QUANTITATIVE ABILITY - 79 (SOLUTION)

1. (A) C has invested his money for 8 months.
Let ₹ 'x' be C's monthly salary.
Profit = ₹ 2,40,000
Therefore, profit to be shared = ₹ (24000 – 8x)
Ratio of investments by A and B = 2 : 3 = 4 : 6
Ratio of investments by B and C = 6 : 5
Ratio of investments by A, B and C = 4 : 6 : 5
Profit will be shared in the ratio (4 × 12) : (6 × 12) : (5 × 8) = 6 : 9 : 5
Given, B's share = 90000
ATQ,

$$\frac{9}{20}\times(240000-8x)=90000$$

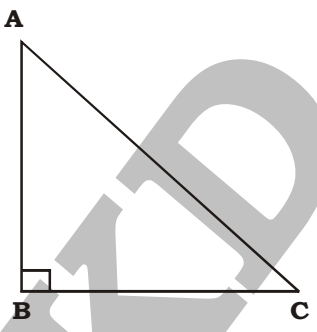
240000 – 8x = 200000
8x = 40000
x = ₹ 5000

2. (C) Let the time to catch P for Q = t
3(t + 1) = 4t
t = 3 hours
Distance covered by P = 3 × 4 = 12 km
Distance covered by R in 2 hours = 10 km
2 = 3t' + 5t'

$$t' = \frac{1}{4} \text{ hour} = 15 \text{ min}$$

Time = 5 : 15 O'clock

3. (B)



Let circum radius be = R
And in-centre radius = r
$AC^2 = AB^2 + BC^2$
$AC^2 = 24^2 + 10^2$
$AC^2 = 676$
AC = 26 cm

$$\text{Circumradius} = \frac{\text{hypotenuse}}{2} = \frac{26}{2} = 13 \text{ cm}$$

inradius of a right angle triangle

$$= \frac{P + B - H}{2} = \frac{AB + BC - AC}{2}$$

$$= \frac{(24 + 10 - 26)}{2} = 4\,\text{cm}$$

Distance between incentre and circumcentre = $\sqrt{R^2 - 2Rr}$

$$= \sqrt{13^2 - 2 \times 13 \times 4} = \sqrt{65}$$

4. (D) We know that,

$$\frac{(3!)^{3!}}{12} = \frac{6^6}{12} = 0 \text{ (Remainder)}$$

From third term onward every term in the series leaves remainder as 0 when divided by 12.

So, required remainder $= \frac{(1!)^{1!} + (2!)^{2!} + (3!)^{3!} + (4!)^{1!} + \ldots\ldots + (20!)^{20!}}{12}$

$$= \frac{1 + 4 + 0 + 0 + \ldots + 0}{12} = 5$$

5. (C) Here we have $1 - 2\sin^2 x + a\sin x = 2a - 7$

$2\sin^2 x - a\sin x + 2a - 8 = 0$

$$\sin x = \frac{a \pm \sqrt{a^2 - 8(2a - 8)}}{4}$$

$$\sin x = \frac{a \pm \sqrt{(a - 8)^2}}{4}$$

$$\sin x = \frac{a - 4}{2} \text{ or } 2$$

We know that the value of sin x lies [–1, 1].

$$-1 \le \frac{a - 4}{2} \le 1$$

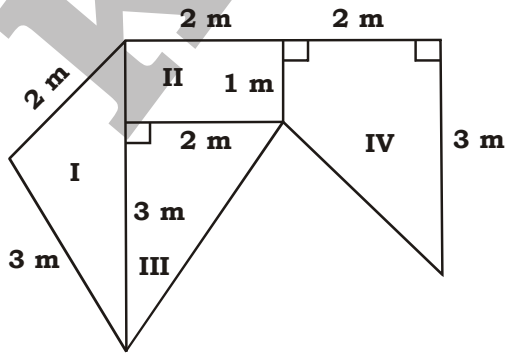
$–2 \le a - 4 \le 2$

$2 \le a \le 6$

a = 2, 3, 4, 5, 6

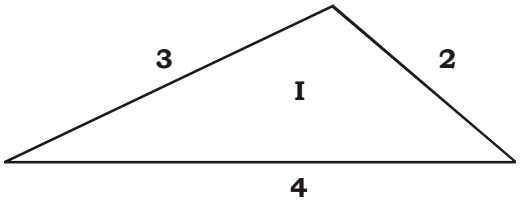
Sum of possible integral values = 20

6. (C)



First of all whole part divides into 4 parts i.e. I, II, III and IV.

Part I:



Semi perimeter (S) = $\frac{2+3+4}{2} = \frac{9}{2}$

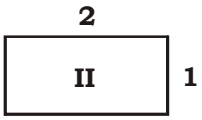
According to Heron's formula,

Area = $\sqrt{S(S-a)(S-b)(S-c)}$

$\sqrt{\frac{9}{2}\left(\frac{9}{2}-2\right)\left(\frac{9}{2}-3\right)\left(\frac{9}{2}-4\right)}$

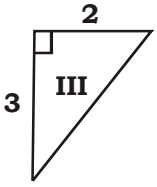
$\sqrt{\frac{9}{2}\times\frac{5}{2}\times\frac{3}{2}\times\frac{1}{2}} = \frac{3\sqrt{15}}{4}$ sq.meter

Part II:



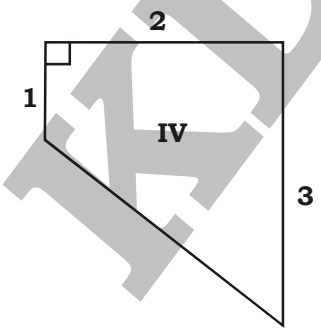
Area of rectangle = 2 × 1 = 2 sq. meter

Part III :



Area of triangle $= \frac{1}{2}\times 2\times 3 = 3$ sq. meter

Part IV:



Area = $\frac{1}{2}\times(1+3)\times 2 = 4$ sq. meter

Total Area = $\frac{3\sqrt{15}}{4}+2+3+4 = \frac{3\sqrt{15}}{4}+9$ sq.meter

7. (C) $x = \sqrt{1+\frac{\sqrt{3}}{2}} - \sqrt{1-\frac{\sqrt{3}}{2}}$

$$x^2 = 1+\frac{\sqrt{3}}{2}+1-\frac{\sqrt{3}}{2}-2\sqrt{1-\frac{3}{4}}$$

$$x^2 = 2-2\times\frac{1}{2} = 1$$

$$x = \pm 1$$

$\because \sqrt{1+\frac{\sqrt{3}}{2}} > \sqrt{1-\frac{\sqrt{3}}{2}}$

$x = 1$

$$\frac{x+\sqrt{2}}{x-\sqrt{2}} = \frac{1+\sqrt{2}}{1-\sqrt{2}} \times \frac{\left(1+\sqrt{2}\right)}{1+\sqrt{2}}$$

$$= \frac{\left(1+2+2\sqrt{2}\right)}{-1} = -3-2\sqrt{2}$$

8. (B) It is given that:

A car starts from point A with the speed of 70 km/hr.

