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NUMERICAL & VERBAL ABILITY

PRACTICE QUESTIONS BOOKLET

Chapter 1 Analytical Aptitude

1.1 Logical Puzzles

01. Ans: (a)

Sol: C person is wrong, from A, B persons statements 'X' party won the elections option (a) is correct answer.

02. Ans: (Box 1)

Sol: Box 1 message is Lies.
Box 2 message is true.
Box 3 message is Lies.
$\therefore$ Box 1 has the gold.

03. Ans: 22

Sol: Rs. 15 = 15 chocolate
For 15 chocolate get 15 wrappers ÷ 3 = 5 chocolate.
For 5 chocolate get 5 wrappers = 3 wrappers + 2 wrappers = 1 chocolate + 2 wrappers

$$\underbrace{= 1 \text{ wrapper} + 2 \text{wrappers}}_{1 \text{ Chocolate}}$$

= 15 + 5 + 1 + 1 = 22
= 22 chocolate

04. Ans: 12

Sol: By using calendar for one year
31 (7) + 28 (1) + 30 × 4 = 365 days comparing with given relation.
x = 7, y = 1, z = 4
x + y + z = 7 + 1 + 4 = 12

05. Ans: (b)

Sol: 50 P are enough. Just select random. If the machine gives you coffee then you know that's in fact the coffee button. Then coffee-labeled button cann't be random because then Tea would be Tea. So coffee-labeled is Tea and Tea-labeled is random.

06. Ans: (b)

Sol: The person who is opening the boxes, he knew that all 3 are marked wrong.
Suppose if three boxes are labelled as below.

(1) Apples (2) Oranges (3) Apples & Oranges

If he inspected from Box (1), picked one fruit, found orange, then he don't know whether Box contains oranges (or) both apples & oranges.
Similarly if he picked one fruit from box(2), found apple then he don't know whether box contain apples (or) both apples & oranges.
But if he picked one fruit from box(3), i.e., labelled as 'apples & oranges', if he found apple then he can decide compulsorily that box (3) contain apples and as he knew all boxes are labeled as incorrect, he can tell

box(2) contains both apples & oranges, box(1) contain remaining oranges. So, he should open box labelled 'apples & oranges' to determine contents of all the three boxes.

07. Ans: (a)

Sol:

(i) A, B → in 2 mins

(ii) ← A in 1 min (for torch)

(iii) C, D → in 8 min

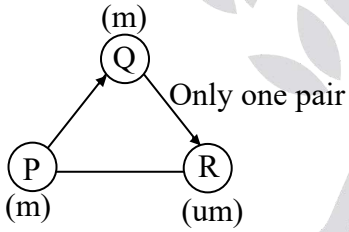
(iv) ← B in 2 min (for torch)

(v) A, B → in 2 min

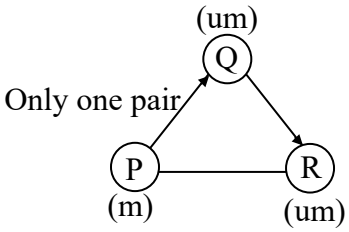
Total time 2 + 1 + 8 + 2 + 2 = 15 min

08. Ans: (b)

Sol: Let Q be married



Let Q be unmarried



∴ whether Q is married or unmarried, the number of pairs we get is only 1.

09. Ans: (a)

Sol: P states that S has atleast 3 cars = ≥ 3

Q believes that S has less than 3 cars = < 3

R indicates that S has atleast one car = ≥ 1

P's and Q's statements are exactly opposite in nature and R's statement is proportional to P's statement.

From the given data, only one person statement is right as it mean that two person statements are wrong. i.e., P and R when S has zero cars.

10. Ans: (c)

Sol: $R \to 2\left(\frac{x}{3}\right)+4$

$$S \to \frac{3}{4}\left(\frac{2x}{3}+4\right)+3=\frac{x}{2}+6$$

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

$$\therefore \quad \frac{x}{4}+5=17$$

$x = 48$

11. Ans: (c)

Sol: $7x + 8y + 3z = 20$

$3y + 4z + 5e = 21$

$\underline{4x + 4z + 6e = 25}$

$\underline{11x + 11y + 11z + 11e = 66}$

$\therefore x + y + z + e = 6$

12. Ans: (c)

Sol: Total distance travelled by 4 wheels

$= 4 \times 40000 = 160000$ km

So average distance travelled by the each tyre $= \frac{160000}{5} = 32000$

13. Ans: (a)

Sol: Let, no of 10 rupees notes = x

Then, no of 20 rupees notes = 14 – x

Now, total value of all notes = Rs 230

i.e 10(x) + 20(14 – x) = Rs 230

$\therefore$ x = 5

i.e no of 10 rupee notes = 5

14. Ans: 3

Sol: i. Divide the coins in 3 parts (9, 9, 9)

ii. Next, 9 coins as (3, 3, 3)

iii. Last step, '3' divided as (1, 1, 1)

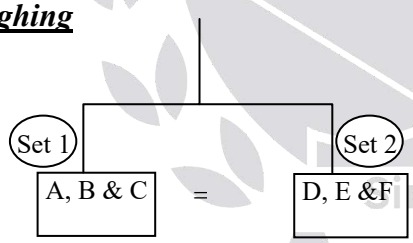
we are getting the false in minimum 3 steps.

15. Ans: (a)

Sol: Let us consider eight rice bags are A, B,C, D, E, F, G and H

Case – I

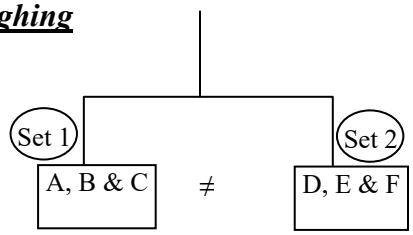
First weighing



If A, B & C (set 1) and D, E and F (set 2) are equal, in second weighing either G (or) H are heavier.

Case - II

First weighing



If A,B & C (set 1) and D, E & F (set 2) are not equal among set 1 and set 2 any one them is heavier than other.

If set 2 (D, E & F) is heavier than set 1, In second weighing D Vs E

- If D and E are equal, than F is heavier
- If D and E are unequal, then higher side one is heavier.

$\therefore$ From case I and case II, the minimum number of weighings required to identify the heavier bag is '2'.

16. Ans: (b)

Sol:

$$16 \times 22 \times 15 \times 50 \times 65 \times 115 \times 18 \times 90$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$2^4 \times (2\times11) \times (5\times3) \times (2\times5^2) \times (5\times13) \times (5\times23) \times (2\times9) \times (5\times2^3)$$

Total number of times a factor of 2 = 11

Total number of times a factor of 5 = 6

Minimum value of (6, 11) = 6

The number of zeros at the end of product =16

17. Ans: (c)

Sol: Michael = 10 km

Ahmed = 5 km

Susan = 7 km

Arun > Ahmed > 5 km

Arun < Susan < 7 km

$\therefore$ 5 < Arun < 7

Option (c) is correct answer.

18. Ans: (b)

Sol: (w, w), (b, b), (w, b)

19. Ans: (c)

Sol:

M	N
x	y
x + 1	y – 1

$x + 1 = y - 1$

$x - y = -2$ ……(1)

2nd condition

M	N
x	y
x – 1	y + 1

$y + 1 = 2(x - 1)$

$2x - y = 1$ …… (2)

By solving (1) and (2) we get

$x = 3,\ y = 5$

20. Ans: (b)

Sol: Rule ⇒ > 18 years ⇒ Drink beer

P – 16 years → P's drink

Q – 25 years.

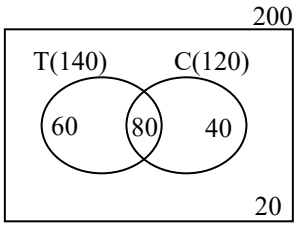
R – Drinking milkshake

S → Drinking Beer → 5's age.

1.2 Venn Diagram

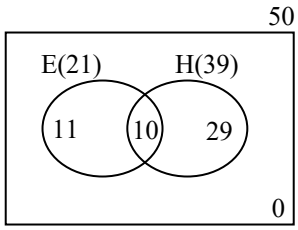
01. Ans: (i) 60 (ii) 40 (iii) 20 (iv) 100 (v) 180

Sol:



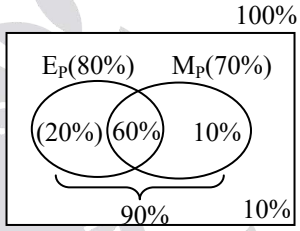
02. Ans: (a)

Sol:



03. Ans: 240

Sol:

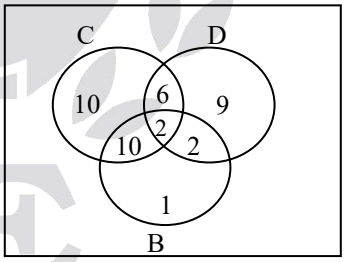


Passed both 60% = 144

Total 100% = 240

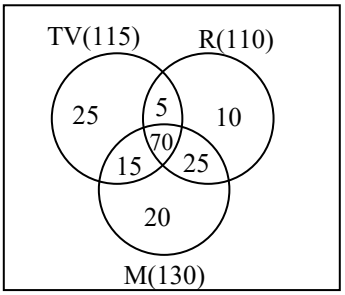
04. Ans: 12

Sol:

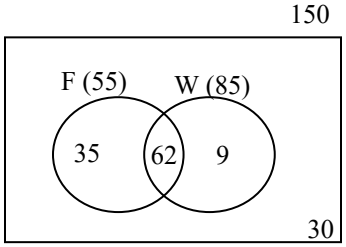


05. Ans: (i) 10 (ii) 25 (ii) 15

Sol:



06. Ans: (a)



$n(F \cup W) = 150 - 30 = 120$

$n(F \cup W) = n((F) - n(W) - n(F \cap W)$

$n(F) - n(F \cap W) = 120 - 85 = 35$

$\therefore$ $n(F) - n(F \cap W)$ is the faculty that has only Facebook account

07. Ans: (a)

Sol: $n[coffee] = 35\%$

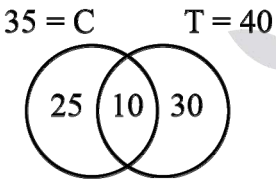
$n[Tea] = 40\%$

$n[c \cap T] = 10\%$

$n[c \cup T] = 35 + 40\text{-}10 = 65\%$

$100 - 65\% = 35\%$

Neither tea or coffee



$= 100 - 65\% = 35\%$

08. Ans: (d)

Sol: Read books = $n(R) = 12 + 44 + 7 + 13 = 76$

Play sports = $n(s) = 44 + 7 + 17 + 15 = 83$

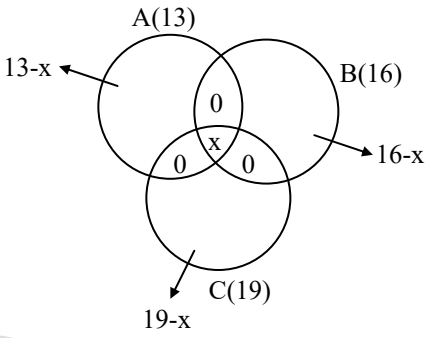
$n(R \cap S) = 44 + 7 = 51$

$n(R \cup S) = n(R) + n(S) - n(R \cap S)$

$= 76 + 83 - 51 = 108$

09. Ans: (c)

Sol:



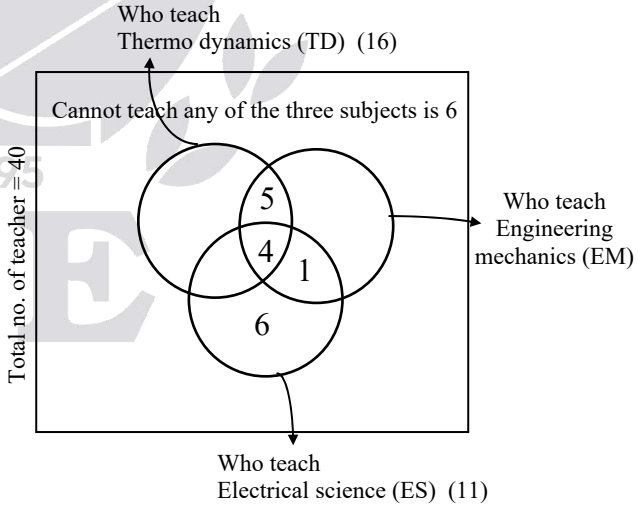
$(13 - x) + (16 - x) + (19 - x) + 0 + 0 + 0 + x = 40$

$x = 4$

option 'c' is the correct answer.

10. Ans: (a)

Sol: From the given data, the following diagram is possible.



1.3 Blood Relation

01. Ans: (a)

Sol: The relations may be analysed as follows.
His father's wife = his mother
Only brother of his mother = his uncle
Son of his uncle = his cousin.
So, that Rohit is Anil's cousin.
Hence the answer is (a).

02. Ans: (a)

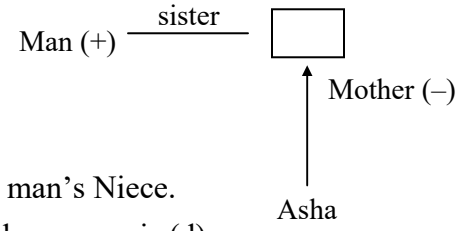
Sol: his father's wife = his mother
Only son of his mother = man
$\therefore$ she is the daughter of man.
So that the girl in the photograph is man's daughter.
Hence the answer is (a)

03. Ans: (a)

Sol: The wife of my husband = Rita
Brother of the daughter of Rita = Son
So, that the man on the stage is Rita's sons.
Hence the answer is (a)

04. Ans: (d)

Sol: By decoding the given information using symbols of family diagram we gat



Asha is man's Niece.
Hence the answer is (d)

05. Ans: (c)

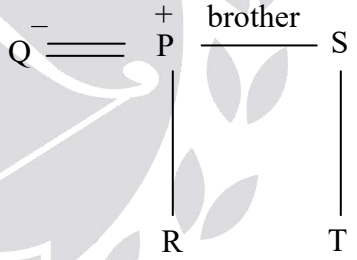
Sol: Her father's father = grand father
Only son of grand father = father
His brother's father = her father
So that, The women is the man's sister
Hence the answer is (c).

06. Ans: (b)

Sol: Q and R are the son and Daughter of M, E is the mother of P and daughter-in-law of M means Q and E are married couples in the family
$\therefore$ P is the grandchild of M

07. Ans: (c)

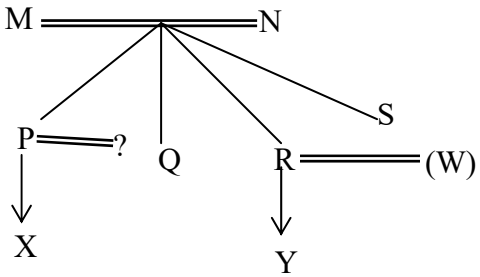
Sol:



$\therefore$ S is parent of 'T'.

08. Ans: (a)

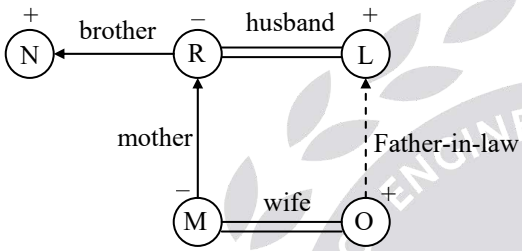
Sol: From given, data, the following blood relations tree can be formed



From the given information, R and W are the married couples so, option '1' is necessarily FALSE. Remaining all other options are may be true.

09. Ans: (d)

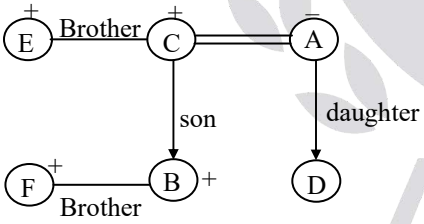
Sol: By decoding the given information using symbols of family of diagram.



So that L is related to O's father-in-low.
Hence, the answer is (d)

10. Ans: (d)

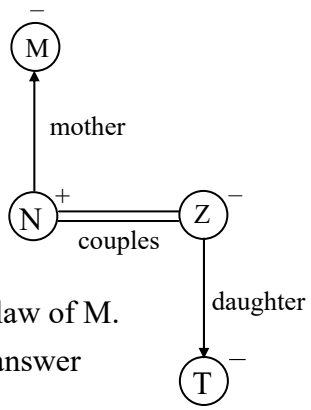
Sol:



A is the mother of 'B'.

11. Ans: (b)

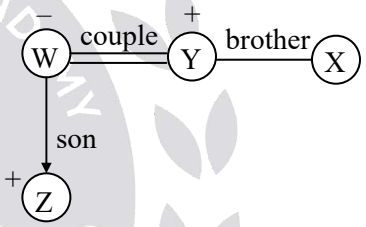
Sol: By decoding the given information using symbols of family diagram, we get



So that Z is daughter-in-law of M.
Hence (b) is the correct answer

12. Ans: (a)

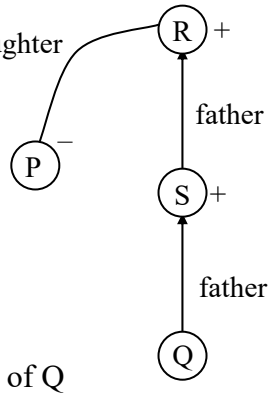
Sol: By decoding the given information suing symbols of family diagram, we get



So, that W is X's brother's wife
Hence (a) is the correct answer.

13. Ans: (b)

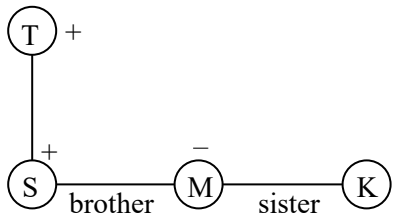
Sol: By decoding the given information using symbols of family diagram, we get



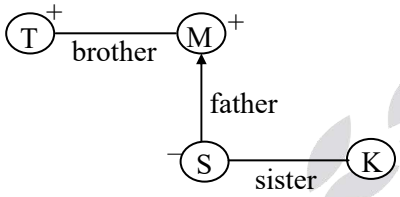
So that P is the aunt of Q
Hence (b) is the correct answer.

14. Ans: (b)

Sol:



So that, S is not niece of T.



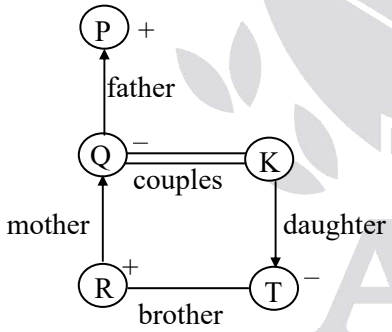
So that S is the niece of T

Hence (b) is the correct answer.

15. Ans: (c)

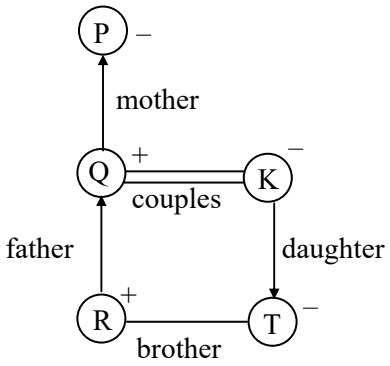
Sol: By decoding he given information symbol of family diagram, we

(a)



So that P is not mother-in-law of K.

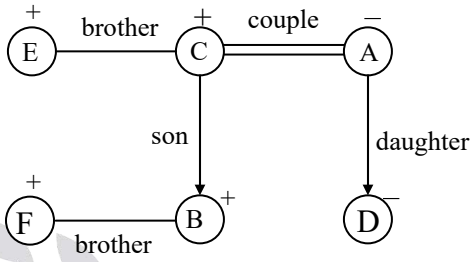
(c)



So that P is the mother-in-law of K.

Hence (c) is correction answer.

(d) By decoding the given information using symbols of family diagram, we get



So that

A is the mother of B.

Hence (d) is the correct answer.

1.4 Cubes & Dice

01. Ans: (a)

Sol: 6 → adjacent → 2, 3, 4, 5

6 → apposite → 1

Option (a) is the correct answer.

02. Ans: (a)

Sol: 4 → adjacent → 5, 6, 2, 3

4 → opposite → 1

Option (a) is the correct answer.

03. Ans: (c)

Sol: 4 → adjacent → 5, 6, 1, 2

4 → opposite → 3

Option (c) is correct answer.

04. Ans: (c)

Sol: 4 → adjacent → 2, 3, 1, 6

4 → opposite → 5, 5, 5

Option (c) is the correct answer.

05. Ans: (b)

Sol: 2 → adjacent → 1, 4, 3, 6
2 → opposite → 5
Option (b) is the correct answer.

06. Ans: (b)

Sol: 1 → adjacent → 4, 3, 5, 6
1 → opposite → 2
After rotating the view of dice.
` Then we have one common number and same surface, then corresponding number are same so 6 opposite is 4.

07. Ans: (c)

Sol: 2 → adjacent → 4, 6, 1, 3
2 → opposite → 5
6 → adjacent → 3, 5, 2, 4
6 → opposite → 1
Option (c) is correct answer.

08. Ans: (d)

Sol: From the folded figure.
5 → opposite → 3
2 → opposite → 4
1 → opposite → 6.
Option (d) is the correct answer.

09. Ans: (c)

Sol: five dots → opposite → three dots
Option (c) is the correct answer.

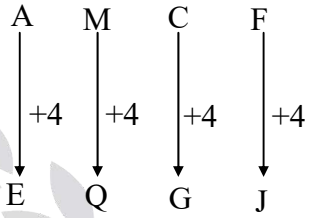
10. Ans: (d)

Sol: three dots → opposite → six dots.

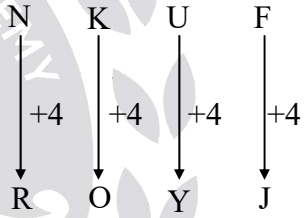
1.5 Coding and Decoding Test

01. Ans: (c)

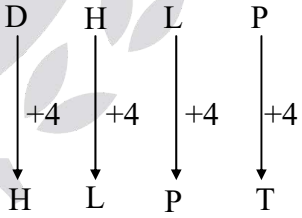
Sol: Clearly each letter in the word AMCF is moved as follows



and



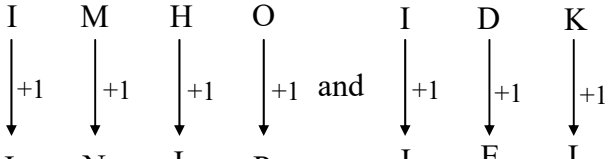
Similarly in the same code DHLP becomes



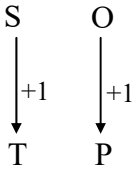
Hence, the answer is (c)

02. Ans: (d)

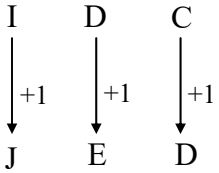
Sol: Clearly, each letter in the word IMH 0 moved as follows



And



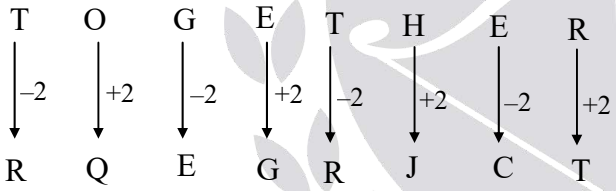
Similarly in the same code



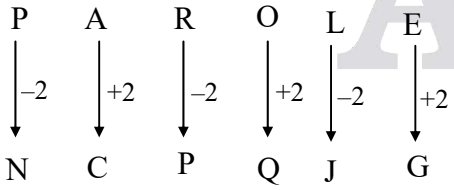
Hence, the answer is (d)

03. Ans: (a)

Sol: Clearly, each letter in the word TOGETHER is moved as follows



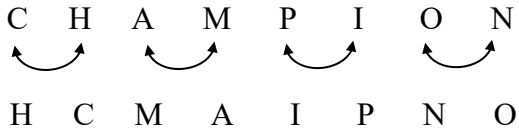
Similarly in the same code PAROLE becomes



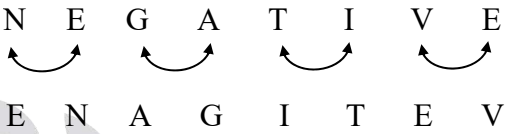
Hence, the answer is (a)

04. Ans: (a)

Sol: The letter of the words are written in a reverse order and each two letter



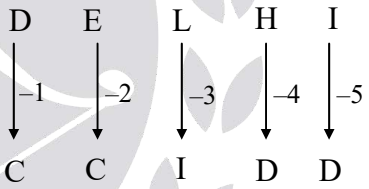
Similarly in the same code. NEGATIVE become



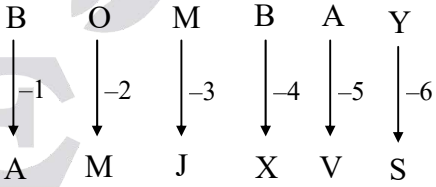
Hence Answer is (a)

05. Ans: (b)

Sol: Clearly each letter in the word DELHI is moved as follows



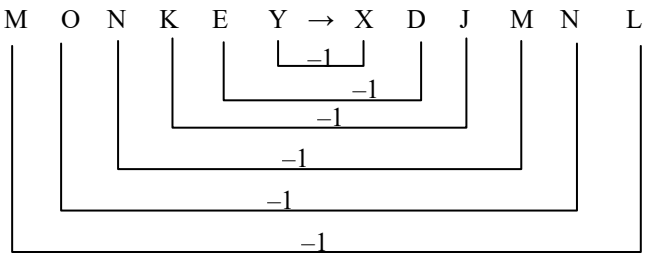
Similarly in the same BOMBAY becomes



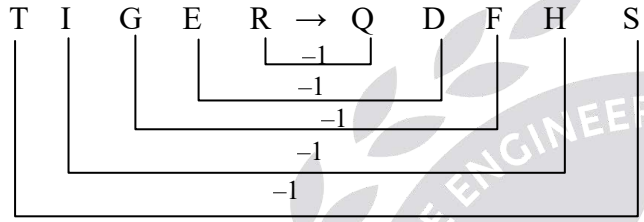
Hence, the Answer is (b)

06. Ans: (a)

Sol: Clearly each letter in the word MONKEY is moved as follows



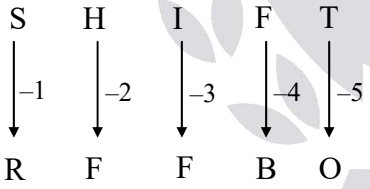
Similarly in the same code TIGER becomes



Hence, the Answer is (a)

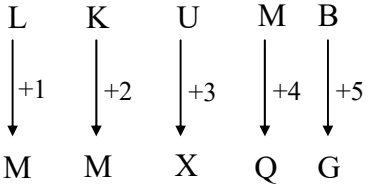
07. Ans: (a)

Sol: Clearly each letter in the word SHIFT is moved as follows



But here which word is coded as

So that



Hence, the Answer is (a)

