TEST NO. 53 SSC Mains (Maths) Answer with Explanation

1. (C) $t_1 + t_2 = 10$
Total distance = x

$$T = \frac{D}{S} \Rightarrow \frac{\frac{x}{2}}{30} + \frac{\frac{x}{2}}{70} = 10$$

$\Rightarrow x = 420$ km

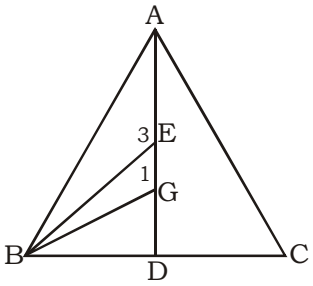
2. (D) $a^2 + b^2 + c^2 = -(ab + bc + ca)$
$a^2 + b^2 + c^2 + ab + bc + ca = 0$

$$\Rightarrow \frac{1}{2}[(a+b)^2 + (b+c)^2 + (c+a)^2] = 0$$

$a = -b, b = -c, c = -a$
Its possible only when $a = b = c = 0$
$\therefore$ $3a - 2b + 5c = 0$

3. (C) L.C.M. of (240, 144, 112) = 5040
He save ₹40
Then total money he should take
= 5040 + 40 = ₹5080

4. (A) ATQ.,



Area of $\Delta ABG = \frac{1}{3} \times$ Area of ΔABC

$= \frac{1}{3} \times 24 = 8$ cm^2
E is mid point of AD
DE : EG = 3 : 1

Then area of $\Delta BEG = \frac{8}{4} \times 1 = 2$ cm^2

5. (B) Let the average expenditure per student = ₹x
$\Rightarrow$ Total expenses = ₹$35x$
Now total expenses = ₹$(35x + 42)$
and New average expenditure per student = ₹$(x - 1)$

$$\therefore \frac{35x+42}{35+7} = \frac{35x+42}{42} = (x-1)$$

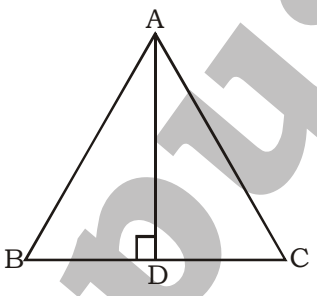
$\Rightarrow 35x + 42 = 42x - 42$
$x = 12$,
$\therefore$ The original expenditure = 35 × 12 = ₹420

6. (D) By option (D) $\Rightarrow x = 3$

$$\sqrt{x + 2\sqrt{x + 2\sqrt{x + 2\sqrt{3x}}}} = x$$

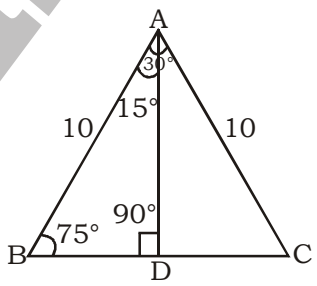
$$\Rightarrow \sqrt{3 + 2\sqrt{3 + 2\sqrt{3 + 2\sqrt{3 \times 3}}}} = 3$$

7. (C)



$AD^2 = BD.DC$
$\angle A > 45°$
$\therefore$ or $\angle B \geq 45°$
or $\angle C \geq 45°$

8. (A)



Area of Triangle

$= \frac{1}{2} \times AB \times AC \times \sin 30°$

$= \frac{1}{2} \times 10 \times 10 \times \frac{1}{2} = \frac{100}{4} = 25$ cm

Area of $\Delta = \frac{1}{2} \times AB \times BC \times \sin 75$

$$\Rightarrow 25 = \frac{1}{2} \times 10 \times BC \times \left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)$$

$$\Rightarrow 100\sqrt{2} = 10BC \times \left(\sqrt{3}+1\right)$$

$$\Rightarrow BC = \left(\frac{10\sqrt{2}}{\sqrt{3}+1}\right) \times \left(\frac{\sqrt{3}-1}{\sqrt{3}-1}\right)$$

$$\Rightarrow BC = \frac{10\sqrt{2}\left(\sqrt{3}-1\right)}{2} = \frac{10\left(\sqrt{3}-1\right)}{\sqrt{2}}$$

9. (A) R = 14, r = 10 cm
CSA = $2\pi R^2 + 2\pi r^2 + \pi(R^2 - r^2)$
$\Rightarrow 2\pi\ (14)^2 + 2\pi(10)^2 + \pi(14^2 - 10^2)$
$\Rightarrow 392\pi + 200\pi + 96\pi$
$\Rightarrow 688\pi\ cm^2$

10. (D) Age of man = 50 years
$\therefore$ Age of his elder brother
= 50 + 7 = 57 years
Age of his sister = 57 – 12 = 45 years
$\Rightarrow$ Difference in the age of the man and his sister = (50 – 45) yrs. = 5 years
Thus when the age of his sister was 15 years, then the age of the man was = 15 + 5 = 20 years.

11. (A) Let the four parts into which 3150 divided are a, b, c and d.

