QUANTITATIVE ABILITY - 67 (SOLUTION)

1. (A) **Seeta** **Geeta**

1 : 2 = 3

100 : 200 = 300

20%↓ ↓ ↓30%

120 : x = 390

x = 390 – 120 = 270

Increase in Geeta's weight = $\frac{270-200}{200} \times 100 = 35\%$

2. (C)

	₹	kg	Ex
Initial	10	10	100
	↓+20%		↓ +5%
New	12	x	115

$x = \frac{115}{12}$,

If 10 → 24

$\frac{115}{12} \rightarrow \frac{24}{10} \times \frac{115}{12} = 23$ kg

3. (A) Total questions required to pass = $\frac{60}{100} \times 75 = 45$

Arithmetic = $\frac{70}{100} \times 10 = 7$

Algebra = $\frac{40}{100} \times 30 = 12$

Geometry = $\frac{60}{100} \times 35 = 21$

Total questions answered = 7 + 12 +21 = 40

He has to answer 45 – 40 = 5 questions more to pass.

4. (B) Time taken by P to complete the work = 10× 4 = 40 days

Time taken by Q to complete the work = $15 \times \frac{100}{40} = 37\frac{1}{2}$ days

Time taken by R to complete the work = 13 × 3 = 39 days

Time taken by S to complete the work = 7 × 6 = 42 days

So, Q will be able to complete the work

5. (B) Ganga 8 ——— 3
Saraswati 12 ——— $\frac{2}{5}$
24

Work done by Ganga and Saraswati in 1 hour = 5 units
If they work alternatively the work done in 2 hours = 5 unit

20 unit work done = $\frac{20}{5} \times 2$ = 8 hours

3 unit work done by Ganga = 1 hours

1 unit work done by Saraswati = $\frac{1}{2}$ hours

If work begins at a.m then it will be finish at = 6.30 pm

6. (C) Total work = 5 km

work done = $3\frac{1}{2}$ km

Remaining work = $1\frac{1}{2}$ km

Men × Days = Work

$$\frac{\text{Men} \times \text{Day}}{\text{work}} = 1$$

$$\frac{M_1 \ D_1}{W_1} = \frac{M_2 \ D_2}{W_2}$$

$$\frac{280 \times 80}{3\frac{1}{2}} = \frac{M_2 \ (100-80)}{1\frac{1}{2}}$$

$$M_2 = \left(\frac{280 \times 80 \times 2}{7}\right)\left(\frac{3}{2 \times 20}\right) = 480$$

Extra men needed = 480 – 280 = 200

7. (B) $3 \div \left[(8-5) \div \left\{(4-2) \div \left(2+\frac{8}{13}\right)\right\}\right] = 3 \div \left[3 \div \left\{2 \div \left(\frac{34}{13}\right)\right\}\right]$

$$= 3 \div \left[3 \div \left\{2 \times \frac{13}{34}\right\}\right] = 3 \div \left[3 \div \left\{\frac{13}{17}\right\}\right]$$

$$= 3 \div \left[3 \times \frac{17}{13}\right] = 3 \div \left[\frac{51}{13}\right]$$

$$= 3 \times \frac{13}{51} = \frac{13}{17}$$

8. (A) $\dfrac{2\frac{1}{7}+2\frac{1}{2}}{2\frac{1}{4}+1\frac{1}{7}} \div \dfrac{1}{2+\dfrac{1}{2+\dfrac{1}{2-\frac{1}{2}}}} = \dfrac{\frac{15}{7}+\frac{5}{2}}{\frac{9}{4}+\frac{8}{7}} \div \dfrac{1}{2+\dfrac{1}{2+\frac{1}{\frac{3}{2}}}}$

$= \dfrac{\frac{30+35}{14}}{\frac{63+32}{28}} \div \dfrac{1}{2+\dfrac{1}{2+\frac{2}{3}}} = \dfrac{65}{14} \times \dfrac{28}{95} \div \dfrac{1}{2+\dfrac{1}{\frac{8}{3}}}$

$= \dfrac{26}{19} \div \dfrac{1}{2+\frac{3}{8}} = \dfrac{26}{19} \div \dfrac{1}{\frac{19}{8}}$

$= \dfrac{26}{19} \div \dfrac{8}{19} = \dfrac{26}{19} \times \dfrac{19}{8}$

$= \dfrac{13}{4}$

9. (A) Let the speeds of goods train and a passenger train be $4x$ and $5x$ m/sec and length of goods train and passenger train be A and B m respectively.
According to question

$\dfrac{A+B}{4x+5x} = 40 \Rightarrow \dfrac{A+B}{9x} = 40$ ...(i)

and $\dfrac{A}{4x+5x} = 25 \Rightarrow \dfrac{A}{9x} = 25$ ...(ii)

Dividing equation (i) by (ii)

$\dfrac{A+B}{A} = \dfrac{40}{25}$

$\Rightarrow 1+\dfrac{B}{A} = \dfrac{8}{5}$

$\Rightarrow \dfrac{B}{A} = \dfrac{8-5}{5}$

$\Rightarrow \dfrac{B}{A} = \dfrac{3}{5} \Rightarrow A : B = 5 : 3$

10. (D) Let the distance be d km and the initial speed be x km/hr
As the accident took place after 3 hours
Distance of accident site = $3x$ km
Distance left = $(d - 3x)$ km

