

SSC MAINS (MATHS) MOCK TEST-16 (SOLUTION)

1. (B) Total age of 2 girls
 $= (27 + 37) + 2 \times 8$
 $= 80$ years

\therefore Required average age $= \frac{80}{2} = 40$ years

2. (A)

constable	114 m	theif
21m/min	-----	15m/min

Required time $= \frac{114}{21-15} = \frac{114}{6} = 19$ min

3. (D) 20% profit $= \frac{20}{100} = \frac{1}{5}$

C.P	S.P	
5	6	
1	2 $\frac{3}{11}$	0.72
5	2 $\frac{3}{11}$	$6 \times 0.72 = 4.32$

loss% $= \frac{0.68}{5} \times 100 = \frac{68}{5} = 13\frac{3}{5}\%$

4. (B) Total money = ₹ 56

₹ 1	:	50p	:	25p
No. 1		4		2
₹ 1		2		50

 $3.5R = 56$

$R = \frac{56}{3.50} = \frac{56}{350} \times 100 = 16$

50 paise coin $= 16 \times 4 = 64$

5. (D) $a^2 + b^2 + c^2 = ab + bc + ca$
multiplying both side by 2
 $2a^2 + 2b^2 + 2c^2 = 2ab + 2bc + 2ca$
 $a^2 - 2ab + b^2 + b^2 - 2bc + c^2 + c^2 - 2ca + a^2 = 0$
 $(a - b)^2 + (b - c)^2 + (c - a)^2 = 0$
 $a = b = c$

$\sin^2 60^\circ + \sin^2 60^\circ + \sin^2 60^\circ$
 $= \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{9}{4}$

6. (A) $x \sin 45^\circ = y \operatorname{cosec} 30^\circ$

$\square \frac{x}{y} = \frac{\operatorname{cosec} 30^\circ}{\sin 45^\circ}$

$\square \frac{x}{y} = \frac{2}{\sqrt{2}}$

$\square \frac{x}{y} = 2\sqrt{2}$

$\frac{x^4}{y^4} = (2\sqrt{2})^4 = 16 \times 4 = 64 = 4^3$

7. (D) $\tan \theta = \frac{31}{29}$ (given)

$\frac{1 + 2 \sin \theta \cdot \cos \theta}{1 - 2 \sin \theta \cdot \cos \theta}$

$= \frac{\sin^2 \theta + \cos^2 \theta + 2 \sin \theta \cdot \cos \theta}{\sin^2 \theta + \cos^2 \theta - 2 \sin \theta \cdot \cos \theta}$

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

$= \frac{\cos^2 \theta [\tan \theta + 1]^2}{\cos^2 \theta [\tan \theta - 1]^2}$

$= \left(\frac{\tan \theta + 1}{\tan \theta - 1} \right)^2$

$= \left(\frac{60}{2} \right)^2 = 900$

8. (B) Borrowed Amount = ₹10
Return Instalment = 11
Interest = 11 - 10 = 1

$\frac{n(n+1)}{2} = \frac{10 \times 11}{2} = 55 \times 1 = 55$

$\frac{55 \times R \times 1}{100 \times 12} = 1$

$R = \frac{1200}{55} = \frac{240}{11} = 21\frac{9}{11}\%$

9. (A) $\frac{4x^3 - x}{(2x+1)(6x-3)} = \frac{x(4x^2-1)}{(2x+1) \times 3(2x-1)}$

$\Rightarrow \frac{x}{3} = 1111$

10. (D) S. P of 20 kg sugar = ₹400

\therefore SP of 1 kg sugar = ₹20

discount = 20%

$= \frac{1}{5} \rightarrow$ Discount

$= \frac{1}{5} \rightarrow$ M.P

\therefore MP of 1 Kg sugar

$= \frac{5}{4} \times 20 = ₹25$

Now, the gives 4% less sugar

Instead of 1 kg

i.e he gives 960 gm sugar

i.e SP of 960 gm sugar = ₹20

\therefore sp of 1 kg sugar

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$$= \frac{20}{960} \times 100 = \frac{125}{6}$$

∴ Effective discount

$$= \frac{25 - \frac{125}{6}}{25} \times 100$$

$$= \frac{25}{6} \times 4 = 16\frac{2}{3}\%$$

11. (A) 1st toy at 12% Profit = $\frac{3}{25}$

2nd toy at 4% Loss = $\frac{1}{25}$

CP	SP
25 × 6	28 × 6
25 × 7	24 × 7 (SP of both toy is equal)

150	168
175	168

325	336

$$P\% = \frac{11}{325} \times 100 = \frac{44}{13} = 3\frac{5}{13}\%$$

12. (A) given $a \sec\theta + b \tan\theta = 1$... (1)

and $a^2 \sec^2\theta - b^2 \tan^2\theta = 5$... (2)

from equation (1) and (2)

$$a \sec\theta - b \tan\theta = 5$$
 ... (3)

from equation (1) and (3)

$$a \sec\theta = 3$$
 ... (4)

$$b \tan\theta = -2$$
 ... (5)

from equation (4)

$$a^2 \sec^2\theta = 9$$

$$a^2 (1 + \tan^2\theta) = 9$$

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

$$\Rightarrow a^2 b^2 + 4a^2 = 9b^2$$

13. (B) $a^3 - b^3 = 56$

$$a - b = 2$$

take cube both side

$$\Rightarrow a^3 - b^3 - 3ab(a - b) = (2)^3$$

$$\Rightarrow 56 - 3ab \times 2 = 8$$

$$\Rightarrow 6ab = 56 - 8$$

$$\Rightarrow 6ab = 48$$

$$\Rightarrow ab = 8$$

$$(a - b) = 2$$

both side squaring.