08. Ans: (a)

Sol: Clearly each letter in the word represented as

R = 6, I = 1, P = 3, L = 8, E = 2

Then

P I L L E R = 3 1 8 8 2 6

Hence, the answer is (a)

09. Ans: (a)

Sol: Man sleeps on Bed

So that

Bed is called Window

Hence, the Answer is (a)

10. Ans: (b)

Sol: A woman shall draw water from a "well"

So that

Well is called "ISLAND"

Hence, the Answer is (b)

11. Ans: (b)

Sol: We drink water when we are thirsty, so that

Here water is called 'air'

Hence, the answer is (b)

12. Ans: (d)

Sol: From both statements

The common code words are

Nee = are

See = you

So that

In the second statement, the remaining code 'ble' means 'where'

Hence, the Answer is (d)

13. Ans: (b)

Sol: From statements

The common code words are

8 = good

1= fruit

So that

In the first statement, the remaining code '5' mean 'sweet'

14. Ans: (b)

Sol: D=4

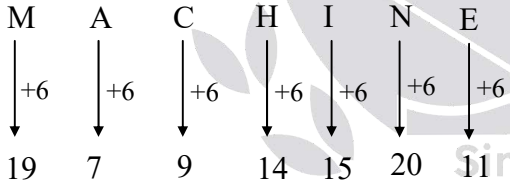
COVER = 3+15+22+5+18= 63

So that

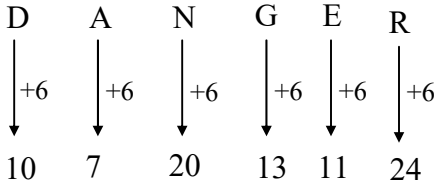
BASIS = 2+1+19+9+19 = 50

15. Ans: (a)

Sol: Clearly each letter in the word MACHINE is moved as follows



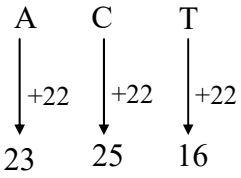
Similarly in the same code DANGER becomes



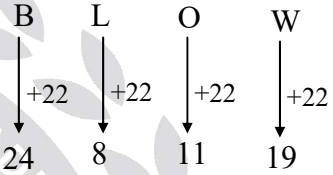
Hence, the Answer is (a)

16. Ans: (d)

Sol: Clearly each letter in the word ACT is moved as follows



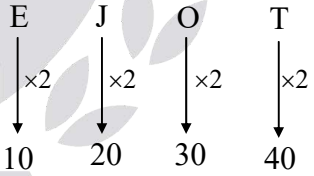
Similarly in the same code BLOW becomes



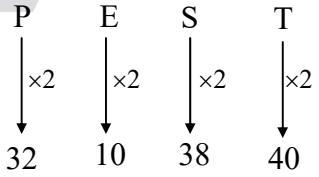
Hence the Answer is (d)

17. Ans: (a)

Sol: Clearly each letter in the word is moved as follows



Similarly in the same code



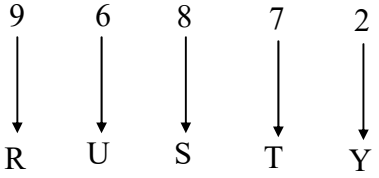
P+ E+S+T = 32+10+38+40 = 120

Hence, the answer is (a)

18. Ans: (a)

Sol: The letter of the words are written in a reverse order

So that



Hence the Answer is (a)

19. Ans: (c)

Sol: AT=(1) (20) = 20

BAT = (2)(1) (20) = 40

So that,

CAT = (3)(1)(20) = 60

Hence that Answer (c)

20. Ans: (d)

Sol: AROMA = $\frac{1+18+15+13=1}{2} = \frac{48}{2} = 2$

GRAND = $\frac{7+18+1+14+4}{2} = 22$

Similarly

KWALITY = $\frac{11+23+1+12+9+20+25}{2} = \frac{101}{2} = 50.5$

Hence the Answer is (d)

21. Ans: (d)

Sol: BARS = $\frac{2+1+18+19}{4} = \frac{40}{4} = 10$

BEERT = $\frac{2+5+5+18+20}{5} = \frac{50}{5} = 10$

Similarly

DEEZ = $\frac{4+5+5+26}{4} = \frac{40}{4} = 10$

$\therefore$ Logic is $\frac{\text{Sum of letters}}{\text{number of letters}} = \text{output}$

Hence the Answer is (d)

22. Ans: (c)

Sol: Number of Letters -1 is coded as output

So that

Number of letters in GOVERNMENT is 10

$\therefore 10-1=9$

Hence the Answer is (c)

23. Ans: (b)

Sol: Number of letters = x

$\therefore$ x (x – 1)

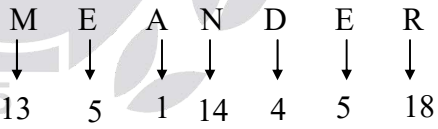
Contract = 8(8 –1) = 56

Growth = 6(6 –1) = 30

Distribution = 12(12 –1) = 132

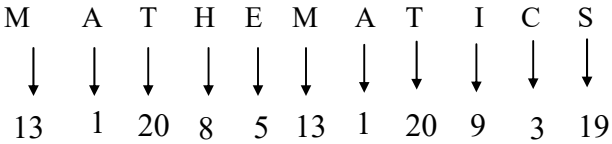
24. Ans: (b)

Sol:



(1+ 3) =4 5 1 (1 + 4) = 5 4 5 (1 + 8 = 9)

Similarly



(1 + 3 = 4) 1 (2 + 0 = 2) 8 5 (1 +3 = 4) 1 (2 + 0 = 2) 9 3 (1 + 9)10 = 10 = (1 + 0) = 1

Hence, the Answer is (b)

25. Ans: (d)

Sol: ∴ Alternative Letter's number sum and then difference

BANANA

2 + 14 + 14 = 30

1 + 1 + 1 = 3

∴ 30 – 3 = 27

MOTORE

13 + 20 + 18 = 51

15 + 15 + 5 = 35

∴ 51 – 35 = 16

LOFERS

12 + 6 + 18 = 36

15 + 5 + 19 = 39

∴ 36 – 39 = –3

1.6 Inserting the Missing Character

01. Ans: (a)

Sol: $(2 + 3)^2 = 25$

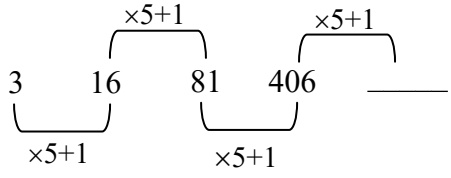
$(15 + 6)^2 = 441$

$(10 + 7)^2 = 289$

$(12 + 13)^2 = 625$

02. Ans: (d)

Sol:



= 405(5) + 1 = 2031

Option (d) is the correct Ans.

03. Ans: (c)

Sol: $21 = 4^2 + 2^2 + 1^2$

$98 = 5^2 + 3^2 + 8^2$

$x = 6^2 + 7^2 + 3^2$

x = 94

(c) is the correct Ans.

04. Ans: (a)

Sol: $1^{st} \times 3^{rd} = 2^{nd}$ (in column wise)

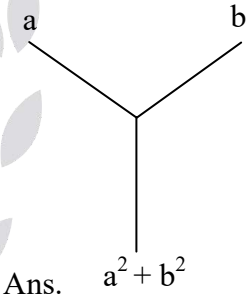
4 × 7 = 28

2 × 5 = 10

3 × 15 = 45

05. Ans: (b)

Sol:

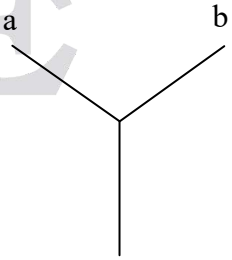


∴ $1^2 + 5^2 = 26$

Option (b) is correct Ans.

06. Ans: (b)

Sol:



$a^2 - b^2 = (a - b)(a + b)$

$(10 - 7)(10 + 7) = 51$

Option (b) is correct Ans.

07. Ans: (c)

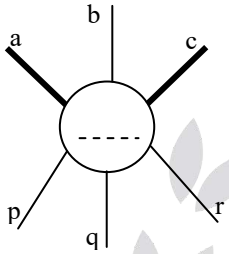
Sol:

$(3 \times 4 + 5 \times 5) = 37$

Option (c) is the correct Ans.

08. Ans: (b)

Sol:



$\therefore |a - p| \quad |b - q| \quad |c - r|$

$|8 - 2| \quad |6 - 4| \quad |3 - 1|$

$= 622$

Option (b) is the correct Ans.

09. Ans: (c)

Sol: $2 \times 7 = 14$

$15 \times 2 = 30$

$7 \times 9 = 63$

$9 \times 15 = 135$

Option (c) is the correct answer.

10. Ans: (d)

Sol: $93 = 27+63+3$

$79 = 38+ 37+4$

$67= 16+42+x$

$x = 9$

option (d) is the correct Ans

11. Ans: (d)

Sol: $2^2 + 2^2 + 3^2 + 4^2 = 33$

$3^2 + 4^2 + 5^2 + 2^2 = 54$

$3^2 + 4^2 + 5^2 + 6^2 = 86$

Option (d) is the correct Ans

12. Ans: (a)

Sol:

$$\left.\begin{matrix} a & b \\ - & + \\ c & d \end{matrix}\right\} (a-c)(b+d)$$

$10 \times 8 = 80$

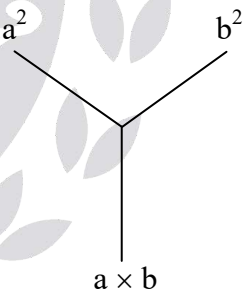
$5 \times 13 = 65$

$2 \times 24 = 48$

Option (a) is the correct Answer

13. Ans: (c)

Sol:



$2 \times 3 = 6$

$3 \times 4 = 12$

$4 \times b = 20$

$b = 5$

$\therefore b^2 = 25$

Option (c) is the correct Answer.

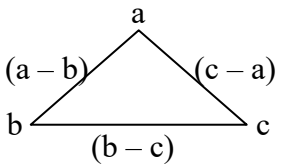
14. Ans: (b)

Sol:

$2 + 3 = 5$	$P + 3 = S$
$5 + 3 = 8$	$S + 3 = V$
$8 + 3 = 11$	$V + 3 = Y$

15. Ans: (c)

Sol:



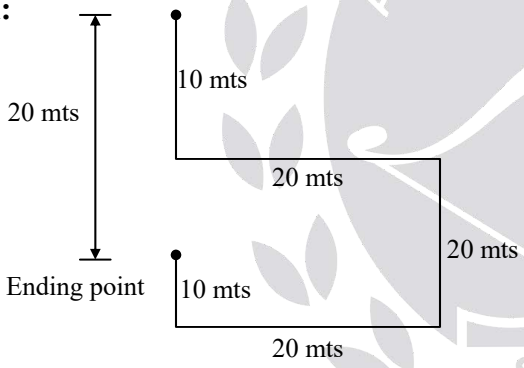
15-5 = 10

Option (c) is the correct Answer.

1.7 Directions

01. Ans: (b)

Sol:



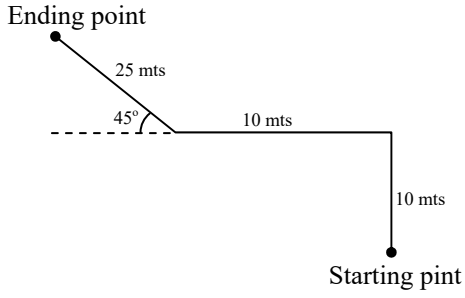
distance = 20 mts

Direction = South

Hence, the Answer is (b)

02. Ans: (c)

Sol:

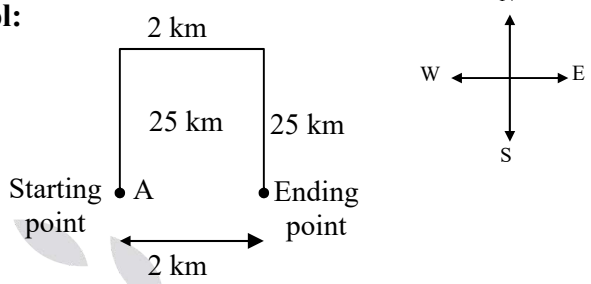


direction = North – West

Hence, the Answer is (c)

03. Ans: (b)

Sol:

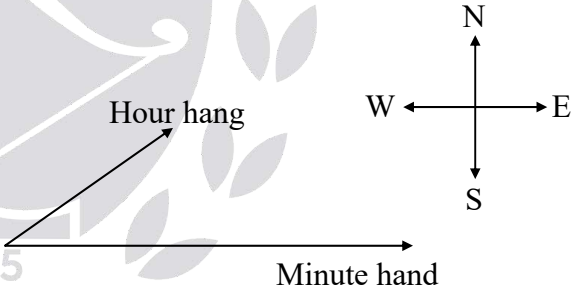


She need to drive 2 km to reach to the starting point.

Hence, the Answer is (b)

04. Ans: (a)

Sol: ∴ 4 : 30 clock diagram.



When the minute hand points to the East, hour hand points to the North – East direction

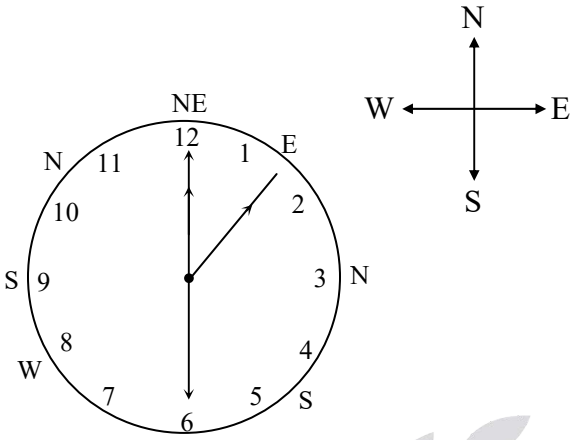
Hence, the Answer is (a)

05. Ans: (c)

Sol: Diagram is shown as per the conditions in the question

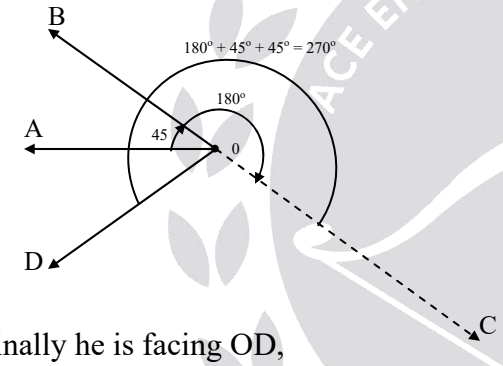
Clearly at 1:30 P.M hour hand shall point East

Hence, the Answer is (c)



06. Ans: (a)

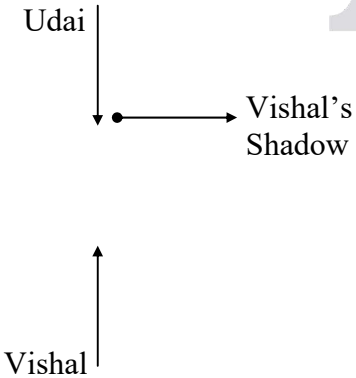
Sol:



Finally he is facing OD,
Which is south west
Hence the Answer is (a)

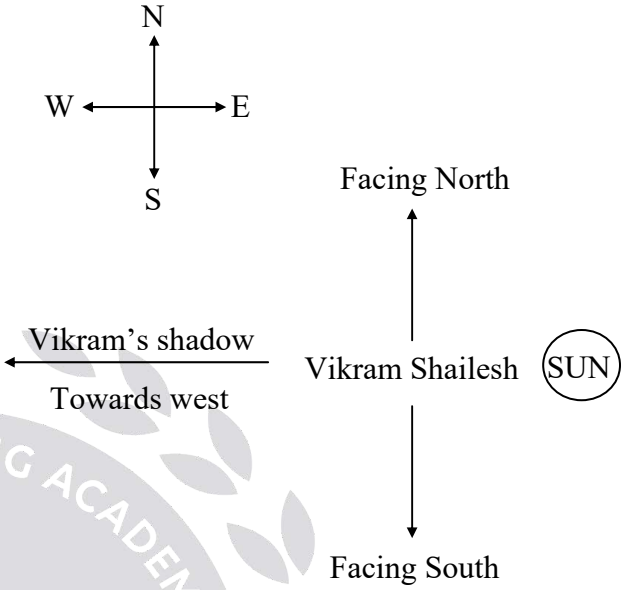
07. Ans: (c)

Sol:



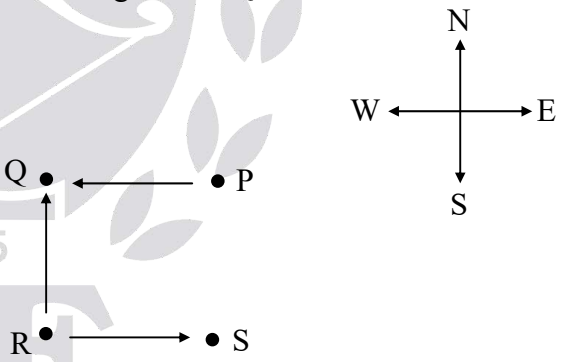
08. Ans: (d)

Sol:



09. Ans: (d)

Sol: According to P % Q + R – S



10. Ans: (c)

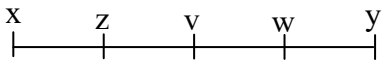
Sol: If sourth-east becomes North and North east becomes west, therefore, the whole figure moves through 135°. Hence, west will be south east.

See, Actual figure is rotating 135° anticlockwise, So, when west will be rotated by same degree anticlockwise. It will hold the place of south east.

1.8 Seating arrangements

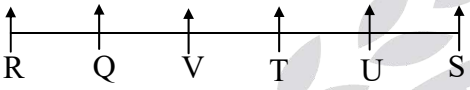
01. Ans: (a)

Sol:



02. Ans: (d)

Sol:

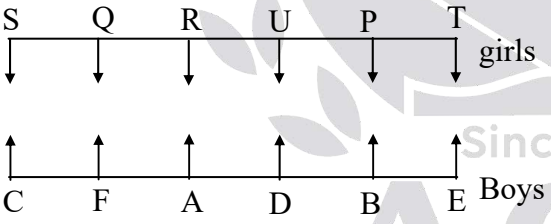


03. Ans: (a)

Sol:

04. (a) 05. (d) 06. (c)

Sol:



07. Ans: (a)

Sol: Four peoples are Rahul, Mathew, Seema and Lohit and in the group one engineer, one is a doctor, one a teacher and another a dancer.

Statement 1:

Seema Mathew

Statement 2:

Lohit ___ ___ ___ ___

Engineer

Statement 3:

Rahul ≠ doctor

Statement 4:

Teacher (or) Dancer Dancer (or) Teacher

Statement 5:

____ Seema

Doctor

From above conditions, the following line can be formed

Lohit Seema Rahul

↓ ↓ ↓

Doctor Teacher/Dancer Teacher/Dancer

Mathew

↓

Engineer

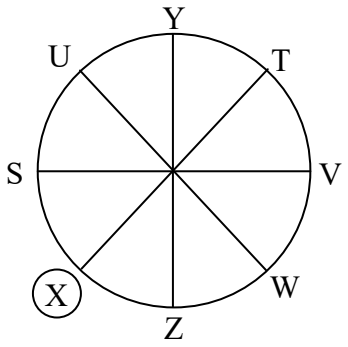
From above, an engineer in the group is Mathew.

08. Ans: (a)

Sol: From the given data, eight persons are seated around a circular table as follows

Y T V	S U Y
(or)	(or)
V T Y	Y U S

S — Z — — T



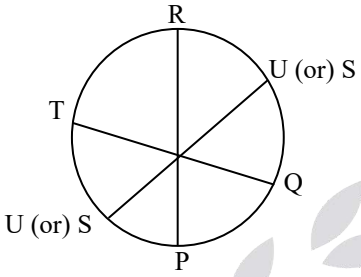
∴ X is third to the left of V

09. Ans: (c)

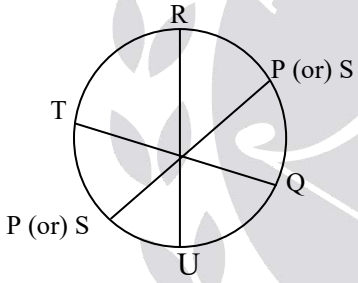
Sol: From the given data, all are seated around a circular table as follows

P Q – – R

S is opposite to U



P and U are switch seated means, they are interchange their places

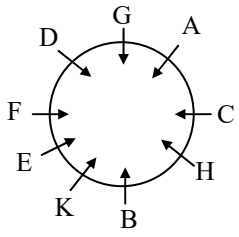


In option (c), before interchange T is immediately to the left of P and After interchange P is immediately to the right of Q.

∴ Option '(c)' is correct

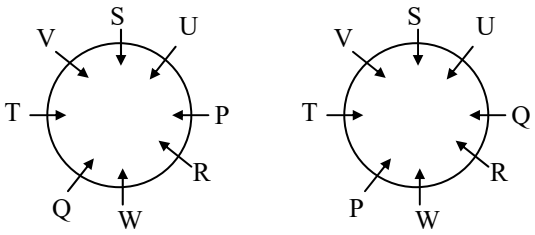
10. Ans: (d)

Sol:



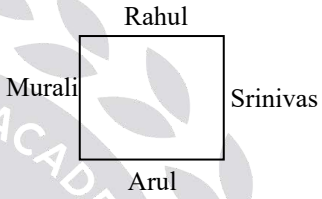
11. Ans: (a)

Sol:



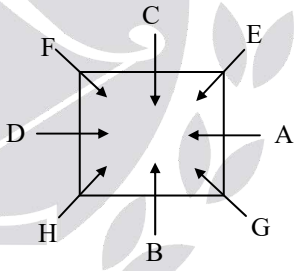
12. Ans: (c)

Sol:



13. Ans: (c, d)

Sol:



14. (c) 15. (a)

Sol:

22^{nd} → psychology → saturday

23^{rd} → Sunday

24^{th} → philosophy → Monday

25^{th} → Economics Tuesday

26^{th} → science → wenesday

27^{th} → Engineering → Thursday

28^{th} → sociology → Friday

16. Ans: (b)

Sol: We get the two possible orders

RS P T Q

QT P S R

17. Ans: (c)

Sol: M = S+ 2

T = 3+S = M + 1

$\Rightarrow$ P = 1+5 = M–1 = T–2

S < P < M < T

18. Ans: (d)

Sol: Ages is

Shiva > Leela > Pavithra

19. Ans: (d)

Sol:

G > R, L

L > S

M > G

$\therefore$ M > G > R, L > S

20. And: (c)

Sol: 10, 5, 4, 7, 2

1.9 Analytical Figure/Counting figure

01. Ans: 11

Sol:

a	b	c	d
p	q	r	s

A, b, c, d, p, q, r, s $\rightarrow$ 8

Abpq, bcqr, cdrs $\rightarrow$ 3

11

02. Ans: 204

Sol: For $8 \times 8 \Rightarrow 8^2 + 7^2+6^2 + 5^2 +4^2+3^2+2^2 + 1^2$

= 204

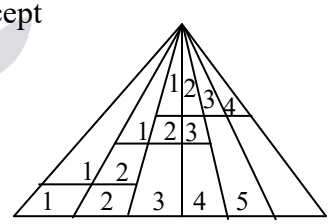
03. Ans: 40

Sol: By using base concept

1+2+3+4 = 10

1+2+3 = 6

1+ 2 = 3



$\Rightarrow$ 1+2=3 +4+5+6 = 21

Total = 21 + 3+6+10 = 40

04. Ans: 16

Sol: Form with single triangles = 8

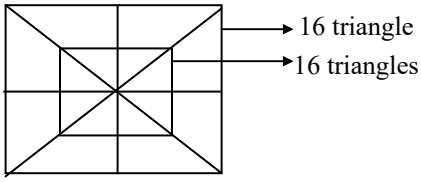
Form with double triangles = 4

Form with 4 triangles = 4

Total = 16

05. Ans: (c)

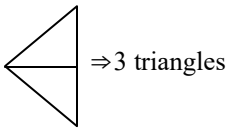
Sol:



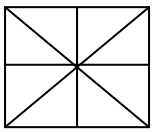
10 squares

06. Ans: (c)

Sol:

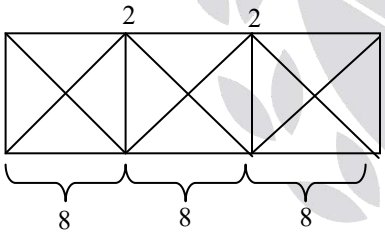


Total = 2 + 3 + 12= 17 triangles



07. Ans: (a)

Sol:

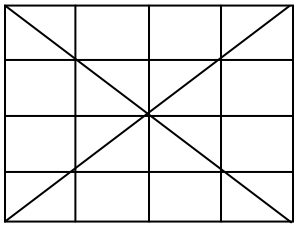


Number of triangles = 8 + 8+8+2+2 = 28

Number of squares = 3 + 2 = 5

08. Ans: (d)

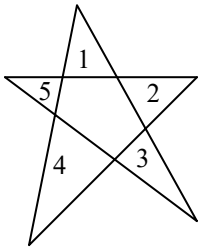
Sol:



Total number of triangle = 16+16+8×2 = 48

09. Ans: (d)

Sol:



5 + 5= 10

10. Ans: 48

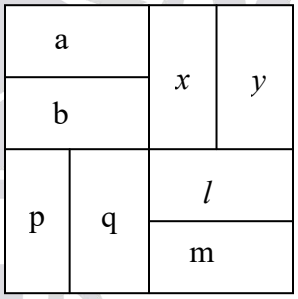
Sol: h = 5 odd

$$= \frac{h(h+2)(2h+1)-1}{8}$$

$$= \frac{5\times 7\times 11-1}{8} = \frac{384}{8} = 48$$

11. Ans: 21

Sol:



a, b, x, y, p, q, r, m = 8

ab, xy, pq, *l*n = 4

abx, xy*l*, bpq, q*l*m = 4

abpq, abxy, pq*l*n, xy*l*m – 4

abxypq*l*m = 1

total = 8+4+4+4+1= 21

12. Ans: (c)

Sol: $3C_2 \times 5C_2 = \frac{3!}{2!} \times \frac{5!}{3!2!}$

$= 3 \times 5 \times 2 = 30$

13. Ans: 18

Sol: $3C_2 \times 4C_2 = 3 \times 6 = 18$

14. Ans: (c)

Sol: $4C_2 \times 5C_2 = 60$

15. Ans: (b)

Sol: Horizontal lines = 4

Vertical lines = 0

Cross lines = 7

Total = 11

1.10 Syllogism/Logical Reasoning

01. Ans: (a)

Sol: Only conclusion I follows

Hence, the answer is (a)