$\Rightarrow \frac{a}{2} = \frac{b}{3} = \frac{c}{4} = \frac{d}{12} = k$

Then, $a = 2k$, $b = 3k$, $c = 4k$ and $d = 12k$
As, $a + b + c + d = 3150$
$\Rightarrow (2k + 3k + 4k + 12k) = 3150$
$\Rightarrow 21k = 3150$
$\Rightarrow k = 150$
Hence, the four parts are 300, 450, 600, 1800
So, the largest part is 1800

12. (D) Let each day's salary = ₹x

Given, $18x + 8 \times \frac{x}{2} - 15\times4 = 1700$

$\Rightarrow 22x = 1760$

$\Rightarrow$ Monthly Salary = $\frac{1750}{22} \times 30 = ₹2400$

13. (B) Area of circle = Area of square
$\pi r^2 = a^2$

$\Rightarrow \frac{r}{a} = \frac{1}{\sqrt{\pi}}$

$\Rightarrow r = \frac{a}{\sqrt{\pi}}$

Perimeter of eq. Δ = Perimeter of square

$3b = 4a \Rightarrow \frac{a}{b} = \frac{3}{4} \Rightarrow b = \frac{4}{3}a$

Area of circle: Area of equilateral triangle

$= pr^2 : \frac{\sqrt{3}}{4}b^2$

$= \pi\left(\frac{a}{\sqrt{\pi}}\right)^2 : \frac{\sqrt{3}}{4}\left(\frac{4}{3}a\right)^2$

$= 1 : \frac{\sqrt{3}}{4} \times \frac{16}{9}$

$= 9 : 4\sqrt{3}$

14. (D) $\frac{\cot 5^\circ.\cot 10^\circ.\cot 15^\circ.\cot 60^\circ.\cot 75^\circ.\cot 80^\circ.\cot 85^\circ}{(\cos^2 20^\circ + \cos^2 70^\circ) + 2}$

$= \frac{\tan 85^\circ.\tan 80^\circ.\tan 75^\circ.\cot 60^\circ.\cot 75^\circ.\cot 80^\circ.\cot 85^\circ}{(\sin^2 70^\circ + \cos^2 70^\circ) + 2}$

$= \frac{\frac{1}{\sqrt{3}}}{1+2} = \frac{1}{3\sqrt{3}} = \frac{\sqrt{3}}{9}$

15. (D) ATQ.,

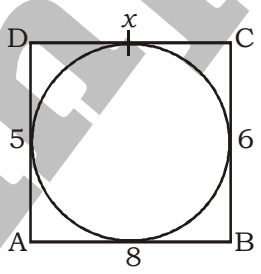
$x + \frac{1}{x} = 99 \Rightarrow x^2 + 1 = 99x$

$\frac{100x}{2x^2 + 102x + 2} = \frac{50x}{x^2 + 51x + 1}$

$= \frac{50}{\left(x + \frac{1}{x}\right) + 51}$

$= \frac{50}{99 + 51} = \frac{50}{150} = \frac{1}{3}$

16. (D) AB = 8, BC = 6, AD = 5, CD = 2



$\because$ AB + CD = BC + AD
$\Rightarrow 8 + x = 6 + 5$
$\Rightarrow x = 11 - 8 = 3$ cm.

17. (D) Let the person invest amount x and y into two different rates of interest.

$= \frac{x \times 10 \times 1}{100} + \frac{y \times 12 \times 1}{100} = 130$

$\Rightarrow 10x + 12y = 13000$ ...(i)

and $\frac{y \times 10 \times 1}{100} + \frac{x \times 12 \times 1}{100} = 134$

$\Rightarrow 10y + 12x = 13400$ ...(ii)

On solving eqs. (i) and (ii), we get
x = ₹700 and y = ₹500

18. (D) Total weight of stone = 35 gm
Cost of stone = 12250
Cost of stone × (weight of stone)^2
C.S. = k(w.s.)^2
$\Rightarrow 12250 = k(35)^2$
$\Rightarrow k = 10$
Divided into parts = 2:5

$= \frac{2}{7} \times 35 : \frac{5}{7} \times 35 = 10 : 25$ gm

Cost of stone = $k(10)^2 + k(25)^2$
= 10[100 + 625] = ₹ 7250
Loss = 12250 – 7250 = ₹ 5000

19. (A) H M
4 : 30

Angle = $\frac{11}{2}\times M - 30\times H$

$= \frac{11}{2}\times 30 - 30\times 4$

$= 165 - 120$

$= 45° = \frac{\pi}{4}$

20. (D) A in one day = $\frac{1}{12}$ parts

B in one day = $\frac{1}{8}$ parts

(A+B) in one day = $\frac{1}{12}+\frac{1}{8}=\frac{5}{24}$ parts

(A+B) take = $\frac{24}{5}$ days

C takes = $\frac{4}{5}\times\frac{24}{5}=\frac{96}{25}$ days

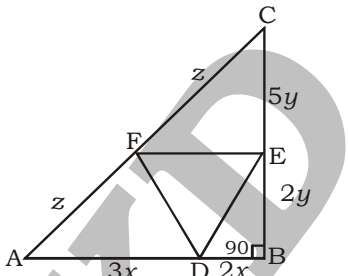
(A+B) in 3 days = $\frac{5}{24}\times 3=\frac{5}{8}$ parts

Remaining work = $1-\frac{5}{8}=\frac{3}{8}$ parts

C $\rightarrow$ 1 work $\rightarrow \frac{96}{25}$ days

C $\rightarrow \frac{3}{8}$ parts $\rightarrow \frac{3}{8}\times\frac{96}{25}$ days $= 1\frac{11}{25}$ days

21. (B)



Area of $\Delta BDE = \frac{1}{2}\times 2x\times 2y$

$= 20 = \frac{1}{2}\times 2x\times 2y$

$\Rightarrow xy = 10$

Area of $\Delta ABC = \frac{1}{2}\times 5x\times 7y$

$\Rightarrow \frac{35}{2}\times 10 = 175\ cm^2$

22. (A) Side of square = a
Length of rectangle = a + 5
Breadth of rectangle = a – 3
Area of square = Area of rectangle
$\Rightarrow a^2 = (a+5)(a-3)$
$\Rightarrow a^2 = a^2 + 5a - 3a - 15$
$\Rightarrow a^2 = a^2 + 2a - 15$