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

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

$$a^2 + b^2 = 4 + 2 \times 8 = 20$$

14. (C) $t^2 - 4t + 1 = 0$

$$t^2 + 1 = 4t$$

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

(take cube both sides)

$$t^3 + \frac{1}{t^3} + 3t \cdot \frac{1}{t} \left(t + \frac{1}{t}\right) = 64$$

$$t^3 + \frac{1}{t^3} = 64 - 12$$

$$t^3 + \frac{1}{t^3} = 52$$

15. (B) $\frac{64 - 0.008}{16 + 0.8 + 0.04} = \frac{(4)^3 - (0.2)^3}{(4)^2 + 4 \times 0.2 + (0.2)^2}$

$$= \frac{(4 - 0.2)(4^2 + 0.2^2 + 4 \times 0.2)}{4^2 + 4 \times 0.2 + 0.2^2}$$

$$= 4 - 0.2 = 3.8$$

16. (A) If $\tan\theta = 1$

It means $\theta = 45^\circ$

$$= \frac{8 \sin\theta + 5 \cos\theta}{\sin^3\theta - 2 \cos^3\theta + 7 \cos\theta}$$

$$= \frac{8 \sin 45^\circ + 5 \cos 45^\circ}{\sin^3 45^\circ - 2 \cos^3 45^\circ + 7 \cos 45^\circ}$$

$$= \frac{8 \times \frac{1}{\sqrt{2}} + 5 \times \frac{1}{\sqrt{2}}}{\left(\frac{1}{\sqrt{2}}\right)^3 - 2 \left(\frac{1}{\sqrt{2}}\right)^3 + 7 \left(\frac{1}{\sqrt{2}}\right)} = 2$$

17. (C) Let distance from A to B = d km

∴ t = time taken by him

$$= \frac{d/3}{x} + \frac{2d/3}{2y} = \frac{d}{3} \left(\frac{1}{x} + \frac{1}{y}\right) \text{ hr.}$$

If his speed = $6z$ km/hr.

then time taken by him to cover AB

$$= \frac{d}{6z} \text{ hr.}$$

∴ total time from A to B and back again

$$= \frac{2d}{6z} = \frac{d}{3z} \text{ hr.}$$

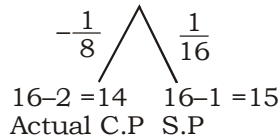
$$\therefore \frac{d}{3z} = \frac{d}{3} \left(\frac{1}{x} + \frac{1}{y}\right)$$

$$\Rightarrow \frac{1}{z} = \frac{1}{x} + \frac{1}{y}$$

18. (C) $6\frac{1}{4}\% = \frac{1}{16}$

$12\frac{1}{2}\% = \frac{1}{8}$

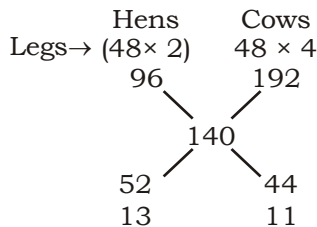
Let CP = 16



$\therefore \text{Profit \%} = \frac{15-14}{14} \times 100$

$= \frac{50}{7} = 7\frac{1}{7}\%$

19. (B)



total hens = $\frac{13}{24} \times 48$
 $= 26$

20. (C) $x = \sqrt{8+x}$ or $x^2 = 8+x$... (1)

and $y = \sqrt{8-y}$ or $y^2 = 8-y$... (2)

from (i) & (ii)

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

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

$\Rightarrow (x-y) = 1$

21. (B) Let first number = x
 2nd number = $50 - x$
 According to Question

$\frac{1}{x} + \frac{1}{50-x} = \frac{1}{12}$

After solving

$x = 20$

So, numbers are 20, 30

22. (D) The number will be = $\frac{31+75}{2} = 53$

$53 - 31 = 22$

$75 - 53 = 22$

23. (B) Let the sides of the rectangular box be

$x, 2x, 3x$

$\Rightarrow 2(2x^2 + 6x^2 + 3x^2) = 88$

$\Rightarrow 11x^2 = 44$

$\Rightarrow x^2 = 4$

$x = 2$

Sides are 2, 4, 6, cm

$\therefore \text{volume} = 2 \times 4 \times 6 = 48 \text{ cm}^3$

24. (B) According to the question
 Average age of 45 persons is

decreased by $\frac{1}{9}$ years.

i.e. $= \frac{1}{9} \times 45 = 5$ years

The age of the person who was replaced
 $= 60$ years

New comers age = $60 - 5 = 55$ years

25. (A) Let HCF = x

LCM = $12x$

$\therefore \text{HCF} + \text{LCM} = 403$

$13x = 403$

$x = 31$

HCF = 31

LCM = 12×31

one number = 93 given

Let the other number is y

$93 \times y = 31 \times 31 \times 12$

$y = 4 \times 31$

$y = 124$

26. (C) $\sqrt{6084} = 78$ and $\sqrt{97344} = 312$

$\therefore \frac{78}{x} = \frac{x}{312}$

$\Rightarrow x^2 = 78 \times 312$

$\Rightarrow x^2 = 39 \times 2 \times (39 \times 2^3)$

$x^2 = 39^2 \times 2^4$

$\therefore x = \sqrt{39^2 \times 2^4}$

$\therefore x = 39 \times 2^2$

$\therefore x = 39 \times 4$

$\therefore x = 156$

27. (D) According to the option (D)

