hard working, the triangle stands for rural and the rectangle stands for intelligent. Study the figure carefully and answer the questions that follow.



26. Non-rural, employed, hard working and intelligent people are indicated by region
(a) 8 (b) 9
(c) 10 (d) 11
(d) 12

27. Non-rural, employed people who are neither intelligent nor hard working are represented by region
(a) 12
(c) 10 (b) 11
(e) 5 (d) 7

28. Intelligent, employed and hard working non-rural people are indicated by region
(a) 11
(c) 9 (b) 6
(e) 3 (d) 4

29. Hard working non-rural people who are neither employed nor intelligent are shown in region
(a) 8
(c) 6 (b) 7
(e) 12 (d) 10

30. Employed, hard working and intelligent rural people are indicated by region
(a) 1 (b) 2
(c) 3 (d) 4
(e) 5

31. Rural hard working people who are neither employed nor-intelligent are indicated by region
(a) 6 (b) 5
(c) 4 (d) 3
(e) 2

32. Rural employed people who are neither intelligent nor hard working are indicated by region
(a) 2 (b) 4
(c) 6 (d) 9
(e) 10

33. Rural people who are hard working and employed but not intelligent are indicated by region
(a) 1 (b) 2
(c) 3 (d) 4
(e) 5

34. Unemployed rural hard working and intelligent people are indicated by region
(a) 1 (b) 2
(c) 3 (d) 4
(e) 5

35. Rural employed people who are neither intelligent nor hard working are indicated by region
(a) 10 (b) 9
(c) 6 (d) 4
(e) 2

□□□□

Solutions

1. (c) The required region is the one which is common to the triangle and the circle but is not a part of the square i.e. IV.
2. (b) The required region is the one common to all the three circles i.e. c.
3. (d) The required region is the one which is common to circles P and R but is not a part of circle Q i.e. b.
4. (a) The required region is the one which lies inside circle P but is not common to circle Q or circle R or both i.e. a.
5. (b) The required region is the one which is common to circles P and Q but lies outside circle R i.e. d.
6. (b) The required region is the region which is common to the triangle and square but lies **outside the circle i.e.**, B.
7. (c) The required region is the one which is common to the circles 2, 3 and 4 but is not a part of circle 1 i.e. M.
8. (d) The required region is the one which is common to all the four circles i.e. E.
9. (c) The required region is the one which is common to the circles 1, 2 and 4, but lies outside circle 3 i.e., F.
10. (d) The required region is the one which does not lie inside circles 1, 2 and 4 i.e. L.
11. (b) The given conditions are satisfied by the persons denoted by the region which is common to circles 1 and 2 but is not a part of either circle 3 or circle 4 i.e. B.
12. (b) Strong armymen will be represented by the region which is common to the square and the triangle but lies outside the circle i.e. 4.
13. (d) The required region is the one common to the circle and triangle i.e regions 5 and 6
14. (d) The required region is the one common to the triangle and circle but lies outside the square i.e. 6.
15. (a) The required region is the one common to the triangle and square i.e. regions 5 and 7.
16. (b) The required region is the one common to the square, triangle and circle i.e. 3.
17. (a) The required region is the one which is common to circles X and Z but lies outside circles Y. i.e. T.
18. (d) The person satisfying the given conditions is represented by the region which is common to the triangle and the rectangle but lies outside the circle i.e. 11.
19. (b) The person satisfying the given conditions is represented by the region which lies inside the circle but outside the square, the rectangle and the triangle i.e. 3.
20. (c) The person satisfying the given conditions is represented by the region which lies outside the rectangle and is common to the circle and the square i.e. 10.
21. (a) The person satisfying the given conditions is represented by the region which is common to the triangle and the rectangle and also lies inside the circle i.e. 4.
22. (d) The person satisfying the given conditions is represented by the region which lies outside the triangle and is common to the circle and the rectangle i.e. 12.
    Remember: The condition which is not mentioned shouldn't be considered or assumed. For instance, here, 6 also denotes the required region. But since it lies inside the square and there is no mention of 'civil servant', so it cannot be the answer.
23. (a) The person satisfying the given is denoted by the region which lies inside the square but outside the circle, rectangle and triangle i.e. 7.