$\Rightarrow 2a = 15,\ a = \frac{15}{2}$

Perimeter of Rectangle = $2(a+5+a-3)$
$= 2(2a+2) = 2[15+2] = 34$ cm

23. (D) Volume of sphere = $\frac{4}{3}\pi r^3$

$V \propto r^3$ (Let $r = 1$), V = 1

New $V \propto (0.7)^3$

Decrease % = $\frac{\text{Decrease}}{\text{original}}\times 100$

$= \frac{1^3-(0.7)^3}{1}\times 100 = \frac{1-0.343}{1}\times 100$

$= 0.657 \times 100 = 65.7\%$

24. (C) Let, $y = 4x^2 + 4x + 9$

$\Rightarrow \frac{dy}{dx} = 8x + 4$

For maxima and minima

$\frac{dy}{dx} = 0 \Rightarrow 8x + 4 = 0 \Rightarrow x = \frac{-1}{2}$

Minimum value = $4x^2 + 4x + 9$

$= 4\left(-\frac{1}{2}\right)^2 + 4\left(-\frac{1}{2}\right) + 9$

$= 1 - 2 + 9 = 8$

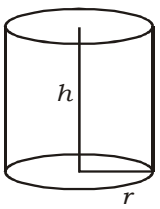
25. (B) Ratio of total capital of A and B
$= 20000 \times 12 : 35000 \times 12$
$= 240000 : 420000$
Now C gives 220000 to both to make the capital equal.
$\therefore$ A's captial : B's captial

$= 240000 : 420000$
$- \underline{220000 : 220000}$
$\underline{20000 : 200000}$

$\therefore$ Required ratio of divided amount = 1 : 10

26. (D) Side of square = $4 \times 25 = 100$m
Area of square = $(100)^2$ = 1 hectare

27. (D)



h + r = 30
T.S.A. = 2640
$\Rightarrow$ $2\pi r (r + h) = 2640$
$\Rightarrow$ $2\pi r \times 30 = 2640$

$\Rightarrow$ $r = \frac{2640 \times 7}{2 \times 22 \times 30} = 14$, h = 16

Now, h : r = 16 : 14 = 8 : 7

28. (D) Let the numbers of men, women and children are 3y, 2y and y and their wages are $5x$, $3x$ and $2x$ respectively.
Given, $3y = 90 \Rightarrow y = 30$
Number of women = 60 and
Number of children = 30
$\therefore$ Now, ATQ.,
Total daily wages = ₹10350
$\Rightarrow 90 \times 5x + 60 \times 3x + 30 \times 2x = 10350$
$\Rightarrow x(450 + 180 + 60) = 10350$

$\Rightarrow x = \frac{10350}{690} = 15$

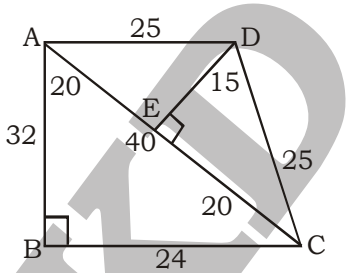
$\therefore$ Daily wage of a man = 15 × 5 = ₹75

29. (B) $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \frac{1}{\sqrt{4}+\sqrt{5}} \ldots + \frac{1}{\sqrt{8}+\sqrt{9}}$

On rationalising
$= \sqrt{2} - 1 + \sqrt{3} - \sqrt{2} + \sqrt{4} - \sqrt{3} + \ldots + \sqrt{9} - \sqrt{8}$
$= \sqrt{9} - 1 = 2$

30. (B) $\alpha + \beta = 135°$
$\alpha - \beta = 15°$
$\Rightarrow$ $\alpha = 75$, $\beta = 60°$

31. (D) ATQ.,



AC = 40 By pythagoras theorem
ΔADC is isosceles
CE = 20, DE = 15
Area of ABCD = Area of ΔABC + Area of ΔADC

$= \frac{1}{2} \times 32 \times 24 + \frac{1}{2} \times 40 \times 15$
$= 384 + 300 = 684\ m^2$

32. (A) $3\sin\alpha - 4\sin\beta = \frac{1}{5}$ ...(i)

$7\sin\beta + 3\sin\gamma = \frac{3}{5}$ ...(ii)

Eq. (i) + eq. (ii)

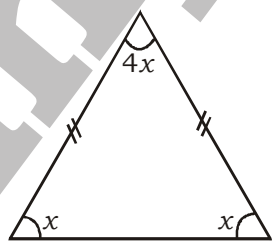
$3\sin\alpha + 3\sin\beta + 3\sin\gamma = \frac{4}{5}$

$\Rightarrow$ $3(\sin\alpha + \sin\beta + \sin\gamma) = \frac{4}{5}$

$\Rightarrow$ $\sin\alpha + \sin\beta + \sin\gamma = \frac{4}{15}$

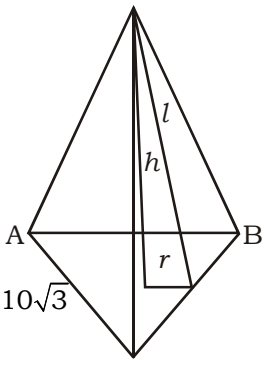
33. (B) $a = 999$
Now, $a(a^2 + 3a + 3)$
$= a^3 + 3a^2 + 3a + 1 - 1$
$= (a + 1)^3 - 1 = (999 + 1)^3 - 1$
$= (1000)^3 - 1$
$= 1000000000 - 1 = 999999999$

34. (C)



$4x + x + x = 180$
$\Rightarrow$ $6x = 180$
$\Rightarrow$ $x = 30°$
Now, $2x = 60°$

35. (C)



TSA of Pyramid = $\frac{1}{2}$ × Perimeter of Base × l + Area of Base

$= 270\sqrt{3} = \frac{1}{2} \times 30\sqrt{3} \times l + \frac{\sqrt{3}}{4} \times 10 \times 10 \times 3$

$\Rightarrow \quad 270\sqrt{3} = \frac{30\sqrt{3}}{2}(l+5)$

$\Rightarrow \quad l = 13$

Inradius of eq. triangle = $\frac{a}{2\sqrt{3}} = \frac{10\sqrt{3}}{2\sqrt{3}} = 5$