$$= \frac{1}{3 + \frac{1}{1 + \frac{1}{2 + \frac{1}{4}}}} = \frac{1}{3 + \frac{1}{1 + \frac{4}{9}}}$$

$$= \frac{1}{3 + \frac{9}{13}} = \frac{13}{48}$$

28. (A) $x + \frac{2}{x} = 1$

$x^2 + 2 = x$

$x^2 - x = -2$

$x - x^2 = 2$

Now, $\frac{x^2 + x + 2}{x^2(1-x)}$

Divide Neumerator and Denominator by x

$$\frac{\frac{x^2}{x} + \frac{x}{x} + \frac{2}{x}}{\frac{x^2}{x}(1-x)}$$

$$\frac{x + 1 + \frac{2}{x}}{x(1-x)}$$

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

$$\Rightarrow \frac{x + \frac{2}{x} + 1}{(x-x^2)} = \frac{x + \frac{2}{x} + 1}{2} = \frac{1+1}{2} = 1$$

29. (D) According to question
 given : Interior = 2 × Exterior
 Exterior + Interior = 180°
 Exterior + 2 Exterior = 180°
 3 Exterior = 180°

$$\text{Exterior} = \frac{180}{3} = 60^\circ$$

$$\text{Number of sides} = \frac{360^\circ}{\text{Exterior angle}}$$

$$\text{Number of sides} = \frac{360^\circ}{60^\circ} = 6$$

30. (C) Let the height be H

$$\Rightarrow \frac{1}{3} \pi r_1^2 H + \frac{1}{3} \pi r_2^2 H = \frac{4}{3} \pi R^3$$

$$\Rightarrow \frac{1}{3} \pi H (r_1^2 + r_2^2) = \frac{4}{3} \pi R^3$$

$$= H = \frac{4R^3}{r_1^2 + r_2^2}$$

31. (D) Radius 100 → 101
 Area 10000π → 10201π

$$\% \text{ Increase} = \frac{201}{10000} \times 100 = 2.01\%$$

32. (A) $\frac{P}{b-c} = \frac{q}{c-a} = \frac{r}{a-b} = k$ (Say)

$$p = k(b-c)$$

$$q = k(c-a)$$

$$r = k(a-b)$$

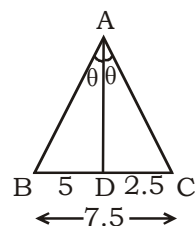
then

$$p + q + r = k(b-c + c-a + a-b)$$

$$p + q + r = k(0)$$

$$p + q + r = 0$$

33. (B)



$$BC = 7.5$$

$$DC = 7.5 - 5 = 2.5$$

From angle bisector theorem

$$\frac{AB}{AC} = \frac{BD}{DC}$$

$$\text{So, } \frac{AB}{AC} = \frac{5}{2.5} = \frac{2}{1}$$

34. (D) Down Stream Upstream

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

$$T = 1 \quad 2$$

$$S = 2 \quad 1$$

$$\text{Boat} = \frac{2+1}{2} = \frac{3}{2}$$

$$\text{Water} = \frac{2-1}{2} = \frac{1}{2}$$

$$B : C = \frac{3}{2} : \frac{1}{2}$$

$$B : C = 3 : 1$$

35. (A) Let the shares of Anita, Bindu and Champa are 11x, 18x and 24x respectively.

$$\text{so, } 1105 = 11x + 10 + 18x + 20 + 24x + 15$$

$$\Rightarrow 1105 = 53x + 45$$

$$x = 20$$

Amount received by Champa

$$= 24x + 15$$

$$= 24 \times 20 + 15$$

$$= ₹495$$

36. (A) Let the speed of truck is x km/hr.
 their relative speed in same direction = (45 - x)

$$\text{time} = \frac{\text{total distance}}{\text{total speed}}$$

$$\Rightarrow \frac{150}{(45-x) \times \frac{5}{18}} = 30$$

$$\Rightarrow \frac{150 \times 18}{(45-x) \times 5} = 30$$

$$\therefore x = 27 \text{ km/h}$$

so speed of the truck is 27 km/hr.

37. (B) Let his present age be x years.

$$\therefore 125\% \text{ of } (x-10)$$

$$= 83\frac{1}{3}\% \text{ of } (x+10)$$

$$\Rightarrow 125(x-10) = \frac{250}{3}(x+10)$$

$$\Rightarrow 3x - 30 = 2x + 20$$

$$\Rightarrow x = 50 \text{ years.}$$

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38. (B) $5 \cos \theta + 3 \cos \left(\theta + \frac{\pi}{3} \right) + 3$

$$= 5 \cos \theta + 3 \left(\cos \theta \cdot \cos \frac{\pi}{3} - \sin \theta \cdot \sin \frac{\pi}{3} \right) + 3$$

$$= 5 \cos \theta + \frac{3}{2} \cos \theta - \frac{3\sqrt{3}}{2} \sin \theta + 3$$

$$= \frac{13}{2} \cos \theta - \frac{3\sqrt{3}}{2} \sin \theta + 3$$

\therefore maximum value

$$= \sqrt{\left(\frac{13}{2}\right)^2 + \left(\frac{3\sqrt{3}}{2}\right)^2} + 3$$

$$= \frac{1}{2} \sqrt{169 + 27} + 3$$

$$= 7 + 3 = 10$$

39. (D) Rate % = 4%
time = 2 years
S.I for 2 years = $4 \times 2 = 8\%$

C.I for 2 years = $4 + 4 + \frac{4+4}{100}$
 $= 8.16\%$

Required C.I = $\frac{80}{8} \times 8.16 = ₹81.6$

40. (B)

