SSC Mains Test- 21 (SOLUTION)

1. (D) Since, divisor = a

Therefore, quotient = $\frac{a}{4}$ a) $\frac{b}{\frac{a}{2}}$ (a/4

and remainder = $\frac{a}{2}$

$\therefore \quad b = a \times \frac{a}{4} + \frac{a}{2}$

$\Rightarrow \quad b = \frac{a^2 + 2a}{4}$

$\Rightarrow \quad \frac{a(a+2)}{b} = 4$

2. (C) Since, 738A6A is divisible by 11, therefore
Sum of odd places – Sum of even places = either multiple of 11 or 0
(7 + 9 + 6) – (3 + A + A) = either multiples of 11 or 0.
$\Rightarrow$ 21 – 2A + 3 = either multiple of 11 or 0
$\Rightarrow$ 18 – 2A = 0 ($\because$ it cannot be a multiple of 11)
$\Rightarrow$ 2A = 18
$\Rightarrow$ A = 9

3. (C) Let the numbers be a and b.
Then, $ab = 1575$

and $\frac{a}{b} = \frac{9}{7}$

$\Rightarrow \quad a = \frac{9b}{7}$

Putting this value of Eq. (i), we get

$\frac{9b}{7} \times b = 1575$

$\Rightarrow \quad b^2 = 1575 \times \frac{7}{9}$

$\Rightarrow \quad b^2 = 175 \times 7$
$= 5^2 \times 7^2$

$\Rightarrow \quad b = 35$

$\therefore \quad a = \frac{9}{7} \times 35$
$= 45$

Thus, sum of the numbers
$= a + b$
$= 45 + 35$
$= 80$

4. (C) $\frac{(81)^{3.6} \times (9)^{2.7}}{(81)^{4.2} \times 3}$

$= \frac{(3)^{14.4} \times (3)^{5.4}}{(3)^{16.8} \times (3)^1}$

$= (3)^{14.4 + 5.4 - 16.8 - 1}$
$= (3)^2 = 9$

5. (D) $\sqrt{6 + \sqrt{6 + \sqrt{6 + ...}}}$

Factorize 6 as the multiplication of two consecutive natural numbers. The greater one will be the answer.
As, $6 = 2 \times 3$

Therfore, $\sqrt{6 + \sqrt{6 + \sqrt{6 + ...}}} = 3$

6. (D) Let the two consecutive odd numbers be x and $(x + 2)$.
Then, according to the question,

$(x)^2 + (x + 2)^2 = 394$
$\Rightarrow \quad x^2 + x^2 + 4 + 4x = 394$
$\Rightarrow \quad 2x^2 + 4x = 390$
$\Rightarrow \quad x^2 + 2x = 195$
$\Rightarrow \quad x(x + 2) = 195 = 13 \times 15$
$\Rightarrow \quad x = 13$

Thus, sum of the numbers
$= x + (x + 2)$
$= 13 + 15$
$= 28$

7. (C) We know that, when $(a - 1)^n$ is divided by a, then remainder = $(-1)^n$
Now, $67^{67} + 67$
$= (68 - 1)^{67} + 67$
$\therefore$ When $(68 - 1)^{67}$ is divided by 68, then remainder = $(-1)^{67} = -1$
Thus, when $67^{67} + 67$ is divided by 68, then remainder = $-1 + 67 = 66$

8. (A) Let the work is completed in n days.

Then, $\frac{6}{24} + \frac{n-6}{52} + \frac{n}{64} = 1$

$\Rightarrow \quad \frac{n-6}{52} + \frac{n}{64} = 1 - \frac{1}{4}$

$\Rightarrow \quad \frac{16(n-6) + 13n}{4 \times 13 \times 16} = \frac{3}{4}$

$\Rightarrow \quad 16n - 96 + 13n = 3 \times 13 \times 16$

$\Rightarrow \quad 29n = 624 + 96$

$\Rightarrow \quad 29n = 720$

$\Rightarrow \quad n = \frac{720}{29}$

$= 25$ days

9. (B) $\sqrt{\frac{(0.75)^3}{(1-0.75)}+[0.75+(0.75)^2+1]}$

$=\sqrt{\frac{(0.75)^3+(1-0.75)[0.75+(0.75)^2+1]}{0.25}}$

$=\sqrt{\frac{(0.75)^3+[1^3-(0.75)^3]}{0.25}}$

$=\sqrt{\frac{(0.75)^3+1-(0.75)^3}{0.25}}$

$=\sqrt{\frac{1}{0.25}}=\sqrt{\frac{100}{25}}=\sqrt{4}=2$

10. (B) $\sqrt{4096}+\sqrt{40.96}+\sqrt{0.004096}$
$= 64 + 6.4 + 0.064 = 70.464$

11. (C) Required number
$= 3012 \times 3011 - (3011)^2$
$= 3011(3012 - 3011)$
$= 3011$

12. (D) (P + Q)'s work $= \frac{19}{23}$ ... (i)

(Q + R)'s work $= \frac{8}{23}$ ... (ii)

(P + Q + R)'s work $= 1$ ... (iii)

Subtracting Eq. (i) from Eq. (iii), we get

R's work $= 1 - \frac{19}{23} = \frac{4}{23}$

Subtracting Eq. (ii) and from Eq. (iii), we get

P's work $= 1 - \frac{8}{23} = \frac{15}{23}$

Now Q's work = 1 – (P + R)'s work

$= 1 - \left(\frac{4}{23}+\frac{15}{23}\right)$

$= 1 - \frac{19}{23} = \frac{4}{23}$

$\therefore$ Q's share $= \frac{4}{23} \times 5750$
$= 4 \times 250$
$= ₹\ 1000$

13. (C) Let CP = ₹ x.
Then,
SP = 70% of $x = 0.7x$
$\Rightarrow$ 60% of MP = $0.7x$