Now, $h^2 = l^2 - OB^2$

$\Rightarrow \quad h^2 = 169 - 25 = 144$

$\Rightarrow \quad h = 12$ cm

36. (B) From option (B)

Thickness = 1 cm

The inner dimension of box are

$l = 10 - 2 = 8$

$b = 9 - 2 = 7$

$h = 7 - 2 = 5$

TSA = 2 ($lb + bh + hl$)

= 2 [56 + 35 + 40]

= 262 cm^2

37. (D) $\cos12°.\cos24°.\cos48°.\cos60°.\cos84°$

$= \frac{\cos12°\times\cos48°\times\cos72°\times\cos24°\times\cos36°\times\cos84°\times\cos60°}{\cos36°\times\cos72°}$

(multipling and dividing by cos72 × cos 36)

$= \frac{\frac{1}{4}\times\cos(3\times12)\times\frac{1}{4}\cos(24\times3)\times\frac{1}{2}}{\cos36\times\cos72} = \frac{1}{32}$

38. (D) $(a^2 + 2a)^2 + 12(a^2 + 2a) - 45$

Let $(a^2 + 2a) = x$

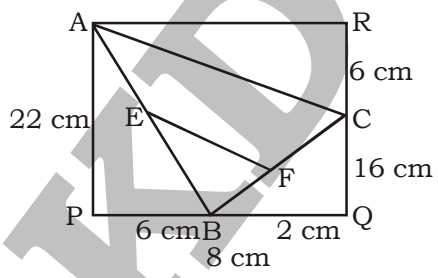
$= x^2 + 12x - 45$

$= (x + 15)(x - 3)$

$= (a^2 + 2a + 15)(a^2 + 2a - 3)$

$= (a^2 + 2a + 15)(a + 3)(a - 1)$

39. (B)



AC = $\sqrt{8^2 + 6^2} = 10$

In ΔABC E & F are mid points of AB and BC

Hence, EF is half of AC and parallel to it.

EF = $\frac{10}{2} = 5$ cm

40. (B) $V_1 = V_2$ and $h_1 = h_2 = h$

Volume of prism with equilateral base

= Volume of prism with hexagonal base

$\frac{\sqrt{3}}{4}\times a^2\times h = 6\times\frac{\sqrt{3}}{4}\times b^2\times h$

$\Rightarrow \quad \frac{a^2}{b^2} = \frac{6}{1} \Rightarrow \frac{a}{b} = \frac{\sqrt{6}}{1}$

$\Rightarrow \quad a : b = \sqrt{6} : 1$

41. (B) $(a^2 - b^2)\sin\theta + 2ab\cos\theta = (a^2 + b^2)$

$\frac{a^2 - b^2}{a^2 + b^2}\sin\theta + \frac{2ab}{a^2 + b^2}\cos\theta = 1$

On comparing with $\sin^2\theta + \cos^2\theta = 1$

$\sin\theta = \frac{a^2 - b^2}{a^2 + b^2}$

$\cos\theta = \frac{2ab}{a^2 + b^2}$

$\therefore \quad \tan\theta = \frac{a^2 - b^2}{2ab}$

42. (C) $a = \frac{xy}{x+y}, b = \frac{xz}{x+z}, c = \frac{yz}{y+z}$

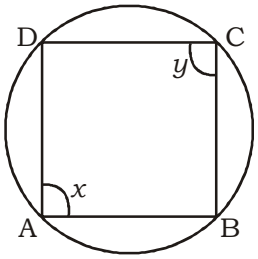
$\frac{1}{a} = \frac{x+y}{xy}, \frac{1}{b} = \frac{x+z}{xz}, \frac{1}{c} = \frac{y+z}{yz}$

$\frac{1}{a} = \frac{1}{x} + \frac{1}{y}, \frac{1}{b} = \frac{1}{z} + \frac{1}{x}, \frac{1}{c} = \frac{1}{y} + \frac{1}{z}$

Now, $\frac{2}{x} = \frac{1}{a} + \frac{1}{b} - \frac{1}{c}$

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

43. (A)



$\angle x + \angle y = 180$

$\Rightarrow \quad \angle y = 180 - \angle x$

$\Rightarrow \quad \sin\angle y = \sin(180 - \angle x)$

$\Rightarrow \quad \sin\angle y = \sin\angle x$

$\Rightarrow \quad \sin\angle y = \frac{3}{4} \qquad \left[\because x = \sin^{-1}\left(\frac{3}{4}\right)\right]$

$\Rightarrow \quad \angle y = \sin^{-1}\left(\frac{3}{4}\right)$

44. (C) $\frac{2}{3}\pi r^3 = 19404\ \text{cm}^3$

$\Rightarrow r^3 = \frac{19404 \times 3 \times 7}{22 \times 2}$

$\Rightarrow r^3 = 441 \times 3 \times 7$

$\Rightarrow r = 21$ cm

$\Rightarrow$ T.S.A. $= 3\pi r^2 = 3 \times \frac{22}{7} \times 21 \times 21$

$= 4158\ \text{cm}^2$

45. (B) $\frac{6}{234} \times 100 = 2.56\%$

46. (C) Wheat $= \frac{120}{560} \times 100 = 21.43\%$

Rice $= \frac{60}{240} \times 100 = 25\%$

Maize $= \frac{152}{228} \times 100 = 66.67\%$

Other $= \frac{40}{420} \times 100 = 9.52\%$

47. (B) $1989 = \frac{50}{350} \times 100 = 14\frac{2}{7}\%$

$1990 = \frac{20}{400} \times 100 = 5\%$

$1991 = \frac{40}{420} \times 100 = 9.52\%$

$1992 = \frac{40}{420} \times 100 = \frac{200}{23} = 8.69\%$

48. (A) $\frac{1200}{100} \times 15 = 180$

49. (C) $\frac{1200}{100} \times (13 + 11) = 288$

50. (D) $\frac{22}{21} \times 100 = 104.76\%$

51. (C) ATQ.,

A → 20 days
B → 15 days
C → 12 days
3 : 4 : 5 → 60 units

A+B→1 day $= \frac{1}{20} + \frac{1}{15} = \frac{3+4}{60} = \frac{7}{60}$ parts

A+C→1 day $= \frac{1}{20} + \frac{1}{12} = \frac{3+5}{60} = \frac{8}{60}$ parts

Hence in 2 days $\rightarrow \frac{15}{60}$ parts over

Total work = 60

Days needed = 8

52. (C) $\underbrace{(666.....9)}_{n} + \underbrace{(888.....8)}_{n}$

$\left(\underbrace{111.....1}_{n}\right)[8 + 6] = 14 \times \frac{[999....9]}{9}$