02. Ans: (a)

Sol: Only conclusion I follows

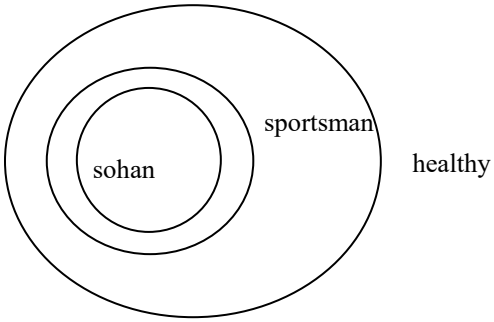
Hence, the answer is (a)

03. Ans: (c)

Sol: Either I (or) II follows

04. Ans: (b)

Sol:



Sohan is sportmen

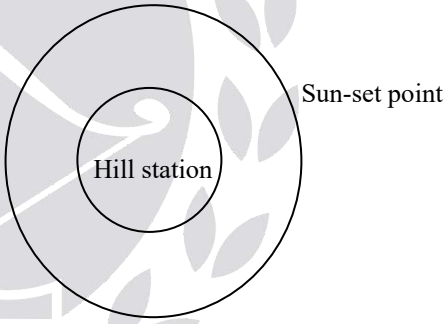
Sportmen is healthy

$\therefore$ not given healthy are sportmen

Only conclusion II follows

05. Ans: (a)

Sol:



Only conclusion I is follows

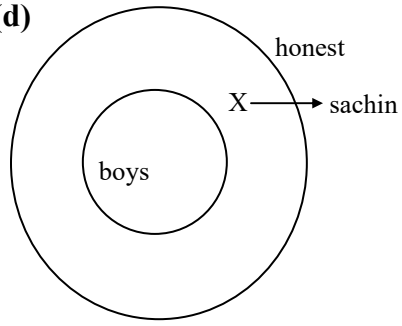
Hence, the answer is (a)

06. Ans: (c)

Sol: Either I or II follows

07. Ans: (d)

Sol:



Neither I nor II follows,

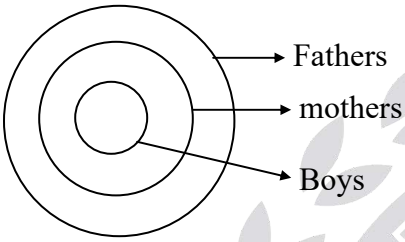
Hence, the answer is (d)

08. Ans: (c)

Sol: Either I are II follows

09. Ans: (b)

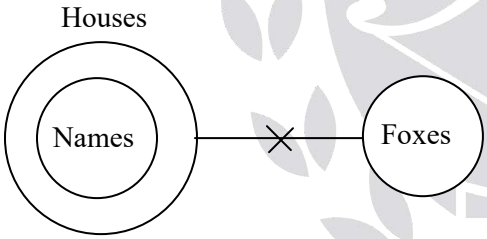
Sol:



Only conclusion II is follows

10. Ans: (d)

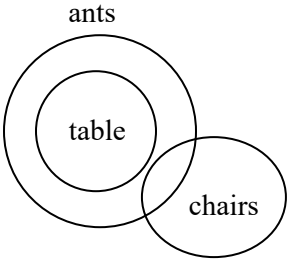
Sol:



Neither I nor II is follows

11. Ans: (d)

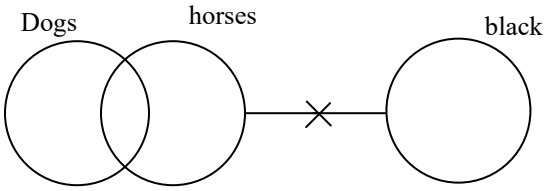
Sol:



Neither I nor II is follows

12. Ans: (b)

Sol:

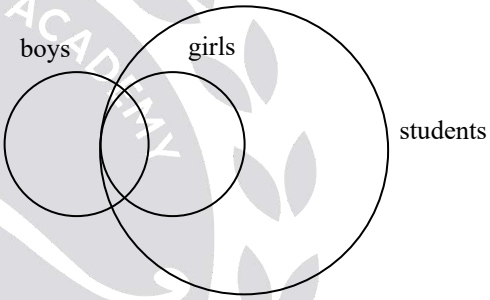


Only conclusion II follows

Hence, the correct and (b)

13. Ans: (a)

Sol:

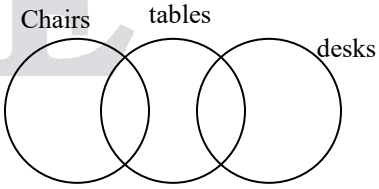


I, II, III follows

Hence, the correct and (a)

14. Ans: (c)

Sol:

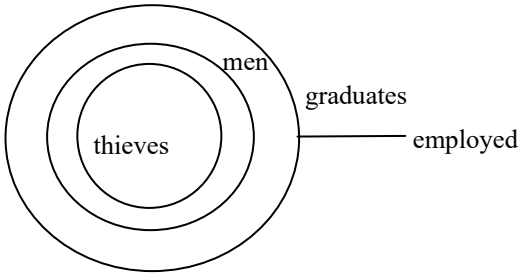


Either I and II follows

Hence, the correct ans (c)

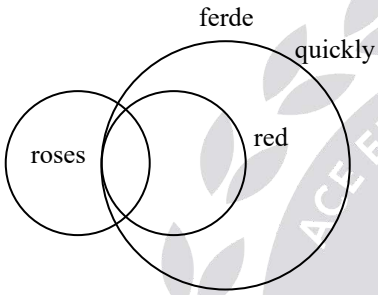
15. Ans: (a)

Sol:



16. Ans: (c)

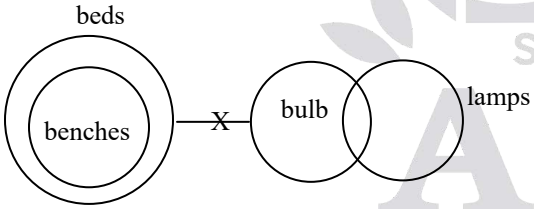
Sol:



If (i) and (ii) are true, than (iii) is true hence the correct options (c)

17. Ans: (d)

Sol:

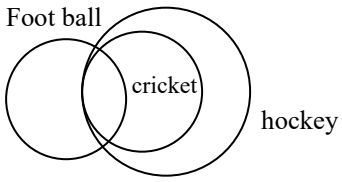


Neither I nor ii inferred

Hence the correct answer (d)

18. Ans: (d)

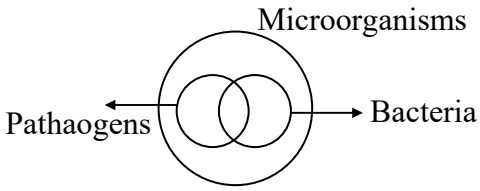
Sol:



Some football players play hockey hence, the correct answer (d)

19. Ans: (a)

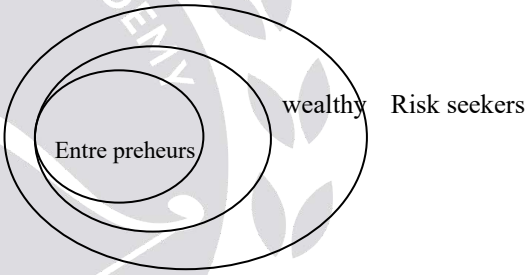
Sol:



Only conclusion I is correct.

20. Ans: (d)

Sol:



Neither conclusion I not II is hence, the correct and (d).

1.11 Series, Classification, Analogy

1.11. (a) Series:

01. Ans: (b)

Sol:

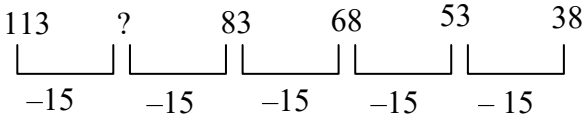
3 13 33 ? 153 313 633

+10 +20 +40 +80 +160 +320

40 + 33 = 73

02. Ans: (b)

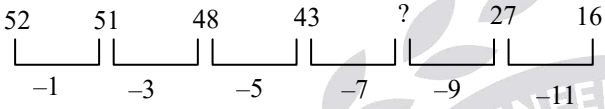
Sol:



113 – 15 = 98

03. Ans: (b)

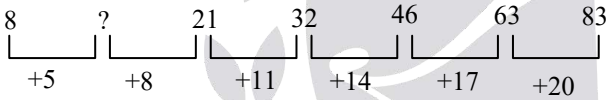
Sol:



43 – 7 = 36

04. Ans: (d)

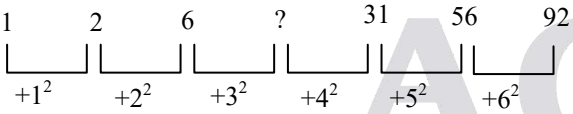
Sol:



8 + 5 = 13

05. Ans: (a)

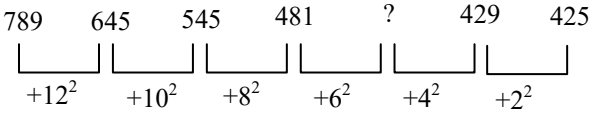
Sol:



6 + 9 = 15

06. Ans: (d)

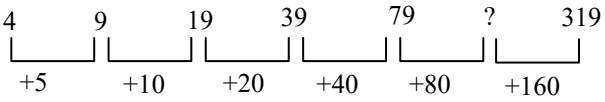
Sol:



= 481 + 64 = 445

07. Ans: (c)

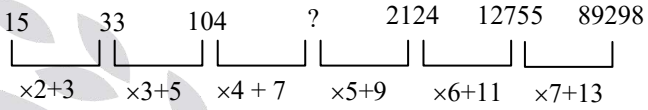
Sol:



= 79 + 80 = 159

08. Ans: (d)

Sol:

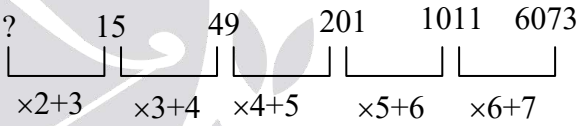


=104 × 4 + 7

= 423

09. Ans: (b)

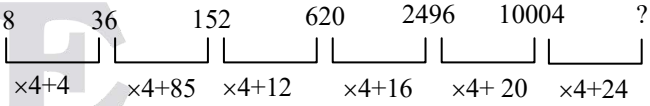
Sol:



2x +3 = 13 $\Rightarrow$ x = 6

10. Ans: (c)

Sol:



10004 × 4 + 24 = 40040

11. Ans: (d)

Sol: 4 × 2 + 2 = 10

10 × 3 + 3 =33

33 × 4 + 4 = 136

136 × 5 + 5 = 685

685 × 6 + 6 = 4116

12. Ans: (b)

Sol: 343, 1331, _____, 4913

7^3, 11^3, 13^3, 17^3

cubes of prime numbers.

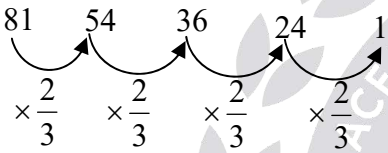
343, 1331, 2197, 4913

13. Ans: (b)

Sol: 2×6, 12×5, 60×4, 240×3, 720×2, 1440×1, 1440×0

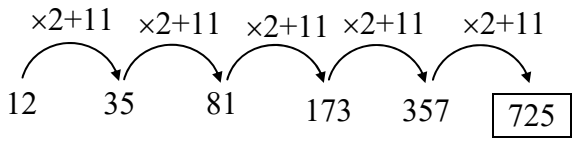
14. Ans: 16

Sol:



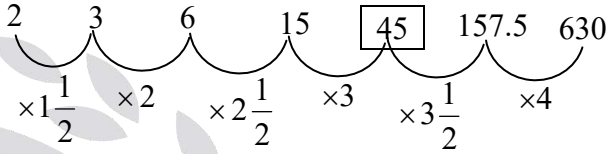
15. Ans: 725

Sol:



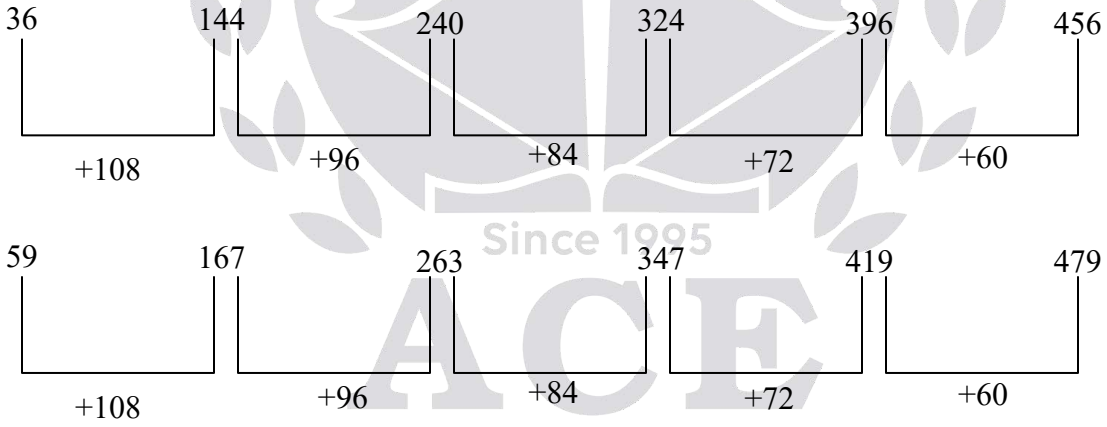
16. Ans: 45

Sol:



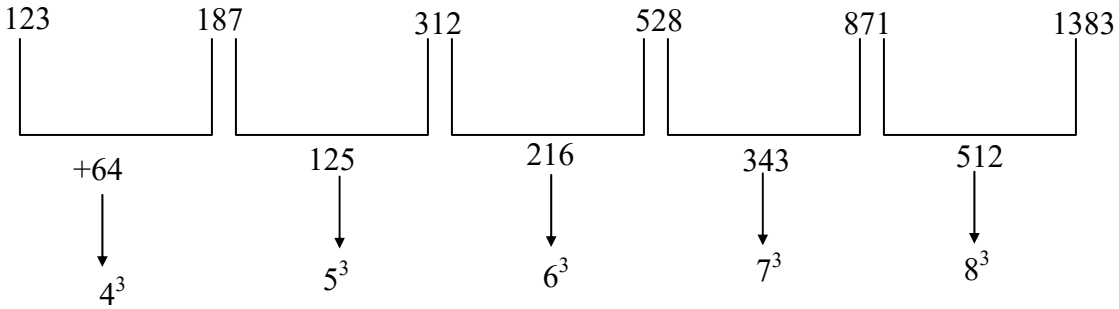
17. Ans: (a)

Sol:



18. Ans: (b)

Sol:



231 +64 = 295

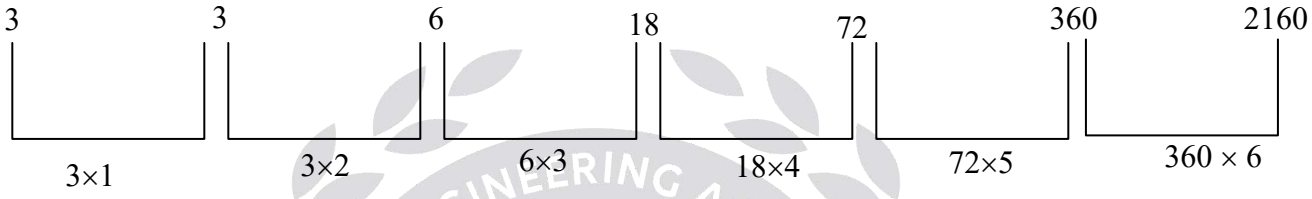
295 + 125 = 420

420 + 216 = 636

636 + 343 = 979

19. Ans: (c)

Sol:



9 ×1 = 9

9×2 = 18

18×3 = 54

54×4 = 216

216×5 = 1080

1080×6 = 6480

20. Ans: (c)

Sol: 14, 37, 611, 1016, 1522

First letter +2, +3, + 4, + 5

Second letter +3, +4, +5, +6

1522 = OV

21. Ans: (b)

Sol: 7G, 11K, 13 M, 17 Q

∴ Prime numbers

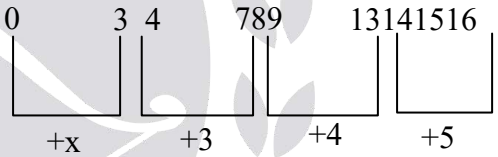
22. Ans: (c)

Sol: 13M, 17Q, 19S, 23W

∴ Prime numbers

23. Ans: (c)

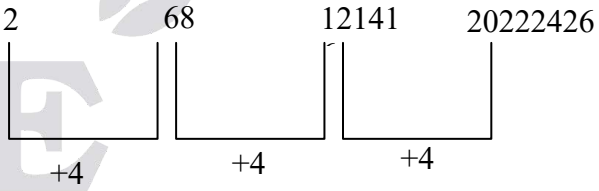
Sol:



13 14 15 16 = MNOP

24. Ans: (c)

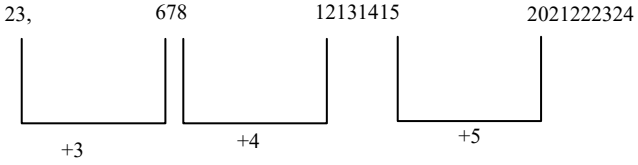
Sol:



20222426 = TVXZ

25. Ans: (b)

Sol:



20 21 22 23 24 = TUVWX

26. Ans: (c)

Sol: a b c c b a a b c c b a

27 Ans: (b)

Sol: a b a a b aab a a b a

28. Ans: (b)

Sol: a b ba a bb a ab b a

29. Ans: (c)

Sol: abc d d a b c c d a b b c

30 Ans: (c)

Sol: P Q R P P Q R P P Q R P P Q R P

11. (b) Classification /odd one out

01. Ans: (b)

Sol: 13 23 33 43 53

33 is not a prime number

02. Ans: (c)

Sol: $324 = 18^2$, $441 = 21^2$, $64 = 8^2$

But 97 is not square of any numbers.

03. Ans: (d)

Sol: $5^3 = 125$, $6^3 = 216$, $7^3 = 343$, $8^3 = 512$, $9^3 = 729$

04. Ans: (d)

Sol:

13339, 13452, 13564, 13678, 13791

+113 +112 +114 +113

Actually

13339, 13452, 13564, 13678, 13791

+113 +113 +113

05. Ans: (d)

Sol: $2 \times 7 - 7^2$, $2 \times 8 - 8^2$, $2 \times 10 - 10^2$, $2 \times 12 - 12^2$

06. Ans: (d)

Sol:

+4 ↓	1	12	18	22	24
	5	16	21	23	2
+4 ↓	9	20	26	4	6
+6 ↓	15	25	5	9	11

07. Ans: (c)

Sol:

+6 →	+3 →	+2 →	
17	23	26	2
2	8	11	13
23	3	7	10
13	19	22	24

08. Ans: (d)

Sol:

+8 →	+6 →	+4 →	
23	5	11	15
9	17	23	1
6	14	20	24
14	22	2	4

09. Ans: (d)

Sol: Nephew (male) remaining all female.

10. Ans: (b)

Sol: June (30 days) remaining all 31 days.

1.11 (c) Analogy

01. Ans: (b)

Sol: $3^2 : 5^3 :: 4^3 : 6^3$

02. Ans: (b)

Sol: $12^2 :: 12–2 :: 13^2 : 13–2$

03. Ans: (c)

Sol: $68 = 4^3 + 4$

$130 = 5^3 + 5$

$222 = 6^3 + 6$

$350 = 7^3 + 7$

04. Ans: (c)

Sol: $6\times7 :: 7\times8 :: 10\times11 : 11\times12$

05. Ans: (b)

Sol: $\frac{20}{10} : 2 :: \frac{24}{8} : 3$

06. Ans: (b)

Sol: M → 13

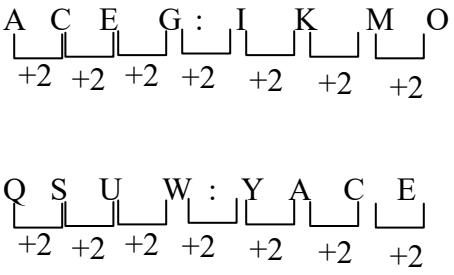
O → opposite is 12

H → 8

J → opposite is 17

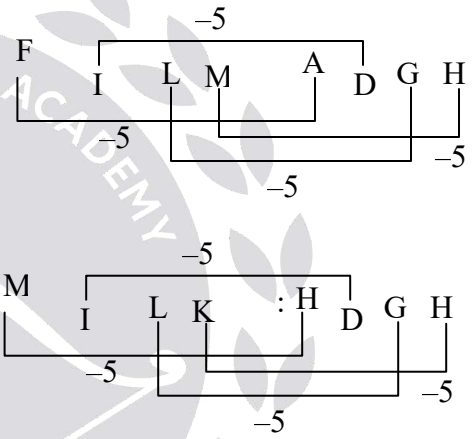
07. Ans: (c)

Sol:



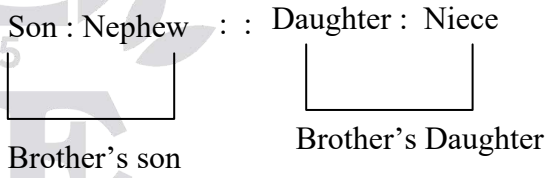
08. Ans: (c)

Sol:



09. Ans: (b)

Sol:



10. Ans: (c)

Sol: Pen : write : : knife : cut

Pen used for writing

Knife used for cutting

Chapter 2 Quantitative Aptitude

1.1 Number System

01. Ans: (c)

Sol: The unit place the square of natural number will not get 7.

Hence the correct answer 'c'

02. Ans: (c)

Sol: $31^{42} \times 33^{72} \times 48^{61} \times 37^{51}$

$31^{42} \Rightarrow$ unit place = 1

$33^{72} \Rightarrow \frac{72}{4} \Rightarrow$ reminder = 0 $\Rightarrow 3^0 = 1$

$48^{61} \Rightarrow \frac{61}{4} \Rightarrow$ reminder = 1 $\Rightarrow 8^1 = 8$

$37^{51} = \frac{54}{4} \Rightarrow$ reminder = 3 $\Rightarrow 7^3 = 343$

$= 1 \times 1 \times 8 \times 3 = 24$

Unit place of given expansion is 4

03. Ans: (c)

Sol: $2^{1999} \times 2^{2013}$

$2^{1999} \Rightarrow \frac{1999}{4} \Rightarrow$ reminder = 3 $\Rightarrow 2^3 = 8$

$2^{2013} \Rightarrow \frac{2013}{4} \Rightarrow$ reminder = 1 $\Rightarrow 2^1 = 2$

$= 8 \times 2 = 16$

Last digit is 6

04. Ans: (b)

Sol: $(217)^7 + (2172)^9 + (2173)^{11} + (2174)^{13}$

$(2171)^7 \Rightarrow$ last digit = 1

$(2172)^7 \Rightarrow \frac{9}{4} \Rightarrow$ reminder = 1 $\Rightarrow 2^1 = 2$

$(2173)^{11} \Rightarrow \frac{11}{4} \Rightarrow$ reminder = 3 $\Rightarrow 3^3 = 27$

$(2174)^{13} \Rightarrow$ power is odd $\Rightarrow 4$

$= 1+2+7+4 = 14$

05. Ans: 7

Sol: $211^{870} + 146^{127} \times 3^{424}$

$211^{870} \Rightarrow$ last digit = 1

$146^{127} \Rightarrow$ last digit = 6

$3^{424} \Rightarrow \frac{424}{4} \Rightarrow$ reminder = 0 $\Rightarrow 3^0 = 1$

$= 1+6(1) = 7$

Hence the correct answer (7)

06. Ans: (b)

Sol: $(26591749)^{110016}$

Given power is even so that unit place will be 1

$\therefore$ Unit digit = 9

07. Ans: (a)

Sol: $(35)^{87} + (93)^{46}$

$(35)^{87}$ the unit place = 5

$(93)^{46} \Rightarrow \frac{46}{4} \Rightarrow$ reminder = 2 $\Rightarrow 3^2 = 9$

$= 5 + 9 = 1\,4$

08. Ans: (d)

Sol:

$$\begin{array}{r|l} 2 & 1420 \\ 2 & 710 \\ 5 & 355 \\ & 71 \end{array}$$

$1420 = 2^2 \times 5^1 \times 71^1$

Number of factors (or) divisors = (2+1) (1+1) (1+1)

= 3(2) (2)

= 12

09. Ans: 8

Sol:

$$\begin{array}{r|l} 2 & 2014 \\ 19 & 1007 \\ & 53 \end{array}$$

$2014 = 2^1 \times 19^1 \times 53^1$

Number of factors (or) divisors = (1+1) (1+1) (1+1)

= 2(2) (2) = 8

10. Ans: 36

Sol:

$$\begin{array}{r|l} 2 & 2100 \\ 2 & 1050 \\ 5 & 525 \\ 5 & 105 \\ 3 & 21 \\ & 7 \end{array}$$

$2100 = 2^2 \times 3^1 \times 5^2 \times 7^1$

Number of divisors (or) factors = (2+1) (1+1) (2+1) (1+1)

= 3(2) (3) (2)

= 36

11. Ans: (d)

Sol: $63 = 9 \times 7 = 3^2 \times 7^1$

$55 = 5 \times 11 = 5^1 \times 11^1$

Number of divisors (or) factors

= (2+1) (1+1) (1+1) (1+1)

= 3(2) (2) (2) = 24

Hence the correct answer (d)

12. Ans: (c)

Sol: $24 = 4 \times 6 = 2 \times 2 \times 3 \times 2$

The given number must be divisible by 3

Hence the correct answer (c)

Divisible by 3, rule $\frac{\text{sum of digit}}{3}$

Then total number divisible by 3

$$\frac{7+1+5+x+4+2+3}{3} = \frac{22-1x}{3}$$

x – is replaced by 2, then total number divisible by -3

13. Ans: (c)

Sol: Where divisible by '3' rule.

$$\frac{4+7+6+a+b+0}{3}$$

$$\frac{17+a+b}{3}$$

So a, b values becomes (7, 4), (8, 5)

Bored on options.

$$\underbrace{4\ 7}\ \ \underbrace{6\ a}\ \ \underbrace{b\ 0}$$

$4 + 6 + b = 7 + a + 0$

$a - b = 3$

So according to option 'c' is possible

(8, 5)

$\therefore$ option (c) is existing

14. Ans: (b)

Sol: Divisible by 3, rule $\frac{\text{sum of digit}}{3}$

Then total number divisible by 3

$$\frac{7+1+5+x+4+2+3}{3}=\frac{22-1x}{3}$$

x – is replaced by 2, then total number divisible by -3

15. Ans: (d)

Sol: $\frac{\text{LCM}(5,8,11)}{\text{HCF}(2,9,14)}=5\times8\times11=440$

Hence the correct ans (d)

16. Ans: (a)

Sol: LCM (5, 6, 10, 12, 15)

5	5, 6, 10, 12, 15
2	1, 6, 2, 12, 15
3	1, 3, 1, 6, 3
	1, 1, 1, 2, 1

$= 5\times2\times3\times2 = 60$ sec

Hence the correct answer (a)

17. Ans: (a)

Sol: LCM (48, 72, 108)

3	48, 72, 108
4	16, 24, 36
2	4, 6, 9
3	2, 3, 9
	2, 1, 3

$\Rightarrow 3\times4\times2\times3\times2\times3 = 432$ sec

432 sec = 7 min : 12 sec

$$\begin{array}{r} 8:20:00 \\ 07:12 \\ \hline 8:27:12 \text{ am} \end{array}$$

Hence the correct answer (a)

18. Ans: (d)

Sol: $4,\quad 5\frac{1}{2},\quad 8$

$\frac{4}{1},\ \frac{11}{2},\ \frac{8}{1}$

LCM of numbers for fracture

$\Rightarrow \frac{\text{LCM of numerator}}{\text{HCF of demonator}}$

$= \frac{\text{LCM of}(4,\ 11,\ 3)}{\text{HCF of}(1,\ 2,\ 1)}$

= 88 hrs

Smallest speed 4 km/h

Then $\frac{88}{4}=22$ hrs

19. Ans: (c)

Sol: Required least number = LCM of given + common remainder

= LCM (20, 42, 76) + 7

= 7980 + 7

` = 7987

20. Ans: (d)

Sol: xy = LCM × HCF

480 y = 4800 × 160

y = 1600

21. Ans: (c)

Sol: HCF (42, 49, 63)

The factors of 42 = 1, 2, 3, 6, 7, 14, 21, 42

The factors of 49 = 1, 7, 49

The factors of 63 = 1, 3, 7, 9, 21, 63

Then the greatest common factor is 7

22. Ans: (d)

Sol: HCF [408, 468, 516] = 12

23. Ans: (c)

Sol: HCF = [403, 434, 465] = 31

24. Ans: (b)

Sol: $x + y = 9$ …… (1)

$10x + y - 45 = 10y + x$ ……. (2)

By solving (1) and (2) $x = 7,\ y = 2$

Since number is 72

25. Ans: (d)

Sol: Given that

$x + y = 26$

$xy = 165$

$(x+y)^2 = (x-y)^2 + 4xy$

$(26)^2 = (x-y)^2 + 4(165)$

$x - y = 4$

Hence the correct ans (d)

2.2 Ratio, Proportion & Variation

01. Ans: (d)

Sol: 70 must be divisible by a + b if ratio is a :b

So that 1 : 3 cannot represent the ratio of boys and girls in the class

02. Ans: (b)

Sol: $A : D = \frac{A}{B} \times \frac{B}{C} \times \frac{C}{D}$

$= \frac{8}{15} \times \frac{5}{8} \times \frac{4}{5}$

$A : D = \frac{4}{15}$

03. Ans: (a)

Sol: Let the number of seats for Mathematics, Physics and Biology be 5x, 7x and 8x respectively.