So, when the car reaches to the middle point:

Distance = 150 m

Relative speed = (70 – 45) = 25 km/hr.

$$\text{Time} = \frac{150}{25\times 5}\times 18\,\text{sec}$$

So, the distance covered by car $= \frac{150}{25\times 5}\times 18\times 70\times\frac{5}{18} = 420\,\text{m}$

When it reaches exactly half the distance ; distance left to be covered = 150 m

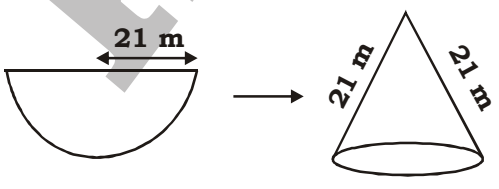
Now, new Relative speed = (65 – 60) = 5 km/hr

$$\text{Time} = \frac{150}{5\times 5}\times 18\,\text{sec.} = 108\,\text{sec.}$$

Distance covered by car = $\frac{(180\times 65\times 5)}{18} = 1950\,\text{m}$

So total distance = 1950 + 420 = 2370 m = 2.37 km

9. (C)



So, from the above image slant height will be equal to radius and curved circumference of semi-circle to the circumference of the base of cone.

Let radius, height and slant height of the cone are r, h and l respectively.

$2\pi r = \pi \times (21)$

$r = \frac{21}{2}\text{cm}$

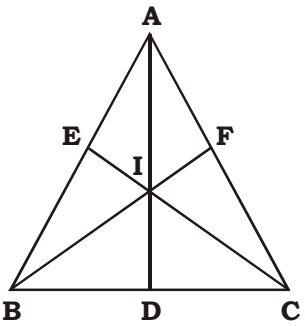
We know that, in a cone

$l^2 = h^2 + r^2$

$21^2 = \left(\frac{21}{2}\right)^2 + h^2$

$h = \frac{21}{2}\sqrt{3} = 18.18 \approx 18\,\text{cm}$

10. (A) In ΔABC , CF is Angle bisector of $\angle ACB$.



Then,

$\frac{CA}{CB} = \frac{AF}{FB} = \frac{16}{20}$

Let AF = 16k, FB = 20k

Also, AB = AF + FB

16k + 20k = AB

36k = 15

$k = \frac{15}{36}$

Hence,

$AF = 16k = 16 \times \left(\frac{15}{36}\right) = \frac{20}{3}$ cm

11. (C) Number of coins = $\frac{\text{Amount in rupees}}{\text{Value of coins in rupees}}$

Number of one rupee coin = x

Number of 50 paise coin = $\frac{3x}{\frac{1}{2}} = 6x$

Number of 25 paise coin = $\frac{7x}{\frac{1}{4}} = 28x$

ATQ,

$x + 6x + 28x = 3150$

$35x = 3150$

$\therefore\ x = 90$

Number of one rupee coin = 90

Number of 50 paise coin= 540

Number of 25 Paise coin = 2520

Total value of coins $= 1 \times 90 + \frac{1}{2} \times 540 + \frac{1}{4} \times 2520$

$= 90 + 270 + 630 = ₹\ 990$

12. (B) Let two trains meet after t hours, when the first train from town P leaves at 8 am.

$\therefore$ Distance covered in t hours at 50 kmph + Distance covered in $(t - 3)$ hours at 100 kmph = 600 kms.

ATQ,

$50t + 100\,(t - 3) = 600$

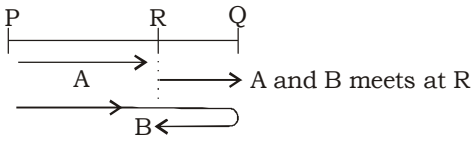
$50t + 100t - 300 = 600$

$150t = 900$

$t = \frac{900}{150} = 6$ hours

Hence, the trains will meet at 2 pm.

13. (A)



When B meets A at R, B has walked the distance PQ + QR and A the distance PR

That is both of them together have walked twice the distance from P to Q, i.e. 40 km.

Now, rates of A & B are 3 : 5 and they walked 36 km.

Hence the distance PR travelled by A

$= \frac{3}{8} \times 40$ km $= 15$ km

14. (C) $(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$

Percentage of total failed candidates = 25 + 20 + 30 – 10 – 15 – 20 + 7 = 37%

Percentage of total candidates who passed = 100 – 37 = 63%

15. (A) Let the two digit number be $= 10x + y$

then, $y = x^2$

ATQ,

$10y + x - (10x + y) = 108$

$9y - 9x = 108$

$y - x = 12$

$x^2 - x - 12 = 0$

$(x - 4)\,(x + 3) = 0$

$\therefore\ x = 4$ and $y = 16$

Original number = 46

$\therefore$ 50% of 46 = 23

16. (C) Total equivalent capital of P $= 5 \times 12 + 8 \times 12 = ₹\ 156$

Total equivalent capital of Q $= 4 \times 24 = ₹\ 96$

Total equivalent capital of R $= 6 \times 12 + 3 \times 12 = ₹\ 108$

$\therefore$ Required ratio = P : Q : R = 156 : 96 : 108 = 39 : 24 : 27

17. (B) Required time = LCM of 20, 22 and 28 seconds = 1540 seconds = 25 min. 48 sec.