11 Analytical Reasoning

I Practice Exercise: I

Direction for Questions: (1 to 3)

(i) Six friends A, B, C, D, E and F are sitting along the sides of a hexagonal table for playing a game, though not necessarily in the same order.

(ii) F, who is sitting exactly opposite of A, is to the immediate right B.

(iii) D is between A and B and is exactly opposite to C.

1. A is sitting between which of the following pairs of persons?
   (a) D and E (b) B and E
   (c) E and C (d) None of these

2. Who is sitting opposite B?
   (a) E (b) F
   (c) A (d) C

3. Three of the following are alike in a certain way on the basis of sitting positions and so form a group. Which is the one that does not belong to the group?
   (a) B, C (b) A, D
   (c) B, F (d) E, A

Direction for Questions: (4 to 8)

A, B, C and D are four friends living together in a flat and they have an agreement that whatever edible comes they will share equally among themselves. One day A' s uncle came to him and gave a box of laddoos. Since no one was around, A divided the laddoos in four equal parts and ate his share after which he put the rest in the box. As he was closing the box, B walked in and took the box. He again divided remaining laddoos in four equal parts. A and B ate one part each and kept the remaining laddoos in the box. Suddenly C appeared and snatched the box. He again divided the laddoos in four equal parts, the three of them ate one part each and kept the remaining laddoos in the box. Later when D came, he again divided the laddoos in four equal parts and all four ate their respectively share. In total D ate 3 laddoos.

4. How many laddoos, in total did C eat?
   (a) 12 (b) 15
   (c) 39 (d) None of these

5. How many laddoos, in total did B eat?
   (a) 24 (b) 15
   (c) 39 (d) None of these

6. How many laddoos, in total did A eat?
   (a) 56 (b) 68
   (c) 71 (d) None of these

7. How many laddoos were given to A by his Uncle?
(a) 128 (b) 125
(c) 113 (d) None of these

8. How many laddoos, did A eat the first time?
(a) 32 (b) 24
(c) 15 (d) None of these

Direction for Questions: (9 to 13)

(i) A, B, C, D, E, F G and H are eight friends. Three of then play cricket and table tennis each and two of them play football. Each one of them has a different height
(ii) The tallest does not play football and the shortest does not play circket
(iii) F is taller than A and D but shorter than H and B. E who does not play cricket, is taller than B and is second to the tallest. G is shorter than D but taller than A.
(iv) H, who is fourth from the top, play table tennis with D.
(v) G does not play either cricket or football. B doest not play football.

9. Who is the tallest?
(a) B (b) H
(c) C (d) Data inadequate

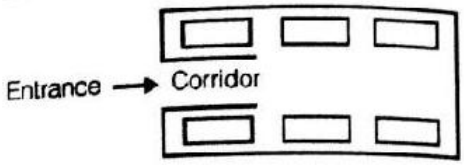
10. Who is the shortest?
(a) G (b) D
(c) A (d) Data inadequate

11. Which of the following pairs of friends play foot ball?
(a) EF (b) EA
(c) HF (d) Data inadequate

12. What is F's position from the top when they are arranged in descending order of their height?
(a) Fifth (b) Fourth
(c) Sixth (d) None of these

13. Which of the following group of friends play circket
(a) CAE (b) CBF
(c) CBA (d) None of these

Direction for Questions: (14 to 17)



The plan above shows an office block for six officers–A, B, C, D, E and F. Both B and C occupy offices to the right of the corridor (as one enters the office block) and A occupies office to the left of the corridor. E and F occupy offices on opposite sides of the corridor but their offices do not face each other. The offices of C and D face each other. E does not have a corner office. F's office is further down the corridor than A's, but on the same side.

14. If E sits is his office and faces the corridor, whose office is to his left?
(a) A (b) B
(c) C (d) D

15. Whose office face A's office?
(a) A (b) C
(c) D (d) E

16. Who is/are F's neighbour (s)?
(a) A only (b) A & B
(c) C (d) B & C

17. D was heard telling someone to go further down the corridor to the last office on the right. To whose room was he trying to direct that person?
(a) A (b) B
(c) C (d) F

Direction (Qs.18 to 22)

A, B, C, D, E, F and G are travelling in three different vehicles. There are at least two passenger in each vehicle–Maruti, Santro, Opel– and only one

is a male. There are two engineers, two and three teachers among them.
C is lady doctor and she does not travel with the pair of sisters, A and F
B, a male engineer, travels with only G, a teacher in Maruti
D is a male doctor
Two persons belonging to the same profession do not travel in the same vehicle.
A is not an engineer and travels in Santro.