Number of increased seats are (140% of 5x), (150% of 7x) and (175% of 8x).

$\Rightarrow \left(\frac{140}{100} \times 5x\right), \left(\frac{150}{100} \times 7x\right)$ and $\left(\frac{175}{100} \times 8x\right)$

$\Rightarrow 7x, \frac{21x}{2}$ and $14x$

$\therefore$ The required ratio $= 7x : \frac{21x}{2} : 14x$

$\Rightarrow 14x : 21x : 28x$

$\Rightarrow 2 : 3 : 4$

04. Ans: (d)

Sol: Let share of A,B and C be Rs.(3x+5),(4x+10) and (5X+15)

Then Total amount=3x + 5 + 4x + 10 + 5x +15 = 12x + 30

According to the question

$\Rightarrow 12x + 30 = 2430$

$\Rightarrow 12x = 2400$

$\Rightarrow x = 200$

B'share=4x + 10 = 4 × 200 + 10 = 810 Rs

05. Ans: (d)

Sol: Quantity of milk = $\left(60\times\frac{2}{3}\right)$ litres = 40 litres

Quantity of water in it = (60 –40) litres = 20 litres

New ratio = 1 : 2

Let the quantity of water to be added further be x litres

Then milk : water = $\left(\frac{40}{20+x}\right)$

Now, $\left(\frac{40}{20+x}\right)=\frac{1}{2}$

$\Rightarrow 20 + x = 80$

$\Rightarrow x = 60$

$\therefore$ Quantity of water to be added = 60 litres

06. Ans: (a)

Sol: Let their salries be 9x and 7x

Let their expenditure be 4y and 3y

According to the question,

$9x - 4y = 2000 \rightarrow (1)$

$7x - 3y = 2000 \rightarrow (2)$

By solving above (1), (2) we get

x = 2000, y = 4000

So,

Salary of first person = 9 × 2000 = Rs. 18000

Salary of second person = 7× 2000 = Rs. 14000

07. Ans: (b)

Sol: Quantity of tin in 60 kg of A

$=\left(60\times\frac{2}{5}\right)$ kg

= 24 kg

Quantity of tin in 100 kg of B

$=\left(100\times\frac{1}{5}\right)$kg

= 20 kg

$\therefore$ Quantity of tin in the new alloy

= (24 + 20) kg

= 44 kg

08. Ans: (c)

Sol: There are 25 paise, 10 paise and 5 paise coins in a bag

Their ratio is 1 : 2 : 3

Here total value is Rs. 30

Let exact quantity of coins be x, 2x, 3x respectively.

Then value of all coins combined = 25x + 10(2x) + (5)3x = 30 × 100 paise

$\Rightarrow 60 x = 30 \times 100$ paise

$\Rightarrow x = 50$

Number of 5 paise coins = 3x = 150

09. Ans: (d)

Sol:

Alloy (A)			Alloy (B)			Alloy (C)		
Gold		Copper	Gold		Copper	Gold		Copper
2	:	3	3	:	7	$\frac{2}{5}+\frac{3}{10}$	:	$\frac{3}{5}+\frac{7}{10}$
$\frac{2}{5}$	:	$\frac{3}{5}$	$\frac{3}{10}$	:	$\frac{7}{10}$	$\frac{4+3}{10}$	:	$\frac{6+7}{10}$
						7	:	13

10. Ans: (d)

Sol: Let number of boys participated = 4x

Number of girls participated = 3x

Total passed candidates = $\frac{80}{100}\times 7x = \frac{28}{5}x$

Girls candidate who passed

$$= \frac{90}{100}\times 3x = \frac{27}{10}x$$

Boys candidate who passed = Total passed candidate - Girls candidate who passed

$$= \frac{28}{5}x - \frac{27}{10}x$$

$$= \frac{29}{10}x$$

$$= \frac{29x}{10\times 4x}\times 100 = 72.5\%$$

11. Ans: (d)

Sol: Number of hens in farm $Q = \frac{5}{32}\times 416 = 65$

Number of ducks in farm

$Q = \frac{14}{32}\times 416 = 182$

Number of goats in farm

$Q = \frac{13}{32}\times 416 = 169$

Initially, the number of hens, ducks and goats in farm P are 65, 91 and 169 respectively.

Al the hens, ducks, and goats are sent from farm Q to farm P.

Number of hens = 65 + 65 = 130

Number of ducks = 91 + 182 = 273

Number of goats = 169 + 169 = 338

$\therefore$ the required ration = 130 : 273 : 338 = 10 : 21 : 26

12. Ans: (b)

Sol: Let the third proportional to 12 and 30 be x.

Then,

$\Rightarrow$ 12 : 30 : : 30 : x

$\Rightarrow x = \frac{(30\times 30)}{12} = 75$

$\therefore$ Third proportional to 12 and 30 = 75

Mean proportional between 9 and 25

$$= \sqrt{9\times 25} = 15$$

$\therefore$ Required ratio = 75 : 15 = 5 : 1

13. Ans: (b)

Sol: $P^2 - 1 = K(q + 2)$

$4^2 - 1 = K(3+2)$

$15 = k(5)$

$K = 3$

$\therefore P^2 - 1 = 3(q+2)$

$P^2 - 1 = 3(14 + 2)$

$P^2 = 49 \Rightarrow P = 7$

14. Ans: (a)

Sol: $P + 3 = \frac{K}{\sqrt{q}}$

$-2 + 3 = \frac{k}{\sqrt{4}}$

$\therefore k = 2$

$p + 3 = \frac{2}{\sqrt{q}}$

$p + 3 = \frac{2}{\sqrt{9}}$

$p + 3 = \frac{2}{3}$

$p = \frac{2}{3} - 3 = -\frac{7}{3}$

$p = -\frac{7}{3}$

15. Ans: (b)

Sol: Price $\propto$ (Length)^2

$\therefore$ Price = K (Length)^2, where K is constant

i.e 1600 Rs = K $(10)^2$

$\therefore$ K = 16

Total price of 2 pieces $= K\left(L_1^2\right) + K\left(L_2^2\right)$

$= K\left(L_1^2 + L_2^2\right)$

$= 16\,(4^2 + 6^2)$

= Rs. 832

2.3 Partnership

01. Ans: (d)

Sol: Just take care of the months of investment, rest all will be simple.

Yogesh : Pranab : Atul

$= 45000 \times 12 : 60000 \times 9 : 90000 \times 3$

= 2 : 2 : 1

Atul's share

$= \text{Rs.}20000 \times \frac{1}{5}$

= Rs. 4000

02. Ans: (c)

Sol: **A: B :C** = [(3 × 16000) + (9× 11000)] : [(3 × 12000) + (9 ×17000)] : [(6 × 21000)]

= (48000 + 99000) : (36000+153000) : (126000)

= 147000 : 189000 : 126000

= 49 : 63 : 42 = 7 : 9 : 6

Therefore, Amount $= 26400 \times \left(\frac{9-6}{7+9+6}\right)$

$= 26400 \times \frac{3}{22} = 1200 \times 3 = \text{Rs.}3600$

03. Ans: (a)

Sol: A : B : C

= (25 lakhs × 1 + 35 lakhs ×2) : (35 lakhs × 2 + 25 lakhs × 1) : (30 lakhs × 3)

= 95 lakhs : 95 lakhs : 90

= 19 : 19 : 18

04. Ans: (a)

Sol: Let A invest Rs 14a for 10 months and B invest Rs 15a for b months

The, $\frac{14a \times 10}{15a \times b} = \frac{7}{6}$

$b = \frac{840}{105} = 8$

Hence B invested money for 8 months

05. Ans: (b)

Sol: For managing, A received = 5% of Rs. 7400

= Rs. 370

Balance = Rs. (7400 –370) = Rs. 7030

Ratio of their investments = (6500×6) : (8400 × 5) : (10000×3)

= 39000 : 42000 : 30000

= 13: 14 : 10

$\therefore$ B's share

$= \text{Rs. } 7030 \times \frac{14}{37}$

= Rs. 2660

06. Ans: (c)

Sol:

	A		B
Investments	3	:	2

10% profit → foundation

↓ 100–10

90% → both A and B

Let total profit = x

Profit

$\Rightarrow A : B = 3 : 2$

A′s share = $\frac{3}{3+2} \times 90\%$ of x

$\Rightarrow \frac{3}{5} \times \frac{90}{100} \times x$

$\Rightarrow \frac{27}{50} \times x$

$\frac{27}{50} x = 810$

x = 1500

07. Ans: (d)

Sol: Suppose B invested Rs. x for y months

Then, A invested Rs. 3x for 2y months

So, A : B

= (3x × 2y) : (x ×y)

= 6xy : xy

= 6 : 1

∴ B's profit : Total profit = 1 : 7

Let the total profit is Rs. X

Then, $\frac{1}{7} = \frac{4000}{x}$

x = 28000

08. Ans: (d)

Sol: Let B join after 'x' months

A joins for 12 months with Rs 4,500

B joins for (12–x) months with Rs 5,400

$\Rightarrow \frac{4500 \times 12}{5400 \times (12-x)} = \frac{2}{1} \Rightarrow x = 7$

09. Ans: (a)

Sol: Let A invests $\frac{x}{6}$ for $\frac{y}{6}$ Month

B invests $\frac{x}{3}$ for $\frac{y}{3}$ Month

C invests $\left[x - \left(\frac{x}{6} + \frac{x}{3}\right)\right]$ for y months

Ratio of their investments

$= \left(\frac{x}{6} \times \frac{y}{6}\right) : \left(\frac{x}{3} \times \frac{y}{3}\right) : \left(\frac{x}{2} \times y\right)$

$= \frac{1}{36} : \frac{1}{9} : \frac{1}{2} = 1 : 4 : 18$

∴ B's share = Rs $\left(4600 \times \frac{4}{23}\right)$ = Rs800

10. Ans: (a)

Sol: For management A receive = 960

Balance amount = (9600 –960) = 86400

Ratio of their investment = 12000: 20000 = 3 : 5

∴ A's share $= 8640 \times \left(\frac{3}{8}\right) = 3240$

So, A receive = (3240 + 960) = 4200

2.4 Averages

01. Ans: (a)

Sol: Now each student awarded 4-grace marks.

So average also increased by 4

New average = 69 + 4 = 73

02. Ans: (b)

Sol: If each number is trippled

Then average in also trippled

Old average = 32

New average = 3(32) = 96

03. Ans: (b)

Sol: 10, 20, 30, …….. 190

$$\text{Avg} = \frac{\text{first term} + \text{last term}}{2}$$

$$= \frac{10+190}{2} = 100$$

04. Ans: (a)

Sol: First 4 days average

$$\text{Average} = \frac{A+B+C+D}{4} = 58$$

$A + B + C+D = 4(58) = 232 \quad \rightarrow (1)$

Average 2^{nd}, 3^{rd}, 4^{th}, 5^{th} day $\Rightarrow$ $\frac{B+C+D+E}{4} = 60$

$B + C+ D+ E = 240 \quad \rightarrow (2)$

$(2) – (1) = E–A = 8 \quad \rightarrow (3)$

Ratio of 1^{st} and 5^{th} = A : E = 7: 8 $\Rightarrow$ 7x, 8x say

From (3)

8x – 7x=8

x = 8

So fifth day = 8x = 8(8) = 64

05. Ans: (c)

Sol: $\frac{\text{sum}_9}{9} = x$ say

$$\frac{\text{sum}_8 + 9\text{th}}{9} = x$$

$$\frac{8[30]+(x+20)}{9} = x \; [\because \; 9^{th} \text{ person spent 20 more than average of '9' persons}]$$

$260 + x= 9x$

$8x = 260$

$x = \frac{260}{8} = 32.5$

Total expenditure = 8 [30] + (x+20)

= 240 + 32.5 + 20 = 292.50

06. Ans: (c)

Sol: $\frac{\text{sum}_{11}}{11} = 50 \quad \Rightarrow \text{sum}_{11} = 550$

$\frac{\text{sum}[\text{First 6 results}]}{6} = 49 \Rightarrow \text{sum}_6 = 6[49] = 294$

$\frac{\text{sum}[\text{Last 6 results}]}{6} = 52 \Rightarrow \text{sum}_6 \Rightarrow 6(52) = 312$

Sixth result is = $[\text{sum}_{(\text{first–6})} + \text{sum}_{(\text{least 6})}] - \text{sum}_{11}$

= 294 + 312–550

= 56

07. Ans: (d)

Sol: Total 30 days

Day – 1 is Sunday

So next Sundays are 8, 15, 22, 29

i.e., (1, 8, 15, 22, 29) = 5 Sundays

$$\text{Average} = \frac{5[510]+25[240]}{30} = 285$$

08. Ans: (c)

Sol: 'M' observations average is 'n'

But there wrong observations, instead of correct observations.

Then

$$\text{Original average} = \frac{\text{Mn} - (\text{wrong} - \text{correct})}{\text{M}}$$

$$= \frac{14(71)-[(42+74)-(56+32)]}{14} = 69$$

09. Ans: (c)

Sol: $\frac{A+B+C}{3} = 84$

$A + B + C = 252 \rightarrow (1)$

$\frac{A+B+C+D}{4} = 80 \Rightarrow A+B+C+D = 320$

$252 + D = 320$

$D = 68$

$E = D + 3 = 68 + 3 = 71$

$\frac{B+C+D+E}{4} = 79 \Rightarrow B + C + D + E$

$= 4(79) = 316$

$B + C + 68 + 71 = 316$

$B + C = 316 - 139 \Rightarrow 177$

From (1) $A + B + C = 252$

$A = 252 - (B+C) = 252 - 177 = 75$

10. Ans: (b)

Sol: In a family = 7 members

$\frac{\text{sum}_7}{7} = 29$

$\text{Sum}_7 = 7\ (29) = 203$

5 years ago, every person in family also back.

$7(5) = 35$ yrs less

$203 - 35 = 168$

So average of 6 members = $\frac{168}{6} = 28$

($\because$ 5 years ago, boy was not there, so remaining 6 members)

11. Ans: (a)

Sol: $\frac{\text{sum}_{11}}{11} = x$

$\frac{\text{sum}_9 + 26 + 29}{11} = x$

Average of 9 persons

$\frac{\text{sum}_9}{9} = x - 1$

($\because$ 1 year less than average of whole team

So $\Rightarrow x - 1$)

$\text{Sum}_9 = 9x - 9$

$\frac{9x - 9 + 26 + 29}{11} = x$

After simplify $x = 23$

i.e. whole team average = 23

12. Ans: 495

Sol: x, x +2, x +4, x +6, x +8…….

$5x + 20 = 425$

$5x = 405$

$x = 81$

Hence 12 odd numbers

81,83,85, 87, 89, 91,93, 95, 97, 99, 101, 103

Sum of last 5 numbers = 495

13. Ans: 163

Sol: Let us suppose 8 consecutive odd numbers be x, x + 2, x + 4 ……. x +14.

Given that their Sum = 656

$8x + 56 = 656$

$8(x+7) = 656$

$x + 7 = \frac{656}{8} = 82$

x = 75 (also smallest odd number)

Now let us consider fore even numbers be

x , x+2 , x+ 4, x+6

Given that Average = 87

$\frac{4x+12}{4} = 87$

$\frac{4(x+3)}{4} = 87 \Rightarrow x = 84$

second largest even number = x + 4 = 88

sum of smallest odd number & second largest even number = 75 + 88 = 163

14. Ans: (d)

Sol: Concept Adding and removing

$= \frac{\text{MP - removing + adding}}{M} = \text{Avg}$

$= \frac{45[52] - 5[48] + 5[54]}{45}$

$= 52.66 \text{ or } 52\frac{2}{3}$

15. Ans: (d)

Sol: $\frac{\text{sum}_{24}}{24} = 16$ | $\frac{\text{sum}_{23} + B}{24} = 17$

$\text{Sum}_{23} + T + B = 384 \ldots (1)$ | $\text{Sum}_{23} + B = 4080 \ldots (2)$

From (1) & (2)

Student weight not given T – B = 24

So not sufficient

2.5 Problem on Ages

01. Ans: (a)

Sol: Let the present age of the man be x years

Then,

$\Rightarrow 3(x+3) - 3(x-3) = x$

$\Rightarrow x = 18$

$\therefore$ The present age of the man is 18 years

02. Ans: (c)

Sol: $\frac{5x-4}{3x+4} = \frac{1}{1}$

$\therefore x = 4$

$\frac{5x+4}{3x-4} = \frac{24}{8} = 3:1$

03. Ans: (d)

Sol $\therefore 10x - 13 = 3(2x+5)$

$\Rightarrow 6x+15 = 10x-13$

$\Rightarrow 15 + 13 = 10x - 6x$

$\Rightarrow x = 7$

$\therefore$ Hema's age = $2x + 5 = 2 \times 7 + 5 = 19$ years

04. Ans: (c)

Sol: Let the ages of Kunal and Sugar 6 years ago be 6x and 5x years respectively.

Then, $\frac{(6x+6)+4}{(5x+6)+4}=\frac{11}{10}$

$\Rightarrow 10(6x+10) = 11(5x+10)$

$\Rightarrow 5x = 10$

$\Rightarrow x = 1$

$\therefore$ Sagar's present age = (5x+6) = 16 years

05. Ans: (a)

Sol: Let the son's present age be x years. Then,

(38–x) = x

$\Rightarrow 2x = 38$

$\Rightarrow x = 19$

$\therefore$ Son's age 5 years back (19–5) = 14 years

2.6 Time and Work

01. Ans: (c)

Sol: A $\rightarrow$ 32 pages $\rightarrow$ 8 hr $\Rightarrow \frac{32}{8}=4$ pages 1 hr

B $\rightarrow$ 40 pages $\rightarrow$ 5 hr $\Rightarrow \frac{40}{5}=8$ pages 1 hr

So, A + B = 4+8 pages in 1 hr

12P $\rightarrow$ 1 hr

120p $\rightarrow$?

$\frac{120}{12}=10\,\text{hrs}$

02. Ans: (b)

Sol: A $\rightarrow$ 100 pages in 5 hrs = $\frac{100}{5}$ = 20 pg/hr

A & B $\rightarrow$ 100 pages in 4 hr = $\frac{100}{4}$ = 25 pages/hr

So, B $\Rightarrow$ (A+B) – A

= 25–20 = 5 pages/hour

For 20 pages $\Rightarrow$ 4 hours

03. Ans: (c)

Sol: Equation Method

$\frac{1}{10}+\frac{1}{15}+\frac{1}{12}\Rightarrow$ 1day work

$\frac{12+8+10}{120}$

$=\frac{30}{120}$

$=\frac{1}{4}$ (1 day work) $\therefore$ Total 4 days

(OR)

$\frac{60}{\frac{60}{10}+\frac{60}{15}+\frac{60}{15}}=\frac{60}{15}=4$ days

(OR)

Formula

$\frac{xyz}{xy+yz+z}=\frac{10[15][12]}{150+120+180}=4$ days

04. Ans: (b)

Sol: A $\rightarrow \frac{1}{3}(w)=5 \Rightarrow$ 15 days [for complete work]

B $\rightarrow \frac{2x}{5}(w)=10 \Rightarrow$ 25 days for complete work

A and B = $\frac{\text{product}}{\text{sum}}=\frac{15[25]}{40}=\frac{75}{8}\Rightarrow 9\frac{3}{8}$

05. Ans: (d)

Sol: P $\Rightarrow$ 12 (8) = 96 hrs

Q $\Rightarrow$ 8 (6) = 48 hrs

P & Q Together = $\frac{96(48)}{144} \Rightarrow 32$ hrs

But they work 8 hrs per day

$\frac{32}{8} = 4\,\text{days}$

06. Ans: (d)

Sol: 5 Skilled workers can build a wall in 20 days 1 skilled workers $5 \times 20 = 100$ days

1 day work of skilled worker = $\frac{1}{100}$

8 semi-skilled workers can build-wall = 25

1 semi-skilled worker $= 8 \times 25 = 200$ days

1 day work of semi-skilled worker = $\frac{1}{200}$

10 unskilled workers can build a wall

= 30 days

1 unskilled workers

$= 10 \times 30 = 300$ days

1 day work of unskilled worker

$= \frac{1}{300}$

$\therefore$ 2 skilled + 6 semi- killed + 5unskilled

$$= 2\left(\frac{1}{100}\right)+6\left(\frac{1}{200}\right)+5\left(\frac{1}{300}\right)$$

$$= \frac{1}{50}+\frac{3}{100}+\frac{1}{60}=\frac{6+9+5}{300}=\frac{1}{15}$$

$\therefore$ 2 skilled+6 semi+skilled + 5 unskilled can build a wall = 15 days

07. Ans: (a)

Sol: $2\left[\frac{\text{L.C.M of(given)}}{\frac{\text{L.C.M}}{x}+\frac{\text{L.C.M}}{y}+\frac{\text{L.C.M}}{z}}\right]$

$$2\left[\frac{60}{\frac{60}{12}+\frac{60}{15}+\frac{60}{20}}\right] \Rightarrow 2\left[\frac{60}{5+4+3}\right] = 2[5] = 10$$

days

08. Ans: (a)

Sol: $\frac{1}{9}+\frac{1}{12} = [A+B] = 2\,\text{days}$

$2\text{days} = \frac{4+3}{36}$

$2\text{ days} = \frac{7}{36}$

$10\text{ days} = \frac{35}{36}$

Remaining Work = $\frac{1}{36}$

11^{th} day start with A

$$\frac{9}{1}=\frac{?}{\frac{1}{36}} \qquad \left[\because \frac{D_1}{W_1}=\frac{D_2}{W_2}\right]$$

$9 \times \frac{1}{36} = \frac{1}{4}$

So 10 days + $\frac{1}{4}$ = 10 ¼ days

09. Ans: (d)

Sol: $2\left[\frac{1}{8}+\frac{1}{10}+\frac{1}{12}\right]+x\left[\frac{1}{10}+\frac{1}{12}\right]=1$

$\Rightarrow \frac{2[15+12+10]+x[12+10]}{120}=1$

$22x = 120–74 = 46$

$x=\frac{46}{22}=2$ hrs (approximate)

9 am + 2 hr + 2 hr = 1 pm

10. Ans: (b)

Sol: Equation Method:

$3\left[\frac{1}{12}\right]+x\left[\frac{1}{12}+\frac{1}{15}\right]+3\left[\frac{1}{15}+\frac{1}{30}\right]=1$

$\frac{15+x[5+4]+3[4+2]}{60}=1$

$\Rightarrow 9x = 60–33$

$x=\frac{27}{9}=3$

So total days

$\Rightarrow 3 + 3+3 = 9$

11. Ans: 100

Sol: A and C completed the work : $\frac{19}{23}$

(Difference 4 parts out of 23 done by B)

$\frac{4}{23}\times 575 \Rightarrow 100/-$

[$\because$ Amount shows is equal to working Ratio]

12. Ans: (c)

Sol: $5\left[\frac{1}{10}+\frac{1}{15}\right]\times 2\left[\frac{1}{x}\right]=1$

$\frac{25}{30}+\frac{2}{x}=1$

$\frac{2}{x}=\frac{1-25}{30}=\frac{5}{30}$

$\frac{2}{x}=\frac{1}{6}$

$x = 12$ days

Days 10, 15, 12

$=\frac{1}{10}:\frac{1}{15}:\frac{1}{12}$

$=\frac{5}{10}:\frac{5}{15}:\frac{2}{12}$

$=\frac{30:20:10}{60}$

$= 30 : 20 : 10$

$= 3 : 2:1$

$A=\frac{3}{6}\times 450=225$

13. Ans: (b)

Sol: $\frac{\text{LCM of (given)}}{\frac{\text{L.C.M}}{x}+\frac{\text{L.C.M}}{y}+\frac{\text{L.C.M}}{z}}$

$A = 18$

$B = 6 \quad \therefore \left(\frac{18}{3}=6\right)$

$C = 3.6 \quad \therefore \left(\frac{18}{5}=3.6\right)$ days

$=\frac{18}{\frac{18}{18}+\frac{18}{6}+\frac{18}{3.6}}$

$=\frac{18}{1+3+5}=2$ days

Hint: (For L.C.M)

L.C. M of (3.6, 6, 18) = 18

14. Ans: (b)

Sol: Chain rule

$$\frac{M_1D_1H_1}{W_1} = \frac{M_2D_2H_2}{W_2}$$

$$\frac{7[7]}{7} = \frac{100(x)}{100}$$

$x = 7$

15. Ans: (a)

Sol: Chain rule

$$\frac{M_1D_1H_1x\%}{W_1} = \frac{M_2D_2H_2y\%}{W_2}$$

$$\frac{2[12][8][90]}{9000} = \frac{3[6][80][x]}{12000}$$

$x = 16$ hr/day

16. Ans: (d)

Sol: $\dfrac{30[104][8]}{\frac{2}{5}} = \dfrac{26[104+x]9}{\frac{3}{5}}$

$160 = 104 + x$

$X = 56$ men (additional men)

17. Ans: (c)

Sol: $\dfrac{5[12]}{300} : \dfrac{7[18]}{600}$ (Q : R)

$20 : 21$

Here 'Q' participated only '5' days only

Hint:

Q – Total capability = 12(25) = 300

R = 12 × 50 = 600

18. Ans: (a)

Sol: $M_1D_1 = M_2D_2$

$52[10] = 40[x]$

$x = 13$ days

but we need (here many more)

13–10 = 3 days

(OR)

$52[10] = 40[10+x]$

$10+x = 13$

$x = 3$

19. Ans: (c)

Sol: $1200\,M + 500\,W = \frac{1}{2} \times 1$

$900\,M + 250 = \frac{1}{3} \times 2$

$1200\,M + 500\,W = \frac{1}{2}$

$1800\,m + 500W = \frac{2}{3}$

$600\,m = \frac{2}{3} - \frac{1}{2} = \frac{4-3}{6} = \frac{1}{6}$

600 m = 6 weeks

? = 1 week

600(6) = x(1)

x = 3600

20. Ans: (a)

Sol: $x + y = 8$ days

$\Rightarrow x + y = \frac{1}{8} \quad \rightarrow (1)$

$\frac{x}{2} + 2y = 5\,\text{day} \Rightarrow \frac{x+4y}{2} = \frac{1}{5}$

$x + 4y = \frac{2}{5} \quad \rightarrow (2)$

From (1) & (2)

x = 30 days

2.7 Pipes and Cisterns

01. Ans: (a)

Sol: If 3-pipes are opened

Then 1 hr work = $\frac{1}{10}+\frac{1}{12}-\frac{1}{20}$

$=\frac{6+5-3}{60}=\frac{8}{60}\Rightarrow\frac{2}{15}$

Then total tank filled in = $\frac{15}{2}$hr

$=7\frac{1}{2}$hrs

02. Ans: (a)

Sol: $\frac{1}{10}-\frac{1}{6}\Rightarrow\frac{6-10}{60}=\frac{-4}{60}=\frac{-1}{15}$

i.e., tank empty in 15 min

but $\frac{2}{5}$ tank only field

so $\frac{2}{5}$ the of tank empty in - ?