Total time taken, if no accident took place = $\dfrac{d}{x}$ hr

According to question

$3+1+\dfrac{d-3x}{\frac{x \times 75}{100}} = \dfrac{d}{x}+4$

$\Rightarrow \dfrac{4d-12x}{3x} = \dfrac{d}{x}$

$\Rightarrow 4d - 12x = 3d$

$\Rightarrow d = 12x$

In 2nd case, distance of accident site = $3x + 150$
Distance left = $d - (3x + 150)$

$\therefore \quad \frac{3x+150}{x} + 1 + \frac{d-(3x+150)}{x \times \frac{75}{100}} = \frac{d}{x} + \frac{7}{2}$

$\therefore$ Original speed of train = 100 km/hr
Distance = $12x$ = 1200 km

11. (B) Let the length of two trains be A m and B m respectively and their speed be $3x$ and $4x$ m/sec respectively Relative speed = $(3x + 4x)$ m/sec = $7x$ m/sec
ATQ,

$\frac{A_1}{3x} = \frac{B}{4x} = 3$ sec

$\Rightarrow \quad \frac{A}{x} = 9$ and $\frac{B}{x} = 12$ ...(i)

Time taken to cross each other = $\frac{\text{Total length}}{\text{Sum of speed taken as direction of both are opposite}}$

$= \frac{A+B}{3x+4x} = \frac{A+B}{7x}$

$= \frac{1}{7}\left[\frac{A}{x} + \frac{B}{x}\right] = \frac{1}{7}[9+12] = 3$ sec

12. (A) $\angle AOC + \angle COF + \angle BOF = 180^\circ$
$\Rightarrow \quad 30^\circ + \angle COF + 35^\circ = 180^\circ$
$\therefore \quad \angle COF = 180^\circ - 30^\circ - 35^\circ = 115^\circ$

13. (D)

14. (B) The total interest after 2 years would be $\left(10 + 10 + \frac{10 \times 10}{100}\right)$% i.e. 21% of the sum & the total interest after 3 yrs. would be $\left(21 + 10 + \frac{21 \times 10}{100}\right)$% i.e. 33.1% of the sum.

Hence, the total amount to be paid would be (100 + 33.1)% of the sum.

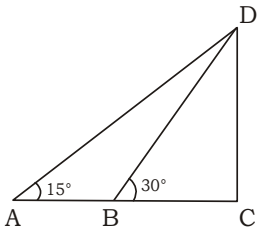
$\therefore$ Required amount = $\frac{10000 \times 133.1}{100}$ = ₹ 13310

15. (B) The total interest for the first 2 years would be $\left(5 + 5 + \frac{5 \times 5}{100}\right)$% i.e. 10.25% of the sum.

Similarly, the total interest for the last two years would be $\left(5 + 5 + \frac{5 \times 5}{100}\right)$% i.e. 10.25% of the increased sum.

Hence, the total interest at the end of four years would be $\left(10.25 + 10.25 + \frac{10.25 \times 10.25}{100}\right)$% i.e. 21.550625% of the sum
Thus, the total amount to be paid = (100 + 21.550625)% of 12000
= 121.550625 × 120 = 14586.075

16. (B)



Let height of tower (CD) = x m

A.T.Q.,

BC = CD × cot 30°

BC = $\sqrt{3}\,x$ ...*(i)*

AC = CD × cot 15°

AC = $(2+\sqrt{3})x$

AC – BC = 48

$(2+\sqrt{3})x - \sqrt{3}x = 48$

$2x = 48$

$x = 24$ m

17. (A) $C.P_1 = x$

$C.P_2 = 980 - x$

$P_1\% = 35\%$

$\therefore \quad S.P_1 = \frac{135x}{100}$

$S.P_2 = \frac{86}{100} = (980 - x)$

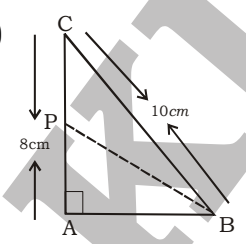
$S.P_1 + S.P_2 = 980$ (There is no profit or Loss)

$\frac{135x}{100} + \frac{86}{100}(980 - x) = 980$

$49x + 84280 = 98000$

$x = \frac{13720}{49} = ₹\,280$

18. (B)



$AB = \sqrt{BC^2 - AC^2} = \sqrt{10^2 - 8^2}$

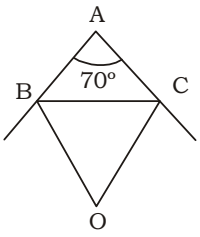
$= \sqrt{100-64} = \sqrt{36} = 6$cm

$AP = \sqrt{PB^2 - AB^2} = \sqrt{9^2 - 6^2}$

$= \sqrt{81-36} = \sqrt{45}$

$= 3\sqrt{5}$ cm

19. (A)



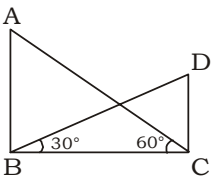
$\angle BOC = 90° - \frac{\angle A}{2}$

$= 90° - \frac{70°}{2} = 55°$

20. (A) Let the angles of triangle be k, 2k, and 3k.
then, $\angle A = k$, $\angle B = 2k$ and $\angle C = 3k$.
Now, $\angle A + \angle B + \angle C = 180°$
$\Rightarrow$ $k + 2k + 3k = 180°$
$\Rightarrow$ $6k = 180°$
$\Rightarrow$ $k = 30°$
Therefore, the angles of the triangle are:
$\angle A = k = 30°$, $\angle B = 2k = 60°$ and $\angle C = 3k = 90°$
the circumradius = 10 cm
Therefore , if the lengths of the sides of the triangle be a,b,c then
$a = 2R \sin A = 2 . 10. \sin 30° = 10$ cm
$b = 2R \sin B = 2. 10. \sin 60° = 10\sqrt{3}$ cm; and
$c = 2R \sin C = 2. 10. \sin 90° = 20$ cm