Principal	Interest
4P	P
time = Rate%	(given)

$$P = \frac{4P \times R \times R}{100}$$

$$R^2 = \frac{100}{4}$$

$R = 5\%$

41. (A) $\frac{n}{1} = \frac{\sin 2x}{\sin 2y}$

$$\Rightarrow \frac{n+1}{n-1} = \frac{\sin 2x + \sin 2y}{\sin 2x - \sin 2y}$$

$$\frac{n+1}{n-1} = \frac{2 \sin(x+y) \cdot \cos(x-y)}{2 \cos(x+y) \cdot \sin(x-y)}$$

$$\frac{n+1}{n-1} = \frac{\tan(x+y)}{\tan(x-y)}$$

42. (B) $\frac{x}{a} = \frac{y}{b} = \frac{z}{c} = k$

$\therefore x = ak, y = bk, z = ck$
 $(x + y + z) = k(a + b + c)$
 $\therefore (x + y + z)^2 = k^2(a + b + c)^2$
 $\therefore x^2 + y^2 + z^2 + 2(xy + yz + zx) = k^2(a + b + c)^2$
 $\therefore 2(xy + yz + zx) = k^2(a + b + c)^2 - (x^2 + y^2 + z^2)$

$$\therefore xy + yz + zx = \frac{k^2}{2} (a + b + c)^2 - \frac{1}{2} (x^2 + y^2 + z^2)$$

$$= \frac{x^2(a + b + c)^2 - a^2(x^2 + y^2 + z^2)}{2a^2}$$

$\left(\because k = \frac{x}{a} \right)$

43. (B) Clearly, present average age of 5 members = $35 + 3 = 38$ years.
and present age of baby = 1 year.
 \therefore After 3 years, average age of the family

$$= \frac{(38 + 3) \times 5 + (1 + 3)}{6}$$

$$= \frac{205 + 4}{6} = \frac{209}{6} = 34 \frac{5}{6} \text{ years.}$$

44. (D) Let the no. is x
According to question,
 $x + x + 1 + x + 2 + x + 3 + x + 4 = S$
 $5x + 10 = S$

$$x = \frac{S - 10}{5}$$

largest integer

$$(x + 4) = \frac{S - 10}{5} + 4$$

$$= \frac{S - 10 + 20}{5} = \frac{S + 10}{5}$$

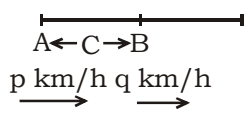
45. (B) Women = $\frac{43}{83} \times 311250$
 $= 161250$
Men = $311250 - 161250$
 $= 150000$

\therefore total number of literate persons

$$= \frac{161250 \times 8}{100} + 150000 \times \frac{24}{100}$$

$$= 12900 + 3600$$

$$= 48900$$

46. (B) 

time required = $\frac{C}{p - q}$

\therefore Required distance = pt

$$= \frac{pC}{p - q} \text{ km}$$

47. (B) $\frac{a}{x} + \frac{b}{y} = m$... (i)

$\frac{b}{x} + \frac{a}{y} = n$... (ii)

(i) $\times b$ - (ii) $\times a$ we get,

$$\frac{b^2}{y} - \frac{a^2}{y} = mb - na$$

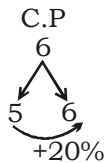
$$\Rightarrow y = \frac{b^2 - a^2}{mb - na} = \frac{a^2 - b^2}{na - mb}$$

Similarly (i) $\times a$ - (ii) $\times b$, we get

$$x = \frac{a^2 - b^2}{ma - nb}$$

48. (B) Profit = 20% = $\frac{1}{5} \rightarrow$ Profit

SP = 5 + 1 = 6



i.e C.P of the mixture = 6
& CP of the Pure mixture = 5

$$\therefore \text{required \%} = \frac{5}{6} \times 100 = \frac{250}{3} \%$$

49. (D) $\tan 70^\circ = \tan (50^\circ + 20^\circ)$

$$\Rightarrow \tan 70^\circ = \frac{\tan 50^\circ + \tan 20^\circ}{1 - \tan 50^\circ \cdot \tan 20^\circ}$$

$$\Rightarrow \tan 70^\circ - \tan 50^\circ (\tan 70^\circ \cdot \tan 20^\circ) = \tan 50^\circ + \tan 20^\circ$$

$$\Rightarrow \tan 70^\circ - \tan 50^\circ = \tan 50^\circ + \tan 20^\circ = \tan 70^\circ = 2 \tan 50^\circ + \tan 20^\circ$$

50. (C) $a = \sqrt{7 + 2\sqrt{12}} = \sqrt{7 + 2 \times 2 \times 2 \times \sqrt{3}}$

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

similarly, $b = 2 - \sqrt{3} = \frac{1}{a}$

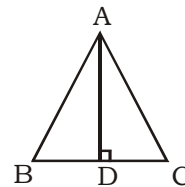
$$\therefore a + \frac{1}{a} = 4$$

$$a^3 + b^3 + a^2 + b^2 + 1$$

$$= \left(a^3 + \frac{1}{a^3}\right) + \left(a^2 + \frac{1}{a^2}\right) + 1$$

$$\begin{aligned} &\Rightarrow \left(a + \frac{1}{a}\right)^3 - 3\left(a + \frac{1}{a}\right) + \left[\left(a + \frac{1}{a}\right)^2 - 2\right] + 1 \\ &= 4^3 - 3 \times 4 + (4^2 - 2) + 1 \\ &= 64 - 12 + 14 + 1 \\ &= 67 \end{aligned}$$