$t\rightarrow 15$ min

$\frac{2}{5}(t)$-?

$15\times\frac{2}{5}=6\,\text{min}$ for empty tank

03. Ans: (b)

Sol: $\frac{1}{5}+\frac{1}{4}-\frac{1}{20}\Rightarrow\frac{4+5-1}{20}=\frac{8}{20}=\frac{2}{5}$

Tank filled in $=\frac{5}{2}$hrs

$2\frac{1}{2}$hrs $=2.50$ hrs

04. Ans: (b)

Sol: P Q R

$\frac{1}{30}$ $\frac{1}{20}$ $\frac{1}{10}$

All are opened 3-min $\Rightarrow$

$3\left[\frac{1}{30}\right]:3\left[\frac{1}{20}\right]:3\left[\frac{1}{10}\right]$

$\Rightarrow\frac{1}{30}:\frac{1}{20}:\frac{1}{10}\Rightarrow\frac{2:3:5}{60}$

i.e., $\frac{2}{60}:\frac{3}{60}:\frac{6}{60}$

$\Rightarrow 2:3:6$

So, proportion of solution 'R' is $\frac{6}{11}$

05. Ans: (b)

Sol: Half tank already filled, so 3 hrs

Remaining half tank -?

Filled by 4 – pipes

Let, by using 4-pipes tank filled in

$=\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}$

$=\frac{4}{6}=\frac{2}{3}$(1 hr work)

Tank filled in = $\frac{3}{2}\Rightarrow 1:30$

We need half tank only, so

$\frac{\frac{3}{2}}{2}=\frac{3}{4}\text{hrs}=\frac{3}{4}\times 60=45$ min

Total time = 3hr + 45 mm = 3 : 45

06. Ans: (b)

Sol: (A+ B)'s 1 hr work = $\frac{1}{12}+\frac{1}{15}=\frac{5+4}{60}=\frac{9}{60}$

$\rightarrow (1)$

(A+C)'s 1 hr work = $\frac{1}{12}+\frac{1}{20}=\frac{5+3}{60}=\frac{8}{60}$

$\rightarrow (2)$

(1) + (2) means 2 hrs work

$\frac{9}{60}+\frac{8}{60}=\frac{17}{60}$

$2\,\text{hr}=\frac{17}{60}$

$6\text{hr}=\frac{51}{60}$

Remaining work = $1-\frac{51}{60}\Rightarrow\frac{9}{60}$

This remaining work done by ne xT hrs

With (A + B), (throught-1)

So 6 + 1 = 7 hrs

07. Ans: (a)

Sol: $4\left[\frac{1}{6}-\frac{1}{12}\right]+6\left[\frac{1}{9}-\frac{1}{12}\right]+x\left[\frac{1}{9}\right]=1$

$\frac{4(6-3)+6(4-3)+4x}{36}=1$

$4x = 36–18 = 18$

$x=\frac{18}{4}=4.50\,\text{hr}$

Total time = 4+6+4.50 = 14.50

08. Ans: (d)

Sol: $3\left(\frac{1}{12}+\frac{1}{15}\right)+x\left(\frac{1}{15}\right)=1$

$\frac{3(5+4)+4x}{60}=1$

$4x = 60 – 27$

$x=\frac{33}{4}=8\frac{1}{4}=8\,\text{min}.\frac{1}{4}\times 60\,\text{sec}$

= 8 min. 15 sec

09. Ans: (a)

Sol: $10\left(\frac{1}{15}+\frac{1}{20}-\frac{1}{25}\right)+x\left(\frac{1}{15}+\frac{1}{20}\right)=1$

$\frac{10(20+15-12)+x(20+15)}{300}=1$

$35x = 300–230$

$x=\frac{70}{35}=2\,\text{hrs}$

Total time = 10 + 2 = 12 hrs

10. Ans: (c)

Sol: $\frac{1}{20}+\frac{1}{24}-\frac{1}{x}=\frac{1}{15}$

$\frac{1}{20}+\frac{1}{24}-\frac{1}{15}=\frac{1}{x}$

$\frac{6+5-8}{120}=\frac{1}{x}$

$\frac{1}{40}=\frac{1}{x}$

x =40 min

i.e., pipe 'c' can empty the tank in 40 min

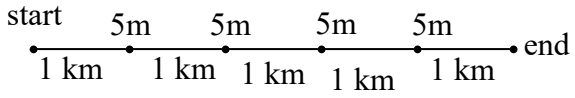
$\because$ each min – 3 gallons water out

= 40 ×3 = 120 gallons

2.8 Time, Speed and Distance

01. Ans: (c)

Sol:



10 km → 60 min

5 km → 30 min

30 m + 20 min (for rest) = 50 min

02. Ans: (c)

Sol: 5 +2 = 7 hrs

03. Ans: (d)

Sol: 21→ Poles i.e., 20 spaces

20 × 50 = 1000 meteres

1000 → 1 min

1000 → 60 sec

$\text{Speed} = \frac{1000}{60}\text{m/s}$

$= \frac{1000}{60}\times\frac{18}{5} \Rightarrow 60$ km/s

04. Ans: (a)

Sol: $\text{A}\xrightarrow{D = ST}\text{B}$

$D = \frac{5}{4}(S)(T-6)$

$ST = \frac{5}{4}(S)(T-6)$

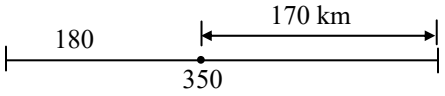
4T = 5(T–6)

T = 30

05. Ans: (d)

Sol: Speed = 80 km/h → 2hr : 15 min → 160 + 20 = 180

Next speed = 60 kmph



60 km ⟶ 60 min

170 km ⟶ ?

$\frac{60\times170}{60} = 170\,\text{min}$

$\frac{170}{60} = 2\text{hr}\,50\,\text{min}$

5 : 20 + 2:15 + 2:50 = 10 : 25

06. Ans: (b)

Sol: 60 km → 60 min

48 km → 60 min

12 km → ?

$\frac{60\times12}{60} = 12\,\text{min}$

07. Ans: (c)

Sol: $T_1 \sim T_2 = 2$ hr

$\frac{715}{s} - \frac{715}{s+10} = 2$

Use options, s = 55 km/h

08. Ans: (c)

Sol: D = 20(T) [∵ D = speed × Time]

$D = 30\left(T - 1\frac{1}{2} - 2\frac{1}{2}\right)$

20T = 30 (T–4)

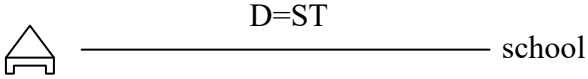
$2T = 3T - 12$

$T = 12$

So distance $= 20(12) = 240$ km

09. Ans: (c)

Sol:



$D = \frac{3(T+5)}{60} \rightarrow 1^{st}$ day ($\because$ convert into hr's)

so $\div 60$

$D = \frac{4(T-10)}{60} \rightarrow 2^{nd}$ day

$\frac{3(T+5)}{60} = \frac{4(T-10)}{60}$

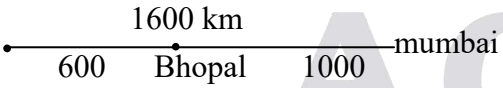
$D = \frac{3(55+3)}{60} = 3\text{km}$

$3T+15 = 45-40$

$T = 55$

10. Ans: (a)

Sol:



$\frac{S_1}{S_2} = \frac{\frac{600}{T}}{\frac{1000}{T}}$

$\frac{S_1}{S_2} = \frac{600}{1000} \Rightarrow \frac{3}{5}$ Travelling time equal

$\therefore\ S_1 : S_2 = 3:5$

11. Ans: (b)

Sol: Average speed $= \frac{\text{Total dis tance}}{\text{Total Time}}$

$= \frac{200+300+500}{3+4+3}$

$= 100$ km/h

12. Ans: (a)

Sol:

Average speed $= \frac{2xy}{x+y}$

$\Rightarrow \frac{2(36)(24)}{60} = 28.8$

Where two distance are same, then we have to apply same formula.

13. Ans: (c)

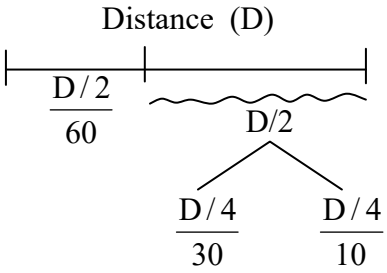
Sol:

Average speed $= \frac{\text{Total Dis tance}}{\text{Total Time}} = \frac{3D}{\frac{D}{80}+\frac{D}{60}+\frac{D}{30}}$

$\Rightarrow \frac{3}{\frac{3+4+8}{240}} = \frac{3(240)}{15} = 48$ kN/m

14. Ans: (c)

Sol:



$$\frac{D}{\frac{D}{120}+\frac{D}{120}+\frac{D}{40}}=\frac{1}{\frac{1+1+3}{120}}\Rightarrow 24\,km/h$$

15. Ans: (b)

Sol: Average speed $= \frac{T.D}{T.Time}$

$$=\frac{1(50)+2(48)+3(50)}{1+2+3}$$

$$\Rightarrow 50\frac{1}{3}\text{ km/h}$$

16. Ans: (a)

Sol: $7\sec=\frac{L(T)}{S(T)}$

$$25\text{ sec}=\frac{L(T)+378}{S(T)}$$

(1) and (2) $\frac{7}{25}=\frac{L}{L+378}$

$7L(T) + 7(378) = 25\,L(T)$

$L(T) = 147$

From (1) $S(T)=\frac{L(T)}{Time}=\frac{147}{7}\times\frac{18}{5}$

$\Rightarrow 75.6$ km/h

17. Ans: (a)

Sol: $10=\frac{L(T)}{40}$

$L(T) = 400$ meter

$$30=\frac{400+L(Bridge)}{40}$$

$1200 = 400 + L(B)$

$L(B) = 800$ m

18. Ans: (d)

Sol: $25=\frac{L(T)+L(P)}{15}\rightarrow(1)$

$$14=\frac{L(T)}{(54-9)\times\frac{5}{18}}$$

$$L(T)=14\times45\times\frac{5}{18}\Rightarrow 175$$

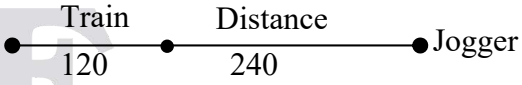
From(1), $25=\frac{175+L(P)}{15}$ .....

(L(P) = length of platform)

Then L(P) = 200

19. Ans: (c)

Sol:



$$=\frac{T.D}{R.S}=\frac{\text{total distance}}{\text{relative speed}}$$

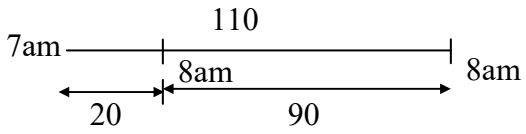
$$\Rightarrow\frac{120+240}{(45-9)\times\frac{5}{18}}$$

$$=\frac{360(18)}{36\times5}$$

$\Rightarrow 36$ sec

20. Ans: (d)

Sol:



Compare with 8 am

$$= = \frac{T.D}{R.S} = \frac{90}{20+25} = 2hrs$$

8 am + 2 hrs = 10 am

21. Ans: (b)

Sol: In 1 hr, one car cover 10 km more than other. So at the time of meeting one car cover 120 km more than other car.

1hr ⟶ 10 km

? ⟶ – 120 km

$$\frac{120\times 1}{10} = 12\,hrs$$

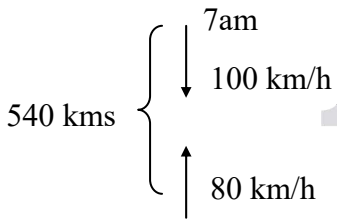
First car ⇒ 12 × 50 = 600

2nd car ⇒ 12 × 60 = 720

Total covered distance = 1320

22. Ans: (b)

Sol:



$$T = \frac{T.D}{R.S} = \frac{540}{100+80} = 3\ hrs$$

7 am + 3 hrs = 10 am

23. Ans: (c)

Sol: $\text{Time} = \frac{T.D}{R.S} \Rightarrow \frac{30\,km}{75-60} = 2\,hrs$

Distance = 95 km/hr × 2hr = 150 km

(after started the first train 2nd train start 75 km/h. and also gap between at the time of 2nd train start 30 kms.

$$\Rightarrow T_2 \frac{\left(\begin{matrix}\text{Travelled}\\ 1/2\,hr\end{matrix}\right)}{30} T_1$$

24. Ans: (a)

Sol:

$$\text{Train (speed}_1) = \frac{D}{1}$$

$$\text{Train (speed}_2) = \frac{D}{1.5}$$

Total distance (D) = S_1 T + S_2 T

$D = S_1 T + \frac{D}{1.5} T$ (they travel same 'T' hrs than they are meet each other)

$$D = DT\left[1+\frac{1}{\frac{3}{2}}\right]$$

$$1 = T\left[\frac{5}{3}\right]$$

$$T = \frac{3}{5}hr = \frac{3}{5}\times 60 = 36\,min$$

= 4hr and 36 min

25. Ans: (c)

Sol: Down Stream Speed = $\frac{32}{6}\left(\text{i.e.}, x+y=\frac{32}{6}\right)$

Up Stream Speed = $\frac{14}{6}\left(\text{i.e.}, x-y=\frac{14}{6}\right)$

Stream speed $(y)=\frac{1}{2}\left[\frac{32}{6}-\frac{14}{6}\right]=\frac{1}{2}\left[\frac{18}{6}\right]$

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

26. Ans: (c)

Sol: Down Stream Speed = Up Stream Speed

$\frac{20}{16+x}=\frac{12}{16-x}$

Clearly, we are getting x = 4 km/h

27. Ans: (a)

Sol: Distance $=\frac{T\left(x^2-y^2\right)}{2x}=\frac{10\left(20^2-10^2\right)}{2(20)}=75\,\text{km}$

28. Ans: (d)

Sol: x = 10

y = ?

T = 20

$75=\frac{20\left(10^2-y^2\right)}{2(10)}$

$75=100-y^2$

$y^2=25$

$y=\sqrt{25}=5$

29. Ans: (a)

Sol: Down Stream speed = 3 (Up stream speed)

20 + y = 3(20–y)

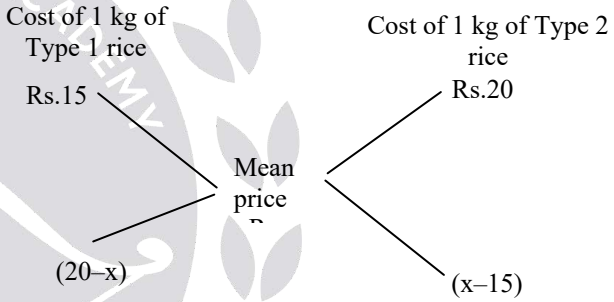
4y = 40

y = 10 km/h

2.9 Mixture and Allegation

01. Ans: (a)

Sol:



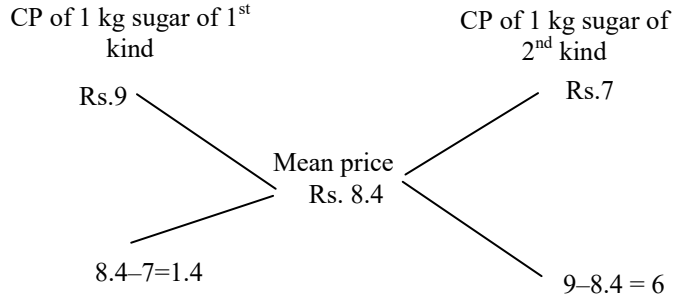
By rule of allegation,

$\frac{20-x}{x-15}=\frac{2}{3}$

x = 18

02. Ans: (d)

Sol:



i.e., to get a cost price of 8.4, the sugars of kind 1 and kind 2 should be mixed in t he ratio 1.4 : 0.6 = 14 : 6 = 7 : 3

Suppose x kg of kind 1 sugar is mixed with 27 kg of kind 2 sugar.

Then x : 27 = 7 : 3

$\Rightarrow 3x = 27 \times 7$

$\Rightarrow x = 63$

03. Ans: (d)

Sol: Let the cost price of spirit be Rs. 1 per litre

Spirit in 1 litre mixture in $A = \frac{5}{7}$ litre;

Cost price of 1 litre mixture in $A = \text{Rs.}\frac{5}{7}$

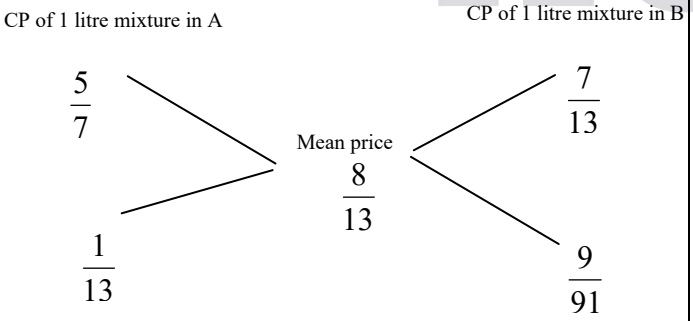
Spirit in 1 litre mixture in B = Rs. $\frac{7}{13}$ litre;

Cost price of 1 litre mixture in $B = \text{Rs.}\frac{7}{13}$

Spirit in 1 litre mixture of $C = \frac{8}{13}$ litre;

Mean price = $\text{Rs.}\frac{8}{13}$

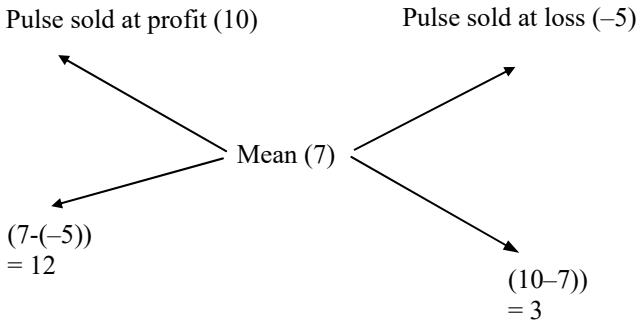
By the rule of allegation, we have:



$\therefore$ Request ratio = $\frac{1}{13} : \frac{9}{19} = 7 : 9$

04. Ans: (a)

Sol:



Therefore, ratio of pulses sold at 10% profit 5% loss = 12 : 3 = 4 :1

Therefore, quantity of pulse sold at 10% profit

$$= \frac{4}{4+1} \times 50$$

$$= \frac{4}{5} \times 50$$

and quantity of pulse sold at 5% loss

$$= \frac{1}{4+1} \times 50$$

$$= \frac{4}{5} \times 50 = 10\,\text{kg}$$

05. Ans: (b)

Sol: Let the cost of 1 litre milk be Rs.1

Milk in 1 litre mixture in 1st can = $\frac{3}{4}$ litre,

C.P. of 1 litre mixture in 1st can Rs $\frac{3}{4}$

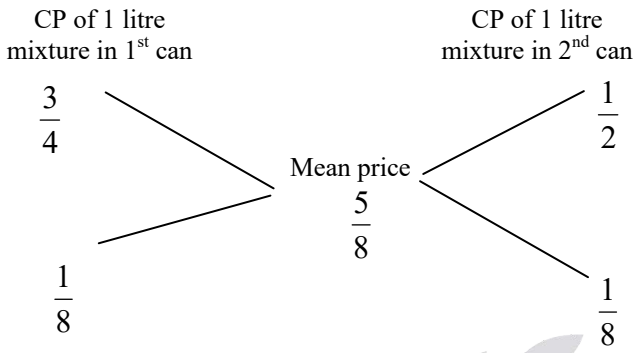
Milk in 1 litre mixture in 2nd can = $\frac{1}{2}$ litre,

C.P. of 1 litre mixture in 2nd can Rs. $\frac{1}{2}$

Milk in 1 litre of final mixture = $\frac{5}{8}$ litre,

Mean price = Rs. $\frac{5}{8}$

By the rule of allegation, we have:



$\therefore$ Ratio of two mixtures= $\frac{1}{8}:\frac{1}{8}=1:1$

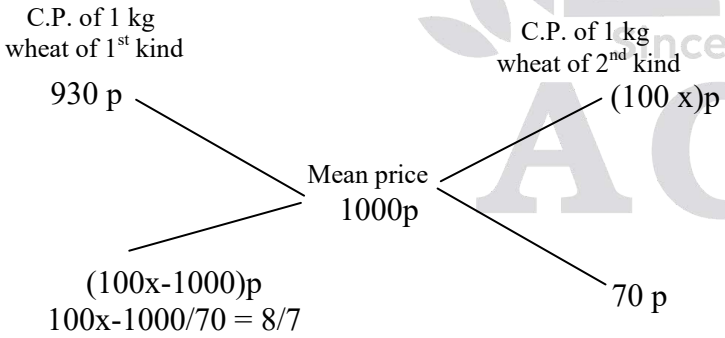
So, quantity of mixture taken from each can

$=\left(\frac{1}{2}\times 12\right)=6\,\text{litres}$

06. Ans: (c)

Sol: Let the rate of the second quantity be Rs. X per kg

By the rule of allegation we have:



So

700x – 7000 = 560

700x = 7560

x = Rs. 10.80

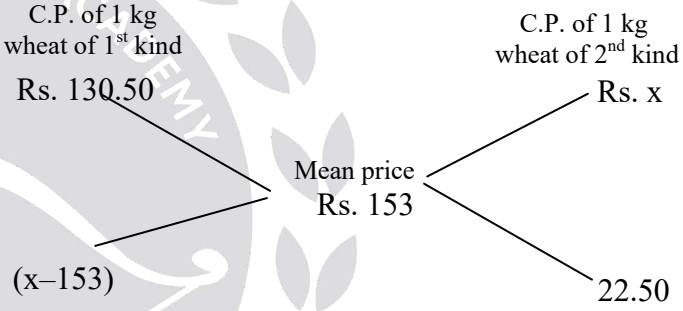
07. Ans: (c)

Sol: Since first and second varieties are mixed in equal proportions.

So, their average price = Rs. $\left(\frac{126+135}{2}\right)$ = Rs. 130.50

So, the mixture is formed by mixing two varieties, one at Rs. 130.50 per kg and the other at say, Rs x per kg in the ratio 2 : 2, i.e., 1 : 1. We have to find x.

By the rule of allegation, we have:



$\therefore \frac{x-153}{22.50}=1$

$\Rightarrow x-153=22.50$

$\Rightarrow x=175.50$

08. Ans: (d)

Sol: Milk contained by the container now

$=40\left(1-\frac{4}{40}\right)^3$

$=40\left(1-\frac{1}{10}\right)^3$

$=40\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}=29.16$

09. Ans: (d)

Sol: Quantity left after n operation

$$= x\left(1-\frac{y}{x}\right)^n$$

Where, x = initial quantity

y = amount of mixture with drawn each time (this should be same every time)

n = no. of times operation performed

$$= 10\left(1-\frac{1}{10}\right)^n$$

$$= 10\left(\frac{9}{10}\right)^3$$

$= 10 \times 0.9 \times 0.9 \times 0.9$

$= 10 \times 0.729 = 7.29$ litres

Hence, option d is correct

10. Ans: (b)

Sol: Let the quantity of the wine in the cask originally be x litres

The, quantity of wine left in cask after 4 operations= $\left[x\left(1-\frac{8}{x}\right)^4\right]$ litres

$$\therefore \left[\frac{x\left(1-\frac{8}{x}\right)^4}{x}\right] = \frac{16}{81}$$

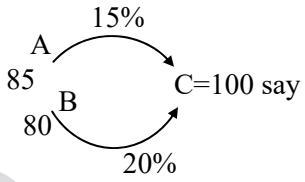
$$\Rightarrow \left[1-\frac{8}{x}\right]^4 = \left(\frac{2}{3}\right)^4$$

$\Rightarrow x = 24$

2.10 Percentages

01. Ans: (b)

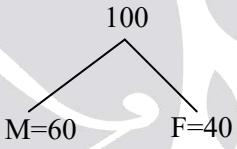
Sol:



$$\frac{85}{80} \times 100 \Rightarrow 106.25$$

02. Ans: (b)

Sol:



Let people 100 say

80% invited i.e. 80

all female attended the party

80–40 = 40 belongs to male

M: F = 40 : 40 = 1:1

03. Ans: (d)

Sol:

X=3000	y=100
3	2

$$\frac{5}{400} \times 100 = 1.25$$

04. Ans: (a)

Sol:

$\frac{P}{40}$	$\frac{Q}{60}$
$=\frac{60}{100}\times 25=15$	$=40\times\frac{15}{100}=6$
= 40–6+15,	= 30 –15 + 6
= 49%	= 51%

51 – 49 = 2%

2% = 2 votes

100% = 100 votes

05. Ans: (c)

Sol: Let = 100 $\xrightarrow{50\%}$ infected $50\times\frac{30}{100}=15$

developed the disease

Remaining = 50–15 = 35

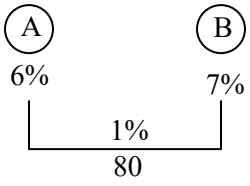
06. Ans: (d)

Sol: Delay % ⇒75% = 1200

Then 25% = 400 (correct time flying flights)

07. Ans: (b)

Sol:



1% = 80

100% = 8000

08. Ans: (a)

Sol: $=\frac{147}{1400}\times 100$

= 10.50

09. Ans: (c)

Sol: 23% = 92 marks

100% ⇒ 400

[∵ 22% →52 (failed)

45% → 40 (passed)

23%→ 52 +40

23% = 62 marks

So 100% = ?