18. (B) (Q + R)'s 1 day's work = $\frac{1}{12}$ ...(i)

(P + Q)'s 1 day's work = $\frac{1}{15}$ ...(ii)

(P + R)'s 1 day's work = $\frac{1}{18}$ ...(iii)

On adding all these three equations,

2 (P + Q + R)'s 1 day's work

$$\frac{1}{12}+\frac{1}{15}+\frac{1}{18}=\frac{15+12+10}{180}=\frac{37}{180}$$

(P + Q + R)'s 1 day's work = $\frac{37}{360}$

∴ P, Q and R together can complete the work in $\frac{360}{37}=9\frac{27}{37}$ days

19. (A) Given:

$$\left(\frac{x^2-3x+2}{x^3-8}\right)\div\left(\frac{x^2-9}{x^2+7x+12}\right)\times\left(\frac{x^3+2x^2+4x}{x^2+3x-4}\right)$$

$$=\left(\frac{x^2-3x+2}{x^3-8}\times\frac{x^2+7x+12}{x^2-9}\right)\times\frac{x^3+2x^2+4x}{x^2+3x-4}$$

$$=\frac{(x-1)(x-2)}{(x-2)(x^2+4+2x)}\times\frac{(x+4)(x+3)}{(x-3)(x+3)}\times\frac{x(x^2+2x+4)}{(x-1)(x+4)}=\frac{x}{x-3}$$

20. (D) The distance covered by first train till 12 noon = 40 × 2 = 80 km

Now, remaining distance (220 – 80) = 140 km is covered by the train with relative speed of (40 + 30) = 70 km/hr

∴ Required time both the train meet each other = $\frac{140}{70}$ = 2 hours after 12 pm = 12 + 2 = 2 pm

21. (C) Let the number of students appeared in school A = 100

Number of students qualified in school A = 60

According to question,

Number of students appeared in School B = 130

Number of students qualified in School B = $60\times\frac{140}{100}=84$

∴ Required percentage = $\left[\frac{84\times100}{130}\right]\%=64.61\%$

22. (D) Required number of items = $\frac{(3000+1000)}{(80-30)}=\frac{4000}{50}=800$

23. (D) Let the speed of train Y be x kmph.

Speed of train X relative to Y = $(60 - x)$ kmph

$= \left[(60-x)\times\frac{5}{18}\right]$ m/sec $= \left(\frac{300-5x}{18}\right)$

Distance covered = 100 + 200 = 300m

$$\frac{300}{\left(\frac{300-5x}{18}\right)} = 180$$

$$300 = \frac{180(300-5x)}{18}$$

$30 = 300 - 5x$

$5x = 270$

$x = \frac{270}{5} = 54$ km/hr

Hence, the speed of train Y is 54 kmph.

24. (B) (1) If one black ball in a box, then number of ways = 6

(2) If two black balls in a box, then number of ways = 5

(3) If three black balls in a box, then the number of ways = 4

(4) If four black balls in a box, then number of ways = 3

(5) If five black balls in a box, then number of ways = 2

(6) If six black balls in a box, then number of ways = 1

$\therefore$ Total number of ways = 6 + 5 + 4 + 3 + 2 + 1 = 21

25. (A) $x + y + z = 0$

$x + y = -z$

$x^2 + y^2 + 2xy = z^2$

$x^2 + y^2 - z^2 = -2xy$

Similarly,

$y^2 + z^2 - x^2 = -2yz$ and $z^2 + x^2 - y^2 = -2xz$

Now, we have

$$= \frac{1}{x^2+y^2-z^2} + \frac{1}{y^2+z^2-x^2} + \frac{1}{z^2+x^2-y^2}$$

$$= \frac{1}{-2xy} + \frac{1}{-2yz} + \frac{1}{-2zx} = \frac{z+x+y}{-2xyz} = 0$$

26. (A) Let both the trains meet after t hours

Now, Distance = Speed × Time

ATQ,

$75 \times t - 60 \times t = 150$

$15t = 150$

$t = 15$ hours

$\therefore$ Distance between A and B = $75t + 60t = 135t$

$= 135 \times 15 = 2025$ km

Short trick :

Distance between A and B = $\frac{150}{(75-60)} \times (75 + 60) = 2025$ km

27. (D) Let their monthly income are x and y respectively.

$\therefore$ $x + y =$ ₹ 7000 ...(i)

Again, they spend 90% and 80% respectively.

So, they save 10% and 20%.

By question,

(10% of x) : (20% of y) = 2 : 3

$$\frac{\frac{10x}{100}}{\frac{20y}{100}} = \frac{2}{3}$$

$$\frac{10x}{20y} = \frac{2}{3}$$

$$x = \frac{4}{3}y \quad \text{...(ii)}$$

Putting the value of eq. (ii) in eq. (i)

$$\frac{4}{3}y + y = 7000$$

$$\frac{7y}{3} = 7000$$

$\therefore$ $y = \frac{7000 \times 3}{7}$ = ₹ 3000

$\therefore$ $x = \frac{4}{3}y = \frac{4}{3} \times 3000$ = ₹ 4000

28. (B) Total ages of 5 member family = 25 × 5 = 125 years

Total age 12 years ago = 120 – 5 × 12 = 60 years

$\therefore$ Required average age = $\frac{60}{5}$ = 12 years

29. (B) Let the principal be P and rate of interest be r%. Then, principal (when difference between C.I. and SI is for 2 years) is given by

$$P = \frac{40 \times (100)^2}{r^2} \quad \text{.....(i)}$$

and difference between CI and SI is for 3 years is given by

$$P = \frac{122 \times 10^2}{r^2(300 + r)} \quad \text{.....(ii)}$$

From eqs. (i) and (ii),

$$\frac{40 \times 10^4}{r^2} = \frac{122 \times 10^2}{r^2(300 + r)}$$

$\therefore$ $r = 5\%$

From Eq. (i), $P = \frac{40 \times 10^4}{25}$ = ₹ 8000

30. (B) Ratio of the profit = Ratio of the equivalent capitals of Mohan and Sohan
= 80000 × 12 : 100000 × 6
= 960000 : 600000 = 8 : 5