What is F's profession?
(a) Engineer (b) Doctor
(c) Teacher (d) Data inadequate

In which vehicle does C travel?
(a) Maruti (b) Santro
(c) Opel (d) Data inadequate

Which of the following represents the three teachers?
(a) GEF (b) GEA
(c) GBF (d) Data inadequate

How many lady members are there among them?
(a) Three (b) Four
(c) Three of four (d) Data inadequate

Which of the following is not correct
(a) E-Male-Teacher
(b) B-Male-Engineer
(c) A-Female-Teacher
(d) All are correct

Direction (Qs. 23 to 27)
friends A, B, C, D, E and F work in different companies namely– Pentasoft, Quark, Raymond's Udupi, Trump & Gates and Udupi, and each of the company-sponsored different coloured shirt, viz. Blue, Green, Pink, Yellow, Purple and Red though not necessarily in the same order.
The one wearing the Blue shirt works in Sunmet and the one wearing a Green shirt works in Pentasoft.
(ii) F does not work in Raymond's or Trump & Gates.
(iii) A wears Pink shirt and works in Quark
(iv) D does not work in Trump & Gates and Purple coloured shirt is not sponsored by Raymond's.
(v) E works in Udupi and neither D nor B works in Sunmet
(vi) Trump & Gates does not sponsor Purple or Yellow coloured shirts and C works in Pentasoft.

23. Which colour shirt is sponsored by Raymond's
(a) Yellow
(b) Blue
(c) Pink
(d) Cannot be determined

24. Which pair is correctly matched?
(a) Red-Raymond's-A
(b) Red-Trump & Gates-B
(c) Green-Raymond's-C
(d) None of these

25. Which of the following is true?
(a) Udupi sponsors Green Shirt
(b) D is working in Trump & Gates
(c) E wears Red Shirt
(d) Red shirt is sponsored by Trump & Gates

26. What is the sequence of companies representing A, B, C, D, E & F?
(a) Quark, Pentasoft, Trump & Gates, Raymond's Udupi, Sunmet
(b) Quark, Trump & Gates, Pentasoft, Raymond's Udupi, Sunmet
(c) Quark, Pentasoft, Trump & Gates, Sunmet, Udupi, Raymond's
(d) None of these

27. If Raymond's and Sunmet decide to interchange the colours of sponsored shirts then which two persons had to interchange their shirt?
(a) D & F (b) A & C
(c) D & E (d) B & D

Direction (Qs. 28 to 30)
Five courses – A, B, C, D and E each of one month duration are to be taught from January to May one after the other though not necessarily in the same order by lectures P, Q, R, S and T. P teaches course 'B' but not in the month of April or May. Q teaches course 'A' in the month of March. R teaches in the month of January but does not teach course 'C' or 'D'.

28. Which course is taught by S?
(a) C (b) E
(c) Either C or D (d) D

29. Which lecture's course immediately follows after course B?
(a) Q (b) P
(c) S (d) T

30. Which course is taught in the month of January?
(a) C (b) D
(c) E (d) Data inadequate

Direction (Qs. 31 to 34)
Rajeev planted some plants in his lawn but in a certain fixed pattern:
(i) In most of the rows there are neither Rose nor Marigold
(ii) There are two more row of Orchids than Tuilps and two more rows of Rose than Orchids.
(iii) There are four more rows of Rose than Tulips.
(iv) There aren't as many rows of Lilly as Fireball.
(v) There is one less Marigold row than Rose
(vi) There is just one row of Tulips
(vii) The maximum number of rows he planted is six.

31. How many rows of rose the planted?
(a) Two
(b) Five
(c) Four
(d) cannot be determined

32. Which of the above information is redundant and can be dispensed with?
(a) (i) (b) (iii)
(c) (i) and (iii) both (d) All are necessary

33. What is the sum of the rows of Orchids and Marigold he planted?
(a) Three
(b) Nine
(c) Seven
(d) Cannot be determined

34. How many rows of fireball did he plant
(a) Two (b) Six
(c) Two or Six (d) Data inadequate

Direction (Qs. 35 to 37)
(i) Five friends, Amar, Kapil, Sarvesh, Rohan and Nagesh wear trousers of different colours–red, yellow, blue, white and green (not necessarily in the same order)
(ii) Each one of them has different likings, viz, reading, playing travelling, singing and writting.
(iii) Kapil, who has liking for singing does not wear yellow trousers. Sarvesh wears red trouser and does not like reading or writing. Nagesh likes to play and does not wear blue or Yellow trousers. Amar has liking for writing and Rohan does not wear yellow or green trousers.