$= \frac{14}{9} \times [10^n - 1]$

53. (C) Total sell = 200 + 400 + 9(600) + 2400
= 8400

Bonus $= \frac{8400}{100} - 1 = 83$

Salary = 60 × 12 = 720

Total Income = 720 + 83 = 803

Monthly Income $= \frac{803}{12} = 66.92$

54. (B) Let first fashion house x dress per day

Then second fashion house production = $(x + 21)$ dress/day

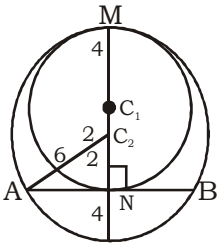
$\left(\frac{3x + (900 - 810)}{21}\right)(x + 21) = 900$

So, $x = 54$

So, First house production = 54

2nd house Production = 54 + 21 = 75

55. (D)



In ΔC_2NA:–

$36 = 4 + AN^2$

$AN = \sqrt{32}$

$AN = 4\sqrt{2}$

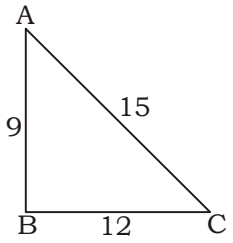
Max Chord = AB = 2AN

$= 2 \times 4\sqrt{2} = 8\sqrt{2}$

56. (B) $\left[20\left(1+\frac{20}{100}\right)^3-32\left(1-\frac{25}{100}\right)^3\right]$ lakh

= 2106000 lakhs

57. (B)



AB = 9 (Pythagoras theorem)

$r = \frac{9+12-15}{2} = 3$

$R = \frac{15}{2} = 7.5$

Distance between incentre and circumcentre

$d = \sqrt{12^2 - 2Rr}$

$= \sqrt{(7.5)^2 - 2\times(7.5)(3)}$

$= \sqrt{56.25 - 45}$

= 3.35

58. (C) $\frac{1}{1} + \frac{1+3}{1+4} + \frac{1+3+5}{1+4+9} + \frac{1+3+5+7}{1+4+9+16} + \ldots\ldots$

$1^2 + 2^2 + 3^2 + 4^2 \ldots\ldots n$

$\frac{n(n+1)(2n+1)}{6}$

59. (B) $\frac{d}{dx}(x^2 + 16x + 20) = 0$

$2x + 16 = 0$

$x = -8$

Put the value of $x = -8$ for min. value

$(-8)^2 + 16(-8) + 20 = 0$

$= -44$

60. (D) $x + y + z = 0$

$x + y = -z$

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

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

Similarly,

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

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

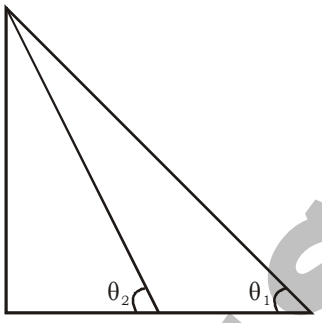
Now, $\frac{1}{x^2+y^2-z^2} + \frac{1}{y^2+z^2-x^2} + \frac{1}{z^2-x^2-y^2}$

$\Rightarrow \frac{-1}{2xy} - \frac{1}{2yx} - \frac{1}{2xz}$

$\Rightarrow -\frac{1}{2}\left[\frac{1}{xy} + \frac{1}{yz} + \frac{1}{zx}\right]$

$\Rightarrow \frac{-1}{2}\left[\frac{x+y+z}{xyz}\right] = 0$

61. (B)



$\tan\theta_1 = \frac{5}{12}$, $\tan\theta_2 = \frac{3}{4}$

$\therefore$ $d = h(\cot\theta_1 - \cot\theta_2)$

$h\left(\frac{12}{5} - \frac{4}{3}\right) = h \times \frac{16}{15}$

$192 = \frac{h\times 16}{15}$

$h = 15 \times 12 = 180m$

62. (D)

G	B
378	675
27×14	27×25

No. of students in a section = 27

So No. of total sections = 14 + 25 = 39

63. (B) Increase in expenditure

$= \frac{2400}{18} \times 28 \times \frac{7}{100} = ₹262$

64. (A) Change = 8% P.A.

Again and 1% P.A.

Net Change in one year

$= 8 + 1 + \frac{8+1}{100} = 9.08$

Change in 2nd year

$= 9.08 + 9.08 + \frac{9.08\times 9.08}{100} = 18.984$

65. (C) Cost of one toffes = $₹\frac{75}{125}$

Cost of one million toffes at 40% off

$= \frac{75}{125} \times 1000000 \times \frac{60}{100} = ₹3,60,000$

66. (C) C.P = 100/- of 110 gms.