$\frac{92\times 100}{23}=400$]

10. Ans: (d)

Sol: S + T = 95 → (1)

1.23 + 0.9T = 90 → (2)

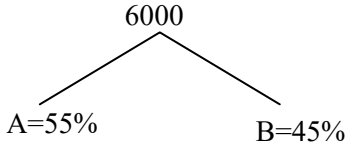
By solving (1) and (2)

T = 80

11. Ans: (a)

Sol: 7500 $\xrightarrow{20\%}$ invalid i.e., 1500

7500 –1500 = 6000

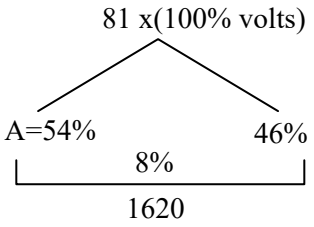


$\frac{45}{100}\times 6000=2700$

12. Ans: (a)

Sol: 100 x – 10 ⇒ 90x – 9x (10% invalid)

= 81x (100% votes)



8% = 1620

100% = ?

With respect votes

20250 = 81%

We need = 100%

$= \frac{20250\times100}{80} = 25{,}000$

13. Ans: (c)

Sol: 10,000 (1.1) (0.8) (1.3) ⇒ 11,440

14. Ans: (a)

Sol:

	2015		2016
G D P	100	10% →	110
F.D	4	? →	5.5(5%)

$= \frac{1.5}{4}\times100 \Rightarrow 37.5$

15. Ans: (a)

Sol: x 2001 20011

1000 → 100 + u

y 10 → 100 +y

(ratio) $P = \frac{x}{y} \quad \frac{100}{100} \quad \frac{100+u}{100+y}$

$1 \quad ? \quad \frac{100+x}{100+y}$

$\frac{\frac{100+x}{100+y}-1}{1}\times100 \Rightarrow \frac{100+x-100-y}{100+y}\times100$

$\Rightarrow \frac{x-y}{100+y}\times100$

16. Ans: (c)

Sol: Let D = 100x

$P = 100x \xrightarrow{-20\%\text{ less}} C = 80\% \xrightarrow{+25\%\text{ more}} B = 100x \xrightarrow{-10\%} \underbrace{90x}_{A}$

90x = 360

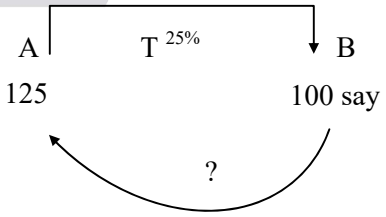
x = 4

Then D = 400

% of D, in 300 $= \frac{400}{500}\times100 = 80\%$

17. Ans: (d)

Sol:



$= \frac{25}{125}\times100 = 20\%$

18. Ans: (b)

Sol: $18{,}400\times\frac{(100-30)}{100}\times\frac{(100-40)}{100}\times\frac{100-50}{100}=3864$

19. Ans: (c)

Sol: 10% → 3 kg

100% → 30 kg

30kg = 225

$\text{kg}=\frac{225}{30}\Rightarrow 7.5$

20. Ans: (c)

Sol: $=\frac{25}{125}\times 100$ $\quad\therefore\left(\frac{x}{100+x}\times 100\right)$

= 20%

2.11 Profit and Loss

01. Ans: (a)

Sol: 90% = 450/-

? = 540/-

$=\frac{90\times 540}{450}\Rightarrow 108\%$ i.e., 8% profit

02. Ans: (d)

Sol: 120 (reems) × 80 = 9600

Transport = 280

Coold = 72/-

120(40P) = 4800 (Paise) = 48/-

$$100\% = \frac{10{,}000}{120} \text{ (per reem)}$$

We need 108% = ?

$$= \frac{10{,}000\times 108}{100\times 120}$$

= 90/- (each reem)

03. Ans: (b)

Sol: CP (40 ranges) = SP(50)

$\frac{CP}{8P}=\frac{50}{40}$ $\quad(\because$ CP = 50, SP = 40)

Loss % = $\frac{10}{50}\times 100 = 20\%$

04. Ans: (c)

Sol: $\frac{\text{Diff}}{\text{Least}}\times 100$

$\frac{200}{800}\times 100 = 25\%$

05. Ans: (c)

Sol: C.P of 12 balloons = 10/-

1 balloon = $\frac{10}{12}$/–

S.p of 10 balloons = 12/-

1 balloon = $\frac{12}{10}$/–

Have sp > cp, so we are getting profits

$$P\% = \frac{\frac{12}{10}-\frac{10}{12}}{\frac{10}{12}}\times 100$$

$$= \frac{\frac{144-100}{120}}{\frac{10}{12}}\times 100$$

= 44%

06. Ans: (a)

Sol: For A

100% = ?

125% = 100

$CP \Rightarrow \frac{1000\times100}{125} \Rightarrow 800$

So profit = 200

For B

25% profit on S.P

$\frac{25}{100}\times1000 = 250$

B's profit = 250

Compare with A, B is getting 50/- more profit

07. Ans: (c)

Sol: % SP

$$\begin{array}{r} 111\% = x/- \\ 118\% = x + 175/- \\ \hline 7\% = 175 \end{array}$$

$100\% = ? \Rightarrow \frac{175\times100}{7} \Rightarrow 2500$

08. Ans: (c)

Sol: 87.5% = x /- (say)

110% = x + 108

22.5% = 108/-

We need 12.5%, because loss%

12.5% = ?

$\frac{108\times12.5}{22.5} \Rightarrow 60/-$

09. Ans: (e)

Sol: Profit = 575 – CP

Loss = CP – 295

575– CP = CP –295

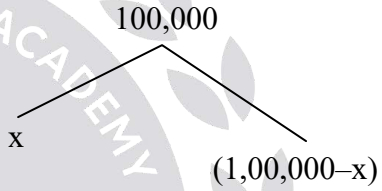
(∵ profit amount = loss amount)

2(CP) = 870

$CP = \frac{870}{2} = 435$

10. Ans: (a)

Sol:



[0.1x + 0.12 (1,00,000-x]

– {[0.12x + 0.1 (1,00, 000–x]} = 120

0.2x–0.24x + 12000–10000 = 120

2000–120 = 0.04x

$x = \frac{1880}{0.04} \Rightarrow 47000$

Remaining = 53000

47000 : 53000 = 47 : 53

11. Ans: (d)

Sol: $\frac{x^2}{100}\%$ always loss

$\frac{10^2}{100} = 1\%$ loss

12. Ans: (c)

Sol: 2 fans cost = 2 × 1200 = 2400

$S.P_1 \Rightarrow$

$1200 \times \frac{(100-5)}{100},\ 1200 \times \frac{100+10}{100} = SP_2$

1140 + 1320 = 2460

So 60 rupees profit

$P\% = \frac{60}{2400} \times 100 \Rightarrow 2.5\%$ (Profit)

13. Ans: (d)

Sol: $30 - 10 - \frac{30(10)}{100} = 17\%$

14. Ans: (a)

Sol: In 500, 10% discount 450/-

125% = 450

$100\% = ? \Rightarrow \frac{450 \times 100}{125} \Rightarrow 360$

15. Ans: (b)

Sol: $252 = CP \times \frac{100-30}{100} \times \frac{100-20}{100} \times \frac{100-10}{100}$

$252 = CP \times \frac{70}{100} \times \frac{80}{100} \times \frac{90}{100}$

CP = 500

2.12 Simple & Compound Interest

01. Ans: (a)

Sol: 5% per annum for 3 years = 15% p

4% per annum for 4 years = 16% p

Difference = 1% $p = \frac{500}{100} = 5$

02. Ans: (a)

Sol: $P\frac{R\%pa}{2\text{ years}} I_1 = (2R\%)P$

$P\frac{(R+4)\%P.a}{2\text{years}} I_2 = (2R\% + 8\%)P$

$I_2 - I_1 = 8\%P = 72$

$\frac{8}{100} P = 72$

P = 900

03. Ans: (d)

Sol: For 100% increment in 12 years

More 100% increment in 12 years

So that 200% increment in 24 years

04. Ans: (a)

Sol: P + 2I = 1260

P + 5I = 1350

3I = 90

I = 30

$I = \frac{PTR}{100} \Rightarrow 30 = \frac{1200 \times 1 \times R}{100}$

R = 2.5% Pa

05. Ans: (b)

Sol: $S.I = \frac{PTR}{100}$

First 2 years 4% pa = $\frac{P(2\times4)}{100} = \frac{8P}{100}$

Next 4 years 6% pa = $\frac{P(6\times4)}{100} = \frac{24P}{100}$

Next (9-6) years 8% pa = $\frac{P(3\times8)}{100} = \frac{24P}{100}$

$\frac{8P}{100} + \frac{24P}{100} + \frac{24P}{100} = 1120$

P = 2000

06. Ans: (a)

Sol: 10% → 1 year = 365 days

↓ ÷5 ↓÷5

2% → 73 days

Time = 2 years 73 days

I = (22% + 2%) P

I = 22% P

I = 2200

07. Ans: (d)

Sol: $800 \frac{R\%Pa}{3years}\ 956$

$800 \frac{(R+4)\%pa}{3years} 956 + 12\%p$

$= 956 + \frac{12}{100}(800)$

= 1052

08. Ans: (a)

Sol: P×105% × 110%×120% = 1386

$P\left(\frac{105}{100}\right)\left(\frac{110}{100}\right)\times\left(\frac{120}{100}\right) = 1386$

P = 1000

09. Ans: (b)

Sol: R = 10% → 1 year

÷4↓ ↓÷4

2.5% → 3 months

T = 2 years 3 months

CI = 4000 $(110\%)^2$ (102.5%) –4000

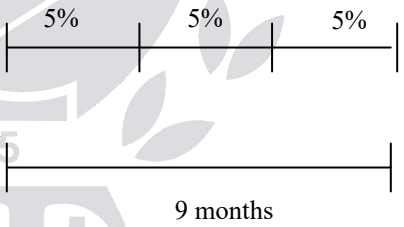
CI = 961

10. Ans: (c)

Sol: R = 2% → 1 year (12 months)

÷4↓ ↓÷4

5% → 3 months



CI = 16000 $(105\%)^3$ –16000 = 2522

CI = 2522

11. Ans: (b)

Sol: P → 10% → 10% → 10% → 10% → 10% → 10 lakhs

P $(110\%)^5$ = 10,00, 000

$P = \frac{1000000}{(1.1)^5} = 620920.9$

P = 6,21,000

12. Ans: (c)

Sol: $P \xrightarrow[\times 3]{4 \text{ years}} 3p$

$P \xrightarrow[\times 3]{4 \text{ years}} 3P \xrightarrow[\times 3]{4 \text{ years}} 3^2 P \xrightarrow[\times 3]{4 \text{ years}} 3^3 P \xrightarrow[\times 3]{4 \text{ years}} 3^4 P$

16 years = 81 P

13. Ans: (a)

Sol:

P —— 0 yrs

×2 (3 yrs)

2200 —— 3 yrs

×2 (3 yrs)

4400 —— 6 yrs

P = 1100

14. Ans: (d)

Sol: $12500 \xrightarrow[20\%]{\text{1st year}}$ 12500 + 2500 = 15000 − 2000 = 13000

$13000 \xrightarrow[20\%]{2^{nd} \text{ year}}$ 13000 + 2600 − 2000 = 13600

$13600 \xrightarrow[20\%]{3^{rd} \text{ year}}$ 13600 + 2720 − 2000 = 14320

15. Ans: (a)

Sol: Simple interest = 10% P = 60 $\Rightarrow$ P = 600

Compound interest = $5 + 5 + \frac{5 \times 5}{100} = 10.25\%$

= 10.25(60) = 615

2.13 Areas and Volumes

01. Ans: (c)

Sol: 12 + 1+6+3+1+2+1+6 = 32

02. Ans: (b)

Sol:

Diagonal of square = diameter of circle

($\because$ 14 = 14)

Area of square = $\frac{1}{2}$ (diagonal)^2

$= \frac{1}{2}(14)^2 = 98 m^2$

03. Ans: (a)

Sol: $2\pi r = 4a = 35 = k$

$r = \frac{k}{2\pi} \Big| a = \frac{k}{4} \Big| s = \frac{k}{3}$

Area of circle = $\pi r^2 = \frac{\pi k^2}{4\pi^2} = \frac{k^2}{4\pi}$

Area of square = $a^2 = \frac{k^2}{16}$

Area of equilateral triangle

$= \frac{\sqrt{3}}{4} s^2 = \frac{k^2\sqrt{3}}{36} = \frac{k^2}{12\sqrt{3}}$

$\therefore$ The circle has the largest area

04. Ans: (a)

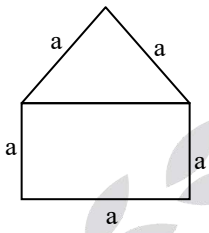
Sol: Area of parallelogram = area of triangle

$b\times h_2 = \frac{1}{2}\times b\times h_1$

$h_1 = 2h_2$

05. Ans: (b)

Sol:



$5a = 6$

$a = \frac{6}{5} = 1.2$

Area of window = area of equilateral triangle + area of square

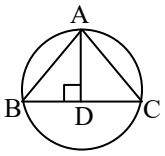
$= \frac{\sqrt{3}}{4}a^2 + a^2$

$= \frac{\sqrt{3}}{4}(1.2)^2 + (1.2)^2$

$= 2.06$

06. Ans: (c)

Sol:



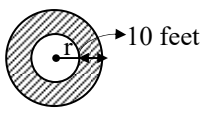
Area of triangle $= \frac{AB\times BC\times CA}{4R} = \frac{1}{2}\times BC\times AD$

$\frac{17.5\times 9}{4R} = \frac{3}{2}$

$R = 26.25$ m

07. Ans: (a)

Sol:



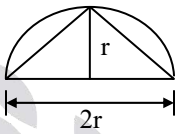
Area of path = $\frac{11}{25}$ area of pool

$\pi(r+10)^2 - \pi r^2 = \frac{11}{25}(\pi r^2)$

$r = 50$

08. Ans: (c)

Sol:



Area of triangle $= \frac{1}{2}\times 2r\times r = r^2$

09. Ans: (d)

Sol: (i) $V = lbh = 10\times 8\times 6 = 480\ cm^3$

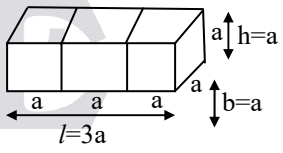
(ii) $V = a^3 = 8^3 = 512\ cm^3$

(iii) $V = \pi r^2 h = \pi(7)^2(7) = 343\pi\ cm^3$

(iv) $V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(7^3) = 343\left(\frac{4}{3}\right)\pi$

10. Ans: (a)

Sol:



Total surface area of cubolld

$= 2(3a^2+a^2+3a^2)$

$= 14a^2 \rightarrow (1)$

Sum of total surface area at 3 cubes

$= 6a^2+6a^2+6a^2 = 18a^2 \rightarrow (2)$

$= \frac{14a^2}{18a^2} = \frac{7}{9}$

11. Ans: (c)

Sol:

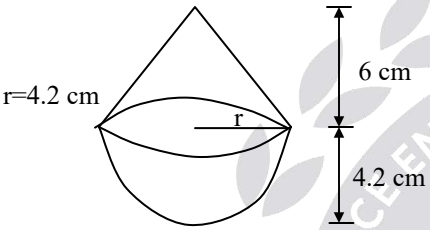
Volume of 6 spherical balls = volume of cylinder

$$6\left(\frac{4}{3}\pi r^3\right) = \pi r^2 h$$

$h = 8r$

12. Ans: (a)

Sol:



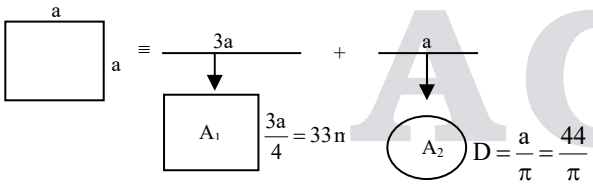
Volume of toy = volume of cone + volume of hemisphere

$$\text{Volume of toy} = \frac{1}{3}\pi(4.2)^2 \times 6 + \frac{2}{3}\pi(4.2)^3$$

Volume of toy = $266\ cm^3$

13. Ans: (c)

Sol:



$a^2 = 1936$

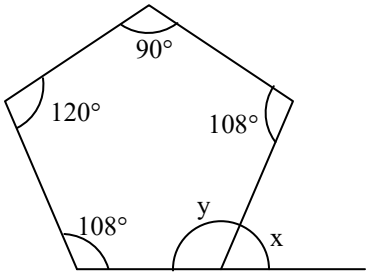
$\therefore a = 44$

$$A_1 + A_2 = 33^2 + \frac{\pi}{4} \times \left(\frac{44}{\pi}\right)^2 = 33^2 + \frac{\pi}{4} \times \frac{44^2}{\pi}$$

$$= 33^2 + \frac{44^2}{4\pi} = 1243.06\ m^2$$

14. Ans: 58°

Sol:



$x + y = 180°$

Sum of all interior angles = (5–2)×180°

$918 + y = 540$

$y = 122°$

$x = 58°$

15. Ans: (c)

Sol: Volume of cone = $\frac{1}{3}\pi r^2 h$

As per question, radius and height both increase by 10%

We know that, change in volume = Successive change of increase in radius and height.

$\therefore$ Successive change of 10%, 10% and 10% = successive of $10 + 10 + \frac{10(10)}{100} = 21\%$

and $10\% = 21 + 10 + \frac{21(10)}{100} = 33.1\%$

Thus, change in volume = 33.1%

16. Ans: (a)

Sol: OM = ON ($\therefore$ radius of circle)

Given that $\frac{1}{2}(OM).(ON) = 50$

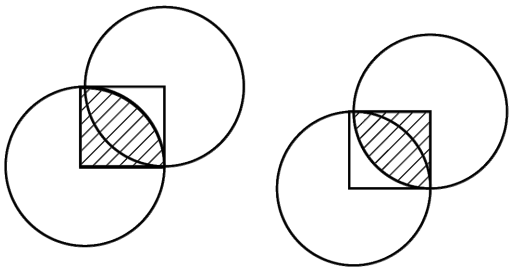
$\frac{1}{2}(OM)^2 = 50$

OM = 10

Then area of circle $= \pi(10)^2 = 100\pi$

17. Ans: (d)

Sol: Area of Shaded region from the figure is



Area of shaded region from the figure is $r^2 - \frac{\pi r^2}{4}$

Area of shaded part in the question

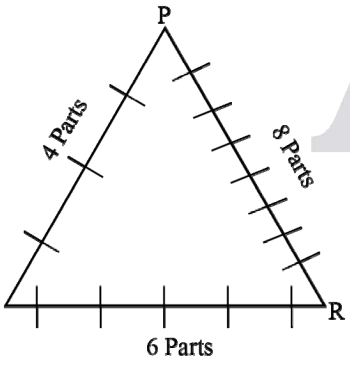
$$= r^2 - 2\left(r^2 - \frac{\pi r^2}{4}\right)$$

$$= \frac{\pi r^2}{4} - r^2$$

Required probability $= \frac{\frac{\pi r^2}{2} r^2}{r^2} - \frac{\pi}{2} - 1$

18. Ans: (d)

Sol:



Minimum area of triangle

= L.C.M of (4,6, 8) = 24

$$A = \frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4}(24^2)$$

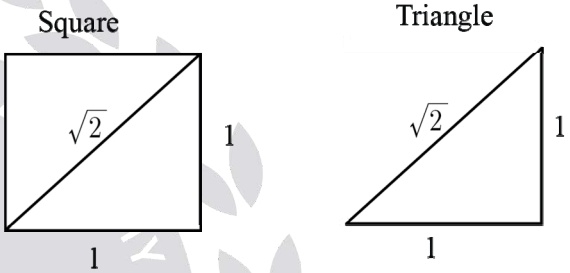
$$= \frac{\sqrt{3}}{4}(576)$$

$$= \sqrt{3}(144)$$

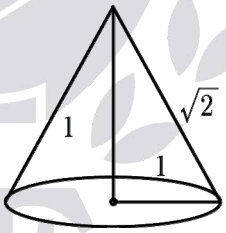
$$= 144\sqrt{3}$$

19. Ans: (c)

Sol:



Solid core formed by revolving triangle abouts its short edge



r = 1, h = 1

Volume of solid cone $= \frac{1}{3} \times \pi \times 1^2 \times 1 = \frac{\pi}{3}$

20. Ans: (d)

Sol: When a square is formed by joining the midpoints of the next larger square, the area of inner square is exactly of the area of the larger square.

Area of 1st square = 10 × 10 = 100 Sq.cm

Area of 2nd square = $\frac{1}{2} \times 100 = 50$ Sq.cm

Area of 3rd square = $\frac{1}{2} \times 50 = 25$ Sq.cm

Area of 4th square = $\frac{1}{2} \times 25 = 12.5$ Sq.cm

Area of 5th square = $\frac{1}{2} \times 12.5 = 6.25$ Sq.cm

Area of the smallest square is 6th square = $\frac{1}{2} = 3.125$ Sq.cm

Option (d) is the correct answer.

21. Ans: (d)

Sol: Each interior angle in a regular polygon $= \frac{(2n-4)90^o}{n}$

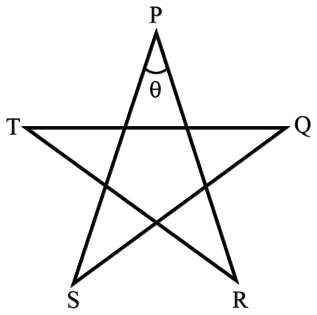
Where n is the number sides.

$\therefore$ Each interior angle

$$= \frac{[(2\times 10)-4]90^o}{10} = 144^o$$

22. Ans: (d)

Sol:

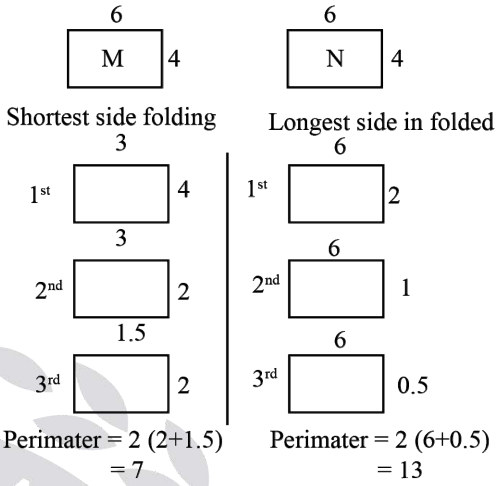


Sum of the angles = 180°

Each angle = $\frac{180}{5} = 36^o$

23. Ans: (b)

Sol:



But requirement is N : M

13 : 7

24. Ans: (b)

Sol: R = radius of circumscribed circle $= \frac{a}{\sqrt{3}}$

r = radius of inscribed circle $= \frac{a}{2\sqrt{3}}$

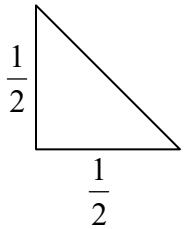
$\Rightarrow \pi r^2 : \pi R^2$ $\therefore$ a = side of triangle

$$\Rightarrow \pi\left(\frac{a}{2\sqrt{3}}\right)^2 = \pi\left(\frac{a}{\sqrt{3}}\right)^2$$

= 1 : 4

25. Ans: (c)

Sol: Final shape will be



$$\text{Area of triangle} = \frac{1}{2}\times\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{8}$$

2.14 Logarithm

01. Ans: (b)

Sol: $\log\left(\begin{matrix}\tan1^\circ\times\tan2^\circ\times\tan3^\circ---\\ \times\tan45^\circ\times---\tan88^\circ\times\tan89^\circ\end{matrix}\right)$

$\therefore \tan88^\circ = \cot2^\circ$

$\therefore \tan89^\circ = \cot1^\circ$

$\therefore \tan\theta = \cot(90-\theta)$

$\tan\theta\times\cot\theta = 1$

$= \log\tan45^\circ = \log1 = 0$

(b) is the correct Ans.

02. Ans: (a)

Sol: $\log_x\left(\frac{5}{7}\right) = -\frac{1}{3}$

$\frac{5}{7} = x^{-1/3}$

$x = \left(\frac{7}{5}\right)^3 = \frac{343}{125}$

Option (a) is the correct Ans.

03. Ans: (d)

Sol: $\log_2[\log_3(\log_2 x)] = 1$

$\log_3(\log_2{}^2) = 2^1 = 2$

$\log_2{}^x = 3^2 = 9$

$x = 2^9 = 512$

Option (d) is the correct answer

04. Ans: (b)

Sol: $\therefore \frac{1}{\log_x{}^y} = \log_y{}^x$

$$\frac{1}{\log_{c+a}{}^b}+\frac{1}{\log_{c-a}{}^b} = \log_b{}^{c+a}+\log_b{}^{c-a}$$

$$= \log_b(c^2-a^2)$$

$$= \log_b{}^{b^2} = 2.$$

05. Ans: (d)

Sol: $\log_4{}^2-\log_8{}^2+\log_{16}{}^2----to\ \infty$

$= \log_2 2^2-\log_2 3^2+\log_2 4^2-----to\ \infty$

$= \frac{1}{2}-\frac{1}{3}+\frac{1}{4}-\frac{1}{5}+\frac{1}{6}-----$

$= e^x = 1+\frac{x}{1!}+\frac{x^2}{2!}+-----+\frac{x^n}{n!}+---\infty$

$\ell n(1+x) = x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+---\infty$

$\ell n2 = 1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+----\infty$

$\therefore x = 1$

$1-\ell n2 = \frac{1}{2}-\frac{1}{3}+\frac{1}{4}----\infty$

$= 1-\ell n2$

Option (d) is the correct answer.