$\Rightarrow$ MP $= \frac{0.7x}{60} \times 100 = \frac{7x}{6}$

If article is sold at the marked price, then

SP $= \frac{7}{6}x$

$\therefore$ Required profit per cent

$= \frac{\frac{7}{6}x - x}{x} \times 100\%$

$= \frac{100}{6}\% = 16\frac{2}{3}\%$

14. (A)
A (↑) 3 ——— 4
B (↑) 4 — 12 — 3
C (↓) 1 ——— –12
–5

Cistern fill till 5'clock = 4 × 2 + 3 = 11

Cistern will empty in $= \frac{11}{5}$ = 2 hr 12 min
or at 7 : 12 pm

15. (D) Required number of days
$= \sqrt{4 \times 16}$ = 8 days

16. (C) Here, $M_1 = 250$, $D_1 = 20$, $T_1 = 5$
$M_2 = ?$, $D_2 = 10$, $T_2 = 8$
Using $M_1D_1T_1 = M_2D_2T_2$, we have,
$250 \times 20 \times 5 = M_2 \times 10 \times 8$

$M_2 = \frac{250 \times 20 \times 5}{10 \times 8}$
$= 312.5$
$= 313$

17. (A) $2m + 5w = \frac{1}{12}$ ... (i)

$5m + 2w = \frac{1}{9}$ ... (ii)

Multiplying Eq. (i) by 5 and Eq. (ii) by 2 and then subtracting it from Eq. (i), we get

$10m + 25w = \frac{5}{12}$
$\underline{10m + 4w = \frac{2}{9}}$
$21w = \frac{5}{12} - \frac{2}{9}$

$= \frac{7}{36}$

$\Rightarrow \quad 3w = \frac{1}{36}$

$\Rightarrow$ 3 women's 1 day's work = 36
$\Rightarrow$ 3 women can complete the work in 36 days.

18. (A) Let CP of the article = ₹ 100
Then SP = 125% of 100
= ₹ 125

Also, $\frac{3}{4}$th of MP = SP

$\Rightarrow \quad \frac{3}{4} \times MP = 125$

$\Rightarrow \quad MP = 125 \times \frac{4}{3} = ₹ \frac{500}{3}$

$\therefore$ Required ratio = $\frac{500}{3} : 100 = 5 : 3$

19. (A) Let Earnings of A = $2x$
and Earnings of B = x
Expenditure of A = $5y$
Expenditure of B = $3y$
Further, suppose monthly savings of A = $4z$
And monthly savings of B = z
Also, total monthly savings of A and B = 5000

$\Rightarrow 4z + z = 5000$
$\Rightarrow \quad 5z = 5000$
$\Rightarrow \quad z = 1000$

Now using,
Income – Expenditure = Savings

$2x - 5y = 4000 \quad \ldots$ (i)
and $x - 3y = 1000 \quad \ldots$ (ii)

Multiplying Eq. (ii) by 2,

$2x - 6y = 2000 \quad \ldots$ (iii)

Subracting EQ. (iii) from Eq. (i), we get

$-5y + 6y = 2000$
$\Rightarrow \quad y = 2000$

Putting this value of Eq. (ii), we get

$x = 1000 + 6000$
$= 7000$

Thus, monthly salary of B = ₹ 7000

20. (B) Let the greater and smaller be a and b, respectively.

$$\frac{a+b}{a-b} = \frac{5}{1}$$

Applying componendo and dividendo rule, we get

$$\frac{(a+b)+(a-b)}{(a+b)-(a-b)} = \frac{5+1}{5-1}$$

$$\Rightarrow \quad \frac{2a}{2b} = \frac{6}{4}$$

$$\Rightarrow \quad a : b = 3 : 2$$

21. (B) Required equivalent discount

$$\left(1 - \frac{90}{100} \times \frac{80}{100} \times \frac{50}{100}\right) \times 100 = 64\%$$

22. (D) I. Equivalent discount

$$= \left(10 + 10 - \frac{10 \times 10}{100}\right)\%$$

$= (20 - 1)\%$
$= 19\%$

II. Equivalent discount

$$= \left(12 + 8 - \frac{12 \times 8}{100}\right)\%$$

$= (20 - 0.96)\%$
$= 19.04\%$

III. Equivalent discount

$$= \left(15 + 5 - \frac{15 \times 5}{100}\right)\%$$

$= (20 - 0.75)\%$
$= 19.25\%$

IV. Discount = 20%

Selling price will be minimum where discount is maximum *i.e.*, in IV condition.

23. (D) In the mixture, acid = 80% = $\frac{4}{5}$

and water = 20% = $\frac{1}{5}$

Let xth part of the mixture be removed and replaced by water.

Then, $$\frac{\frac{4}{5} - \frac{4}{5}x}{\frac{1}{5} - \frac{1}{5}x + x} = \frac{4}{3}$$

$$\Rightarrow \quad \frac{4 - 4x}{1 - x + 5x} = \frac{4}{3}$$

$$\Rightarrow \quad \frac{4 - 4x}{1 + 4x} = \frac{4}{3}$$

$$\Rightarrow \quad 12 - 12x = 4 + 16x$$

$$\Rightarrow \quad 8 = 28x$$

$$\Rightarrow \quad x = \frac{8}{28} = \frac{2}{7}\text{th}$$

24. (B) Ratio of reduction is number of employees = 9 : 8
Ratio of increment in wages = 14 : 15
Now, ratio of reduction in the wage bill
$= 9 \times 14 : 8 \times 15$
$= 126 : 120$
$= 21 : 20$

25. (D) Let maximum score of the cricketer = x
Then, his minimum score = $x - 172$
Now, total score in 40 innings
$= 40 \times 50 = 2000$
And, total scores in 38 innings
$= 38 \times 48 = 1824$
$\therefore$ Sum of remaining two innings
$= 2000 - 1824 = 176$
Therefore, sum of maximum and minimum scores = 176

$\Rightarrow \quad x + x - 172 = 176$

$\Rightarrow \quad 2x = 348$

$\Rightarrow \quad x = 174$

Thus, highest score of the cricketer is 174.