M.P = 120/-

D = 10/-

S.P = $\frac{90}{100} \times 120$ = 108/- of 90 gms

C.P of 110 gm = 100/-

C.P of 100 gm = $\frac{100\times100}{110}$ /–

C.P = $\frac{1000}{11}$ /–

S.P of 90 gms = 108/-

S.P of 100 gm = $\frac{108\times100}{90}$

S.P = $\frac{1080}{90}$

P % = $\frac{\frac{1080}{90}-\frac{1000}{11}}{\frac{1000}{11}}\times100\%$

= $\frac{1080\times11-9000}{11\times9}\times\frac{11}{1000}\times100$

= $\frac{1080\times11-9000}{90}\times32\%$

Short Cut:

₹ 1000 → ₹ 1100
While purchasing
P = 10%
While selling

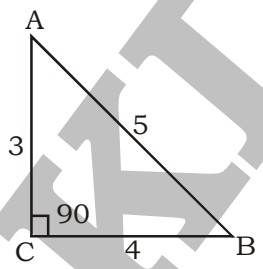
₹ 900 = 1000 × $\frac{120}{100}\times\frac{90}{100}$

900 = 1080/-

P % = $\frac{180}{900}\times100 = 20\%$

Eff % = 10 + 20 + $\frac{10\times20}{100}$ = 32%

67. (C)



Volume of cone formed on rotating around BC

= $\frac{1}{3}\pi\times3\times3\times4 = 12\pi$

Volume of rotating around AB

= $\frac{1}{3}\pi\times4\times4\times3 = 16\pi$

% increase = $\frac{\text{Income}}{\text{Original}}\times100$

Now, $x = \frac{4\pi}{12\pi}\times100 = \frac{100}{3} = 33\frac{1}{3}$

68. (D)

	A	B	C
SP	8x	9x	5x
%P	8y	7y	14y
=	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{4}$

8y ⇒ 14.28% = $\frac{1}{7}$

y = $\frac{1}{7}\times8 \Rightarrow 7y = \frac{1}{8}$

CP of B = 400

SP of B = 400 × $\frac{9}{8}$ = 450

9x + 450
x = 50
SP of A = 400

CP of A = $\frac{400}{8}\times7 = 350$

SP of C = 250

CP of C = $\frac{250}{5}\times4 = 200$

% Net Profit = $\frac{\text{Net profit}}{\text{Total CP}}\times100$

= $\frac{50+50+50}{350+400+200}\times100$

= $\frac{150}{950}\times100 = 15.78\%$

69. (D) ATQ,
10 CP = 6 SP and 10 D = 5P

⇒ $\frac{CP}{SP}=\frac{6}{10}\Rightarrow\frac{3}{5}$ $\frac{D}{P}=\frac{5}{10}=\frac{1}{2}$

Profit percentage = $\frac{2}{3}\times100 = 66\frac{2}{3}\%$

Percentage of D = $\frac{1}{6}\times100 = 16\frac{2}{3}\%$

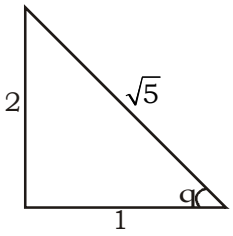
Difference between P% and D%

$= 66\frac{2}{3}\% - 16\frac{2}{3}\% = 50\%$

70. (A) Given that,
$x^2 - kx - 21 = 0$ ...(i)
$x^2 - 3kx - 35 = 0$ ...(ii)
From eq (ii) – eq (i), we get
$kx^2 = 28$ ...(iii)
$x^2 = 49$
$x = \pm 7$
Put the value of x in eq^n (3)
$k \times (\pm 7) = 28$
$k = \pm 4$

71. (A) $x^3 + 3x^2y + 2xy^2$
$x^3 + 2x^2y + x^2y + 2xy^2$
$x^2(x + 2y) + xy(x + 2y)$
$(x^2 + xy)(x + 2y)$
$x(x + y)(x + 2y)$ ...(i)
$x^4 + 6x^3y + 8x^2y^2$
$x^4 + 4x^3y + 2x^3y = 8x^2y^2$
$x^3(x + 4y) + 2x^2y + 8x^2y^2$
$(x^3 + 2x^2y)(x + 4y)$
$x^2(x + 2y)(x + 4y)$ ...(ii)
H.C.F of (1 & 2)
HCF = $x(x + 2y)$

72. (A)

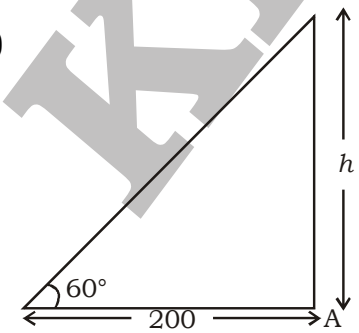


$\tan\theta = 2$, $\sin\theta = \frac{2}{\sqrt{5}}$ and $\cos\theta = \frac{1}{\sqrt{5}}$

Now, $\frac{8\sin\theta + 5\cos\theta}{\sin^3\theta + 2\cos^3\theta + 3\cos\theta}$

$= \frac{8 \times \frac{2}{\sqrt{5}} + 5 \times \frac{1}{\sqrt{5}}}{\frac{8}{5\sqrt{5}} + \frac{2}{5\sqrt{5}} + \frac{3}{\sqrt{5}}} = \frac{\frac{21}{\sqrt{5}}}{\frac{25}{5\sqrt{5}}} = \frac{21}{5}$

73. (A)



$\tan 60° = \frac{h}{200}$

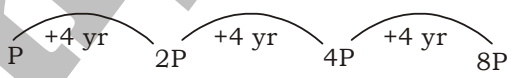
$h = 200\sqrt{3}$ meter

Speed of the ballon = $\frac{200\sqrt{3}}{90}$

= 3.87 meter/sec

74. (C) $\frac{1}{x} + \frac{1}{7} = \frac{1}{x+7} \Rightarrow \frac{70 + x}{7x} = \frac{1}{(x+7)}$
$\Rightarrow (x + 7)^2 = 7x$
$\Rightarrow x^2 + 49 + 14x = 7x$
$\Rightarrow x^2 + 7x + 49 = 0$
Multiplying both side $(x - 7)$
$\Rightarrow (x - 7)(x^2 + 7x + 49) = 0$
$\Rightarrow x^3 - 7^3 = 0 \Rightarrow x^3 - 343 = 0$
Now, $x^{49} - 343x^{46} + x^3 + 17$
$\Rightarrow x^{46}(x^3 - 343) + x^3 + 17$
$\Rightarrow 346 \times 0 + 343 + 17 \Rightarrow 360$