51. (D)



$$AB = AC = \frac{5}{6} BC$$

$$AB + BC + AC = 544$$

$$\frac{5}{6} BC + BC + \frac{5}{6} BC = 544$$

$$\Rightarrow \frac{5BC + 6BC + 5BC}{6} = 544$$

$$\Rightarrow \frac{16BC}{6} = 544$$

$$BC = \frac{544 \times 6}{16} = 204$$

$$AB = AC = \frac{5}{6} \times 204 = 170 \text{ cm}$$

$$\text{Area of } \Delta ABC = \frac{b}{4} \sqrt{4a^2 - b^2}$$

\therefore where a = equal side
 b = base

$$= \frac{204}{4} \sqrt{4(170)^2 - (204)^2}$$

$$= 51 \sqrt{115600 - 41616}$$

$$= 51 \sqrt{73984}$$

$$= 51 \times 272 = 13872 \text{ cm}^2$$

52. (A) In a rhombus

$$4a^2 = d_1^2 + d_2^2$$

$$4a^2 = 8^2 + 6^2$$

$$a^2 = \frac{100}{4} = 25$$

\therefore Area of square = 25 cm²

53. (C) $\frac{90}{\text{total work}}$

A \rightarrow 18	5
B \rightarrow 15	6

B's 10 day's work = 6 \times 10 = 60 units

work left = 90 - 60 = 30 units

A does 30 unit in = $\frac{30}{5} = 6$ days

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54. (B) Principal Amount

$$\begin{array}{ccc} 6000 & & 7200 \\ & \curvearrowright +1200 & \end{array}$$

By using formula

$$\text{Rate \%} = \frac{1200}{6000} \times \frac{100}{4} = 5\%$$

$$\text{New rate \%} = 5 \times \frac{3}{2} = 7.5\%$$

Interest after 5 years

$$= \frac{6000 \times 7.5 \times 5}{100} \\ = ₹2250$$

$$\text{Hence Amount} = ₹(6000 + 2250) \\ = ₹8250$$

55. (A)

$$\begin{array}{r} x : y : z \\ \times \left| \begin{array}{ccc} 5 & : & 4 & : & 4 \\ \hline 5 & & 5 & & 4 \end{array} \right. \\ \hline 25 : 20 : 16 \end{array}$$

$$\therefore \text{runs scored by } A + B + C = x + y + z \\ = 25x + 20x + 16x \\ = 61x$$

$$\Rightarrow A + B + C = 1098 \text{ given}$$

$$\therefore x = \frac{1098}{61} = 18$$

$$\text{runs covered by } A = 25x \\ = 25 \times 18 = 450$$

$$\text{run scored by } B = 20x \\ = 20 \times 18 \\ = 360$$

$$\text{run scored by } C = 16x \\ = 16 \times 18 \\ = 288$$

$$\therefore (450, 360, 288)$$

56. (A) $p : q : r : s : t : u$

$$4 : 3 : 4 : 3 : 4 : 3$$

$$\frac{p}{q} = \frac{r}{s} = \frac{t}{u} = \frac{4}{3}$$

$$\Rightarrow \text{Let } P = 4x, q = 3x \\ r = 4x, S = 3x \\ t = 4x, u = 3x$$

$$\frac{mp + nr + ot}{mq + ns + ou}$$

$$= \frac{4xm + 4xn + 4xo}{3xm + 3xn + 3xo} = \frac{m \cdot 4x + n \cdot 4x + 0.4x}{m \cdot 3x + n \cdot 3x + 0.3x}$$

$$= \frac{4x(m + n + 0)}{3x(m + n + 0)} = \frac{4}{3}$$

57. (C) Let C.P = ₹100

$$\text{M.P} = 100 \times 140\% = ₹140$$

After Discount S.P

$$80\% \times 140 = \frac{80}{100} \times 140$$

$$= ₹112$$

$$\% \text{ Profit} = 12\%$$

58. (A)

12 (total unit)

$$\begin{array}{l} A \rightarrow 4 \quad | \quad 3 \text{ (efficiency)} \\ B \rightarrow 12 \quad | \quad 1 \end{array}$$

Pipe A will fill 3 unit till 11 A.M

$$\text{unit left} = 12 - 3 = 9$$

Now both pipe will fill and they will take

$$= \frac{9}{4} = 2 \frac{1}{4} \text{ hours.}$$

so, $\left(11 + 2 \frac{1}{4}\right)$, tank will be filled at

1: 15 P.M

59. (D) Let HCF = x

$$\therefore \text{LCM} = 20x$$

$$\text{Sum of HCF} + \text{LCM} = 2520$$

$$= x + 20x = 2520$$

$$21x = 2520$$

$$x = 120$$

$$\therefore \text{HCF} = 120$$

$$\text{LCM} = 120 \times 20 = 2400$$

$$\text{One number} = 480$$

Let another number = y

$$\therefore y \times 480 = 120 \times 2400$$

$$y = \frac{120 \times 2400}{480} = 600$$

60. (A) Let the total time = 8 years.