26. (C)

	Gold	**Copper**
Alloy A	$\frac{7}{9}$	$\frac{2}{9}$
Alloy B	$\frac{7}{18}$	$\frac{11}{18}$

Since, alloys A and B are melted in the ratio 1 : 1 to make the alloy, therefore in the alloy C, the ratio of gold and copper.

$$\left(\frac{7}{9}\times\frac{1}{2}+\frac{7}{18}\times\frac{1}{2}\right):\left(\frac{2}{9}\times\frac{1}{2}+\frac{11}{18}\times\frac{1}{2}\right)$$

$$=\left(\frac{7}{9}+\frac{7}{18}\right):\left(\frac{2}{9}+\frac{11}{18}\right)$$

$$=\frac{21}{18}:\frac{15}{18}=21:15$$

$= 7 : 5$

27. (C)

	Acid	**Water**
Bottle I	$\frac{2}{7}$	$\frac{5}{7}$
Bottle II	$\frac{7}{10}$	$\frac{3}{10}$

Let the required ratio be x : 1. Then, according to the question,

$$\left(\frac{2}{7}x+\frac{7}{10}\right):\left(\frac{5}{7}x+\frac{3}{10}\right)=2:3$$

$$\frac{\frac{2}{7}x+\frac{7}{10}}{\frac{5}{7}x+\frac{3}{10}}=\frac{2}{3}$$

$$\Rightarrow \frac{6}{7}x+\frac{21}{10}=\frac{10}{7}x+\frac{6}{10}$$

$$\Rightarrow \frac{4}{7}x=\frac{15}{10}$$

$$\Rightarrow \quad x=\frac{15}{10}\times\frac{7}{4}=\frac{21}{8}$$

Hence, required ratio = x : 1 = 21 : 8

28. (A) Let third number = x

Then, second number = $2x$

Then, the first number = $4x$

Now, average of these three numbers = 154

$\Rightarrow \quad x + 2x + 4x = 3 \times 154$

$\Rightarrow \quad 7x = 3 \times 154$

$\Rightarrow \quad x = 3 \times 22$

$= 66$

Thus, first number = $4 \times 66 = 264$

29. (D) Then, number of rest = $(500 - x)$

$500 \times 5000 = x \times 14000 + (500 - x) \times 4000$

$\Rightarrow \quad 2500 = 14x + 4(500 - x)$

$\Rightarrow \quad 2500 = 14x + 2000 - 4x$

$\Rightarrow \quad 500 = 10x$

$$\Rightarrow \quad x = \frac{500}{10} = 50$$

Thus, number of officers is 50.

30. (D) Total marks of 40 students.

$= 40 \times 72 = 2880$

Rectified total marks

$= 2880 - 68 - 73 + 64 + 62 + 84$

$= 2884$

Thus, rectified average = $\frac{2884}{40} = 72.1$

31. (B) Let first number = x

Second number = $3x$

Third number = $\frac{3}{4}x$

$$\therefore \quad x + 3x + \frac{3}{4}x = 3 \times 114$$

$$\Rightarrow \quad \left(4+\frac{3}{4}\right)x = 342$$

$$\Rightarrow \quad x = 342 \times \frac{4}{19}$$

$= 72$

Thus, largest number $= 3x$

$= 3 \times 72$

$= 216$

32. (D) Time taken to cover $\frac{1}{5}$ of the distance

$$= \frac{1}{5} \times \frac{1}{8} = \frac{1}{40}$$

Time taken to cover $\frac{1}{10}$ of the disteance

$$= \frac{1}{10} \times \frac{1}{25} = \frac{1}{250}$$

Time taken to cover rest of the distance

$$= \left\{1-\left(\frac{1}{5}+\frac{1}{10}\right)\right\} \times \frac{1}{20}$$

$$= \frac{7}{10} \times \frac{1}{20} = \frac{7}{200}$$

Therefore, total time taken

$$= \frac{1}{40} + \frac{1}{250} + \frac{1}{200}$$

$$= \frac{25+4+35}{100}$$

$$= \frac{64}{1000}$$

Thus, average speed $= \frac{\text{Total distance covered}}{\text{Total time taken}}$

$$= \frac{1}{\frac{64}{1000}} = \frac{1000}{64}$$

$$= 15.625 \text{ km/h}$$

33. (C) Let x marbles must be added.

Then, $\frac{10+x}{40+x} \times 100 = 60$

$$\Rightarrow \frac{10+x}{40+x} = \frac{3}{5}$$

$$\Rightarrow 50 + 5x = 120 + 3x$$

$$\Rightarrow 2x = 70$$

$$\Rightarrow x = 35$$

34. (A) Let the number be x.
Then according to the question,
$x \times$ (25% of x) = x + (200% of x)

$$\Rightarrow x \times \frac{x}{4} = 3x$$

$$\Rightarrow x^2 = 12x$$

$$\Rightarrow x = 12$$

35. (B) Let the value of the article 3 years ago be x.

Then, $729 = x\left(1 - \frac{10}{100}\right)^3$

$$729 = x\left(\frac{9}{10}\right)^3$$

$$\Rightarrow 729 = x \times \frac{729}{1000}$$

$$\Rightarrow x = ₹\ 1000$$

36. (B) Required percentage decrease

$$= \frac{50}{100+50} \times 100\%$$

$$= \frac{50}{150} \times 100\%$$

$$= 33\frac{1}{3}\%$$

37. (B) Let the required distance be d km.

Then, $\frac{d}{3} - \frac{d}{4} = \frac{10}{60}$

$$\Rightarrow \frac{(4-3)d}{12} = \frac{1}{6}$$

$$\Rightarrow d = 2 \text{ km}$$

38. (A) CP per dozen $= \frac{40+30}{2} = ₹\ 35$

SP per dozen = ₹ 45
Profit per dozen = 45 – 35 = ₹ 10
But total profit = ₹ 480
Thus, required number of dozen

$$= \frac{480}{10} = 48$$

39. (D) Let CP of first chair = ₹ x
and SP of second chair = ₹ (900 – x)

$\therefore$ SP of first chair $= \frac{4}{5}x$

SP of second chair $= \frac{5}{4}(900 - x)$

We know that,
SP – CP = Profit

$$\frac{4}{5}x + \frac{5}{4}(900 - x) - 900 = 90$$

$$\Rightarrow \frac{16x + 25(900 - x)}{20} = 990$$

$$\Rightarrow \frac{16x + 22500 - 25x}{20} = 990$$

$$\Rightarrow -9x + 22500 = 19800$$

$$\Rightarrow 9x = 2700$$

$$\Rightarrow x = 300$$

Thus, the cost of lowest price chiar is ₹ 300.