∴ Mohan's share in the profit = $\frac{5}{13} \times 213200$ = ₹ 82,000

31. (A) Ena = $3x$ years
Akanksha's = $2x$ years

After 8 years, $\frac{3x+8}{2x+8} = \frac{11}{8}$

$24x + 64 = 22x + 88$

$2x = 88 - 64 = 24 \Rightarrow x = 12$

∴ Akanksha's age = $2x = 2 \times 12 = 24$ years

∴ Age of Ena's son = $\frac{1}{2} \times 24 = 12$ years

32. (A) Speed of bus = $\frac{480}{8}$ = 60 km/hr

∴ Speed of Train = $\frac{60}{3} \times 4$ = 80 km/hr

and speed of car = $\frac{80}{16} \times 15$ = 75 km/hr

∴ A car covered distance in 6 hours = 75 × 6 = 450 km

33. (A) Amount remaining after

1 year = $5000\left(1+\frac{8}{100}\right) - 1500$ = ₹ 3900

2 years = $3900\left(1+\frac{8}{100}\right) - 1500$ = ₹ 2712

3 years = $2712\left(1+\frac{8}{100}\right) - 1500$ = ₹ 1428.96

34. (B) S.I. = $\frac{25000 \times 12 \times 2}{100}$ = ₹ 6000

C.I. = $18000\left[\left(1+\frac{6}{100}\right)^2 - 1\right]$

= $18000\left[\left(\frac{53}{50}\right)^2 - 1\right]$

= $18000\left[\frac{2809-2500}{2500}\right]$

= $18000 \times \frac{309}{2500}$

= ₹ 2224.80

∴ Total interest earned = ₹ 6000 + 2224.80 = ₹ 8224.80

35. (A) In first vessel:

Quantity of water = $\frac{1}{4}$ and milk = $\frac{3}{4}$

In second vessel:

Quantity of water = $\frac{2}{7}$ and milk = $\frac{5}{7}$

In resultant vessel:

$\frac{1}{8}$ part of mixture of first vessel is taken and $\frac{7}{8}$ part of mixture of Second vessel is taken

So, the ratio of water to milk in the new vessel.

$$\left(\frac{1}{4}\times\frac{1}{8}+\frac{2}{7}\times\frac{1}{8}\right) : \left(\frac{3}{4}\times\frac{7}{8}+\frac{5}{7}\times\frac{7}{8}\right) = \left(\frac{1}{32}+\frac{1}{28}\right) : \left(\frac{21}{32}+\frac{5}{8}\right)$$

$$= \left(\frac{7+8}{224}\right) : \left(\frac{21+20}{32}\right) = \frac{15}{224} : \frac{41}{32} = 15 : 287$$

36. (C) Given expression :

$$\frac{1+x}{1-x}\times\frac{1+y}{1-y}\times\frac{1+z}{1-z}$$

$$= \frac{1+\frac{a-b}{a+b}}{1-\frac{a-b}{a+b}}\cdot\frac{1-\frac{b-c}{b+c}}{1-\frac{b-c}{b+c}}\cdot\frac{1+\frac{c-a}{c+a}}{1-\frac{c-a}{c+a}} = \frac{a}{b}\times\frac{b}{c}\times\frac{c}{a} = 1$$

37. (A) Let the speed of boat in still water is x km/hr and speed of current is y km/hr.
ATQ,

$$\frac{10}{x+y} = \frac{3}{x-y}$$

$10x - 10y = 3x + 3y$
$7x = 13y$

$$\frac{x}{y} = \frac{13}{7} = k \text{ (let)}$$

$x = 13k$ and $y = 7k$
Now,

$$\frac{30}{13k+7k} + \frac{30}{13k-7k} = 10$$

$$\frac{30}{20k} + \frac{30}{6k} = 10$$

$$\frac{3}{2k} + \frac{10}{2k} = 10$$

$13 = 20k$

$$k = \frac{13}{20}$$

∴ Speed of current = $y = 7k$

$$= 7 \times \frac{13}{20} = \frac{91}{20} \text{ km/hr} = 4\frac{11}{20} \text{ km/hr}$$

38. (B) Required ratio = $200 \times \frac{120}{100}$: 320 = 240 : 320 = 3 : 4

39. (D) Total number of people travelled by B on Monday and Tuesday = 200 + 170 = 370
Total number of people travelled by A on Saturday and Sunday = 350 + 270 = 620
∴ Required difference = 620 – 370 = 250

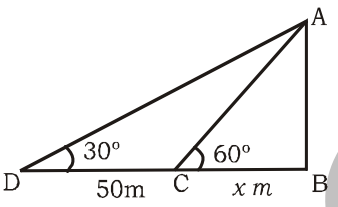
40. (D) Required average = $\frac{240+210+140+230}{4} = \frac{820}{4} = 210$

41. (B) Required % = $\left(\frac{350-210}{350}\times 100\right)\% = 40\%$

42. (B) Required % = $\left(\frac{580-280}{260}\times 100\right)\% = 123.07\% \approx 123\%$

43. (B) Let the weight of Mr. Gupta and Mrs. Gupta be $7x$ kg and $8x$ kg respectively.
Then, $7x + 8x = 120$
$15x = 120$
$x = \frac{120}{15} = 8$ kg
Initially weight of Mr. Gupta = $7x = 7 \times 8 = 56$ kg
and initially weight of Mrs. Gupta = $8x = 8 \times 8 = 64$ kg
After taking dieting, weight of Mr. Gupta = 56 – 6 = 50 kg
Ratio of their weight = $\frac{50}{60} = 5 : 6$
So, Mrs. Gupta reduced weight = 64 – 60 = 4 kg

44. (A)



In the above figure,
AB → the tower and DC = 50 m
Let CB = x m

Now, $\tan 30° = \frac{AB}{(50+x)}$

$\frac{1}{\sqrt{3}} = \frac{AB}{(50+x)}$

$\sqrt{3}(AB) = (50 + x)$

$x = \sqrt{3}(AB) - 50$ _____(i)

also, $\tan 60° = \frac{AB}{x}$

$\sqrt{3} = \frac{AB}{x}$

$AB = \sqrt{3}\, x$

$AB = \sqrt{3}\{\sqrt{3}(AB) - 50\}$ [From (i)]

$AB = 3AB - 50\sqrt{3}$

$2AB = 50\sqrt{3}$

$AB = 25\sqrt{3}$ metre

45. (A) Here $\angle CAB = \angle BCD$ (angles in alternate segments)
and $\angle DAB = \angle CDB$ (angles in alternate segments)
$\angle CAD = \angle CAB + \angle DAB = \angle BCD + \angle CDB$
$\angle CAD + \angle CBD = \angle BCD + \angle CDB + \angle CBD = 180^\circ$

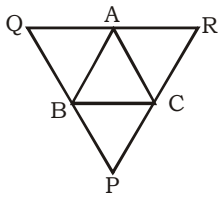
46. (D) Base and height of triangle are 16 and 9cm respectively.