Let the total capital = 20 units

A : B : C

$$\begin{array}{r} \text{Capital} \rightarrow 5 \quad | \quad 4 \quad | \quad 11 \\ \text{Time} \rightarrow 2 \quad | \quad 4 \quad | \quad 8 \\ \hline \text{Profit} \rightarrow 10 : 16 : 88 \end{array}$$

$$5 : 8 : 44$$

According to the question $(5 + 8 + 44)$ units = ₹1140

$$57 \text{ units} = ₹1140$$

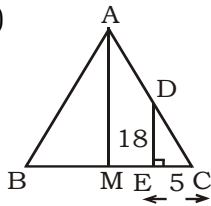
$$1 \text{ unit} = ₹ \frac{1140}{57} = ₹20$$

$$\text{Profit of A} = 20 \times 5 = ₹100$$

$$\text{Profit of B} = 20 \times 8 = ₹160$$

$$\text{Profit of C} = 44 \times 20 = ₹880$$

61. (A)



In $\triangle DEC$

$$\tan \angle DCE = \frac{18}{5} = 3.6$$

$\Rightarrow \tan \angle ABC$

$\therefore \angle C = \angle B$

So, $AB = AC$

$\triangle ABC$ is isosceles triangle

Where $AM \parallel DE$

clearly M is mid point of BC $\Rightarrow CM = \frac{BC}{2}$

also $\triangle ACM \sim \triangle DCE$

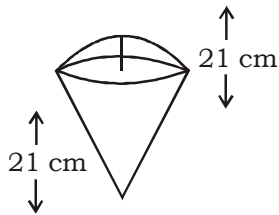
$$\therefore \frac{AC}{CD} = \frac{CM}{CE} = \frac{BC}{2} \times \frac{1}{CE} = \frac{BC}{2CE}$$

62. (C) $25 \left(\frac{10x-4}{5x} \right) = 24 \left(\frac{12x-4}{6x} \right)$

$$\frac{5x-2}{6x-2} = \frac{4}{5}$$

The sides are $5x$ and $6x$
Then side = 10 and 12

63. (A)



$$\frac{2}{3} \pi r^3 + \frac{1}{3} \pi r^3$$

$$\Rightarrow \frac{1}{3} \pi (2r^3 + r^3)$$

$$= \frac{1}{3} \times \frac{22}{7} (3 \times 21 \times 21 \times 21)$$

$$= 29106 \text{ cubic cm}$$

64. (A) Let the required time be t years

$$\therefore \text{S.I} = \frac{prt}{100}$$

$$\Rightarrow 0.125P = \frac{P \times 5 \times t}{100}$$

$$t = \frac{0.125 \times 100}{5}$$

$$t = \frac{5}{2} \text{ years}$$

$$t = 2\frac{1}{2} \text{ years}$$

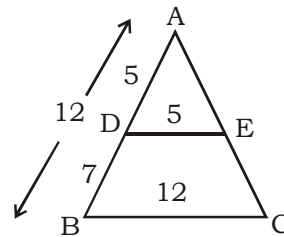
65. (A) $\frac{1}{20}$ hectare = $\frac{1}{20} \times 10,000$ sq. metres
= 500 sq. metres
 $\therefore 4x \times 5x = 500$

$$x^2 = \frac{500}{20}$$

$$x = 5$$

Width = $4x = 4 \times 5 = 20$ metres.

66. (B) In $\triangle ABC$, $DE \parallel BC$



$$\frac{AE}{AC} = \frac{AD}{AB} = \frac{DE}{BC}$$

Here, $\frac{AD}{DB} = \frac{5}{7}$

$$\Rightarrow \frac{AD}{AB} = \frac{DE}{BC} = \frac{5}{12}$$

$$DE : BC = 5 : 12$$

67. (C) Ratio of sides = $\frac{1}{3} : \frac{1}{4} : \frac{1}{5}$

$$20 : 15 : 12$$

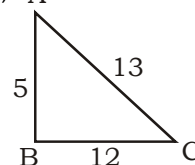
$$\Rightarrow 20 + 15 + 12 = 47$$

$$47 \rightarrow 235$$

$$1 \rightarrow 5$$

$$\Rightarrow \text{smallest side} = 12 \times 5 = 60 \text{ cm}$$

68. (A)



Clearly the base triangle is the right triangle

$$\therefore \text{Area of triangle ABC} = \frac{1}{2} \times 5 \times 12$$

$$= 30 \text{ cm}^2$$

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Volume of the pyramid

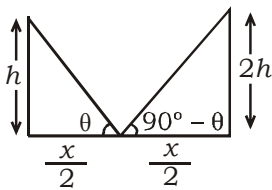
$$= \frac{1}{3} \times (\text{base area}) \times \text{height}$$

$$\Rightarrow \frac{1}{3} \times \text{base area} \times \text{height} = 330$$

$$\Rightarrow \frac{1}{3} \times 30 \times \text{height} = 330$$

$$\text{height} = \frac{330 \times 3}{30} = 33\text{cm}$$

69. (A)



$$\tan \theta = \frac{h}{x/2} \quad \dots(1)$$

$$\tan (90^\circ - \theta) = \frac{2h}{x/2} \quad \dots(2)$$

1 multiplying by (2)

$$\frac{x^2}{4} = 2h^2$$

$$\Rightarrow h = \frac{x}{2\sqrt{2}}$$

70 (C) total surface area of a prism = base area \times 2 + Perimeter \times height

$$608 = 2x^2 + 4x \times 15$$

On solving

$$x = 8 \text{ cm}$$

Volume of Prism = base area \times height

$$= 8^2 \times 15 = 64 \times 15$$

$$= 960 \text{ cm}^3$$

71. (A) Let the radius of wire = 1 cm

$$\text{volume of cone} = \frac{1}{3} \pi r^2 \cdot h$$

$$\Rightarrow \frac{1}{3} \pi (1)^2 \cdot h = \frac{1}{3} \pi h$$

$$\text{radius of new wire} = \frac{1}{4} \text{ cm}$$

$$\text{volume of new cone} = \frac{1}{3} \pi \left(\frac{1}{4}\right)^2 \cdot H$$