21. (A)

22. (A)



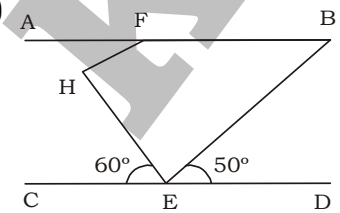
Height of one post (AB) = 108 m
A.T.Q.,

$BC = AB \cot 60° = 108 \times \frac{1}{\sqrt{3}} = 36\sqrt{3}$ m

$CD = BC \tan 30° = 36\sqrt{3} \times \frac{1}{\sqrt{3}} = 36$ m

Height of the other post = 36 m

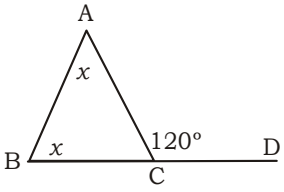
23. (A)



$\angle BEH = 180° - (60° + 50°) = 70°$
Now, $\angle BEH + \angle FHE = 180°$ [co-interior angles]
$\therefore$ $70° + \angle FHE = 180°$
$\angle FHE = 110°$

24. (C)

25. (A)



Let $\angle BAC$ be x

$\angle ACD = \angle ABC + \angle CAB$ [Exterior angle sum property]

$x + x = 120°$ $(\because \angle ABC = \angle CAB)$

$\Rightarrow$ $x = 60°$

So, $\angle BAC = 60°$

26. (B) ATQ,

$$\left[\frac{(n-2)180}{n}\right] = 2\times \frac{360}{n}$$

$n - 2 = 2 \times 2$

$n = 4 + 2$

$n = 6$

27. (C) $12\frac{1}{2}\% = \frac{1 \to \text{Water}}{8 \to \text{Milk}}$

Mixture = 8 + 1 = 9

Milk = 8

$\therefore$ Mixture : Milk = 9 : 8

28. (C) $\sqrt{\frac{\sec\theta - 1}{\sec\theta + 1}} = \sqrt{\frac{\frac{1}{\cos\theta} - 1}{\frac{1}{\cos\theta} + 1}}$

$$= \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \sqrt{\frac{(1-\cos\theta)(1-\cos\theta)}{(1+\cos\theta)(1-\cos\theta)}}$$

$$= \sqrt{\frac{(1-\cos\theta)^2}{1-\cos^2\theta}} = \frac{1-\cos\theta}{\sin\theta}$$

$= \text{cosec}\,\theta - \cot\theta$

29. (A) $\sec^2\theta - \frac{\sin^2\theta - 2\sin^4\theta}{2\cos^4\theta - \cos^2\theta} = \sec^2\theta - \frac{\sin^2\theta(1-2\sin^2\theta)}{\cos^2\theta(2\cos^2\theta - 1)}$

$$= \sec^2\theta - \frac{\sin^2\theta\left[1-2(1-\cos^2\theta)\right]}{\cos^2\theta(2\cos^2\theta-1)} = \sec^2\theta - \tan^2\theta\,\frac{(2\cos^2\theta-1)}{2\cos^2\theta-1}$$

$= \sec^2\theta - \tan^2\theta = 1$

30. (D) $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sqrt{\frac{(1+\sin\theta)(1+\sin\theta)}{(1-\sin\theta)(1+\sin\theta)}} + \sqrt{\frac{(1-\sin\theta)(1-\sin\theta)}{(1+\sin\theta)(1-\sin\theta)}}$

$$= \frac{1+\sin\theta}{\cos\theta} + \frac{1-\sin\theta}{\cos\theta} = \frac{1+\sin\theta+1-\sin\theta}{\cos\theta}$$

$$= \frac{2}{\cos\theta} = 2\sec\theta$$

31. (B) Using the formula,

$N = \left[\frac{N+1}{2}\right]^2 - \left[\frac{N-1}{2}\right]^2$, where N = Natural number

Put N = 51

$\Rightarrow 51 = \left(\frac{51+1}{2}\right)^2 - \left(\frac{51-1}{2}\right)^2$

$\Rightarrow 51 = (26)^2 - (25)^2$

32. (D) Let the total score be n runs, then

$\frac{2n}{9} - \frac{2}{9} \times \left(n - \frac{2n}{9}\right) = 8$

$\Rightarrow \frac{2n}{9} - \frac{2}{9} \times \frac{7n}{9} = 8$

$\Rightarrow \frac{2n}{9} \times \left(1 - \frac{7}{9}\right) = 8$

$\Rightarrow \frac{2n}{9} \times \frac{2}{9} = 8$

$\Rightarrow n = 162$

33. (B) Let the investment be ₹ 700 and ₹ 300

	I	II	Total
C.P	700	300	1000
	↓ +10%	↓ –15%	
S.P	770	255	= 1025

Profit = 1025 – 1000 = ₹ 25

$P\% = \frac{25}{1000} \times 100 = 2.5\%$

34. (D) Cost Price for A = $506 \times \frac{100}{(100+10)} \times \frac{100}{(100+15)} =$ ₹ 400