Area of triangle = $\frac{1}{2} \times 16 \times 9 = 72$ cm

$\therefore$ Area of equilateral triangle = $\frac{\sqrt{3}}{2} \times 72 = 36\sqrt{3}$ cm^2

$\frac{\sqrt{3}}{4}a^2 = 36\sqrt{3}$

a = 12 cm

47. (C) 

AQ $\parallel$ CB, and AC $\parallel$ QB
AQBC, is a parallelogram
BC = AQ
Again , AR $\parallel$ BC and AB $\parallel$ RC
ARCB, is a parallelogram.
BC = AR $\Rightarrow$ AQ = AR

AQ = AR = $\frac{1}{2}$QR

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

Similarly, AB = $\frac{1}{2}$PR and AC = $\frac{1}{2}$PQ

$\therefore$ Required ratio = (PQ + QR + RP) : (AB + BC + CA) = 2 : 1

48. (A) Total age of the 4 members of the family, 10 years ago = 24 × 4 = 96 years
Present age of 4 members = 96 + 40 = 136 years
Total age of the 7 members presently = 22 × 7 = 154 years
Age of [twins + youngest – child] = 154 – 136 = 18 years
Let the age of the one of the twins = x years
Age of the youngest = $(x - 3)$ years
Then,
$2x + (x - 3) = 18$
$3x = 21$
$x = 7$

$\therefore$ Age of children's = 7, 7, 4 years

49. (B) Average of 10 numbers = 40.2
Sum of 10 numbers = 40.2 × 10 = 402
As per Question,

$$\text{Actual Average} = \frac{402-18+(31-13)}{10} = \frac{402-18+18}{10} = 40.2$$

50. (A) Let the bank makes a transaction of ₹ x crores.
According to question,
(20 – 16.5)% of x = 10.5 crore

$$\frac{3.5}{100} \times x = 10.5$$

$$\therefore \quad x = \frac{10.5 \times 100}{3.5} = 300 \text{ crore}$$

51. (D) Let speed of row is 'x'.
Speed of covered is 'y'

$$\text{Downstream time taken} = \frac{12}{x+y}$$

$$\text{Upstream time taken} = \frac{12}{x-y}$$

$$\frac{12}{x-y} - \frac{12}{x+y} = 6 \Rightarrow x^2 - y^2 = 4y \qquad \text{_____(i)}$$

Now, If speed of row double $\Rightarrow$ '$2x$'
Time is 1 hour less as compared to upstream

$$\frac{12}{2x-y} - \frac{12}{2x+y} = 1$$

$4x^2 - y^2 = 24y$ _____(ii)
From (i) & (ii) we get,

$$y = \frac{8}{3} \text{ mph.} = 2\frac{2}{3} \text{ mph}$$

52. (A) Let the 4 numbers are A, B, C and D.
According to question,
(A + 3) = (B – 3) = (C × 3) = (D ÷ 3)
Let (A + 3) = (B – 2) = (C × 3) = (D ÷ 3) = k (say)

then, A= (k – 3), B = (k + 3); C = $\left(\frac{k}{3}\right)$, D = 3k

Also,
A + B + C + D = 64

$$(k-3) + (k+3) + \left(\frac{k}{3}\right) + (3k) = 64$$

$$5K + \frac{K}{3} = 64$$

$16\ k = 64 \times 3$

$k = 12$

1st number = $(k - 3) = 9$ = A

2nd number = $(k + 3) = 15$ = B

3rd number = $\left(\frac{k}{3}\right) = 4$ = C

4th number = $3k = 36$ = D

$\therefore$ Required difference = 36 – 4 = 32

53. (A) Let amount invested in scheme A = ₹ x

then in B = ₹ $(27000 - x)$

For scheme A, CI = 16.

54. (B) For 1st year

[5000 + 50% of 5000] = ₹ 5250

Tax = 20% of interest = $\frac{20}{100} \times 250$ = ₹ 50

At the end of 1st year = ₹ [5250 – 50] = ₹ 5200 invested

Similarly,

For 2nd year

$\left[5200 + \frac{5}{100} \times 5200 - 52\right]$ = ₹ 5408

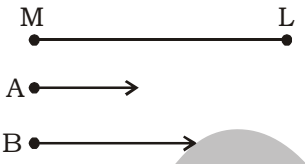
For 3rd year

$\left[5408 \times \frac{105}{100}\right]$ = ₹ 5678.40

At the end of 3rd year = ₹ [5678.40 – tax]

= ₹ [5678.40 – 54.08] = ₹ 5624.32

55. (D)



Given that,

Speed of A = 60 km/hr

Distance travelled in 3 hr = 60 × 3 = 180 km

At 2 : 00 pm

Speed of B = 72 km/hr

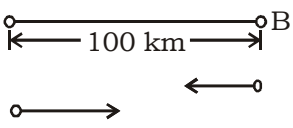
Time difference = 3 hrs

Relative velocity = [72 – 60] = 12 km/hr

Now, Time - gap (meeting) = $\frac{180}{12}$ = 15 hr after they meet

They will meet at 2 pm + 15 hour = 5 am

56. (A)



Let the speed of A = u km/hr

Speed of B = v km/hr
As per question,

$\frac{100}{(u+v)}$ = 1 hr

$(v + u) = 100$ ..... (i)
Again from question

$\frac{100}{(u-v)}$ = 5,

$5v - 5u = 100$ ..... (ii)
From equation (i) and (ii)
$10v = 600$
v = 60 m/hr

57. (A)

Ratio of CP =	1	:	2	:	4
Ratio of No. of articles sold =	$\frac{2}{2}$	:	$\frac{5}{10}$	:	$\frac{2}{8}$
Ratio of % profit =	10%	:	20%	:	25%
SP =	1 × 1.1		5×1.2		4×1.25
Total SP =	1.1		6		5 = 12.1

So, Net % profit = $\frac{12.1-10}{10} \times 10 = 21\%$

58. (C) Given that,
Invested ratio of A : B : C = 5 : 7 : 6
After 6-months,
Invested ratio of A : B : C = 60 : 84 : 54
Now,

Share of profit of C = $\frac{9}{33} \times 33000 = ₹ 9000$

59. (C) According to question,
Sohan = 25000 × (36 months) = ₹ 900000
Aditya = [15000 × 30 + 15000 × 24] = ₹ 810000

$\therefore$ Profit share of Aditya = $\frac{\text{Sohan}}{\text{Sohan}+\text{Mohan}} \times 247000$

$= \frac{9}{19} \times 247000 = 1,17,000$

60. (A) 25 men and 15 women complete a piece of work in 12 days.