40. (B) SP of 100 oranges – CP of 100 oranges
= SP of 20 oranges
$\Rightarrow$ SP of 80 oranges = CP of 100 oranges
Let CP of 1 orange = ₹ 1
$\therefore$ CP of 100 oranges = ₹ 100
SP of 80 oranges = ₹ 100

$\Rightarrow$ SP of 1 oranges = ₹ $\frac{100}{80}$ = ₹ $\frac{5}{4}$

Profit percent $= \frac{\frac{5}{4}}{1} - 1 \times 100\%$

$$= \frac{1}{4} \times 100\%$$

$$= 25\%$$

41. (C) 60% of CP = 50% of SP

$$\frac{CP}{SP} = \frac{5}{6}$$

Let CP = $5x$ and SP = $6x$
Then, there is a profit.

And profit per cent = $\frac{6x - 5x}{5x} \times 100\%$

= 20%

42. (D) CP of two horses
= ₹ 40000 + ₹ 40000
= ₹ 80000
SP of one horse = 115% of 40000
= ₹ 46000
Let the second horse was sold at a loss of x%.
Then, SP of second horse
= (100 – x)% of 40000
= 40000 – 400x
Total SP = 46000 + 40000 – 400x
= 86000 – 400x
Now, using CP – SP = loss, we have

$$80000 - (86000 - 400x) = 3600$$
$$\Rightarrow -6000 + 400x = 3600$$
$$\Rightarrow 400x = 9600$$
$$\Rightarrow x = 24$$

Thus, SP of second horse
= (100 – 24)% of 40000
= 76% of 40000 = ₹ 30400

43. (D) CP of 1 guava = ₹ $\frac{y}{x}$

SP of 1 guava = ₹ $\frac{x}{y}$

$\because x > y$, therefore SP > CP and hence the fruit seller will have a gain.

Gain per cent = $\frac{SP - CP}{CP} \times 100$

$$= \frac{\frac{x}{y} - \frac{y}{x}}{\frac{y}{x}} \times 100\%$$

$$= \frac{x^2 - y^2}{xy} \times \frac{x}{y} \times 100\%$$

$$= \frac{x^2 - y^2}{y^2}\%$$

44. (B) According to the question,

$$\frac{x \times a \times m}{100} = \frac{y \times a^2 \times m^2}{100}$$
$$x = y\,am$$
$$\Rightarrow x : y = am : 1$$

45. (D) Let A took ₹ x from B and ₹ (1200 – x) from C.
Then,

$$\frac{x \times 14 \times 1}{100} + \frac{(1200 - x) \times 15 \times 1}{100} = 172$$
$$\Rightarrow 14x + 18000 - 15x = 17200$$
$$\Rightarrow x = 800$$

Thus, A borrowed ₹ 800 from B.

46. (B) Given,

$$\frac{(2n-4)}{n} \times 90^\circ = \frac{3}{5} \times 2 \times 90^\circ$$
$$\Rightarrow \frac{(2n-4)}{n} = \frac{3}{5} \times 2$$
$$\Rightarrow \frac{n-2}{n} = \frac{3}{5}$$
$$\Rightarrow 5n - 10 = 3$$
$$\Rightarrow 2n = 10$$
$$\Rightarrow n = 5$$

Thus, the polygon has 5 sides.

47. (C) Side of given square = $\sqrt{200}$ m

= $10\sqrt{2}$ m

$\therefore$ Its diagonal = $10\sqrt{2}$ m × $\sqrt{2}$ = 20 m
which is the side of new square
$\therefore$ Area of new square = $(20)^2$ = 400 sq m

48. (C) Let radii of cone, cylinder and hemisphere are 2r, 3r and r respectively.
Volume of cone : Volume of cylinder : Volume of hemisphere

$$= \frac{1}{3}\pi(2r)^2h : \pi(3r)^2h : \frac{2}{3}\pi r^3$$

$$= \frac{1}{3} \times 4h : 9h : \frac{2}{3}r$$

(for hemisphere r = h)

$$= \frac{4}{3}h : 9h : \frac{2}{3}h$$
$$= 4 : 27 : 2$$

49. (A) Let rate of flow of river be u km/h.

Then, $\frac{91}{10+u} + \frac{91}{10-u} = 20$

$$\Rightarrow \frac{10 - u + 10 + u}{100 - u^2} = \frac{20}{91}$$
$$\Rightarrow \frac{20}{100 - u^2} = \frac{20}{91}$$
$$\Rightarrow 100 - u^2 = 91$$
$$\Rightarrow u^2 = 9$$
$$\Rightarrow u = 3 \text{ km/hr}$$

50. (B) Let the original speed and time be S and T respectively.

Then, $S \times T = \frac{3}{4}S \times \left(T + \frac{20}{60}\right)$

$\frac{4}{3}T = \left(T + \frac{1}{3}\right)$

$\Rightarrow \frac{4}{3}T - T = \frac{1}{3}$

$\Rightarrow \frac{T}{3} = \frac{1}{3}$

$\Rightarrow$ T = 1 hr = 60 minutes

51. (C) Let speed of boat in still water $= u$ km/h

And speed of stream $= v$ km/hr

Then, $\frac{25}{u-v} + \frac{39}{u+v} = 8$ ... (i)

and $\frac{35}{u-v} + \frac{52}{u+v} = 11$ ... (ii)

Multiplying Eq. (i) by 4 and Eq. (ii) by 3 and subtracting Eq. (ii) from Eq. (i), we get

$\frac{100}{u-v} - \frac{105}{u-v} = 32 - 33$

$\Rightarrow \frac{-5}{u-v} = -1$

$\Rightarrow u - v = 5$ ... (iii)

Now, from Eq. (i),

$\Rightarrow \frac{25}{5} + \frac{39}{u+v} = 8$

$\Rightarrow \frac{39}{u+v} = 8 - 5 = 3$

$\Rightarrow u + v = 13$ ... (iv)

Now, subracting Eq. (iv) from Eq. (iii), we get

$(u - v) - (u + v) = 5 - 13$

$\Rightarrow -2v = -8$

$\Rightarrow v = 4$ km/h

52. (C) Sum of money at compound interest becomes 2 times in 5 years.