75. (B)



It will take 12 years

76. (C)

CP	SP	MP
100	126	140

Tax 10% on profit = $26 \times \frac{10}{100} = 2.6$
Net Profit = 26 – 2.6 = 23.4
CP – $\frac{468}{23.4} \times 100 = 2000$

77. (D)

CP	SP	MP	Profit 25%
60	75	100	CP = $\frac{75}{125} \times 100$

If Discount is 10%

CP	D	SP	MP
60	10%	90	100

% Profit = $\frac{30}{60} \times 100 = 50\%$

78. (D) Age of Father = x yr
Age of Son = y yr
After 6 yr
$(x + 6) = 3(y + 6)$
$x - 3y = 12$ ...(i)
Before 3 yr
$(x - 3) = 9(y - 3)$
$x - 9y = -24$ ...(ii)
From eq. (i) and (ii)
Age of father x = 30 yr

79. (D) Unit digit of $(2457)^{754}$
$7^2 = 9$ Unit digit

80. (B) $x(y-z)(y+z)+y(z+x)(z-x)+z(x-y)(x+y)$
Put, $x = 1$
$y = 2$
$z = 3$
$1(-1)(5) + 2(2)(4) + 3(-1)(3) = 2$
By option (B)
$(x-y)(x-z)(z-y) = (-1)(-2)(1) = 2$

81. (A) $(x+3)^3 + \frac{1}{(x+3)^3} = ?$

$x^2 + x = 5$ ...(i)
$x + 3 = k$
$x = k - 3$
Put the value of x en eq.(i)
$(k-3)^2 + (k-3) = 5$
$k^2 - 6k + 9 + k - 3 = 5$
$k^2 - 5k + 6 = 5$

$k + \frac{1}{k} = 5$

So, $K^3 + \frac{1}{k^3} = (5)^3 - 3(5)$
$= 110$

82. (D) Let x can complete the work in t days
Eff.
$(t + 3) \rightarrow$ t days
$(t) \rightarrow$ t + 3 days
Total work = t(t + 3)
$4 \times (t + 3) + 10(t) = t(t + 3)$
$\Rightarrow$ t = 12, –1
So, t = 12 days
$\Rightarrow y = 12 + 3 = 15$ days

83. (D) $x = \frac{3+\sqrt{5}}{2}$

$\frac{1}{x} = \frac{2}{3+\sqrt{5}} \times \frac{3-\sqrt{5}}{3-\sqrt{5}} = \frac{3-\sqrt{5}}{2}$

$x + \frac{1}{x} = \frac{3+\sqrt{5}}{2} + \frac{3-\sqrt{5}}{2}$

$x + \frac{1}{x} = \frac{6}{2} = 3$

Now, $x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right)^3 - 3\left(x + \frac{1}{x}\right)$
$= 27 - 3 \times 3$
$= 18$

84. (C) Let the number of workers be x.
A.T.Q.,
$x \times 8500 = 7 \times 10000 + (x - 7)\ 78000$
$\Rightarrow 85x = 700 + 78(x - 7)$
$\Rightarrow 85x - 78x = 700 - 546$
$\Rightarrow 7x = 154$

$\Rightarrow x = \frac{154}{7} = 22$

85. (C) 1. $\text{cosec}^2x + \sec^2x = \text{cosec}^2x.\sec^2x$

L.H.S. $\frac{1}{\sin^2 x} + \frac{1}{\cos^2 x}$

$= \frac{\sin^2 x + \cos^2 x}{\sin^2 x.\cos^2 x}$
$= \text{cosec}^2x.\sec^2x$

2. $\sec^2x + \tan^2x = \sec^2x.\tan^2x$
L.H.S.

$= \frac{1}{\cos^2 x} + \frac{\sin^2 x}{\cos^2 x} = \frac{1+\sin^2 x}{\cos^2 x}$
$\neq$ R.H.S.

3. $\text{cosec}^2x + \tan^2x = \cot^2x + \sec^2x$
L.H.S.
$= 1 + \cot^2x + \tan^2x$
$= \cot^2x + \sec^2x$ = R.H.S.
1 and 3 are correct.

86. (D) $\sqrt{3}\sin\theta + \cos\theta = 2$

$\Rightarrow \frac{\sqrt{3}}{2}\sin\theta + \frac{1}{2}\cos\theta = 1$

$\Rightarrow \cos30.\sin\theta + \sin30.\cos\theta = \cos0$
$\Rightarrow \cos(30 - \theta) = \cos0$
$\Rightarrow 30 - \theta = 0 \Rightarrow \theta = 30$
Now, $\sqrt{3}\cos\theta - \sin\theta \Rightarrow \sqrt{3}\cos30 - \sin30$

$\Rightarrow \sqrt{3} \times \frac{\sqrt{3}}{2} - \frac{1}{2} = 1$

87. (C) Suppose the cost prize of each TV = ₹x
Then, $(x - 9400) = 2(10600 - x)$
$\Rightarrow x - 9400 = 21200 - 2x$
$\Rightarrow 3x = 21200 + 9400$
$\Rightarrow 3x = 30600$

$\Rightarrow x = \frac{39600}{3} =$ ₹10200

88. (A) The difference between C.I. and S.I. for the interest as the first year's interest

S.I. for the first year = $\frac{100}{2}$ = ₹ 50
C.I. – S.I. = 105 – 100 = ₹ 5
Interest on ₹50 for 1 years = ₹ 5

or, $5 = \frac{50 \times 1 \times R}{100}$

or, $r = 10\%$

Again S.I. = $\frac{P \times R \times T}{100}$

$\Rightarrow 100 = \frac{P \times 10 \times 2}{100}$

or, P = ₹ 500

89. (B) Let the weight of Mr. Gupta and Mrs. Gupta be $7x$ kg and $8x$ kg respectively.