$$= \frac{1}{48} \pi H$$

Volume of old cone = volume of new cone

$$\frac{1}{3} \pi h = \frac{1}{48} \pi H$$

$$H = 16h$$

Height of new cone is increased by 16 times

$$72. (A) \frac{S^3}{V^2} = \frac{(4\pi r^2)^3}{\left(\frac{4}{3}\pi r^3\right)^2} = \frac{4^3 \times \pi^3 \times r^6}{4^2 \times \pi^2 \times r^6} \times 3^2$$

$$= 4 \times \pi \times 9$$

$$= 36\pi \text{ units}$$

73. (C) Let total work be 1 unit

$$\text{A and B complete} = 1 - \frac{7}{10}$$

$$= \frac{3}{10} \text{ of work in 4 days}$$

$$1 \text{ work in } \frac{4 \times 10}{3} = 13\frac{1}{3} \text{ days}$$

$$74. (A) \text{ Regular Rate} = \frac{3000}{75} = ₹40$$

$$\text{Rate of additional hours} = \frac{3}{2} \times 40$$

$$= ₹60$$

$$\text{No of additional hours} = \frac{3450 - 3000}{60}$$

$$= \frac{450}{60} = 7\frac{1}{2} \text{ hr.}$$

75. (D) In 2007

Gross Profit = ₹50 Lakh

Net Profit = ₹25 Lakh

76. (C) Required Percentage

$$= \frac{15}{40} \times 100$$

$$= 37.5\%$$

77. (D) Required difference

$$= ₹ \frac{1}{4} (20 + 25 + 20 + 25) \text{ Lakhs}$$

$$= \frac{1}{4} \times 90$$

$$= 22.5 \text{ lakhs.}$$

78. (A) Year Gross Profit : Net Profit

2004 30 : 10 = 3 : 1

2005 40 : 15 = 8 : 3

2006 45 : 25 = 9 : 5

2007 50 : 25 = 2 : 1

So option (A) is correct

$$79. (C) \text{ Required ratio} = \frac{30 + 40 + 45 + 50}{10 + 15 + 25 + 25}$$

$$= \frac{165}{75} = \frac{11}{5} = 11 : 5$$

80. (B) Put $x = y = z = 2$

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

$$\Rightarrow \frac{1}{2+1} + \frac{1}{2+1} + \frac{1}{2+1}$$

$$\Rightarrow \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$$

$$= 1$$

81. (B) From option

$$4.64 \times 10 = ₹46.4$$

$$4.65 \times 20 = ₹93$$

$$4.65 \times 21 = ₹97.65$$

$$4.65 \times 25 = ₹116.25$$

So least number of days is 20

82. (A) We know that

$$3(AB^2 + BC^2 + CA^2) = 4(AD^2 + BE^2 + CF^2)$$

$$3(144 + 256 + 400) = 4(AD^2 + BE^2 + CF^2)$$

$$\frac{3 \times 800}{4} = 600 \text{ cm}^2$$

83. (B) Let speed = 1

$$\text{Increase} = 1 \times \frac{20}{100} = \frac{1}{5}$$

$$\therefore \text{New speed} = \frac{6}{5}$$

$$\therefore \frac{6}{5} - 1 = \frac{1}{5}$$

$$\therefore \frac{1}{5} = 20$$

$$\therefore 1 = 100$$

$$\therefore \frac{6}{5} = 20 \times 5 \times \frac{6}{5}$$

$$= 120 \text{ min}$$

84. (C) $x\% + a = y\% - b$

$$a + b = y\% - x\%$$

$$a + b = (y - x)\%$$

$$100\% = 100 \frac{(a + b)}{y - x}$$

85. (D) Let C.P of item is ₹100

$$\text{Increase } 20\% = ₹120$$

$$10\% \text{ Discount on MRP} = 120 \times \frac{10}{100}$$

$$= ₹12$$

$$\text{So selling Price} = 120 - 12$$

$$= 108$$

$$\% \text{ gain} = \frac{8}{100} \times 100$$

$$= 8\%$$

86. (D) Let the speed of boat in still water = x km/hr.

Speed of stream = y km/hr.

Speed of boat in the down stream, $D = (x + y)$ km/hr.

Speed of boat in upstream, $U = (x - y)$ km/hr.

$$D = x + y = \frac{20}{2} = 10 \text{ km/hr.} \quad \dots(i)$$

$$U = x - y = \frac{4}{2} = 2 \text{ km/hr.} \quad \dots(ii)$$

On solving equation (1) & (ii)

$$x = 6 \text{ km/hr.}$$

So, speed of current (y) = 4 km/hr.