$\therefore$ It will become 8 times *i.e.* $(2)^3$ times in $5 \times 3 = 15$ years.

53. (B) Let the share of elder and younger sons be ₹ x and ₹ $(120000 - x)$ respectively.

Amount got by elder son = Amount got by younger son

$x + \frac{x \times 5 \times 4}{100}$

$= (120000 - x) + \frac{(120000 - x) \times 5 \times 6}{100}$

$\Rightarrow x + \frac{x}{5} = (120000 - x) + \frac{(120000 - x) \times 3}{10}$

$\Rightarrow \frac{11x}{5} \times 10 = 120000 \times 10 + 360000 - 3x$

$\Rightarrow 22x = 1200000 + 360000 - 3x$

$\Rightarrow 25x = 1560000$

$\Rightarrow x =$ ₹ 62400

Thus, yonger son's share

= ₹ 120000 – 62400

= ₹ 57600

54. (C) $a^2 + b^2 + c^2 = 2(a - b - c) - 3$

$\Rightarrow a^2 + b^2 + c^2 - 2a + 2b + 2c + 1 + 1 + 1 = 0$

$\Rightarrow (a^2 - 2a + 1) + (b^2 + 2b + 1) + (c^2 + 2c + 1) = 0$

$\Rightarrow (a-1)^2 + (b+1)^2 + (c+1)^2 = 0$

$\Rightarrow a - 1 = 0 \Rightarrow a = 1$

and $b + 1 = 0 \Rightarrow b = -1$

and $c + 1 = 0 \Rightarrow c = -1$

Thus, $a - b + c = 1 + 1 - 1 = 1$

55. (A) $x^2 + 3x + 1 = 0$

$\Rightarrow x + 3 + \frac{1}{x} = 0$ [Dividing by x]

$\Rightarrow x + \frac{1}{x} = -3$

On cubing both sides, we have

$\left(x + \frac{1}{x}\right)^3 = (-3)^3$

$\Rightarrow x^3 + \frac{1}{x^3} + \left(x + \frac{1}{x}\right) = -27$

$\Rightarrow x^3 + \frac{1}{x^3} + 3(-3) = -27$

$\Rightarrow x^3 + \frac{1}{x^3} = -27 + 9 = -18$

56. (D) $x^a.x^b.x^c = 1$

$\Rightarrow x^{a+b+c} = 1$

$\Rightarrow x^{a+b+c} = x^0$

$\Rightarrow a + b + c = 0$

$\therefore a^3 + b^3 + c^3 = 3abc$

(when $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$)

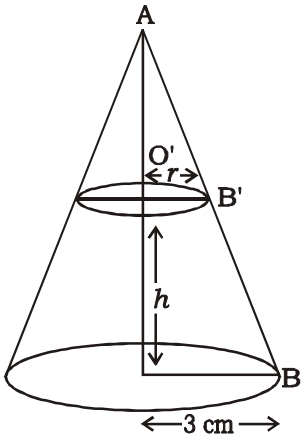
57. (C) Volume of pyramid = 1728

$\frac{1}{3} \times$ area of base $\times$ height = 1728

$\Rightarrow \frac{1}{3} \times 24 \times 24 \times$ height = 1728

$\Rightarrow$ height $= \frac{1728 \times 3}{24 \times 24} = 9$ m

58. (B) Here, $\Delta AO'B'$ and ΔAOB are similar.
Let $OO' = h$ and $OB' = r$



$$\therefore \quad \frac{AO}{AO'} = \frac{OB}{A'B'}$$

$$\Rightarrow \quad \frac{9}{9-h} = \frac{3}{r}$$

$$\Rightarrow \quad 3r = 9 - h$$

$$\Rightarrow \quad h = 9 - 3r$$

Now, volume of frustum = 44

$$\Rightarrow \quad \frac{1}{3}\pi h(R^2 + r^2 + Rr) = 44$$

$$\Rightarrow \quad \frac{1}{3} \times \frac{22}{7} \times (9 - 3r)(9 + r^2 + 3r) = 44$$

$$\Rightarrow \quad (3 - r)(9 + r^2 + 3r) = 2 \times 7$$

$$\Rightarrow \quad 3^3 - r^3 = 14$$

$$\Rightarrow \quad r^3 = 27 - 14$$

$$\Rightarrow \quad r^3 = 13$$

$$\Rightarrow \quad r = \sqrt[3]{13} \text{ cm}$$

59. (A) Let radii of first and second cylinders be 2r and 3r, respectively and their heights be 5h and 4h respectively.
Then, ratio of their curved surface area
$2\pi(2r) \times 5h : 2\pi(3r) \times 4h$
$= 10 : 12$
$= 5 : 6$

60. (C) Curved surface area

$$= \frac{1}{3} \times \text{Total surface area}$$

$$= \frac{1}{3} \times 462$$

$$= 154 \text{ sq cm}$$

Now, total surface area = 462 sq cm

$$\Rightarrow 2\pi rh + 2\pi r^2 = 462$$

$$\Rightarrow 154 + 2\pi r^2 = 462$$

$$\Rightarrow \quad 2\pi r^2 = 308$$

$$\Rightarrow \quad r^2 = \frac{308 \times 7}{2 \times 22}$$

$$\Rightarrow \quad r^2 = 49$$

$$\Rightarrow \quad r = 7$$

Again, $2\pi rh = 154$

$$h = \frac{154}{2\pi r}$$

$$= \frac{154 \times 7}{2 \times 22 \times 7}$$

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

Thus, volume of cylinder
$= \pi r^2 h$

$$= \frac{22}{7} \times 49 \times \frac{7}{2}$$

$$= 11 \times 49$$

$$= 539 \text{ cm}^3$$

61. (D) $\frac{\text{Curved surface area of cylinder}}{\text{Curved surface area of cone}} = \frac{8}{5}$