35. (D) ATQ,

₹ 150 = 2.5 kg Rice

4 kg Rice = 7 kg Sugar

14 kg Sugar = 3 kg Tea

9 kg Tea = 7 kg Coffee

11 kg Coffee = ₹ x

$\therefore x = \frac{150}{2.5} \times \frac{4}{7} \times \frac{14}{3} \times \frac{9}{7} \times 21 =$ ₹ 4320

36. (B) C.P of 36 pens = ₹ 30

S.P of 36 pens = ₹ 36

Discount is calculated on S.P

$\therefore$ 5% of 36 = ₹ 1.8

$\therefore$ Final S.P = ₹ 34.2

Profit = 34.2 – 30 = ₹ 4.2

$P\% = \frac{4.2}{30} \times 100 = 14\%$

37. (B) Total C.P = 20 × 7 + 25 × 10 = ₹ 390

Total S.P = 9 × (25 + 20) = ₹ 405

Profit = 405 – 390 = ₹ 15

38. (D) $a\sin\theta + b\cos\theta = c$ (given)

Let $a\cos\theta - b\sin\theta = x$

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

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

$x = \pm\sqrt{a^2 + b^2 - c^2}$

39. (D) $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ .....(i)

$\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$ .....(ii)

Adding equation (i) and (ii),

$\Rightarrow \left(\frac{x^2}{a^2} + \frac{y^2}{b^2}\right)(\sin^2\theta + \cos^2\theta) = 1^2 + 1^2 = 2$

$\Rightarrow \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

40. (B) $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{(\tan\theta + \sec\theta) - (\sec^2\theta - \tan^2\theta)}{\tan\theta - \sec\theta + 1}$

$= \frac{(\tan\theta + \sec\theta) - \{(\sec\theta + \tan\theta)(\sec\theta - \tan\theta)\}}{(\tan\theta - \sec\theta + 1)} = \frac{(\tan\theta + \sec\theta) - \{1 - \sec\theta + \tan\theta\}}{\tan\theta - \sec\theta + 1}$

$= \tan\theta + \sec\theta = \frac{1 + \sin\theta}{\cos\theta}$

41. (A) $\frac{(m^2 + n^2)\cos^2\beta}{n^2} = \frac{\left(\frac{\cos^2\alpha}{\cos^2\beta} + \frac{\cos^2\alpha}{\sin^2\beta}\right)\cos^2\beta}{\frac{\cos^2\alpha}{\sin^2\beta}}$

$= \frac{\frac{\cos^2\alpha.(\sin^2\beta + \cos^2\beta)}{\cos^2\beta \times \sin^2\beta} \times \cos^2\beta.\sin^2\beta}{\cos^2\alpha} = 1$

42. (D) $\sec\theta + \tan\theta = 3$

$\sec\theta - \tan\theta = \frac{1}{3}$

$2\sec\theta = 3 + \frac{1}{3}$

$\sec\theta = \frac{10}{3 \times 2} = \frac{5}{3}$

43. (A) $\operatorname{cosec}\theta - \sin\theta = m$

$\Rightarrow \dfrac{1-\sin^2\theta}{\sin\theta} = m$

$\Rightarrow \dfrac{\cos^2\theta}{\sin\theta} = m$

$\sec\theta - \sec\theta = n$

$\Rightarrow \dfrac{1-\cos^2\theta}{\cos\theta} = n$

$\Rightarrow \dfrac{\sin^2\theta}{\cos\theta} = n$

Now, $(m^2n)^{2/3} + (mn^2)^{2/3} = \left[\left(\dfrac{\cos^2\theta}{\sin\theta}\right)^2 \times \dfrac{\sin^2\theta}{\cos\theta}\right]^{2/3} + \left[\left(\dfrac{\cos^2\theta}{\sin\theta}\right) \times \left(\dfrac{\sin^2\theta}{\cos\theta}\right)^2\right]^{2/3}$

$= \left[\cos^3\theta\right]^{2/3} + \left[\sin^3\theta\right]^{2/3} = \cos^2\theta + \sin^2\theta = 1$

44. (B) $\sin\theta + \sin^2\theta = 1$

$\sin\theta = 1 - \sin^2\theta = \cos^2\theta$

Now, $\cos^{12} + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta + 2\cos^4\theta + 2\cos^2\theta - 2$

$= (\cos^2\theta)^6 + 3(\cos^2\theta)^5 + 3(\cos^2\theta)^4 + (\cos^2\theta)^3 + 2(\cos^2\theta)^2 + 2\cos^2\theta - 2$

$= \sin^6 + 3\sin^5\theta + 3\sin^4\theta + \sin^3\theta + 2[\sin^2\theta + \sin\theta - 1]$

$= (\sin^2\theta)^3 + 3(\sin^2\theta)^2 \sin\theta + 3\sin^2\theta \sin^2\theta + \sin^3\theta + 2[1-1]$

$= (\sin^2\theta + \sin\theta)^3 = 1^3 = 1$

45. (B) $(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \tan\theta + \sec\theta) = \left(\dfrac{\sin\theta + \cos\theta - 1}{\sin\theta}\right)\left(\dfrac{\cos\theta + \sin\theta + 1}{\cos\theta}\right)$

$= \dfrac{(\sin\theta + \cos\theta)^2 - 1}{\sin\theta \times \cos\theta} = \dfrac{\sin^2\theta + \cos^2\theta + 2\sin\theta.\cos - 1}{\sin\theta.\cos\theta}$