Then, $7x + 8x = 120$

$\Rightarrow x = \frac{120}{15} = 8$ kg

Mr Gupts = $7 \times 8 = 56$ kg

After taking dieting, weight of Mr. Gupta = $56 - 6 = 50$ kg and ratio of their weight

$= \frac{50}{x} = 5 : 6$, $x = 60$ kg

So, Mrs. Gupta reduced weight

$= 64 - 60 = 4$ kg

90. (D) $A \times 1.2 \times 0.75 = B \times 1.25 \times 0.8$

$\Rightarrow A \times 0.9 = B \times 1$

$\Rightarrow \frac{B}{A} = \frac{0.9}{1} = \frac{9}{10}$

$\therefore B : A = 9 : 10$

91. (A) $a = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, $b = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$

$a + b = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}} + \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$

$= \frac{3+2-2\sqrt{6}+3+2+2\sqrt{6}}{(3-2)}$

$a + b = 10$, $ab = 1$

Now, $\frac{a^2}{b} + \frac{b^2}{a} \Rightarrow \frac{a^3+b^3}{ab}$

$= \frac{(a+b)^3 - 3ab(a+b)}{ab} = \frac{1000 - 3(10)}{1}$

$= 970$

92. (D) Total quantity of milk

$= 2 \times 0.9 + 5 \times 0.8 + 9 \times 0.7 = 12.1$ litre

Milk concentration in the resultant mixture

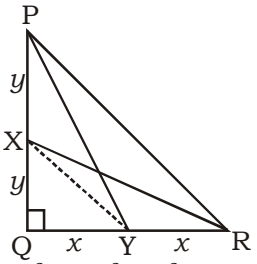
$= \frac{12.1}{2+5+9} \times 100 = 75.625\%$

Water concentration in the resultant mixture

$= 100 - 75.625\% = 24.735\%$

$\Rightarrow$ Milk : Water $= \frac{75625}{24735} = 121:39$

93. (D)



$PY^2 = 4y^2 + x^2$

$RX^2 = 4x^2 + y^2$

$RX^2 + PY^2 = 5x^2 + 5y^2$

$\Rightarrow RX^2 + PY^2 = 5[x^2 + y^2]$

$\Rightarrow RX^2 + PY^2 = 5XY^2$ ....option (A)

$\Rightarrow RX^2 + PY^2 = XY^2 + 4XY^2$

$\Rightarrow RX^2 + PY^2 = XY^2 + 4[x^2 + y^2]$

$\Rightarrow RX^2 + PY^2 = XY^2 + PR^2$ ....option (B)

$[\because PR^2 = 4x^2 + 4y^2)$

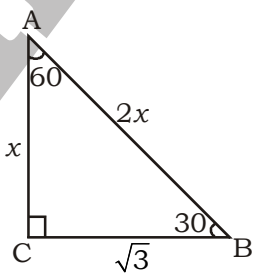
$\Rightarrow RX^2 + PY^2 = 5[x^2 + y^2]$

$\Rightarrow RX^2 + PY^2 = 5\frac{PR^2}{4}$

$\Rightarrow 4(RX^2 + PY^2) = 5\,PR^2$ ....option (C)

$\therefore$ Option D is incorrect.

94. (A)



$A = 60°$, $B = 30°$, $C = 90°$

Now, $3x + \sqrt{3}x = 6 + 2\sqrt{3}$

$\Rightarrow x = 2$

$\therefore$ Area $= \frac{1}{2} \times x \times \sqrt{3} = \sqrt{3}$

95. (C) $\because$ (llgm ABCD) and (llgm ABMN) are on the same base and between the same parallels.

$\therefore$ ar(llgm ABCD) = ar(llgm ABMN)

$\therefore$ ar(llgm ABCD) = 80 sq. unit

Again, DAPN and llgm (ABMN) ar on the same base and between the same parallesl.

$\therefore$ ar(ΔAPN) $= \frac{1}{2}$ ar(llgm ABMN)

$= \frac{1}{2} \times 80$ sq. units

$= 40$ sq. units.

96.(C) Required answer

$= \frac{35\times30}{100} + \frac{35\times15}{100} + \frac{35\times15}{100}$

$= \frac{35}{100}(30 + 15 + 15)$

$= \frac{35\times60}{100} = 21$ lakhs

97.(D) Percentage variation in

Model A $= \frac{40-30}{30} \times 100 = 33\frac{1}{3}\%$

Model B $= \frac{20-15}{15} \times 100 = 33\frac{1}{3}\%$

Model C $= \frac{15-20}{20} \times 100 = -25\%$

98.(A) Required difference

$= \frac{44\times20}{100} - \frac{35\times15}{100}$

$= \frac{880-525}{100} = \frac{355}{100}$ lakhs

$= 355000$

99.(B) Required production

$= \frac{44\times30}{100}$ lakhs $= 13,20,000$

100. (C)Required answer

$= 35 \times \frac{10}{100} \times \frac{15}{100} + 44 \times \frac{10}{100} \times \frac{15}{100}$

$= \frac{150}{10000} \times 79 = 1.1850$ lakhs

= ₹ 1,18,500

SSC TIER II (MATHS) MOCK TEST - 53 (ANSWER KEY)

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

Note:- If your opinion differs regarding any answer, please message the mock test and question number to 8860330003

Note:- Whatsapp with Mock Test No. and Question No. at 7053606571 for any of the doubts. Join the group and you may also share your suggestions and experience of Sunday Mock

Note:- If you face any problem regarding result or marks scored, please contact 9313111777