$$\Rightarrow \frac{2\pi rh}{2\pi l} = \frac{8}{5}$$

$$\Rightarrow \frac{h}{\sqrt{h^2 + r^2}} = \frac{4}{5}$$

$$\Rightarrow \frac{h^2}{h^2 + r^2} = \frac{16}{25}$$

$$\Rightarrow \frac{h^2 + r^2}{h^2} = \frac{25}{16}$$

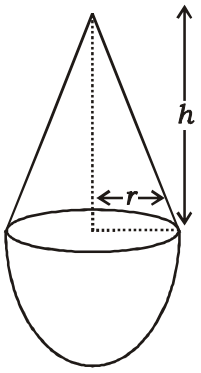
$$\Rightarrow 1 + \frac{r^2}{h^2} = \frac{25}{16}$$

$$\Rightarrow \frac{r^2}{h^2} = \frac{9}{16}$$

$$\Rightarrow \frac{r}{h} = \frac{3}{4}$$

$$\Rightarrow r : h = 3 : 4$$

62. (D)



Surface area of conical part
= Surface area of hemisphere

$\pi r\sqrt{h^2+r^2} = 2\pi r^2$

$\sqrt{h^2+r^2} = 2r$

$\Rightarrow h^2 + r^2 = 4r^2$

$\Rightarrow h^2 = 3r^2$

$\Rightarrow \frac{r^2}{h^2} = \frac{1}{3}$

$\Rightarrow \frac{r}{h} = \frac{1}{\sqrt{3}}$

$r : h = 1 : \sqrt{3}$

63. (D) Volume of prism = Area of base × height

$108\sqrt{3} = \frac{\sqrt{3}}{4} \times (6)^2 \times$ Height

$\Rightarrow$ Height $= \frac{108 \times 4}{36}$

= 12 cm

64. (B) $a + \frac{1}{a} + 2 = 0$

$\Rightarrow a^2 + 1 + 2a = 0$

$\Rightarrow (a+1)^2 = 0$

$\Rightarrow a = -1$

$\therefore \quad a^{37} - \frac{1}{a^{100}} = -1 - \left(\frac{1}{1}\right)$

$= -1 - 1 = -2$

65. (A) Given lines

$(k-1)x + y - 2 = 0$ ... (i)

and $(2-k)x - 3y + 1 = 0$ ... (ii)

Since, the lines (i) and (ii) are parallel.

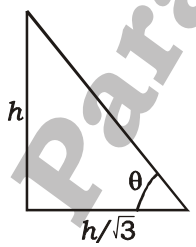
$\therefore \quad \frac{k-1}{2-k} = \frac{1}{-3}$

$\Rightarrow 3k - 3 = -2 + k$

$\Rightarrow 2k = 1$

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

66. (C)



Let height = h

Then, length of shadow = $\frac{h}{\sqrt{3}}$

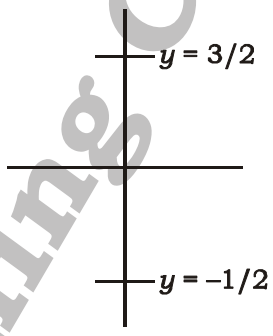
In the figure,

$\Rightarrow \tan\theta = \frac{h}{\frac{h}{\sqrt{3}}}$

$\Rightarrow \tan\theta = \sqrt{3}$

$\Rightarrow \theta = 60°$

67. (D)



Given lines are

$x + 2y = 3$ ... (i)

and $3x - 2y = 1$ ... (ii)

Put $x = 0$

Then, from Eq. (i) $y = \frac{3}{2}$

from Eq. (ii) $y = -\frac{1}{2}$

Distance between both the points

$= \frac{3}{2} - \left(-\frac{1}{2}\right) = \frac{4}{2} = 2$ units

68. (B) $x + \frac{1}{16x} = 1$

$4x + \frac{1}{4x} = 4$

Cubing both sides, we get

$64x^3 + \frac{1}{64x^3} + 3.4x.\frac{1}{4x}\left(4x + \frac{1}{4x}\right) = 64$

$\Rightarrow 64x^3 + \frac{1}{64x^3} + 3\left(4x + \frac{1}{4x}\right) = 64$

$\Rightarrow 64x^3 + \frac{1}{64x^3} = 64 - 3 \times 4$

$\left(\because 4x + \frac{1}{4x} = 4\right)$

= 64 – 12

= 52

69. (B) $a + b + c = 0$

$\Rightarrow \quad a + c = -b$

On squaring both sides,

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

$\Rightarrow \quad a^2 + b^2 + 2ac = b^2$

$\Rightarrow \quad a^2 + c^2 = b^2 - 2ac$

Now, $\dfrac{a^2 + b^2 - 2ac}{b^2 - ca}$

$= \dfrac{b^2 + b^2 - 2ac}{b^2 - ac}$

$= \dfrac{2(b^2 - ac)}{b^2 - ac} = 2$

70. (D) Given equations are

$a^4 + a^2b^2 + b^4 = 8 \quad$ ... (i)

$a^2 + ab + b^2 = 4 \quad$ ... (ii)

Squaring Eq. (ii), we get

$(a^2 + ab + b^2)^2 = (4)^2$

$a^4 + a^2b^2 + b^4 + 2a^3b + 2a^2b^2 + 2ab^3 = 16$

$\Rightarrow \quad 8 + 2ab(a^2 + b^2 + ab) = 16$

[Using eq. (i)]

$\Rightarrow \quad 2ab(a^2 + b^2 + ab) = 16$

[Using eq. (ii)]

$\Rightarrow \quad 2ab \times 4 = 8$ [using Eq. (ii)]

$\Rightarrow \quad ab = 1$

71. (D) We know the formula

$a^3 + b^3 + c^3 - 3abc$

$= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$= \dfrac{1}{2}(a + b + c)(2a^2 + 2b^2 + 2c^2 - 2ab - 2bc - 2ca)$