$= \dfrac{1 + 2\sin\theta.\cos - 1}{\sin\theta.\cos\theta} = \dfrac{2\sin\theta.\cos\theta}{\sin\theta.\cos\theta} = 2$

46. (B) $\cos^3\theta = \sin^2\theta$

$\Rightarrow \cot^2\theta = \sec\theta$

Now, $\cot^6\theta - \cot^2\theta$

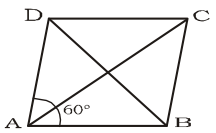
$(\cot^2\theta)^3 - \cot^2\theta$

$\sec^3\theta - \sec\theta$

$\sec\theta(\sec^2\theta - 1)$

$\cot^2\theta \times \tan^2\theta = 1$

47. (B)



$\angle ABC = 180° - 60° = 120°$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc} = \cos 60°$$

$$\frac{1}{2} = \frac{8^2 + 8^2 - a^2}{2 \times 8 \times 8}$$

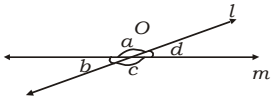
$a = 8$ cm $= BD$

$$\cos 120° = \frac{8^2 + 8^2 - b^2}{2 \times 8 \times 8}$$

$$-\frac{1}{2} = \frac{4 + 64 - b^2}{2 \times 8 \times 8}$$

$b = 8\sqrt{3}$ cm = AC

48. (A)



$a + d = 180°$

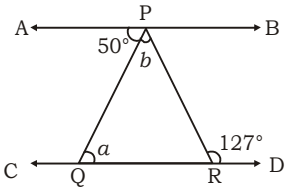
$a + 45° = 180°$

$\Rightarrow$ $a = 135°$

$\therefore$ $d = b = 45°$ (Vertically opposite angles)

Similarly a = c = 135°

49. (C)



$\angle PQR = \angle QPA$ (Alternate Angles)

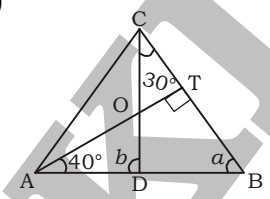
$\angle a = 50°$

$\because$ $\angle APR = \angle PRD$ (Alternate angles)

$50° + b° = 127°$

$b = 77°$

50. (A)



In $\triangle$ COT

$\angle COT = 180° - (30° + 90°) = 60° = \angle AOD$

In $\triangle$ AOD

$40° + \angle AOD + b = 180°$

$40° + 60° + b = 180°$

$b = 80°$

In $\triangle$ BCD

$b = 30° + a$ (Exterior angles sum property)

$80° = 30° + a$

$a = 50°$

51. (D) Discount of 10% offered on M.P = ₹ 60

After discount $= \frac{90}{100} \times 60 =$ ₹ 54 per toy

S.P of 8 dozen toys = 54×12 × 8 = ₹ 5184

∴ New S.P of one toy $= \frac{5184}{12 \times 9} =$ ₹ 48

52. (C) **M.P** **S.P** **C.P**

1800 ← 1440 → 1000

20% Dis. 44% Profit

$M.P = \frac{100}{100 - P\%} \times S.P = \frac{100}{100 - 20} \times 1440 =$ ₹ 1800

$C.P = \frac{100}{100 + P\%} \times S.P = \frac{100}{100 + 44} \times 1440 =$ ₹ 1000

Now,
After 10% discount,

New S.P = $1800 \times \frac{90}{100} =$ ₹ 1620

∴ Profit = 1620 – 1000 = ₹ 620

$P\% = \frac{1620}{1000} \times 100 = 62\%$

53. (B) P = 15% L = 10% P = 10%

$= \frac{3 \to P}{20 \to C.P_1} \quad \frac{1 \to L}{10 \to C.P_2} \quad \frac{1 \to L}{10 \to C.P_3}$

$C.P_1 = 20$ $C.P_2 = 10$ $C.P_3 = 10$
$S.P_1 = 23$ $S.P_2 = 9$ $S.P_3 = 11$

S.P of each article is same.

$C.P_1 = 20$, $S.P_1 = 23$]×99 $C.P_2 = 10$, $S.P_2 = 9$]×253 $C.P_3 = 10$, $S.P_3 = 11$]×207

$C.P_1 = 1980$ $C.P_2 = 2530$ $C.P_3 = 2070$
$S.P_1 = 2277$ $S.P_2 = 2277$ $S.P_3 = 2277$

Total C.P = 6580
Total S.P = 6831

∴ Profit = 6831 – 6580 = ₹ 251

↓×2

Actual profit = ₹ 502

∴ $C.P_2 = 2530 \times 2 =$ ₹ 5160

54. (C) Points on the given line are (–3, 2) and (x, 10). The length is 10.

$\sqrt{(x+3)^2 + (10-2)^2} = 10$

$(x + 3)^2 + 8^2 = 10^2$

$x^2 + 6x + 9 + 64 = 100$

$x^2 + 6x - 27 = 0$

$x^2 + 9x - 3x - 27 = 0$

$x(x + 9) - 3(x + 9) = 0$

$(x - 3)(x + 9) = 0$

$x = 3$ *or* -9

Therefore, the required abscissa will 3 or – 9

55. (C) The required point be P (x, y)
Then,
AP = 2PB

$\Rightarrow \frac{AP}{PB} = \frac{2}{1}$

AP : PB = 2 : 1

Therefore $x = \left[\frac{2\times(-3)+1\times 5}{2+1}\right] = \frac{-1}{3}$ and

$y = \left[\frac{2\times 2+1\times(-4)}{2+1}\right] - 0$

So, the required point is $\left(\frac{-1}{3}, 0\right)$.