Work of 8 days = $\frac{1}{12} \times 8 = \frac{2}{3}$

Remaining work = $1 - \frac{2}{3} = \frac{1}{3}$

Now, $\frac{1}{3}$ piece of work completed by 25 men in 6 days.

1 work can be completed by 25 men in 18 days.
Now

Total work done by women = $\frac{1}{12} - \frac{1}{18} = \frac{3-12}{36}$

$= \frac{1}{36}$ work and done by in 36 days

61. (B) 12 men takes 18 days to complete 1 work.

12 men will take 1 day to complete $\frac{1}{18}$ work

1 man will take 1 day to complete $\frac{1}{18\times12}$ work

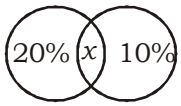
10 men will complete the job in = $\frac{10}{18\times12}+\frac{9}{12\times24}$

$= \frac{5}{108}+\frac{4}{144}$

$= \frac{20+12}{432} = \frac{32}{432}$

10 men will take $\frac{432}{32} = \frac{27}{2} = 13\frac{1}{2}$ days to complete a job.

62. (B) Let the Family have both, car and phone = x%



ATQ,

20 + 15 + x = 35 [given]

$\therefore$ x = 5%

Now,

5% comprises 2000 family.

100% = 2000 × 20 = 40000

63. (C) Let number of students of type A = 100

ATQ,

$\frac{80}{100}$ of $\frac{40}{100}$ of 100 = 32

Percentage of remaining number of boys = (100 – 32)% = 68%

64. (B) Given that,

tan A – tan B = x, and

cot A – cot B = y, then cot(A – B) = ?

$\cot(A-B) = \frac{1}{\tan(A-B)} = \frac{1+\tan A\tan B}{\tan A-\tan B}$

$\cot(A-B) = \frac{1+\tan A\tan B}{x}$ .... (i)

Now, $\frac{1}{\tan A}+\frac{1}{\tan B} = y$

$\frac{\tan A-\tan B}{\tan A.\tan B} = y$

$\frac{-x}{\tan A.\tan B} = \frac{y}{1}$

tanA.tan B = $\frac{-x}{y}$ .... (ii)

From (i) and (ii),

$$\cot (A - B) = \frac{1 - \frac{x}{y}}{x}$$

$$\cot (A - B) = \frac{1}{x} - \frac{1}{y}$$

65. (A) $\sin\alpha + \sin\beta = a$ .... (i)

$\cos\alpha + \cos\beta = b$ .... (ii)

Squaring and adding them,

$a^2 + b^2 = \sin^2\alpha + \sin^2\beta + 2\sin\alpha.\sin\beta + \cos^2\alpha + \cos^2\beta + 2\cos\alpha\cos\beta$

$a^2 + b^2 = 2 + 2[\sin\alpha\sin\beta + \cos\alpha\cos\beta]$

$a^2 + b^2 = 2 + 2\cos(\alpha + \beta)$

$\therefore \cos(\alpha + \beta) = \frac{a^2 + b^2 - 2}{2}$

Again, squaring and subtracting them [equation (i) and (ii)],

$b^2 - a^2 = \cos^2\alpha - \sin^2\alpha + \cos^2\beta - \sin^2\beta + 2[\cos\alpha\cos\beta - \sin\alpha\sin\beta]$

$= \cos 2\alpha + \cos 2\beta + 2\cos(\alpha + \beta)$

$= 2\cos(\alpha + \beta)\cos(\alpha - \beta) + 2\cos(\alpha + \beta)$

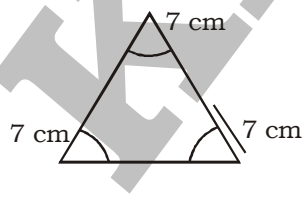
$= 2\cos(\alpha + \beta)[\cos(\alpha - \beta) + 1]$

$= 2\cos(\alpha + \beta)\left[\frac{a^2 + b^2 - 2}{2} + 1\right]$

$= 2\cos(\alpha + \beta)\left[\frac{a^2 + b^2}{2}\right]$

$\therefore \cos(\alpha + \beta) = \frac{b^2 - a^2}{a^2 + b^2}$

66. (C)



Area of region gazed = $\frac{\angle A + \angle B + \angle C}{360^\circ}(\pi R^2)$

$= \frac{180^\circ}{360^\circ}\left[\frac{22}{7} \times 7 \times 7\right]$ = 77 sq. units

67. (C) Side of the cube = $\sqrt[3]{343}$ = 7 cm

Height of the cone = 7 cm

radius = $\frac{7}{2}$ cm

Volume of the cone = $\frac{1}{3}\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\times 7$

= $\frac{539}{6}$ = $89.8\overline{3}$ cm = 90 cm^2 (approx.)