$= \dfrac{1}{2}(a + b + c)\{(a - b)^2 + (b - c)^2 + (c + a)^2\}$

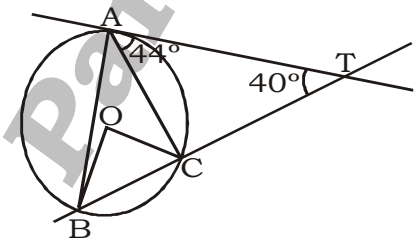
Now, $\dfrac{a^3 + b^3 + c^3 - 3abc}{(a - b)^2 + (b - c)^2 + (c - a)^2}$

$= \dfrac{1}{2}\dfrac{(a + b + c)\{(a - b)^2 + (b - c)^2 + (c - a)^2\}}{\{(a - b)^2 + (b - c)^2 + (c - a)^2\}}$

$= \dfrac{a + b + c}{2}$

$= \dfrac{25 + 15 - 10}{2} = \dfrac{30}{2} = 15$

72. (D) In ΔACT,



$\angle ACB = 180° - (\angle CAT + \angle ATC)$

$= 180° - (44° + 40°)$

$= 96°$

$\therefore \quad \angle ACB = 180° - \angle ACT$

$= 180° - 96°$

$= 84°$

Also,

$\angle ABC = \angle CAT$

$= 44°$

$\therefore$ In ΔABC,

$\Rightarrow \quad \angle BAC = 180° - (\angle ABC + \angle ACB)$

$= 180° - (44° + 84°)$

$= 180° - 128°$

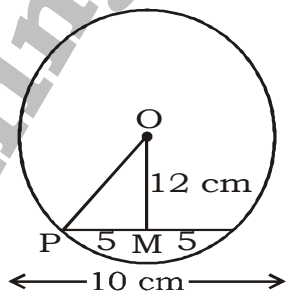
$= 52°$

$\therefore \quad \angle BOC = 2\angle BAC$

$= 2 \times 52°$

$= 104°$

73. (C)



In ΔOPM,

$OP^2 = PM^2 + OM^2$

$= 25 + 144$

$= 169$

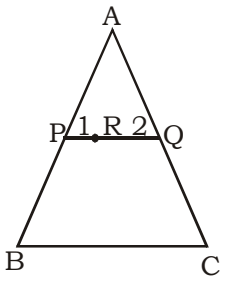
$\Rightarrow \quad OP = 13$

$\therefore$ Diameter of circle

$= 2 \times OP$

$= 2 \times 13 = 26$ cm

74. (C) Since, P, S, Q are the mid-points of AB and BC, therefore



$\dfrac{AP}{AB} = \dfrac{PQ}{BC} = \dfrac{1}{2} \quad$ ... (i)

Now, $\dfrac{PR}{RQ} = \dfrac{1}{2}$

$\Rightarrow \quad \dfrac{2}{RQ} = \dfrac{1}{2}$

$\Rightarrow \quad RQ = 4$

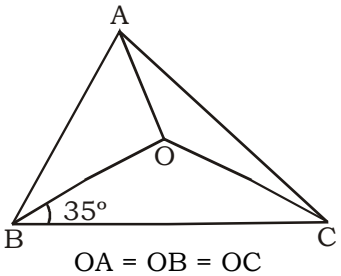
$\therefore$ PQ = 2 + 4 = 6 cm

Therefore, from Eq. (i),

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

$$BC = 12 \text{ cm}$$

75. (A) Since. 'O' is the circumference of ΔABC, therefore



OA = OB = OC

In ΔBOC,

OB = OC

$\therefore$ $\angle OCB = \angle OBC = 35°$

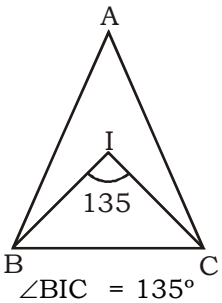
$\therefore$ $\angle BOC = 180° - (\angle OCB + \angle OBC)$

$= 180° - 70°$

$= 110°$

$\therefore$ $\angle BAC = \frac{1}{2}\angle BOC = \frac{1}{2} \times 100° = 55°$

76. (C) In ΔBIC,



$\angle BIC = 135°$

$\Rightarrow \frac{1}{2}(\angle A + \angle C) = 180° - 135°$

$\Rightarrow \frac{1}{2}(\angle B + \angle C) = 45°$

$\Rightarrow \angle B + \angle C = 90°$

$\Rightarrow \angle A = 90°$

ΔABC is a right angled triangle.

77. (C) $\sin^2\alpha + \sin^2\beta = 2$

$\Rightarrow \sin\alpha = \sin\beta = 1 \quad (\because \sin\theta \le 1)$

$\Rightarrow \alpha = \beta = 90°$

$\therefore \cos\left(\frac{\alpha+\beta}{2}\right) = \cos 90° = 0$

78. (D) $\cot\frac{\pi}{20}\cot\frac{3\pi}{20}\cot\frac{5\pi}{20}\cot\frac{7\pi}{20}\cot\frac{9\pi}{20}$

$= \cot\frac{\pi}{20}\cot\frac{3\pi}{20}\cot\frac{\pi}{4}\cot\left(\frac{\pi}{2}-\frac{3\pi}{20}\right)\cot\left(\frac{\pi}{2}-\frac{\pi}{20}\right)$

$= \cot\frac{\pi}{20}\cot\frac{3\pi}{20}\cot\frac{\pi}{4}\tan\frac{3\pi}{20}\tan\frac{\pi}{20} = 1$

79. (D) $\sin\theta + \cos\theta = \frac{17}{13}$

$\Rightarrow (\sin\theta + \cos\theta)^2 = \frac{(17)^2}{(13)^2}$

$\Rightarrow \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = \frac{289}{169}$ ...(i)

$\Rightarrow 1 + 2\sin\theta\cos\theta = \frac{289}{169}$

$\Rightarrow 2\sin\theta\cos\theta = \frac{289}{169} - 1 = \frac{120}{169}$ ... (ii)

Again, from Eq. (i),

$\sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta + 4\sin\theta\cos\theta = \frac{289}{169}$

$\Rightarrow (\sin\theta - \cos\theta)^2 + 4\sin\theta\cos\theta = \frac{289}{169}$