06. Ans: (b)

Sol: $\log P = \frac{p}{2}\log Q = \frac{1}{3}\log R = k(cons\tan t)$

$P = 10^k,\ Q = 10^{2k}, R = 10^{3k}$

$\therefore 10^{4k} = PR = Q^2$

Option (b) is the correct answer

07. Ans: (a)

Sol: log a +log b + log c = a

$\log^{abc} = Q$

abc = $10^{\circ} = 1$

abc =1 $\Rightarrow a = 1, b = 1, c = 1$

$\therefore$ a,b,c non-ve integers

A + b + c = 3

option (a) is the correct Ans .

08. Ans: (a)

Sol: log|a| + log|b| +log|c| =0

log |a| |b| |c | = 0

|a| |b| |c | =1

$(a + b + c)_{\text{minimum}}$ = -1-1-1=-3

$(a + b + c)_{\text{maximum}}$ 1+1+1 = 3

Option (a) is the correct Ans

09. Ans: (c)

Sol: $\frac{1}{\log_w^w + \log_w^{uv}} + \frac{1}{\log_v^v + \log_u^{vw}} + \frac{1}{\log_v^v + \log_v^{wu}}$

$= \frac{1}{\log_w^{uvw}} + \frac{1}{\log_u^{uvw}} + \frac{1}{\log_v^{uvw}}$

$= \log^w{}_{uvw} + \log^u{}_{uvw} + \log^v{}_{uvw}$

$= \log_{uvm}^{uvm} = 1$

Option (c) is the correct Ans

10. Ans: (b)

Sol: $\log^P$=10 (y-z) $\Rightarrow$ P = $10^{10(y-z)}$

$\log^Q$=10 (z-x) $\Rightarrow$ Q = $10^{10(z-x)}$

$\log^R = 10(x-y) \Rightarrow R = 10^{10(x-y)}$

PQR = $10^{10y-10z+10z-10x+10x-10y}$

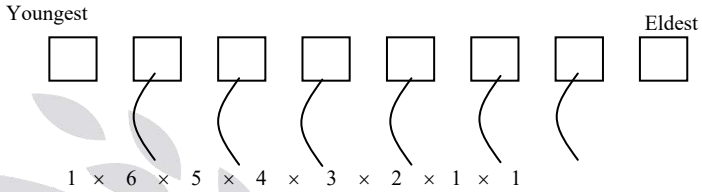
PQR = 10°

PQR = 1

2.15 Permutation & Combinations

01. Ans: 720

Sol: We have children to be seated



No. ways = 6 × 5 × 4 × 3 × 2 × 1 = 720 ways

02. Ans: 6336

Sol:

Girls – 6
Boys – 8
Treasurer (Girl) ☐ ← 6 ways

Girls – 5
Boys – 8
Secretary (Boy) ☐ ← 8 ways

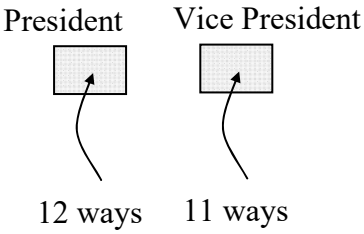
Treasurer (Girl) – 6 ways

Secretary (Boy) -8 ways

Girls – 5

Boys – 7;

Total = 12



Total = 6 × 8 × 12 × 11

03. Ans: (b)

Sol:

$57\underbrace{\_\ \_\ \_\ \_\ \_}$

$^{8}P_5 = 8 \times 7 \times 6 \times 5 \times 4$

$= 56 \times 120 = 6720$

04. Ans: (i) 240 (ii) 120 (iii) 60 (iv) 180

Sol: (a) 3, 4, 5, 6, 7, 8

Digits available	Position		Arrangements
5	3	3 - - -	$^5P_3$
5	3	- 3 - -	$^5P_3$
5	3	- - 3 -	$^5P_3$
5	3	- - - 3	$^5P_3$

Number of 4 digit numbers with $3 = 4 \times {}^5P_3$

(b) Digits available – 5(4, 5, 6, 7, 8)

Number of 4 digit number without $3 = {}^5P_4 = 120$ ways

(c) 3 _ _ _

Number of digits available = 5

Number of position available = 3

Number of 4 digit number start with '3' = $^5P_3 = 60$ ways

(d) 4 digit numbers contain '3' but not at first

= 4 digit number with '3' – 4 digit number with '3' at

= solution (a) – solution (c)

= 4. $^5P_3$ –

05. Ans: (i) 48 (ii) 100

Sol: (i) Hundred's place can be filled in 4 ways.

Ten's place can be filled in 4 ways.

Unit's place can be filled in 3 ways.

Required number = $4 \times 4 \times 3 = 48$

(ii) Similarly, the required number

$= 4 \times 5 \times 5 = 100$

06. Ans: 4464

Sol: Number of four-digit numbers = $9 \times 10 \times 10 \times 10 = 9000$

Number of four-digit numbers with no repetition = $9 \times 9 \times 8 \times 7 = 4536$

$\therefore$ Number of four-digit numbers what at least one digit repeated = 9000 – 4536 = 4464

07. Ans: (c)

Sol: Total number of three digit numbers possible are $9 \times 10 \times 10 = 900$

Number of possibilities for digit '1' to be immediate right of digit '2' are

2	1	x

$1 \times 1 \times 10 = 10$

x	2	1

$9 \times 1 \times 1 = 9$

$= 19$

So, number of possibilities such that the digit '1' is never to the immediate right of '2' are 900 – 19 = 881

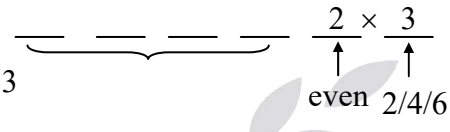
08. Ans: (b)

Sol: Each letter can be posted in 4 ways. So, total number of ways in which all the 7 letters can be posted

$\Rightarrow 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4^7$

09. Ans: (d)

Sol:



$= 120 \times 6 = 720$

10. Ans: (c)

Sol:

8 ways (12, 16, 24, 32, 36, 52, 56, 64)

$= 24 \times 8 = 192$

11. Ans: (c)

Sol: Given data,

Password must contain 3 characters.

One character (C_1) has to be a number from 0 to 9

One character (C_2) has to be an upper case English A to Z

One character (C_3) has to be a lower case English a to z.

Let C_1, C_2, C_3 be the 3 characters

Total possibilities for $C_1 = 10$

Total possibilities for $C_2 = 26$

Total possibilities for $C_3 = 26$

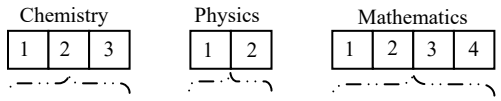
C_1, C_2, C_3 can be arranged in 3! Permutations

$\therefore$ Total number of distinct passwords possible $= 10 \times 26 \times 26 \times 3! = 40{,}560$

Total distinct possible passwords = 40,560.

12. Ans: 1728

Sol:



Intra subject

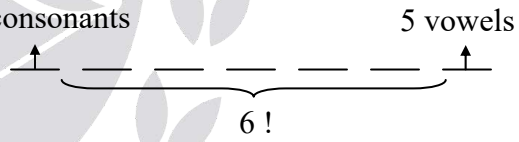
Arrangements → $^3P_3$ $^2P_2$ $^4P_4$

Inter subject arrangement

Total number of arrangements = $_3P_3$ ($3p3 \times {}^2p_2 \times {}^4p_4$) = $3! \times 3! \times 2!$

13. Ans: (b)

Sol:



$6 \times 3 \times 5 = 720 \times 15 = 10800$

14. Ans: 60480

Sol: Treating the vowels as one unit, we have 7 units.

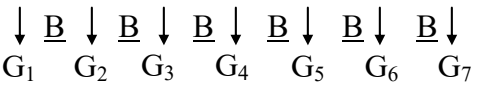
These can be arranged in 7! Ways.

The vowels can be arranged in 4! Ways.

Total ways = $7! \times 2! \times 2! = 60480$ ways.

15. Ans: (a)

Sol:



$6! \, {}^7C_4 \cdot 4!$

$= 6! \, {}^7P_4$

16. Ans: (b)

Sol: ----------.

Starting → b

Starting →g

So that ⇒ 5! × 5! × 2 ways

17. Ans: (c)

Sol: ___ ___ ___ ___

e e e e

4 men = 4 even place

So that 4! 5!

18. Ans: (c)

Sol: ${}^5P_1 + {}^5P_2 + {}^5P_3 + {}^5P_4 + {}^5P_5 = 325$

19. Ans: (c)

Sol: The work 'LAUNCHER' has 8 different Letters

___ ___ ___ $= 8 \times 8 \times 8 = 8^3$

8 ways 8 ways 8 ways

∴ (Repetition of Letters is allowed)

20. Ans: (b)

Sol: Total number of people h = 8

We know that,

Total number of arrangements in an circular table – (n – 1)!

(8 – 1)! = 7! = 5040 ways

21. Ans: (b)

Sol: If select 8 persons first, make them seat an one table. The other 6 persons sit on the next table.

$$= \frac{14!}{8!\,6!}$$

22. Ans: (a)

Sol: by using circular permutation $= \frac{(n-1)!}{2}$

$$= \frac{(11-1)!}{2} = \frac{10!}{2}$$

23. Ans: (d)

Sol: ${}^nC_r = {}^9C_3 = \frac{9!}{3!6!} = \frac{9\times8\times7}{3\times2} = 84$

24. Ans: (b)

Sol: $\underbrace{6 \text{ men}}_{6} + \underbrace{\text{P, VP}}_{1} = 7$

$= 6! \times 2!$

25. Ans: (b)

Sol: ${}^nC_r = {}^nC_{n-r}$

Here r = 7

n – r = 5

⇒ n = 12

26. Ans: (c)

Sol: i. 1 boy + 3 girls = ${}^5C_1 \times {}^4C_3 = 5 \times 4 = 20$

ii. 2 boy + 2 girls = ${}^5C_2 \times {}^4C_3 = 60$

iii. 3 boy + 1 girls = ${}^5C_3 \times {}^4C_1 = 40$

= 20 + 60 + 40 = 120

27. Ans: (c)

Sol: $nc_2 = 66$

$$\Rightarrow \frac{n(n-1)}{2} = 66 \Rightarrow n(n-1) = 132 = 12 \times 11$$

28. Ans: (d)

Sol: Total number of balloons = 5 + 4 + 2 = 11

Since color are repeating so we sued this formula $\frac{n!}{p!\ q!\ r!}$

$$\text{The number of arrangement} = \frac{11!}{5!\ 4!\ 2!} = 6930$$

29. Ans: (b)

Sol: $7C_3 = 35$

30. Ans: (i) 105 (ii) 96

Sol: Through two given point and unique straight line

(a) $^{15}C_2$

(b) 5 points collinear

$\equiv {}^5C_2$ distinct line $\rightarrow$ considered as one number of straight line $= {}^{15}C_2 - {}^5C_2 + 1$.

31. Ans: (a)

Sol: $r + r + 2 = 18$

$r = 8$

$^8C_5 = 56$

32. Ans: (c)

Sol: $P(\text{dice roll} = \text{Green}) = \frac{4}{6} = \frac{2}{3} = P_g$

$P(\text{dice roll} = \text{Red}) = \frac{2}{6} = \frac{1}{3} = P_r$

$\therefore P_g = \frac{2}{3}$ $\qquad P_r = \frac{1}{3}$

(a) $P(G = 3, R = 4) = {}^7C_4 \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^4 = \frac{280}{3^7}$

(b) $P(G = 4, R = 3) = {}^7C_3 \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^3 = \frac{560}{3^7}$

(c) $P(G = 5, R = 2) = {}^7C_5 \left(\frac{2}{3}\right)^5 \left(\frac{1}{3}\right)^2 = \frac{672}{3^7}$

(d) $P(G = 6, R = 1) = {}^7C_6 \left(\frac{2}{3}\right)^6 \left(\frac{1}{3}\right)^1 = \frac{448}{3^7}$

From the above analysis the most likely outcome is the one with highest probability which in this case is option (c) i.e. **Five green and Two red balls**.

33. Ans: (b)

Sol: The sum of all 'n' digit numbers that can be formal by using 'n' distinct non zero digits.

$= (n–1)! \times (\text{sum of digits}) \times (111\ldots.n \text{ times})$

$= (5–1)! \times (1+3+5+7+9) \times (11111)$

$= 4! \times 25 \times 11111$

$= 6666600$

34. Ans: (d)

Sol: More than 3000, 4 digit number means, the First digit may be 3 (or) 4, the second third and fourth digits are three in each (i,e)

2	3	3	3

$= 2 \times 3 \times 3 \times 3 = 54$

35. Ans; (d)

Sol: Total ways in which shirts can be distributed among Arun, Gulab, Neel and Shweta (T) = 4! = 24

Number of ways in which shirts are distributed so that only Arun gets a shirt color he dislikes(red) are (A) = 2×2×1 = 4

Number of ways in which shirts are distributed so that only Shweta gets a shirt color she dislikes(white) are (S) = 2×2×1 =4

Number of ways in which shirts are distributed so that both Arun and Shweta gets a shirt color he/she dislikes(red an white respectively) are (B) = 2×1 = 2

Total number of cases in which shirts can be distributed so that no one has a shirt with a colour he or she dislikes = T-(A+S+B) = 24 – (4 + 4 + 2) = 14

36. Ans: (b)

Sol: P, Q, R, S → Women

V, W, X, Y, Z → Men

P is not to be paired with Z

Y must necessarily be paired with some one.

The possible ways P can be paired with men = 4 × 4 (without z) = 16

The possible ways Q can be paired with men = 4 × 5 = 20

The possible ways S can be paired with men = 4 × 5 = 20

The total no. of ways = 16 + 20+20+20 = 76

37. Ans: (b)

Sol: (3!) 3 = 18 chances

(∵ 'R' should not be seated at second position from the left end)

(__, (R), ____, ___)

×

38. Ans: (b)

Sol: P and R can not adjacent ..... 'S' is seated right of Q.

(i) P Q S R

After interchanging 'P' and 'R' we get one more chance.

R Q S P

(i) Q __ S __ (here two chances)

(ii)__ Q__ S (here two chances)

39. Ans: (d)

40. Ans: (a)

Sol:

1. S	R	P	T	Q
2. Q	R	P	T	S
3. S	R	T	P	Q

2.16 Probability

01. Ans: (c)

Sol: The number of ways of randomly picking 3 cards out of 52 cards

$n(s) = {}^{52}C_3 = 22100$

Total number of spadrs = 13

Total number of red green = 2

Total number of black king = 2

Probability of getting 1 spade, 1 rad queen and 1 black king

$$= \frac{13_{c_1}.2_{C_1}.2_{c_1}}{52_{c_3}} = \frac{52}{22100}$$

= 0.00235

Hence the correct and 'c'

02. Ans: (c)

Sol: Total chances = 6× 6 = 36

Sum is a multiple either of 3 (or) 4

Event getting a multiple of 3 as the sum (1, 2), (1, 5), (2,1), (2,4), (3, 3), (3, 6), (4, 2), (4, 5), (5, 1), (5, 4), (6, 3), (6, 6) = 2

Event of getting a multiple of 4 as the sum (1, 3), (2, 2), (3,1), (4, 4), (3, 5), (5,3),(2, 6), (6, 2), (6, 6) = 9

But (6, 6) we get already

Total number of cases sum is a multiple either of 3 (or) 4 = 20

The probability that their sum is a multiple either of 3 (or) 4 = $\frac{20}{36} = \frac{5}{9}$

Hence the correct answer option c

03. Ans: 0.81

Sol: Total number at bulbs non-defective = 100–5 = 95

The probability that the current batch is accepted

$$= \frac{95}{100}\times\frac{94}{99}\times\frac{93}{98}\times\frac{95}{97} = 0.82 = 0.812$$

(or) $\frac{95_{C_4}}{10_{c_4}} = \frac{\frac{95!}{91!4!}}{\frac{100!}{96!4!}} = 0.812$

04. Ans: (a)

Sol: Let total no at students in the Class = 100

Then girls = 60% of 100 = 60

Poor girls = 25% of 60= 15

Probability that a poor girl is selected leader = $\frac{15}{100} = 15\%$

05. Ans: (b)

Sol: Let n(E) = even of the sum 9 from two throws at a dice (3,6), (6, 3), (5, 4) = 4

Two throws at a dice n(s) = 6×6 = 36

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

06. Ans: (a)

Sol: Total chances n(6) = 6× 6 = 36

Let E = Event that the sum is a prime number then

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

$\therefore$ n(E) = 15

The probability that the total score is a prime number is = $\frac{15}{36} = \frac{5}{12}$

07. Ans: (b)

Sol: Total outcomes of when two dice are thrown simultaneously n(s) = 6×6 = 36

Let E = event of getting two numbers whose product is even

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

n (E) = 27

$\therefore\ P(E) = \frac{n(E)}{n(s)} = \frac{27}{36} = \frac{3}{4}$

08. Ans: (b)

Sol: Total number of face cands in pack of 52 cards is 12 cards

$$\frac{12C_1}{52_{C1}} = \frac{12}{52} = \frac{3}{13}$$

09. Ans: (c)

Sol: Total number of outcomes possible

$n(s) = 10 + 25 = 35$

Total number of prizes $n(E) = 10$

$$P(E) = \frac{10C_1}{35C_1} = \frac{10}{35} = \frac{2}{7}$$

10. Ans: 1/7

Sol: Required probability $= \frac{5!\times 3!}{7!} = \frac{1}{7}$

$\therefore$ When the case of three vowels being together is taken, than three vowels are considered as one unit, so the number of ways in which 5 letters can around = 5!

Also the 3 vowels can be arranged amongst themselves in 3! Ways.

11. Ans: (c)

Sol: Total chances $n(s) = 52$

Let E = event of getting a queen of club or a king of heart

$\therefore n(E) = 2$

$$\therefore P(E) = \frac{n(E)}{n(s)} = \frac{2}{52} = \frac{1}{26}$$

12. Ans: (i) 1 : 11 (ii) 1 : 8 (iii) 5 : 31

Sol: (i) $n(s) = 6\times 6 = 36$

Let E = {(1, 3), (2,2), (3,1)}

Favourable outcomes = 3

Un favarable outcomes = 36–3 = 33

$\therefore$ odds in favour of sum of $4 = \frac{3}{33} = \frac{1}{11}$

(ii) E = { (1,4), (2,3), (3, 2), (4, 1)}

Farounrable outcomes = 4

Unfurounrable outcomes = 36–4 = 32

$\therefore$ odd in favour of sum $S = \frac{4}{32} = \frac{1}{7}$

(iii) E = {(1,5), (1,5), (2,4), (4,2), (3,3)

$n(E) = 5$

Total chances $h(s) = 6\times 6 = 36$

Odds in favour $= \frac{5}{36-5} = \frac{5}{31}$

13. Ans: (b)

Sol: Leap year has 366 days (i.e., $7 \times 52 + 2$)

52 weeks and 2 extra days

The sample space for these 2 days

The two odd days can be {Sunday, Monday}, {Monday, Tuesday}, {Tuesday, Wednesday}, {Wednesday, Thursday}, {Thursday, Friday}, {Friday, Saturday}, {saturaday, Sunday}

So

There are 7 possibilities at of which 2 have a Sundays. So the probability of 53 Sundays in a leap year is $\frac{2}{7}$

14. Ans: (d)

Sol: Let

Event E = numbers are divisible by 7 in 1 to 100.

E = {7,14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98}

$$P(E)=\frac{14}{100}$$

Probability that selected number is not divisibly by 7 = 1–n(E)

$$=1-\frac{14}{100}$$

$$=\frac{86}{100}=\frac{43}{50}$$

15. Ans: (a)

Sol: Given that

$$P(F)=\frac{60}{100}=\frac{3}{5}$$

$$P(S)=\frac{50}{100}=\frac{1}{2}$$

$$CP(F\cap S)=\frac{30}{100}=\frac{3}{10}$$

P(FUS) = Probability that a student selected at random has passed in both examinations

$P(FUS) = F(f) + P(S) – P(F\cap S)$

$$=\frac{3}{5}+\frac{1}{2}-\frac{3}{10}=\frac{8}{10}=\frac{4}{5}$$

The probability that a student selected at random has failed in both the examination = $1–P(F\cup S)$

$$=1-\frac{4}{5}=\frac{1}{5}$$

16. Ans: (b)

Sol: Required probability $= 1-\frac{6_{c_3}}{14_{c_3}}$

17. Ans: (a)

Sol: Required probability $= 1-\frac{11_{c_3}}{14_{c_3}}$

18. Ans: (b)

Sol: Required probability $= \frac{5_{c_3}}{14_{c_3}}$

19. Ans: (d)

Sol: Required probability $= \frac{6_{c_2}\times 3_{c_1}}{14_{c_3}}$

20. Ans: (d)

Sol: Required probability $= \frac{3_{C_2}+4_{C_2}+3_{C_2}}{11_{C_2}}$

$$=\frac{4}{15}$$

21. Ans: (a)

Sol: Required probability $=\frac{10}{25}\times\frac{15}{24}+\frac{15}{25}\times\frac{10}{24}=\frac{1}{2}$

22. Ans: (d)

Sol: Required probability

$$=\frac{4_{C_1}+4_{C_1}+4_{C_1}}{52_{C_3}}=\frac{16}{5525}$$

23. Ans: (a)

Sol: $H_1\ H_2^1\ H_3^1 + H_2\ H_1^1\ H_3^1 + H_3\ H_1^1\ H_2^1$

$$= \frac{1}{7}\times\frac{7}{8}\times\frac{6}{7} + \frac{1}{8}\times\frac{6}{7}\times\frac{6}{7} + \frac{1}{7}\times\frac{6}{7}\times\frac{7}{8}$$

$$= \frac{120}{7\times7\times8}$$

$$= \frac{15}{49}$$

24. Ans: (b)

Sol: Given 4 men throw a die and 2 people get the same number.

1. The first die can give any of the 6 numbers.
2. The second die can give any of the remaining 5 numbers.
3. The third die can give any of the remaining 4 numbers.
4. The fourth die can give any of the remaining 3 numbers.

So, the total possible outcomes will be

$= 6 \times 5 \times 4 \times 3$

Probability of all getting different numbers $=(6 \times 5 \times 4 \times 3)/6^4 = 5/18$

Probability of 2 people get the same number $= 1 - 5/18$

25. Ans: (a)

Sol: with replacement $= \frac{8}{15}\times\frac{8}{15}\times\frac{8}{15} = \frac{512}{2197}$

Without replacement $= \frac{8}{5}\times\frac{7}{4}\times\frac{6}{3}$

26. Ans: (b)

Sol: (1,1), (1, 4), (4, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6) $\Rightarrow$ n(E) = 8

n(s) = 6 × 6 = 36

required probability $= \frac{8}{36}$

27. Ans: 42

Sol: Let the probability that A and B speak truth be P(A) and P(B) respectively.

Therefore,

$P(A) = \frac{60}{100} = \frac{3}{5}$ and $P(B) = \frac{90}{100} = \frac{9}{10}$

A and B can contradict in stating a fact when one is pecking the truth and other is not speaking the truth.

Case 1: A is speaking the truth and B is not speaking the truth.

Required probability = P(A) × (1 – P(B))

$$= \frac{3}{5}\times\left(1-\frac{9}{10}\right) = \frac{3}{50}$$

Case 2: A is not speaking the truth and B is separately the truth.

Required probability = (1 – P(A)) × P(B)

$$= \left(1-\frac{3}{5}\right)\times\frac{9}{10} = \frac{9}{25}$$

Therefore, percentage of cases in which they are likely to contradict in stating the same fact

$$= \left(\frac{3}{50}+\frac{9}{25}\right)\times100\% = \left(\frac{3+18}{50}\right)\times100\% = 42\%$$

From case 1, it is clear that it not necessary that the statement of B will carry more weight as he speaks truth in more number of cases than A.

28. Ans:

Sol: (1, 2, 3) (2, 3, 4) ….. (28, 29, 30)

There are total 28 sets

1 set is selected in $^{28}C_1$ ways = 28

Total outcomes is $^{30}C_3$

$= 30 \times 29 \times 28 / 3 \times 2 \times 1$

$= 4060$

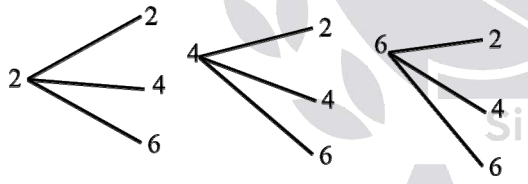
Probability = 28/4060 = 1/145

29. Ans: (c)

Sol: The even numbers on the dice are 2, 4, 6

The probability of even number on a dice $= \frac{3}{6}$

$\therefore$ The probability that an even number is rolled out on each dice is $\frac{3}{6} \times \frac{3}{6} = \frac{1}{4}$



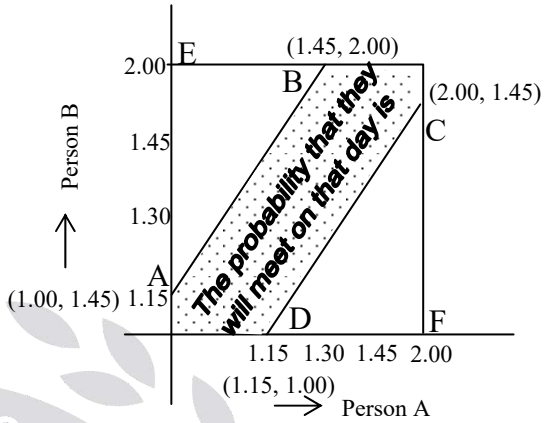
30. Ans: (4/11)

Sol: Required probability $= \frac{5_{C_2} \times 7_{C_1} + 5_{C_3}}{12_{C_3}}$

$= \frac{80}{220} = \frac{4}{11}$

31. Ans: (c)

Sol: Two friends A and B



The probability that they will meet on that day

$= 1 - 2\left[\frac{1}{2} \times \frac{45}{60} \times \frac{45}{60}\right]$

(Area of ABCD)

$= \left[1 - \left(\frac{3}{4} \times \frac{3}{4}\right)\right] = 1 - \frac{9}{16} = \frac{16-9}{16} = \frac{7}{16}$

32. Ans: (a)

Sol: (2, 14), (14, 2), (3, 13), (13, 3), (4, 12), (12, 4), (5, 11), (11, 5).

Required probability $= \frac{8}{40} = 0.20$

33. Ans: (c)

Sol: Probability $= \frac{\text{no. of favorable cases}}{\text{total no. of possible cases}}$

Among two children's (boys), the older one is a boy = 1 and two children's are boys only.