68. (A) Required average = $\frac{3297+2523+2860+2660+2770+2665+2899}{7}$

= $\frac{19674}{7}$ = \$ 2810.57 million ≈ \$ 2811 million

69. (B) Required average value = $\frac{3034+3210+3106+3200+2984}{5}$

= $\frac{15534}{5}$ = \$ 3106.8 million

70. (D) Required % = $\frac{(2860-2523)}{2523}\times 100\%$ = 13.35%

71. (B) Required change in trade gap = $\frac{(2770-2665)}{2770}\times 100\%$ = 3.79% decrease

72. (A) Required difference = (3464 + 3034 + 3210) – (3106 + 3200 + 2984) = 418

73. (B) Let the total number of workers = x

According to question,

20% of 75% of x + 80% of 25% of x = 126

$\frac{20\times 75\times x}{100\times 100}+\frac{80\times 25\times x}{10\times 100}=126$

$\therefore\ x=\frac{126\times 100\times 100}{(1500+2000)}=360$

74. (D) Let single ticket = ₹ x

Return ticket = ₹ $\frac{5x}{4}$

ATQ,

105% of $\frac{5x}{4}$ = 84

$x=\frac{84\times 4\times 100}{5\times 105}$ = ₹ 64

75. (C) Volume = Area of trapezium × height

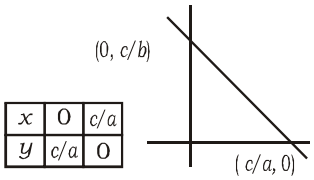
Area of Trapezium = $\frac{1}{2}$ × (sum of parallel sides)× height

= $\frac{1}{2}$ × 22 × 8 = 88 cm^2

Volume = Area of base × Height

Height = $\frac{1056}{88}$ = 12 cm

76. (C)



Area = $\frac{1}{2}$ × b × h

= $\frac{1}{2} \times \frac{c}{b} \times \frac{c}{a} = \frac{c^2}{2ab}$ sq. units

77. (D) $3y - x = 6$ (×3)

$5y + 3x = 38$

$9y + 5y = 18 + 38$

$14y = 56$

$y = 4$

$x = 6, y = 4$

Required co-ordinate = (6, 4)

78. (B) $\frac{(7+\sqrt{5})^2 - (7-\sqrt{5})^2}{49-5}$

$= \frac{49+5+14\sqrt{5}-49-5+14\sqrt{5}}{44}$

$= \frac{7}{11}\sqrt{5} = a + \frac{7}{11}\sqrt{5}b$

$\therefore$ $a = 0$ $b = 1$

79. (A) Area = $\frac{1}{2}$ × sum of || sides × height

$35 = \frac{1}{2} \times 14 \times h$

Height = 5 cm

In ΔDFC,

$DC^2 = DF^2 + FC^2$

$DC^2 = 5^2 + 2^2$

$DC^2 = 29$

$\therefore$ DC = $\sqrt{29}$ cm

80. (B) We know that, AM $\geq$ GM

$\sqrt{a} + \frac{1}{\sqrt{a}} \geq 2$

Here, $\sqrt{x^2-x+1} + \frac{1}{\sqrt{x^2-x+1}} \geq 2$

$2 - x^2 \geq 2$

$x^2 \leq 0$

$\therefore$ $x = 0$

Hence, the given equation has only one solution.

81. (D) Given $x + \frac{a}{x} = 1$

$x^2 + a = x$

$x^2 - x = -a$

Now, $\frac{x^2 + x + a}{x^3 - x^2} = \frac{x + 1 + \frac{a}{x}}{x^2 - x} = \frac{-2}{a}$

82. (B) Let total number of men = x

and total number of women = y

$\therefore$ Number of married men = $\frac{45x}{100}$

and number of married women = $\frac{25y}{100}$

ATQ,

$\frac{45x}{100} = \frac{25y}{100} \Rightarrow y = \frac{9x}{5}$ _____(i)

also,

Total number of married adults = $\frac{45x}{100} + \frac{25y}{100}$

$= \frac{9x}{20} + \frac{9x}{20} = \frac{9x}{10}$ [from eq._____(i)]

and total population in city = $x + y$

$= x + \frac{9x}{5} = \frac{14x}{5}$ [from eq._____(ii)]

$\therefore$ Required percentage = $\frac{\frac{9x}{100}}{\frac{14x}{5}} \times 100 = 32.14\%$

83. (A) Let the total number of candidates = x

Number of candidates who answered all the 5 questions = $\frac{5x}{100}$

also, Number of candidates who answered not a single question = $\frac{5x}{100}$

Remaining students = $x - \left(\frac{5x}{100} + \frac{5x}{100}\right) = \frac{9x}{10}$

Number of candidates who answered only one question = $\frac{9x}{10} \times \frac{25}{100} = \frac{9x}{40}$

Number of candidates who answered four questions = $\frac{9x}{10} \times \frac{20}{100} = \frac{9x}{50}$

Given, number of candidates who answered either two questions or three questions = 396

ATQ,

$$x - \left(\frac{5x}{100} + \frac{5x}{100} + \frac{9x}{40} + \frac{9x}{50}\right) = 396$$

$$x - \left(\frac{10+10+45+36}{200}\right) x = 396$$

$$x\left(\frac{200-101}{200}\right) = 396$$

$$x = \frac{396 \times 200}{99} = 800$$

84. (D) Required area of the 4 walls where wall paper is to be used = Area of four walls – Area of both windows = $2h\,(l + b) - \left(\frac{3}{2}\times 1 + 2\times\frac{3}{2}\right)$

$$= 2\times 3(8+6) - \left(\frac{3}{2}+3\right) = 6 \times 14 - \frac{9}{2}$$

$$= 84 - \frac{9}{2} = \frac{159}{2}\text{m}^2$$

Area of 1 piece of wall paper = $0.5 \times 1 = 0.50\text{m}^2$

Cost of wall paper = ₹ $\frac{\frac{159}{2}}{0.50} \times \frac{25}{100} = \frac{\frac{159}{2}}{\frac{1}{2}} \times \frac{1}{4}$

$$= ₹\ \frac{159}{4} = ₹39.75 = ₹39 \text{ (Approx)}$$

85. (C) Let the original student be n
After 20 days for n students food last for 10 days more.
∴ for (n+500) students food last for 5 days
ATQ,
$10n = 5(n + 500)$
$10n - 5n = 2500$
$n = 500$

86. (B) ₹ $x \rightarrow$ fixed expense (say) & ₹ $y \rightarrow$ Expense per student (say)

$x + 200y = 1300$ _____(i)

$x + 250y = 1600$ _____(ii)

$50\ y = 300$

$y = 6$

Put the value of $y = 6$ in equation (i),

$x + 200\ y = 1300$

$x + 200 \times 6 = 1300$

$x = 100$

Expense for 300 students = $x + 300 \times 6$

$100 + 1800 = ₹\ 1900$

87. (A) Part of the tank filled = $\frac{1}{5}$

capacity of = $x\ l$ (Say)

quantity of water in the tank = $\frac{1}{5}x\ l$

ATQ,

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

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

$\frac{6x-5x}{30} = 8$

x = 240 litres

88. (C) $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} \times \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ (on rationalising the denominator)