56. (B) Let there be x men in the beginning.
So, after 15 days the food for them is left for 45 days.
After 500 men food lets for 40 days.
$\Rightarrow$ (x + 500) men will have the same food for 40 days.
We have,
$45x = (x + 500)\ 40$
$\Rightarrow 5x = 500 \times 40$
So, 4000 men were there in the beginning.

57. (B) Let Vinod and Basu's marks be $6x$ and $5x$ respectively.
Then, sum of marks = $6x + 5x = 11x$
So, $11x = 275 \Rightarrow x = 25$
$\Rightarrow$ Vinod marks = $6x$ = 150
and Basu's marks = $5x$ = 125

$\therefore$ Combined average % of marks = $\frac{150+125}{2}$ = 137.5

Now, if total marks is 100 then combined average is 68.75

$\therefore$ Required total marks = $\frac{137.5}{68.75}\times 100 = 200$

58. (D) Let the number of ₹ 1, 50p and 25p coins be $3k$, $5k$ and $7k$ respectively.
ATQ,
$(100 \times 3k) + (50 \times 5k) + (25 \times 7k) = 5800$
$\Rightarrow 725k = 5800 \Rightarrow k = 8$
Now, If the number of coins of ₹ 1, 50p and 25p, is reversed, the total value of coins in bag (in paise)
$= (100 \times 7k) + (50 \times 5k) + (25 \times 3k)$
$= 1025k = 1025 \times 8$
= 8200 pasie= 82 rupees

59. (C) Money collected = (59.29 × 100) paise = 5929 paise.

$\therefore$ Number of members = $\sqrt{(5929)}$ = 77

60. (D) Part filled in 4 minutes = $4\times\left(\frac{1}{15}+\frac{1}{20}\right)$ = $4\times\ \frac{7}{60}=\ \frac{7}{15}$

Remaining part = $\left(1-\frac{7}{15}\right)=\frac{8}{15}$

Part filled by B in 1 minute = $\frac{1}{20}$

$\therefore\quad \frac{1}{20}:\frac{8}{15}::1:x \Rightarrow \frac{1}{20}\times x=\frac{8}{15}\times 1$

$\Rightarrow\quad \frac{x}{20}=\frac{8}{15}\Rightarrow x=\ \frac{32}{3}=\ 10\frac{2}{3}$ min = 10min 40sec.

The tank will be full in (4 min. + 10 min. 40 sec.) = 14 min. 40 sec.

61. (B) Let their investments be ₹ x for 14 months, ₹ y for 8 months and ₹ z for 7 months respectively.

Then, $14x : 8y : 7z = 5 : 7 : 8$.

Now, $\frac{14x}{8y}=\frac{5}{7}\Leftrightarrow 98x=40y\Rightarrow y\ =\ \frac{49}{20}x$

And, $\frac{14x}{7z}=\ \frac{5}{8}\Leftrightarrow 112x=35z$

$\Rightarrow\quad z=\ \frac{112}{35}x\Rightarrow\ z=\ \frac{16}{5}x$

$x : y : z = x : \frac{49}{20}x : \frac{16}{5}x = 20 : 49 : 64$

Required ratio = 20 : 49 : 64

62. (D) Part filled by (A + B) in 1 minute = $\left(\frac{1}{60}+\frac{1}{40}\right)=\ \frac{1}{24}$

Suppose the tank is filled in x minutes.

Then, $\frac{x}{2}\left(\frac{1}{24}+\frac{1}{40}\right)=\ 1$

$\Rightarrow\quad x$ = 30 min

$\therefore\quad$ Required time = 30 min.

63. (B) In alloy c, Gold = $\frac{4}{7}+\frac{4}{11}=4\ \left(\frac{1}{7}+\frac{1}{11}\right)\ =\ \frac{72}{77}$

and Copper = $\frac{3}{7}+\frac{7}{11}=\ \frac{82}{77}$

$\therefore\quad$ Ratio of gold and copper = $\frac{72}{77}:\ \frac{82}{77}$ = 36 : 41

64. (D) Ratio of investment of A and B = 3 × 2 : 1×1 = 6 : 1

Share of B = $\frac{1}{7}$ × Total profit = 5000

Total profit = 35000

65. (A) Let total work units = 60

In a day man can do = $\frac{60}{20}$ = 3 units

In a day women can do = $\frac{60}{30}$ = 2 units

In a day boy can do = $\frac{60}{60}$ = 1 units

in 2 days = $\frac{60}{2}$ = 3 units

So, $30 = 2 \times 3 + 8 \times 2 + x \times 1$

$x = 30 - 6 - 16 = 8$

So, 8 boys are required to assist 2 men and 8 women.

66. (C) Men × hours × days = work

So, $M_1 D_1 H_1 = M_2 D_2 H_2$

$80 \times 16 \times 6 = 64 \times 15 \times H9$

Hours = $\frac{80 \times 16 \times 6}{64 \times 15}$ = 8 hours

67. (C) The average Income of company = $\frac{40+60+50+65+70}{5} = \frac{285}{5}$ = 57

68. (A)

Expenditure in 2007 = 30
Expenditure in 2008 = 40] increase — 10

Percentage increase in Expenditure= $\frac{10}{30} \times 100$ = 33.33%

69. (B) Profit = Income – Expenditure.