35. What is the colour of Kapil trousers?
(a) White (b) Blue
(c) Green (d) Data inadequate

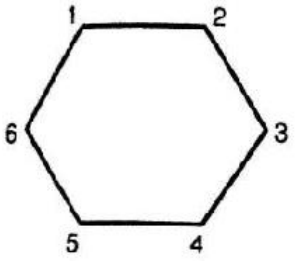
36. What is the liking of Sarvesh?
(a) Writing (b) Travelling
(c) Reading (d) Data inadequate

37. Which of the following combintions of person–colour-liking is correct?
(a) Rohan–Blue–Reading
(b) Nagesh–White–Playing
(c) Amar–Yellow–Writing
(d) None of these

Solutions

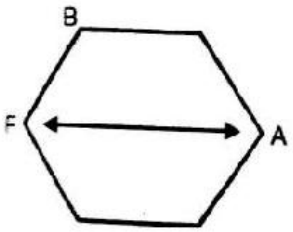
Solution (1 to 3)

Construct the following figure:



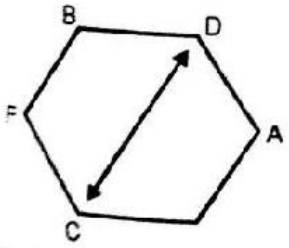
- From the second statement it is clear that F and A are sitting opposite to each other and F is to the immediate right of B.

  The sitting arrangement can be like this

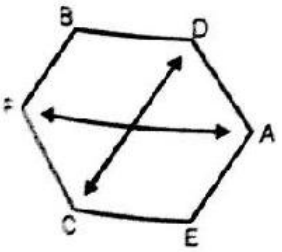


- From the third statement it is clear that D is sitting between A and B and is opposite to C.

  The sitting arrangement can be like this



- There is only one vacant position for E, so the overall sitting arrangement will be like this



1. (a)
2. (a)
3. (a)

Solution (4 to 8)

We will start solving this problem from the last line. D ate 3 laddoos.

Before D ate the laddoos there should be 3 × 4 = 12 laddoos.

Before C ate the laddoos there should be 12 × 3 + 12 = 48 laddoos.

Before B ate the laddoos, there should be 24 × 2 + 48 = 96 laddoos. Before A ate laddos, these should be $\frac{96 \times 4}{3}$ = 128 laddoos

At the Beginning 128 laddoos

	A	B	C	D	Remaining
A's share	32				96
B's share	24	24			48
C's share	12	12	12		12
D's share	3	3	3	3	0
	71	39	15	3	

Now we can answer all the question very easily.

4. (b)
5. (c)
6. (c)
7. (a)
8. (a)

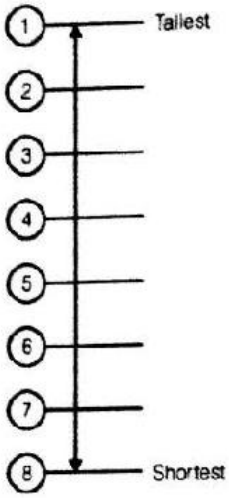
Solution 9 to 13

We will read each statement one by one and start coding accordingly.

- Three of them play cricket and table tennis each and two of them play football.

  3 Cr 3 TT 2 Fb

  Each of them has a different height



- The tallest does not play football and the shortest does not play cricket.

  (1) ~~Fb~~ (8) ~~Cr~~

- F is taller than A and D but shorter than H and B. The arrangement can be like this

  H B
  F
  A D

  Note: Here the heights of H & B and A & D are not given.