$= \frac{\left(\sqrt{3}+\sqrt{2}\right)^2}{\left(\sqrt{3}\right)^2-\left(\sqrt{2}\right)^2} = \frac{3+2+2\sqrt{3}\times\sqrt{2}}{3-2} = 5+2\sqrt{6}$

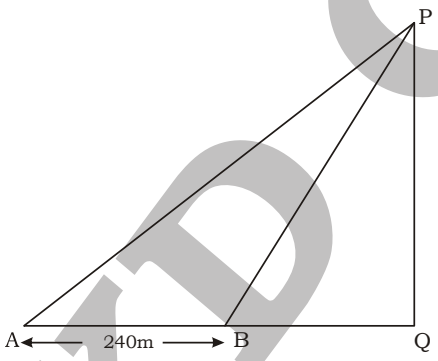
$= a + b\sqrt{6}$

on comparing $a + b\sqrt{6}$ with $5 + 2\sqrt{6}$,

We get,

a = 5 and b = 2

89. (C)



tan A = $\frac{5}{12}$

tan B = $\frac{3}{4}$

$\frac{5}{12} = \frac{PQ}{AQ}$

$\frac{5}{12} = \frac{PQ}{240+BQ}$ ..... (i)

$\frac{3}{4} = \frac{PQ}{BQ}$ ..... (ii)

Divide (i) by (ii),

$$\frac{\frac{12}{5}}{\frac{3}{4}} = \frac{\frac{PQ}{240+BQ}}{\frac{PQ}{BQ}}$$

$$\frac{5}{12} \times \frac{4}{3} = \frac{BQ}{240+BQ}$$

$$\frac{5}{9} = \frac{BQ}{240+BQ}$$

$9BQ - 5BQ = 240 \times 5$

$BQ = \frac{240 \times 5}{4} = 300$

$\frac{PQ}{BQ} = \frac{3}{4}$

$PQ = \frac{3}{4} \times 300 = 225$ m

90. (D) $2Q + P + R = 59$ ..... (i)

$Q + R + 3P = 68$ ..... (ii)

$P + 3Q + 3R = 108$ ..... (iii)

From Eqs. (ii) and (iii),

$3Q + 3R + 9P = 204$

$P + 3Q + 3R = 108$

$8P = 96$

$\therefore$ $P = 12$ years

91. (A) Let any proper fraction be $\frac{1}{2}$

New fraction = $\frac{1+2}{2+2} = \frac{3}{4}$

Now, $\frac{3}{4} > \frac{1}{2}$.

92. (C) $x^2 - 3x + 2 = (x-1)(x-2)$

Hence $(x-1)$ and $(x-2)$ are both factors of the polynomial.

By factor theorem,

$f(1) = 0$

$1 - 5 + A - B + 4 - 40 = 0$

$A - B = 40$ .....(i)

and also,

$f(2) = 0$

$2^5 - 5 \cdot 2^4 + A \cdot 2^3 - B \cdot 2^2 + 4(2) - 40 = 0$

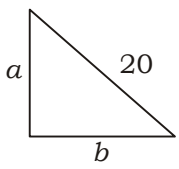
$2A - B = 20$ .....(ii)

Solving (i) and (iii), we get,

$A = -20$

$B = -60$

93. (A)



$a + b = 48 - 20 = 28$

$a^2 + b^2 = 20^2 = 400$

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

$(28)^2 = 400 + 2ab$

$2ab = 384$

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

$(a - b)^2 = 400 - 384 = 16$

$(a - b) = 4$

$a = 16$ cm, $b = 12$ cm

94. (C) $10 = \frac{85 \times R \times 3}{100}$

Interest = $102 \times \frac{200}{51} \times \frac{5}{100}$ = ₹ 20

Amount = ₹ 102 + ₹ 20 = ₹ 122

95. (B) $r^{75} > r^{90}$ is possible only when $0 < r < 1$

96. (B) $\frac{K}{6} \neq \frac{1}{2}$; $K \neq 3$

97. (A) Required ratio = 3 : 2

98. (B) Average Demand of all companies = $\frac{3000 + 600 + 2500 + 1200 + 3300}{5}$ = 2120

Average production of all companies = $\frac{1500 + 1800 + 1000 + 2700 + 2200}{5}$ = 1840

∴ Required difference = 2120 – 1840 = 280

99. (C) Production of company D = 2700

Production of company A = 1500

∴ Required answer = $\frac{2700}{1500}$ = 1.80 times

100. (A) Required% = $\frac{600}{2500} \times 100 = 24\%$

QUANTITATIVE ABILITY - 79 (ANSWER KEY)

1. (A)	26. (A)	51. (D)	76. (C)
2. (C)	27. (D)	52. (A)	77. (D)
3. (B)	28. (B)	53. (A)	78. (B)
4. (D)	29. (B)	54. (B)	79. (A)
5. (C)	30. (B)	55. (D)	80. (B)
6. (C)	31. (A)	56. (A)	81. (D)
7. (C)	32. (A)	57. (A)	82. (B)
8. (B)	33. (A)	58. (C)	83. (A)
9. (C)	34. (B)	59. (C)	84. (D)
10. (A)	35. (A)	60. (A)	85. (C)
11. (C)	36. (C)	61. (B)	86. (B)
12. (B)	37. (A)	62. (B)	87. (A)
13. (A)	38. (B)	63. (C)	88. (C)
14. (C)	39. (D)	64. (B)	89. (C)
15. (A)	40. (D)	65. (A)	90. (D)
16. (C)	41. (B)	66. (C)	91. (A)
17. (B)	42. (B)	67. (C)	92. (C)
18. (B)	43. (B)	68. (A)	93. (A)
19. (A)	44. (A)	69. (B)	94. (C)
20. (D)	45. (A)	70. (D)	95. (B)
21. (C)	46. (D)	71. (B)	96. (B)
22. (D)	47. (C)	72. (A)	97. (A)
23. (D)	48. (A)	73. (B)	98. (B)
24. (B)	49. (B)	74. (D)	99. (C)
25. (A)	50. (A)	75. (C)	100. (A)