Profit in 2005 = 40 – 25 = 15

Profit in 2007 = 50 – 30 = 20

Profit in 2008 = 65 – 40 = 25

Profit in 2009 = 70 – 50 = 20

∴ Maximum profit in 2008.

70. (A) Given: $c = \frac{yz}{y+z} \Rightarrow z = \frac{cy}{y-c}$

$b = \frac{xy}{y+z} \Rightarrow z = \frac{bx}{x-b}$

$\frac{cy}{y-c} = \frac{bx}{x-b} \Rightarrow cyx - cyb = bxy - bxc$

$\Rightarrow y = \frac{bxc}{bx+bc-cx}$ and $a = \frac{xy}{x+y}$

$\Rightarrow y = \frac{ax}{x-a}$

$\therefore \frac{ax}{x-a} = \frac{bxc}{bx+bc-cx}$

$\Rightarrow abx^2 + abcx - acx^2 = bx^2c - abcx$

$\Rightarrow 2abc = x(bc + ac - ab)$

$\Rightarrow x = \frac{2abc}{bc+ac-ab}$

71. (A) Given: $x + y + z = 0$
$\Rightarrow x + y = -z, y + z = -x$ and $z + x = -y$
$\Rightarrow (x + y)(y + z)(z + x) = (-z)(-x)(-y) = -xyz$

72. (C) $p^3 + \frac{1}{p^3} = \left(p+\frac{1}{p}\right)\left(p^2+\frac{1}{p^2}-1\right)$

$= \left(p+\frac{1}{p}\right)\left[\left(\left(p+\frac{1}{p}\right)^2-3\right)\right]$

$= \left(p+\frac{1}{p}\right)(3-3) = 0$

73. (B) $\frac{x^2+y^2+z^2-64}{xy-yz-zx} = -2$

$\Rightarrow x^2 + y^2 + z^2 = -2xy + 2yz + 2zx + 64$
$\therefore (x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$
$\Rightarrow (4z)^2 = -2xy + 2yz + 2zx + 64 + 2xy + 2yz + 2zx$
$\Rightarrow 16z^2 = 4yz + 4zx + 64$
$\Rightarrow 16z^2 = 4z(x + y) + 64$
$\Rightarrow 16z^2 = 4z(3z) + 64$
$\Rightarrow 16z^2 - 12z^2 = 64$
$\Rightarrow 4z^2 = 64$
$\Rightarrow z = 4$

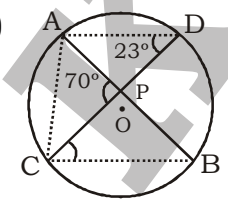
74. (D) Volume of pyramid $= \frac{1}{3} \times$ height $\times$ area of base

$= \frac{1}{3} \times 10 \times 57 = 190 \text{ cm}^3$

75. (B) Clearly, $l = (48 - 16)m = 32\ m$, $b = (36 - 16)m = 20\ m$, $h = 8\ m$.
Volume of the box = $(32 \times 20 \times 8)\ m^3 = 5120\ m^3$.

76. (C) AE = AH
BE = BF
GC = FC
GD = HD
$\Rightarrow$ AB + CD = AD + BC
$\Rightarrow$ 6 + 3 = AD + 7.5
$\Rightarrow$ AD = 9 – 7.5 = 1.5 cm

77. (B)



$\angle ADC = \angle ABC$ [Angle formed by same chord of a circle]
$\angle BCD = 70° - 23° = 47°$

78. (B) $a = 1, b = -1, c = 1$
$a - b + c$
$1 - (-1) + 1 = 2 + 1 = 3$

79. (A) Let $x = -1$,

$(-1)^{97} + \frac{1}{(-1)^{94}} = -1 + 1 = 0$

80. (B) $40! = 40 \times 39 \times 38 \times \ldots\ldots\ldots \times 1$

Number of zero = 8+1 = 9

81. (B) Foreign collaboration in 2013 with U.S.A = $\frac{64.8}{360} \times 1200 = 216$

Foreign collaboration in 2014 with U.S.A = $\frac{75.6}{360} \times 1500 = 315$

$\therefore$ Total increase = 315 – 216 = 99

82. (C) Foreign collaboration with U.K. in 2013 = $\frac{50.4}{360} \times 1200 = 168$

Foreign collaboration with U.K. in 2014 = $\frac{43.2}{360} \times 1500 = 180$

Then Required ratio = 168 : 180 = 14 : 15

83. (B) Foreign collaboration with Germany in 2013 = $\frac{54}{360} \times 1200 = 180$

Foreign collaboration with Germany in 2014 = $\frac{46.8}{360} \times 1500 = 195$

$\therefore$ Percent changes = $\frac{15}{180} \times 100 = 8\frac{1}{3}\%$

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

$= \sqrt{8^2 + 15^2} = 17\ cm$

Curved surface area = $\pi \times 8 \times 17 = 136\pi\ cm^2$

85. (C) $l = 10\ m$

$h = 8\ m$

So, $r = \sqrt{l^2 - h^2} = \sqrt{10^2 - 8^2} = 6\ m.$

Curved surface area = πrl

$= (\pi \times 6 \times 10)\ m^2 = 60\pi\ m^2$

86. (B) Let the thickness of the bottom be $x\ cm.$

Then, $[(330 - 10) \times (260 - 10) \times (110 - \times)] = 8000 \times 1000$

$\Rightarrow 320 \times 250 \times (110 - \times) = 8000 \times 1000$

$\Rightarrow (110 - x) = \frac{8000 \times 1000}{320 \times 250} = 100$

$\Rightarrow x = 10\ cm$

Required thickness = 10 cm

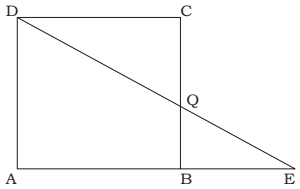
87. (B) The three lower oval shapes can be inserted into the three hollow spaces adjacent to the upper shaded region, and together, the four shapes will nearly form a single circle.