$\therefore$ Probability $= \frac{1}{2}$

34. Ans: (a)

Sol: There are total 100 numbers, out of which
50 numbers are divisible by 2,
33 numbers are divisible by 3,
20 numbers are divisible by 5

Following are counted twice above
16 numbers are divisible by both 2 and 3
10 numbers are divisible by both 2 and 5
6 numbers are divisible by both 3 and 5

Following is counted thrice above
3 numbers are divisible by all 2, 3 and 5
So total numbers divisible by 2, 3 and 5 are
$= 50 + 33 + 20 - 16 - 10 - 6 + 3 = 74$

Required probability $= \dfrac{100-74}{100} = 0.26$

35. Ans: (c)

Sol:

Each digit can be filled in 7 ways as 0, 5 and 9 is not allowed so, each of these places can be filled by 1, 2, 3, 4, 6, 7, 8.

So, required probability $= \left(\dfrac{7}{10}\right)^k = (0.7)^k$

2.17 Progressions

01. Ans: (b)

Sol: 1+2+3+--------- 12 times in 12 hrs

$\dfrac{12(12+1)}{2} = 78$ times in 12 hrs

So in a day = 2(78) = 156
In 2 days = 2 (156) = 312

02. Ans: (c)

Sol: $a_n = a + (n-1)d$
$-54 = 11 + (n-1)(-5)$
$n = 14$

03. Ans: 100

Sol: 201, 204, …….498

$n = \dfrac{498-201}{3} + 1 = \dfrac{292}{3} + 1 = 100$

04. Ans: (a)

Sol: divisible by 3, 4 and 8
Means checking with L.CM of (3, 4, 8) = 24

72, 96, …….288 are multiplies of 24

$S_n = \dfrac{n}{2}(a + \ell)$

$n = \dfrac{288-72}{24} + 1 \Rightarrow \dfrac{216}{24} + 1 = 10$

$S_n = \dfrac{10}{2}(72 + 288) \Rightarrow 5(360) = 1800$

05. Ans: (c)

Sol: $t_{12} = a+11d = 22 \quad \rightarrow (1)$

Let sum of 23 terms = $S_{23} = \frac{n}{2}(a+\ell)$

$= \frac{23}{2}(a+a+(n-1)d)$

$= \frac{23}{2}(a+a+22d)$

$= \frac{23}{2}(2(a+11d))$

$= \frac{23}{2}(2)(22)$ from (1)

$= 506$

06. Ans: (a)

Sol: 11 (a+10d) = 16 (a+15d)

$5a + 130d = 0 \quad \therefore (a + 26d = 0)$

27^{th} term = a + 26d

a + 26d = 0

Then 27^{th} term = 0

07. Ans: (d)

Sol: Common … $\frac{34-2}{7+1} = \frac{52}{8} = 4$

2, 6, 10, 14, 18, 22, 26, 30, 34

$S_n = \frac{1}{2}[30+6] = 7(18) = 126$

$S_n = \frac{n}{2}[2a+(n-1)d]$

n = 23 terms (∵ 44, 42, 40……. 2, 0)

$S_n = \frac{23}{2}[44+0] = 23(22) = 506$

08. Ans: (c)

09. Ans: (a)

Sol: S_1 = c. diff = 4

S_2 = c. diff = 5

L. CM of (4, 5) = 20, so we need coefficient = 20

21, 41, 61, 81, …….

$S_n = \frac{n}{2}(2a+(n-1)d) = \frac{100}{2}[2(21)+99(20)]$

$= 50(42+1980)$

= 50 (2022)

= 1,01, 100

10. Ans: (c)

Sol: $S_\infty = \frac{a}{1-r} = \frac{1}{1-\frac{1}{2}} = 2$

11. Ans: 144

Sol: 3(24 + 12 + 6+3+…….)

$3\left(\frac{24}{1-\frac{1}{2}}\right) = 3(24)2 = 144 \quad \therefore$

$S_\infty = \frac{a}{1-r}$

12. Ans: (d)

Sol: $B = 2^{54} + 2^{53} + \ldots\ldots\ldots\ldots 2^0$

a = 1

r = 2

n = 55

$S_n = \frac{1(2^{55}-1)}{1} = 2^{55}-1$

But A ⇒ 2^{55}

A is larger than 'B' by (1)

13. Ans: 3960

Sol: $= 360 + 2\,(300 + 250 + \ldots.. + \ldots.. 2$

$$= 360 + 2\left(\frac{300}{1-\frac{5}{6}}\right)$$

$$[\because\ 36\times\frac{5}{6} = 300,\ 300\times\frac{5}{6} = 250]$$

$$= 360 + 2\left(\frac{300}{\frac{1}{6}}\right)$$

$= 360 + 2(300)\ 6 \Rightarrow 360 + 3600$

$= 3960$

14. Ans: 1

Sol: $\frac{1}{a+9d} = 21 \Rightarrow 21a + 189d = 0 \quad \rightarrow (1)$

$\frac{1}{a+20d} = 10 \Rightarrow 10a + 200d = 0 \rightarrow (2)$

By solving (1) and (2) a = d, $a = \frac{1}{210}$,

$d = \frac{1}{10}$

We need 210^{th} term

$$= \frac{1}{a+(n-1)d} = \frac{1}{\frac{1}{210}+\frac{209\times1}{210}} = \frac{1}{\frac{210}{210}} = 1$$

15. Ans: (b)

Sol: The reciprocal of 11 terms of HP as = A.P

Sum of 11 terms

$$= \frac{n}{2}(2a + (n-1)d) = \frac{11}{2}(2a + (10)d) = 110$$

$\Rightarrow 2a + 10d = 20$

$a + 5d = 10$ which is (T_6)

again reciprocal = $\frac{1}{10}$ is in HP

16. Ans: 20/9

Sol: $S = 1 + \frac{3}{4} + \frac{5}{4^2} + \ldots.. \infty \quad \rightarrow (1)$

$\frac{S}{4} = \frac{1}{4} + \frac{3}{4^2} + \frac{5}{4^3} + \ldots.. \infty \rightarrow (2)$

(1) – (2)

$= 1 + \frac{3}{4} - \frac{1}{4} + \frac{5}{4^2} - \frac{3}{4^2} + \ldots\ldots\ldots \infty$

$= 1 + \frac{2}{4} + \frac{2}{4^2} + \ldots\ldots..$

$= S - \frac{S}{4} = 1 + \frac{2}{4}\left(1 + \frac{1}{4} + \frac{1}{4^2} + \ldots..... \infty\right)$

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

$\frac{3S}{4} = \frac{5}{3}$

$S = \frac{20}{9}$

17. Ans: (b)

Sol: $8\,[1+11+111+\ldots..n]$

$= 8.\frac{9}{9}(1 + 11 + 111 + \ldots..n)$

$= \frac{8}{9}(9 + 99 + \ldots n)$

$= \frac{8}{9}\left((10'-1) + (10^2+1) - (10^n - 1)\right)$

$= \frac{8}{9}\left((10 + 10^2 + -10^n) - n\right)$

$= \frac{8}{9}\left(\frac{10(10^n-1)}{10-1} - n\right)$

$\Rightarrow \frac{8}{9}\left(\frac{10(10^n-1)}{9} - n\right)$

18. Ans: (d)

Sol: $10 + 84 + 734\ldots\ldots\ldots = (9+1) + (9^2+3) + (9^3+5) + \ldots\ldots$

$= 9 + 9^2+9^3 + \ldots\ldots + (1+3+5+\ldots..n)$

$= \frac{9(9^n - 1)}{9-1} + n^2$

$= \frac{9(9^n - 1)}{8} + n^2$

19. Ans: (c)

Sol: $11 + 103 + 1005 + \ldots..$

$= (10 + 1) + (10^2 + 3) + (10^3 + 5)\ldots\ldots\ldots$

$= (10 + 10^2 + \ldots\ldots 10^7) + (1+3+5+\ldots..n)$

$= \frac{10(10^n - 1)}{10-1} + n^2$

$= \frac{10(10^n - 1)}{9} + n^2$

20. Ans: (d)

Sol: $A.m = \frac{a+b}{2} = p$

$G.m = \sqrt{ab} = q$

Quadratic Equation $= x^2 - (\alpha - \beta)x + \alpha\beta = 0$

$x^2 - 2px + q^2 = 0$ is satisfied

2.18 Data Interpretation

01. Ans: (b)

Sol: Sum of angles in a pie chart $= 360^o$

The relation between angle and percentage is

$100\ \% = 360^o$

$1\% = 3.6^o$

$\therefore\ 40\% = ?$

$= 40 \times 3.6 = 144^o$

02. Ans: (d)

Sol: The total monthly budget of an average household = 4000+1200+2000+1500+1800 = Rs. 10500

Percentage of the monthly budget spent on savings

$= \frac{\text{savings amount}}{\text{Total expenses}} = \frac{1500}{10500} \times 100 = 14.285\%$

$\therefore$ The approximate percentage of the = 100 – 14.285 = 85.714 ≈ 86% monthly budget NOT spent on savings

03. Ans: (d)

Sol:

Category	Years		Increment	% of increment
	2010	2011		
Raw material	5200	6240	1040	$\frac{1040}{5200}\times 100 = 20\%$
Power & fuel	7000	9450	2450	$\frac{2450}{7000}\times 100 = 35\%$
Salary & wages	9000	12600	3600	$\frac{3600}{9000}\times 100 = 40\%$
Plants & Machinery	20000	25000	5000	$\frac{5000}{20000}\times 100 = 25\%$
Advertising	15000	19500	4500	$\frac{4500}{15000}\times 100 = 30\%$
Research & development	22000	26400	4400	$\frac{4400}{22000}\times 100 = 20\%$

$\therefore$ Raw material and research and development are increased by same percentage in year 2010- 2011

04. Ans: 48

Sol: Men & Women who do not own any vehicle

$= 20 + 50 = 70$

Men & Women who own only a car but not scooter = 40 + 34 = 74

Total respondents who do not own a scooter = 144

Total respondents who participated in survey = 300

$$\text{percentage} = \frac{144}{300}\times 100 = 48\%$$

05. Ans: (c)

Sol: Total Revenues of Mola from all types of Rides = 170 + 320 + 215 + 190(pool) + 110 + 220 + 180 + 70(Mini) + 75 + 180 + 120 + 90(prime) =1940

Revenue contribute by prime ride = 75 + 180 + 120 + 90 = 465

$\therefore$ The percentage of share of revenue contributed by prime to the total revenue of Mola

$$= \frac{465}{1940}\times 100 = 23.97$$

06. Ans: (b)

	Elegance	**Smooth**	**Soft**	**Executive**
	27300	20009	17602	9999
	25222	19392	18445	8942
	28976	22429	19544	10234
	21012	18229	16595	10109
	102510	**80059**	**72186**	**39284**
Total Sum	**Rs. ×48**	**Rs. ×63**	**Rs. ×78**	**Rs. ×173**
Total Revenue	**4920480**	**5043717**	**5630508**	**6796132**

More revenue is on executive

07. Ans: (d)

Sol:

Stretch	**Distance (km)**	**Consumption (kwh)**
M	20	12
N	45 – 20 = 25	25 – 12 = 13
O	75 – 45 = 30	45 – 25 = 20
P	100 – 75 = 25	57 – 45 = 12

Cost per km (sketch M) $= \frac{12}{20} = 0.6$

Cost per km (sketch N) $= \frac{13}{25} = 0.52$

Cost per km (sketch O) $= \frac{20}{30} = 0.66$

Cost per km (sketch P) $= \frac{12}{25} = 0.48$

$\therefore$ Stretch P has least consumption per km

08. Ans: (c)

Sol: From the given bar graph,

(i) The number of beds made by carpenter C_2 = The number tables made by carpenter C_3

8 Nos = 8 Nos

$\therefore$ Statement (i) is true

(ii) The total number of chairs made by all carpenters = $C_1 + C_2 + C_3 + C_4 + C_5$

= 2+10+5+2+4 = 23 Nos

The total numbers of tables made by all carpenters = $C_1 + C_2 + C_3 + C_4 + C_5$

= 7+2+8+3+9 = 29 Nos

23 Nos < 29 Nos

$\therefore$ Statement (ii) is also true

$\therefore$ Both the statements (i) and (ii) are true

09. Ans: 6

Sol: Sunday 65 > 110 % (55) (Y > X)

Saturday 60 > 110 % (50) (X > Y)

Friday 35 > 110 % (20) (Y > X)

Wednesday 60 > 110 % (50) (X > Y)

Tuesday 65 > 110 % (55) (Y > X)

Monday 70 > 110 % (45) (Y > X)

Total 6 days, one student is 10% more than another student.

10. Ans: (c)

Sol: Average number of students enrolled in school P in 5 years

$$= \frac{3000+5000+5000+6000+4000}{5} = 4600$$

Average number of students enrolled in school Q in 5 years

$$= \frac{4000+7000+8000+7000+5000}{5} = 6200$$

Average of the difference of the number of students in school,

P and Q = 6200 – 4600 = 1600

Desired ratio = $\frac{4600}{1600} = \frac{23}{8}$

Answer is 23 : 8

11. Ans: (b)

Sol: Suppose Rs x (amount) invested every year by Company P, and Company Q, then the total revenue by P from 2013-2018 is

$$\left[110+120+140+140+150+140\right]\times\frac{x}{100}=8x$$ $\therefore$ The revenue = Investment + Profit

And the total revenue by Q company from 2013-2018 is

$$\left[120+130+130+150+160+160\right]\times\frac{x}{100}=\frac{17x}{2}$$

$\therefore$ Required ratio is $8x:\frac{17x}{2}\Rightarrow 16:17$

12. Ans: (c)

Sol: P - Success rate = $\frac{280}{500}\times 100=56\%$

Q - Success rate = $\frac{330}{600}\times 100=55\%$

R - Success rate = $\frac{455}{700}\times 100=65\%$

S - Success rate = $\frac{240}{400}\times 100=60\%$

Average success rate of four schools

$$=\frac{56+55+65+60}{4}=59\%$$

13. Ans: (b)

Sol: From the given bar chart,

The total expenditure = 500*5 = 2500 million

The total revenue from 2014-2018 = 500 + 700 + 800 + 600 + 400 = 3000 million

$\therefore$ Profit = Revenue – Expenditure = 3000 – 2500 = 500 million

$\therefore$ The profit on the total expenditure

$$=\frac{500}{2500}\times 100=20\%$$

14. Ans: 2006

Sol:

Year	Trade deficit (Imp–Exp)		$\frac{1}{5}$(Exports)
2005	20	$\neq$	$14=\frac{1}{5}\times 70$
2004	10	$\neq$	$14=\frac{1}{5}\times 70$
2007	10	$\neq$	$22=\frac{1}{5}\times 110$
2006	20	$=$	$20=\frac{1}{5}\times 100$

15. Ans: 120

Sol: Installed capacity ≥ 200 tonnes ⇒ large plant

Installed capacity < 200 tonnes ⇒ small plant

Form given multiple pie chart, the large plants are 1, 4, 8 & 9

Total production of large plants = 160 + 190 + 230 + 190 = 770 tonnes

Total production of small plants = 150 + 160 + 120 + 100+ 120 = 650 tonnes

∴ The difference between total production of large plants and small plants in tonnes

= 770 – 650 = 120

16. Ans: 1900

Sol: Total number of management degree holder among the executive in companies

$$C_2=\frac{5}{100}\times\frac{1}{5}\times 1000=100$$

$$C_5=\frac{20}{100}\times\frac{9}{10}\times 10000=1800$$

$C_2 + C_5 = 1900$

17. Ans: (c)

Sol: Money spent on Education = 15%

Money spent on transport = 10%

Extra money spent on Education compared to transport

$$= \frac{15-10}{10} \times 100 = 50\%$$

18. Ans:(a)

Sol: Total number of students registered in the university = 5000

Total number of the registered girls = 1500

The boys enrolled in arts = 20% of 5000 – 30% of 1500 = 550

The girls enrolled in management = 15 % of 1500 = 225

$\therefore$ The ratio of boys enrolled in arts to the girls enrolled in management $= \frac{550}{225} = \frac{22}{9} \Rightarrow 22:9$

Hence option (a) is correct.

19. Ans: (b)

Sol: The total employment in 2010 at all skill level = 600

Total employment increased from 2010 to 2016

$$= 15\% \text{ of } 600 = \frac{15}{100} \times 600 = 90$$

$\therefore$ The employment increased from 2010 to 2016 at S and T skill level = 90

(The total employment at skill levels P, Q and R remained unchanged during this period)

The employment at skill level 'S' in 2010

$= 25 \times 6 = 150 \qquad (\because 100\% = 600, 1\% = 6)$

The employment at skill level S increased by 40 % from 2010 to 2016 = 40% of 150

$$= \frac{40}{100} \times 150 = 60$$

Increased number of employees at skill level T from 2011 to 2016 = 90 – 60 = 30

Total employee at level T in 2016

= 600× 5% + 30

= 30 + 30 = 60

20. Ans: (b)

Sol: Panel (a), Bar diagram represents, proportion of illiterates (%) dark shaded represents female and male illiterates in 2001 and light shaded represents female and male illiterates in 2011. Panel (b) and panel (c) male and females in 2001 and 2011 respectively.

Assume population in 2001 = 100 nos

from given data, population in 2011 also 100.

From the given Bar charts and pie charts, the following table can be possible.

	2001		**2011**	
	Males	**Females**	**Males**	**Females**
Total	**60**	**40**	**50**	**50**
Illiterates	50% of 60 = 30	60% of 40 = 24	40% of 50 = 20	40% of 50 = 20
Literates	60 - 30 = 30	40 – 24 = 16	50 - 20 = 30	50 - 20 = 30

Total literates in 2001 = 30 + 16 = 46

Total literates in 2011 = 30 + 30 = 60

$\therefore$ The percentage increase in the total number of literates from 2001 to 2011

$$= \frac{60-46}{46} \times 100$$

$$= \frac{14}{60} \times 100 = 30.43\%$$

21. Ans: (d)

Sol: Revenue generated through export of item per kilogram

$$= \frac{\text{Total Revenue from Item}}{\text{Export of the item}}$$

Ratio of the revenue generated per kg through export of

Item 1 **Item 4**

$$\frac{12\% \text{ of } 250 \text{ crores}}{11\% \text{ of } 5 \text{ lakh tonnes}} : \frac{6\% \text{ of } 250 \text{ crores}}{22\% \text{ of } 5 \text{ lakh tonnes}}$$

$$\frac{12}{11} : \frac{6}{22} \Rightarrow 4:1$$

22. Ans: 22000

Sol: The expense on labour in 2012 is 4,50,000

Labour = 15% of total cost = 4,50,000

$$= \frac{15}{100} \times \text{total cost} = 4{,}50{,}000$$

Total cost = 30,00,000

Expense on Raw material in 2012

= 20% of 3000000 = 6,00,000

Expense on all other expenses in 2012

= 80% of 3000000 = 240000

Expense on Raw material in 2013

= 6000000 + 30% of 6000000

= 780000

Exp on all other exp in 2013

= 2400000+20% of 2400000

= 2880000

Total cost in 2013

= 780000 + 2880000 = 36,60,000

Percentage increase in the total cost for company in 2013

$$= \frac{3660000 - 3000000}{3000000} \times 100 = 22000$$

23. Ans: (d)

Sol: The amounts invested in the companies of, P and Q in 2006 = 8 : 9

The rate of interest of company 'P' in 2006 = 6%

The rate of interest of company 'Q' in 2006 = 4%

The amounts received after one year by P and Q companies in 2006 year

P		**Q**
6% of 8	:	4% of 9
$\frac{6}{100} \times 8$	:	$\frac{4}{100} \times 9$
4	:	3

24. Ans: (a)

Sol: From the graph statement (i) is correct

- the time taken for curd formation @ 25°C = 120 min
- the time taken for curd formation @ 37°C = 80 min

∴ Statement (ii) is not correct.

25. Ans: (b)

Sol: From the given graph ,

The difference between the maximum and the minimum pollutant concentrations in the winter = 8 – 0 = 8 ppm

The difference between the maximum and the minimum pollutant concentrations in the summer = 10.5 – 1.5 = 9 ppm

Over the given months, these differences are not equal.

∴ Therefore statement (i) is not correct.

From the given graph, the statement (ii) is correct.

26. Ans: (c)

Sol: The total rainfall during the day = 300 mm = 0.3 m

Obstruction free area = 50 m^2

50% of rain fall = 50% of 0.3 m = 0.15 m

Volume of water collected = Area × Depth

= 50 × 0.15 m = 7.5 m^3 = 7500 L

27. Ans: (d)

Sol: The odometer reading increases from starting point to end point

Area of the given diagram = Odometer reading

Area of the velocity and time graph per second

1^{st} sec $\Rightarrow$ triangle = $\frac{1}{2}\times 1\times 1=\frac{1}{2}$

2^{nd} sec $\Rightarrow$ square = 1 × 1 = 1

3^{rd} sec $\Rightarrow$ square + triangle

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

4^{th} sec $\Rightarrow$ triangle $= \frac{1}{2}\times 1\times 2 = 1$

5^{th} sec $\Rightarrow$ straight line $= 0$

6^{th} sec $\Rightarrow$ triangle $= \frac{1}{2}\times 1\times 1 = \frac{1}{2}$

7^{th} sec $\Rightarrow$ triangle $= \frac{1}{2}\times 1\times 1 = \frac{1}{2}$

Total Odometer reading at 7 seconds

$= \frac{1}{2}+1+1\frac{1}{2}+1+0+\frac{1}{2}+\frac{1}{2} = 5$

28. Ans: (d)

Sol: P, Q, R and S are four types of dangerous microbes recently found in a human habitat

In the graph

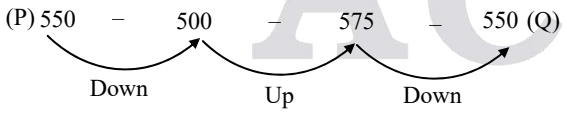
- on X-axis represents probability that microbe will over come human immunity system and
- on Y-axis represents Toxicity (in milligrams of microbe required to destroy half of the body mass in kilograms

Microbe 'S' will have 80% of probability that microbe will overcome human immunity system and less weight of milligrams of microbe required to destroy half of the body mass in kgs.

$\therefore$ Microbe 'S' is danger to human beings.

29. Ans: (c)

Sol: Contour lines can be observed to cross region with height from P to Q is as follows



$\therefore$ The path from P to Q is Down-Up-Down option (c) is satisfies this path

30. Ans: (c)

Sol: The given contour is a hill station, the peak point of this hill station is P, it is under a contour of 550. At floods, the water level is 525 m. So, the village of R, S and T are under a contour of 525. Therefore these villages are submerged.

31. Ans: (c)

Sol:

Region	Air pressure difference
P	0.95 – 0.90 = 0.05
Q	0.80 – 0.75 = 0.05
R	0.8 – 0.65 = 0.15
S	0.95 – 0.90 = 0.05

In general thunderstorms are occurred in a region where suddenly air pressure changes (i.e.,) sudden rise (or) sudden fall of air pressure. From the given contour map in 'R' Region only more changes in air pressure so, the possibility of a thunderstorms in this region.

32. Ans: (d)

Sol: (i) is incorrect as it has move directly

(ii) is incorrect as it stayed for maximum duration on the ground floor

33. Ans: (a)

Sol: Before getting promotion 'T' sharing with R and P and Q's are working together means they are in same office.

Option '(b)' is not correct due to T is sharing with R (i.e.) before getting promotion T is not worked alone.

Option '(c)' is not correct due to 'T' place of work is not defined.

Option '(d)' is also not correct due to after 'T' getting promotion P and Q is are not working together.

34. Ans: (a)

Sol: $= \frac{20}{100} \times 2040 : \frac{20}{100} \times 1450$

$= 240 : 145$

35. Ans: (a)

Chapter 3 Spatial Aptitude

KEY for 3.1 Series									
01. (c)	02. (c)	03. (c)	04. (e)	05. (d)	06. (d)	07. (c)	08. (b)	09. (d)	10. (d)
11. (c)	12. (d)	13.(a)	14. (c)	15. (c)	16. (c)	17. (e)	18. (c)		

KEY for 3.2 Pattern Completion									
01. (a)	02. (c)	03. (d)	04. (a)	05. (c)	06. (a)	07. (a)	08. (b)	09. (b)	10. (d)
11. (c)	12. (a)	13.(a)	14. (a)						

KEY for 3.3 Spotting out Embedded Figure									
01. (b)	02. (c)	03. (c)	04. (b)	05. (b)	06. (d)	07. (b)	08. (a)	09. (a)	10. (d)
11. (d)	12. (b)	13.(a)	14. (c)						

KEY for 3.4 Odd one out / Classification									
01. (d)	02. (d)	03. (d)	04. (b)	05. (d)	06. (d)	07. (c)	08. (c)	09. (c)	10. (c)
11. (b)	12. (c)	13.(d)	14. (b)	15. (d)					

KEY for 3.5 Mirror & Water Images									
01. (a)	02. (d)	03. (c)	04. (c)	05. (b)	06. (d)	07. (b)	08. (d)	09. (d)	10. (d)
11. (d)	12. (c)	13.(b)	14. (d)	15. (c)	16. (d)	17. (b)	18. (b)	19. (b)	20. (c)
21. (d)	22. (a)	23. (d)	24. (c)	25. (b)	26. (d)	27. (a)			

KEY for 3.6 Analogy									
01. (c)	02. (c)	03. (a)	04. (b)	05. (b)	06. (d)	07. (c)	08. (b)	09. (d)	10. (b)
11. (e)	12. (a)	13.(e)							

KEY for 3.7 Paper Folding									
01. (a)	02. (b)	03. (b)	04. (d)	05. (c)	06. (c)	07. (c)	08. (d)	09. (b)	10. (a)
11. (d)	12. (c)	13.(d)	14. (b)	15. (a)	16. (b)	17. (c)	18. (d)	19. (a)	20. (b)

KEY for 3.8 Paper Folding & Cutting									
01. (b)	02. (b)	03. (b)	04. (b)	05. (b)	06. (c)	07. (c)	08. (a)	09. (b)	10. (b)

KEY for 3.9 Grouping of Figures									
01. (d)	02. (a)	03. (d)	04. (b)	05. (b)	06. (c)	07. (a)	08. (b)	09. (a)	10. (a)

KEY for 3.10 Figure Formation / Assembling						
01. (c)	02. (c)	03. (c)	04. (a)	05. (b)	06. (b)	07. (a)

KEY for 3.11 Figure Matrix						
01. (d)	02. (b)	03. (a)	04. (a)	05. (a)	06. (c)	07. (b)
08. (d)	09. (b)	10. (d)	11. (b)	12. (b)	13. (b)	

KEY for 3.12 Rotation						
01. (d)	02. (c)	03. (d)	04. (b)	05. (d)	06. (d)	07. (c)

KEY for 3.13 Diagrammatic Logical Thinking									
01. (a)	02. (b)	03. (a)	04. (a)	05. (b)	06. (b)	07. (c)	08. (c)	09. (b)	10. (d)
11. (c)	12. (a)	13. (a)	14. (c)						