87. (D) $7^1 - 1 \Rightarrow 7$
 $7^2 - 49 \Rightarrow 9$
 $7^3 - 343 \Rightarrow 3$
 $7^4 - 2401 \Rightarrow 1$

$$\Rightarrow 139 = 4n + 3 \text{ and } n = 36$$

$$\therefore \text{Required digit} = 3$$

88. (C) $4x + 3a = 0$

$$4x = -3a$$

$$\therefore \frac{x}{a} = -\frac{3}{4} \quad \dots(i)$$

Both side adding 1

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

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

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

$$\Rightarrow x+a = \frac{a}{4}$$

Again subtract both sides in equation (i)

$$\frac{x}{a} - 1 = -\frac{3}{4} - 1$$

$$\Rightarrow \frac{x-a}{a} = \frac{-3-4}{4}$$

$$\Rightarrow \frac{x-a}{a} = \frac{-7}{4}$$

$$\Rightarrow x-a = \frac{-7}{4} a$$

$$= \frac{x^2 + ax + a^2}{x^3 - a^3} - \frac{x^2 - ax + a^2}{x^3 + a^3}$$

$$= \frac{x^2 + ax + a^2}{(x-a)(x^2 + ax + a^2)} - \frac{x^2 - ax + a^2}{(x+a)(x^2 - ax + a^2)}$$

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

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$$\Rightarrow \frac{-4}{7a} - \frac{4}{a} = -\left(\frac{4}{7a} + \frac{4}{a}\right)$$

$$\Rightarrow -\left(\frac{4+28}{7a}\right) = \frac{-32}{7a}$$

89. (D) Speed $\propto \frac{1}{\text{time}}$

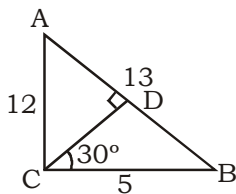
$$A : B : C$$

$$\text{Speed} \rightarrow 2 : 3 : 4$$

$$\text{time} \rightarrow \frac{1}{2} : \frac{1}{3} : \frac{1}{4}$$

$$\text{time} \rightarrow 6 : 4 : 3$$

90. (A)



$$AC \times BC = CD \times AB$$

$$CD = \frac{12 \times 5}{13} = \frac{60}{13} \text{ cm}$$

91. (D) Perimeter of circle and square are equal

$$\Rightarrow 2\pi r = 4a$$

$$r = \frac{4a}{2\pi} = \frac{2a}{\pi}$$

\therefore Area

Area of square : Area of circle

$$a^2 : \pi \times r^2$$

$$a^2 : \pi \times \frac{2a}{\pi} \times \frac{2a}{\pi}$$

$$1 : \frac{4}{\pi}$$

$$1 : \frac{4 \times 7}{22}$$

$$22 : 28$$

$$11 : 14$$

92. (B) $\sin x + \sin^2 x = 1$

$$\sin x = 1 - \sin^2 x$$

$$\sin x = \cos^2 x$$

$$\text{similar } \cos^4 x = \sin^2 x$$

from equation,

$$\cos^8 x + 2 \cos^6 x + \cos^4 x$$

$$= (\cos^4 x + \cos^2 x)^2$$

$$= (\sin^2 x + \sin x)^2$$

$$= (1)^2 = 1$$

93. (B) $\tan 1^\circ \cdot \tan 2^\circ \cdot \tan 3^\circ \dots \tan 89^\circ$

If $A + B = 90^\circ$

$$(\tan 1^\circ \cdot \tan 89^\circ) \cdot (\tan 2^\circ \cdot \tan 88^\circ) \dots (\tan$$

$$44^\circ \cdot \tan 46^\circ) \cdot \tan 45^\circ$$

$$= 1 \times 1 \times 1 \dots 1 \times 1 = 1$$

94. (A) X Y Y Z

$$83 \quad 76 \quad 76 \quad 85$$

$$79 \quad \quad \quad 81$$

$$3 \quad 4 \quad 4 \quad 5$$

$$\therefore x : y : z = 3 : 4 : 5$$

$$\text{Required Average} = \frac{(83 \times 3) + (76 \times 4) + (85 \times 5)}{(3 + 4 + 5)}$$

$$= \frac{249 + 304 + 425}{12}$$

$$= \frac{978}{12} = 81.5$$

95. (C) Let the average of '10' Innings is = x

According to the question,

$$\frac{10x + 108}{11} = x + 6$$

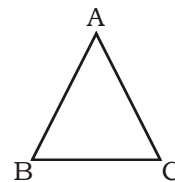
$$10x + 108 = 11x + 66$$

$$x = 42$$

$$11\text{th Innings average} = 42 + 6$$

$$= 48$$

96. (D) According to question.



$$AB + BC = 24 \text{ cm}$$

$$BC + CA = 28 \text{ cm}$$

$$CA + AB = 36 \text{ cm}$$

$$2(AB + BC + CA) = 88$$

$$AB + BC + CA = \frac{88}{2}$$

$$AB + BC + CA = 44 \text{ cm}$$

$$\text{Perimeter of triangle} = 44 \text{ cm}$$

$$\text{Perimeter of triangle} = \text{Perimeter of circle}$$

$$44 = 2\pi r$$

$$r = \frac{44}{2\pi}$$

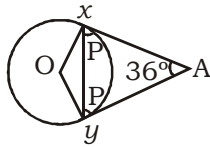
$$r = \frac{44 \times 7}{2 \times 22}$$

$$r = 7 \text{ cm}$$

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97. (A) In ΔAxy , $\angle x = \angle y = P$ (Let)



$$P^\circ + P^\circ + 36^\circ = 180^\circ$$

$$2P = 144$$

$$P = 72^\circ$$

$$\angle Axy = 72^\circ$$

98.(B) Difference between the students of commerce and Law

$$= 65^\circ - 45^\circ = 20^\circ$$

$$\therefore 100^\circ = 2000$$

$$\therefore 1^\circ = 20$$

$$\therefore 20^\circ = 20 \times 20$$

$$= 400$$

99. (B) Required ratio = 100 : 120

$$= 5 : 6$$

100. (B) $\therefore 100^\circ = 2000$

$$\therefore 1^\circ = 20$$

$$\therefore 360^\circ = \frac{2000}{100} \times 360$$

$$= 7200$$

SSC MAINS (MATHS) MOCK TEST-16 (ANSWER KEY)

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