  E does not play cricket

  E → ~~Cr~~

  and is taller than B and also second to the tallest

  So E's position is (2)

  G is shorter than D but taller than A

  So D
  G
  A

- H is fourth from the top so its position is

  H → (4)

  H plays TT with D so

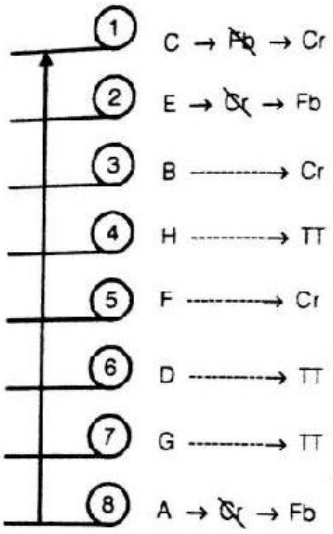
  H → TT

  D → TT

- G does not play either cricket or football so G will play table tennis

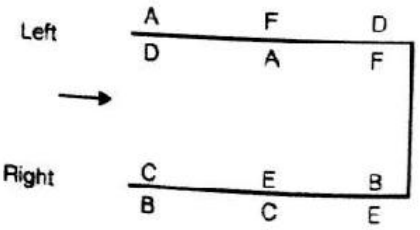
  G → TT

  Now overall arrangements will be like this



9. (c)
10. (c)
11. (b)
12. (a)
13. (b)

Solution (14 to 17)



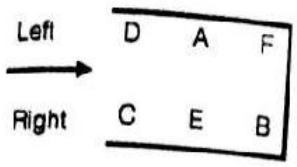
From the last sentence, we get that F is also on the left side, So E will be on the right side. D will be on the left side

E does not have a corner office so E must be in the middle.

E and F do not face each other and F's office is further down the corridor, so F occupies the last office on the left side.

Office of C and D face each other, so C will have first office on the right side and D will have the first office on the left side.

Final office arrangement will be like this



14. (c)

15. (d)

16. (a)

Since there is a corridor between office of F & B so A is the only neighbour of F.

17. (b)

Solution (18 to 22)

There are three vehicles

Maruti, Santro & Opel

There are two engineers, two doctors and three teachers among them

So 2 Engg. 2 Doc 3 Tea

- C is lady doctor and does not travel with the pair of sisters, A & F

  C → Doc

  C → A F

- B is a male engineer and travels only with G a teacher in Maruti,

  so G must be female also

  G → Tea

  B → Engg.

  B G ⟶ Maruti

- D is male doctor

  D → Doc

- A is not an engineer and travels in Santro so

  A E → Santro

Obviously C is travelling in Opel.

C and D are doctors and can't travel in same vehicle so D must travel in Santro. Now we will get following table.

Vehicle	Person	Profession
Maruti	B	Engg.
Santro	G	Tea.
	A	Tea.
	E	Engg.
Opel	D	Doc.
	C	Doc.
	E	Tea.

18. (a)

19. (c)

20. (b)

21. (b)

22. (d)

Solution (23 to 27)

These questions can be solved easily by tabular chart.

Friends / Companies	A	B	C	D	E	F
Pentasoft						
Quark						
Raymonds						
Sunmet						
T & G						
Udupi						

Colour / Companies	Blue	Green	Pink	Yellow	Purple	Red
Pentasoft						
Quark						
Raymonds						
Sunmet						
T & G						
Udupi						

We will start reading each conditions and mark a '✓' sign or '✗' sign accordingly.

From the condition (i) we get following tables.

Companies \ Friends	A	B	C	D	E	F
Pentasoft						
Quark						
Raymonds						
Sunmet						
T & G						
Udupi						

Companies \ Colour	Blue	Green	Pink	Yellow	Purple	Red
Pentasoft	✗	✓	✗	✗	✗	✗
Quark	✗	✗				
Raymonds	✗	✗				
Sunmet	✓	✗	✗	✗	✗	✗
T & G	✗	✗				
Udupi	✗	✗				

Further applying condition (ii) we get following tables.

Companies \ Friends	A	B	C	D	E	F
Pentasoft						
Quark						
Raymonds						✗
Sunmet						
T & G						✗
Udupi						

Companies \ Colour	Blue	Green	Pink	Yellow	Purple	Red
Pentasoft	✗	✓	✗	✗	✗	✗
Quark	✗	✗				
Raymonds	✗	✗				
Sunmet	✓	✗	✗	✗	✗	✗
T & G	✗	✗				
Udupi	✗	✗				

Applying condition (iii) we get following tables.