$\Rightarrow (\sin\theta - \cos\theta)^2 + 2 \times \frac{120}{169} = \frac{289}{169}$

[using eq, (ii)]

$\Rightarrow (\sin\theta - \cos\theta)^2 = \frac{289}{169} - \frac{240}{169} = \frac{49}{169}$

$\Rightarrow \sin\theta - \cos\theta = \frac{7}{13}$

80. (C) $\tan\theta.\tan 2\theta = 1$

$\Rightarrow \tan\theta \cdot \frac{2\tan\theta}{1-\tan^2\theta} = 1$

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

$\Rightarrow 3\tan^2\theta = 1$

$\Rightarrow \tan\theta = \frac{1}{\sqrt{3}}$

$\Rightarrow \theta = 30°$

Now, $\sin^2 2\theta + \tan^2\theta$

$= (\sin 60°)^2 + (\tan 60°)^2$

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

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

$= \frac{3+12}{4} = \frac{15}{4} = 3\frac{3}{4}$

81. (C) Sales in 2008 = ₹ 5 crore
Sales in 2006 = ₹ 6 crore
∴ Required percentage decrease

$$= \frac{6-5}{6} \times 100\%$$

$$= \frac{100}{6}\% = 16\frac{2}{3}\%$$

82. (B) Sales in 2002 = ₹ 2 crore
Sales in 2007 = ₹ 6 crore
∴ Required ratio = 2 : 6 = 1 : 3

83. (A) Average sale of company

$$= \frac{\text{Total sales of the company}}{\text{Number of years}}$$

$$= \frac{3+4+10+6+6}{5}$$

$$= \frac{29}{5} = ₹\ 5.8 \text{ crore}$$

84. (D) Sales in 2005 = ₹ 10 crore
Sales in 2004 = ₹ 4 crore
∴ Required percentage income

$$= \frac{10-4}{5} \times 100\%$$

$$= \frac{6}{4} \times 100\% = 150\%$$

85. (B) Total sales of company from 2005 to 2008
= ₹ (10 + 6 + 6 + 5) crore
= ₹ 27 crore

86. (C) Range of number of students in activity IV
= 438 – 105 = 333
Average of number of students in activity III per college

$$= \frac{65+130+420+75+540+220+153}{7}$$

$$= \frac{1603}{7} = 229$$

⇒ Required difference = 333 – 229 = 104

87. (D) Number of students in activity II
= 100 + 200 + 200 + 100 + 100 + 100 + 100
= 900
Number of students in activity IV
= 317 + 155 + 438 + 105 + 385 + 280 + 120
= 1800

∴ Required percentage $= \frac{900}{1800} \times 100\%$
$= 50\%$

88. (B) The average number in the student in activities III

$$= \frac{65+130+420+75+540+220+153}{7}$$

$$= \frac{1603}{7} = 229$$

89. (A) Number of student in
College D = 100 + 100 + 75 + 105 = 380
College G = 200 + 100 + 153 + 120 = 573
College F = 300 + 100 + 220 + 280 = 900
College A = 200 + 100 + 65 + 317 = 682
Thus, college D has minimum number of students participate in extra-curricular activities.

90. (B) Total number of students in activity II
= 100 + 200 + 200 + 100 + 100 + 100 + 100
= 900
Total number of students in activity I
= 200 + 300 + 500 + 100 + 400 + 300 + 200
= 2000
Thus, Required ratio = 900 : 2000
= 9 : 20

91. (A) Total area under Bajra
18° ≡ 300 acres
Total area under Rice and Barely

$$(72° + 36°) \equiv \frac{300}{18} \times (72 + 36)$$

$$= \frac{300}{18} \times 108 = 1800 \text{ acres}$$

92. (A) Angle covered by Wheat, Rice and Maize
= 72° + 72° + 45°
= 189°
Which is greater than 180°
Hence, area covered by these three crops is more than 50% of the total area.

93. (C) Required ratio

$$= \frac{\text{Land used for Rice}}{\text{Land used for Barely}}$$

$$= \frac{\text{Angle covered by Rice}}{\text{Angle covered by Barely}}$$

$$= \frac{72°}{36°} = \frac{2}{1} = 2 : 1$$

94. (B) 10% of the land reserved for Rice
= 10% of 72° = 7.2°
It is distributed to Wheat and Barely in the ratio 2 : 1. Therefore, angle increased corresponding to Wheat $= \frac{2}{3} \times 7.2 = 4.8°$

∴ Now angle corresponding to Wheat
= 72° + 4.8°
= 76.8°

95. (A) Production of Rice = 5 × production of Jowar
Production of Bazra = 2 × production of Jowar
Required ratio
= Production of Rice : Production of Bazra
= 5 : 2

96. (C) Total production of Rice and Wheat in state B = 10 + 2 = 12 lakh tonnes

in state C = 4 + 4 = 8 lakh tonnes
in state D = 4 + 2 = 6 lakh tonnes
in state E = 2 + 6 = 8 lakh tonnes

97. (D) Total production of Rice in all the mentioned states
= (8 + 10 + 4 + 4 + 2)
= 28 lakh tonnes
Total production of wheat in all the mentioned states
= (16 + 2 + 4 + 2 + 6) lakh tonnes
= 30 lakh tonnes
∴ Required ratio = 28 : 30
= 14 : 15

98. (D) Difference between the production of Rice and Wheat in state A
= 8 – 16 = 8 lakh tonnes
in state B = 10 – 2 = 8 lakh tonnes
in state C = 4 – 4 = 0 lakh tonnes
in state D = 4 – 2 = 2 lakh tonnes
in state E = 2 – 6 = 4 lakh tonnes
Thus, difference is maximum for both the states A and B.

99. (B) From the given bar diagram, it is clear that state B is the largest producer of rice.

100. (B) Average production of Rice

$$= \frac{\text{Total production of Rice}}{\text{Number of states}}$$

$$= \frac{28}{5} = 5.6 \text{ lakh tonnes}$$

SSC Mains Test- 21 (ANSWER KEY)

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

Note: If your opinion differs regarding any answer please message the mock test no. and question no. to 8860330003