The circle has $r = 6$, so area = 36π sq. unit

88. (B) Volume of water displaced = $(3 \times 2 \times 0.01)\ m^3 = 0.06\ m^3$

Mass of man = Volume of water displaced × Density of water = (0.06 × 1000) kg = 60 kg.

89. (A)



AD || BC $\Rightarrow$ AD $\parallel$ BQ (Parts of $\parallel$ lines)

In, ΔDQC and ΔBQE

$\angle DCQ = \angle QBE$

$\angle$DQC = $\angle$BQE

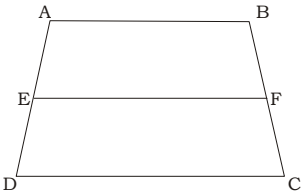
$\angle CDQ = \angle BEQ$

$\therefore$ Both ΔDQC and ΔBQE are similar.

$\therefore$ $\frac{DQ}{QE} = \frac{DC}{BE} = \frac{DC}{AB} = \frac{DC}{DC} = 1$ ($\because$ AB = BE= DC)

$\Rightarrow$ BQ : QE = 1 : 1

90. (D)



So, EF = $\frac{1}{2}$(AB + DC)

= $\frac{1}{2}(x + y) = \frac{x+y}{2}$

91. (A) Total Time = $\frac{600}{80} + \frac{800}{40} + \frac{500}{400} + \frac{100}{50} = \frac{246}{8}$ hours

Average Speed = $\frac{600+800+500+100}{\frac{246}{8}} = \frac{2000 \times 8}{246} = 65\frac{5}{123}$ kms/hr

92. (C) Volume of the large cube = $(3^3 + 4^3 + 5^3)$ = 216 cm^3.

Let the edge of the large cube be a.

So, $a^3 = 216$

a = 6 cm

Required ratio = $\left\{\frac{6 \times (3^2 + 4^2 + 5^2)}{6 \times 6^2}\right\} = \frac{50}{36} =$ 25 : 18

93. (C) Perimeter = Distance travelled in 8 min.

$\Rightarrow$ Perimeter = $\frac{12000 \times 60}{8}$ = 1600 meters

Let the length be 3x and width be 2x.

Perimeter of rectangle 2(L+B)

So, 2(3x + 2x) = 1600

$\Rightarrow$ x = 160

So, Length = 160× 3 = 480 meter

and Width = 160 × 2 = 320 meters

$\therefore$ Required area = length × breadth

= 480 × 320 = 153600 m^2

94. (C) From the question, $2b + l = 30$

$\Rightarrow l = 30 - 2b$

Area $= 100m^2 \Rightarrow l \times b = 100$

$\Rightarrow b(30 - 2b) = 100 \Rightarrow b^2 - 15b = 0$

$\Rightarrow (b - 10)(b - 5) = 0$

$b = 10$ **or** $b = 5$

when $b = 10$ then $l = 10$

when $b = 5$ then $l = 20$

Since the garden is rectangular so we will take value of breadth 5 m.

So its dimensions are 20 m × 5 m

95. (A) $a^2 + b^2 = 117$

$\Rightarrow (a + b)^2 = 117 + 2ab = 117 + 2 \times 54 = 225$

$\Rightarrow a + b = 15$

Also $(a - b)^2 + 2ab = 117$

$\Rightarrow (a - b)^2 = 117 - 2 \times 54 = 9$

$\Rightarrow a - b = 3$

$\therefore$ The value of the given expression $\frac{a+b}{a-b} = \frac{15}{3} = 5$

96. (A) $x + y + z = 0 \Rightarrow x + y = -z,\ y + z = -x,\ x + z = -y$

$\Rightarrow \frac{xyz}{(x+y)(y+z)(z+x)} = \frac{xyz}{-z \times -x \times -y} = -1$

97. (A) Number of men selecting Product C $= \frac{56340 \times 45}{100} = 25353$

Number of men selecting Product F $= \frac{35580 \times 15}{100} = 5337$

$\therefore$ Required percent $= \frac{5337}{25353} \times 100 = 21.05\%$

98. (D) Total number of people selecting all products = 284894

Number of women selecting product E $= \frac{48300 \times 44}{100} = 21252$

$\therefore$ Required percentage $= \frac{21252}{284894} \times 100 = 7.5\%$ (Approx)

99. (D) Total number of children selecting Product A $= \frac{45525 \times 36}{100} = 16389$

100. (A) Average number of women selecting all products together

$$= \frac{\frac{45525 \times 44}{100} + \frac{36800 \times 33}{100} + \frac{56340 \times 30}{100} + \frac{62350 \times 28}{100} + \frac{48300 \times 44}{100} + \frac{35580 \times 35}{100}}{6} = 16707$$

QUANTITATIVE ABILITY - 67 (ANSWER KEY)

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