Companies \ Friends	A	B	C	D	E	F
Pentasoft	✗	✗				
Quark	✓	✗	✗	✗	✗	✗
Raymonds	✗					✗
Sunmet	✗					
T & G	✗					✗
Udupi	✗					

Companies \ Colour	Blue	Green	Pink	Yellow	Purple	Red
Pentasoft	✗	✓	✗	✗	✗	✗
Quark	✗	✗	✓	✗	✗	✗
Raymonds	✗	✗	✗			
Sunmet	✓	✗	✗	✗	✗	✗
T & G	✗	✗	✗			
Udupi	✗	✗	✗			

...ner applying condition (iv) we get following tables.

Friends / Companies	A	B	C	D	E	F
Pentasoft	×	×				
Quark	✓	×	×	×	×	×
Raymonds	×					×
Sunmet	×					
T & G	×			×		×
Udupi	×					

Colour / Companies	Blue	Green	Pink	Yellow	Purple	Red
Pentasoft	×	✓	×	×	×	×
Quark	×	×	✓	×	×	×
Raymonds	×	×	×		×	
Sunmet	✓	×	×	×	×	×
T & G	×	×	×			
Udupi	×	×	×			

...ner applying condition (v) we get following tables.

Friends / Companies	A	B	C	D	E	F
Pentasoft	×					
Quark	✓	×	×	×	×	×
Raymonds	×				×	×
Sunmet	×	×		×	×	
T & G	×			×	×	×
Udupi	×	×	×	×	✓	×

Colour / Companies	Blue	Green	Pink	Yellow	Purple	Red
Pentasoft	×	✓	×	×	×	×
Quark	×	×	✓	×	×	×
Raymonds	×	×	×		×	
Sunmet	✓	×	×	×	×	×
T & G	×	×	×			
Udupi	×	×	×			

...ner applying (vi) we get following tables.

Friends / Companies	A	B	C	D	E	F
Pentasoft	×	×	✓	×	×	×
Quark	✓	×	×	×	×	×
Raymonds	×		×		×	×
Sunmet	×	×	×	×	×	
T & G	×		×	×	×	×
Udupi	×	×	×	×	✓	×

Colour / Companies	Blue	Green	Pink	Yellow	Purple	Red
Pentasoft	×	✓	×	×	×	×
Quark	×	×	✓	×	×	×
Raymonds	×	×	×		×	
Sunmet	✓	×	×	×	×	×
T & G	×	×	×	×	×	
Udupi	×	×	×			

...we will mark '✓' on the only left space and mark '×' on the remaining spaces. Then the following table ...yes

Companies \ Friends	A	B	C	D	E	F
Pentasoft	✗	✗	✓	✗	✗	✗
Quark	✓	✗	✗	✗	✗	✗
Raymonds	✗	✗	✗	✓	✗	✗
Sunmet	✗	✗	✗	✗	✗	✓
T & G	✗	✓	✗	✗	✗	✗
Udupi	✗	✗	✗	✗	✓	✗

Companies \ Colour	Blue	Green	Pink	Yellow	Purple	Red
Pentasoft	✗	✓	✗	✗	✗	✗
Quark	✗	✗	✓	✗	✗	✗
Raymonds	✗	✗	✗	✓	✗	✗
Sunmet	✓	✗	✗	✗	✗	✗
T & G	✗	✗	✗	✗	✗	✓
Udupi	✗	✗	✗	✗	✓	✗

With the help of the above tables we can solve all the questions easily

Note: After drawing table further modification can be done according to given conditions. There is no need to draw further tables. Tables drawn further is just to explain the steps in elaborate manner

23. (a)

24. (b)

25. (d)

26. (b)

27. (a)

Solution (28 to 30)

We can be solved these questions with the help of tabular chart.

Courses \ Months	Jan	Feb	Mar	Apr	May
A					
B					
C					
D					
E					

Courses \ Lecturers	P	Q	R	S	T
A					
B					
C					
D					
E					

We will start reading each condition and mark '✓' sign or '✗' sign accordingly.

- P teaches course B but not in the month of April or May

Courses \ Months	Jan	Feb	Mar	Apr	May
A					
B				✗	✗
C					
D					
E					

Courses \ Lecturers	P	Q	R	S	T
A	✗				
B	✓	✗	✗	✗	✗
C	✗				
D	✗				
E	✗				

• O teaches in the month of March

Courses \ Months	Jan	Feb	Mar	Apr	May
A	✗	✗	✓	✗	✗
B			✗	✗	✗
C			✗		
D			✗		
E			✗		

Courses \ Lecturers	P	Q	R	S	T
A	✗	✓	✗	✗	✗
B	✓	✗	✗	✗	✗
C	✗	✗			
D	✗	✗			
E	✗	✗			

• R teaches in the month of January but does not teach course C or D.

Courses \ Months	Jan	Feb	Mar	Apr	May
A	✗	✗	✓	✗	✗
B	✗	✓	✗	✗	✗
C	✗	✗	✗		
D	✗	✗	✗		
E	✓	✗	✗	✗	✗

Courses \ Lecturers	P	Q	R	S	T
A	✗	✓	✗	✗	✗
B	✓	✗	✗	✗	✗
C	✗	✗	✗		
D	✗	✗	✗		
E	✗	✗	✓	✗	✗

Now we can easily answer given questions with the help of above table.

Note: After drawing first table further modifications can be done according to conditions given. There is no need to draw further table. Further table drawn is just to explain the steps in elaborate manner.

28. (c)

29. (a)

30. (c)

Solution (31 to 34)

$\rightarrow$ $O = T + 2$

Also $R = O + 2$

When $R = M + 1$

$T = 1, O = 3, R = 5, M = 4$

Since from (iv) There are not as many rows of lily as fireball

$\therefore$ Lily < Fireball

So, Lily = 2, Fireball = 6

Now we can answer all the question easily.

31. (b)

32. (c)

33. (c)

34. (b)

Solution (35 to 37)

These questions can be solved easily by drawing tabular chart.

Friends \ Colour	Red	Yellow	Blue	White	Green
Amar					
Kapil					
Sarvesh					
Rohan					
Nagesh					

Friends \ Liking	Read	Play	Travel	Sing	Write
Amar					
Kapil					
Sarvesh					
Rohan					
Nagesh					

We will start reading each condition and mark '✓' sign or '✗' sign accordingly.

- Kapil, who has liking for singing does not wear yellow trouser.

Friends \ Colour	Red	Yellow	Blue	White	Green
Amar					
Kapil		✗			
Sarvesh					
Rohan					
Nagesh					

Friends \ Liking	Read	Play	Travel	Sing	Write
Amar				✗	
Kapil	✗	✗	✗	✓	✗
Sarvesh				✗	
Rohan				✗	
Nagesh				✗	

- Sarvesh wears read trouser and does not like reading or writing.

Friends \ Colour	Red	Yellow	Blue	White	Green
Amar	✗				
Kapil	✗	✗			
Sarvesh	✓	✗	✗	✗	✗
Rohan	✗				
Nagesh	✗				

Friends \ Liking	Read	Play	Travel	Sing	Write
Amar				✗	
Kapil	✗	✗	✗	✓	✗
Sarvesh	✗			✗	✗
Rohan				✗	
Nagesh				✗	

Nagesh like to play and does not wear blue or yellow trousers.

Friends \ Colour	Red	Yellow	Blue	White	Green
Amar	×				
Kapil	×	×			
Sarvesh	✓	×	×	×	×
Rohan	×				
Nagesh	×	×	×		

Friends \ Liking	Read	Play	Travel	Sing	Write
Amar		×		×	
Kapil	×	×	×	✓	×
Sarvesh	×	×		×	×
Rohan		×		×	
Nagesh	×	✓	×	×	×

Amar has liking for weiting and Rohan does not wear yellow or green trousers.

Friends \ Colour	Red	Yellow	Blue	White	Green
Amar	×	✓			
Kapil	×	×			
Sarvesh	✓	×	×	×	×
Rohan	×	×			×
Nagesh	×	×	×		

Friends \ Liking	Read	Play	Travel	Sing	Write
Amar	×	×	×	×	✓
Kapil	×	×	×	✓	×
Sarvesh	×	×	✓	×	×
Rohan	✓	×	×	×	×
Nagesh	×	✓	×	×	×

We can easily answer given questions with the help of above table.

After drawing first table further modifications can be done according to conditions given there is no to draw further table. Further table drawn is just to explain the steps in elaborate manner.

□□□□