KD Campus
KD Campus Pvt. Ltd
2007, OUTRAM LINES, 1ST FLOOR, OPPOSITE MUKHERJEE NAGAR POLICE STATION, DELHI-110009

SSC MAINS (MATHS) MOCK TEST-14 (SOLUTION)

1. (B) $\frac{b-c}{a} + \frac{a+c}{b} + \frac{a-b}{c} = 1$

$\Rightarrow \frac{b-c}{a} - 1 + \frac{a+c}{b} - 1 + \frac{a-b}{c} + 1 = 1 - 1 - 1 + 1 + 1 = 0$

$\Rightarrow \frac{b-c-a}{a} + \frac{a+c-b}{b} + \frac{a-b+c}{c} = 0$

$\Rightarrow (a-b+c) \times \left[-\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right] = 0$

$\Rightarrow \frac{1}{a} = \frac{1}{b} + \frac{1}{c}$

2. (B) $x + y = 37$
$x^2 - y^2 = (x+y)(x-y)$
$\Rightarrow 37(x-y) = 185$
$\Rightarrow x - y = 5$

3. (C) Shaded area $= \frac{1}{2}\pi a^2 - \frac{1}{2} \times 2a \times a$

$\Rightarrow a^2\left(\frac{\pi}{2} - 1\right)$ sq. unit

Required result $= a^2\left(\frac{\pi}{2} - 1\right) \times \frac{3}{4}$

$= \frac{3a^2}{4}\left(\frac{\pi}{2} - 1\right)$ sq. unit

4. (B) Pant cloth = 252 m
shirt cloth = 141 m

for one pant = $\frac{5}{2}$ m cloth needed

so, total pant = $\frac{252}{5/2} = \frac{504}{5}$ = 100 (nearly)

total no, of shirt = $\frac{141}{7/4} = \frac{141 \times 4}{7}$

= 80 nearly

5. (A) Difference in rate of interest (20 – 18) % = 2%
P × (2)% = 20

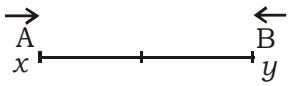
$P \times \frac{2}{100} = 20$

P = ₹1000

6. (C) $(x-3)^2 + (y-5)^2 + (z-4)^2 = 0$
If $a^2 + b^2 + c^2 = 0$
then $a = 0, b = 0, c = 0$
$x = 3, y = 5, z = 4$

$\frac{9}{9} + \frac{25}{25} + \frac{16}{16} = 3$

7. (C)



4 hours 48 min = $4 + \frac{48}{60} = \frac{24}{5}$ hrs.

3 hours 20 min = $3 + \frac{20}{60} = \frac{10}{3}$ hrs.

$\frac{V_B}{V_A} = \sqrt{\frac{T_1}{T_2}} = \sqrt{\frac{24/5}{10/3}} = \sqrt{\frac{36}{25}} = \frac{6}{5}$

$\Rightarrow V_B = \frac{6}{5} \times 45 = 54$ km/hr

8. (A) Sum of pocket money of (A + B + C) – money spend by (A + B + C) = 240 – 180 = 60
2A = B (given)
3A = C (given)
A + B + C = 60 (spend pocket money)
6A = 60
A = ₹10

9. (A) $\frac{\text{milk left}}{\text{total quantity}} = \frac{48}{64} = \frac{3}{4}$

this process is repeated two more time

$\left(\frac{3}{4}\right)^3 = \frac{27 \rightarrow \text{Left milk}}{64 \rightarrow \text{total}}$

quantity of water = 64 – 27
= 37 litres

10. (A)

	Brown	Black
Cost	2	5
total number of item	x	6

Actual cost = $2x + 30$
changed cost = $12 + 5x$

45% = $\frac{45}{100} = \frac{9}{20}$

$\frac{2x+30}{12+5x} = \frac{20}{29}$

$\Rightarrow 58x + 870 = 240 + 100x$
$\Rightarrow 42x = 630$

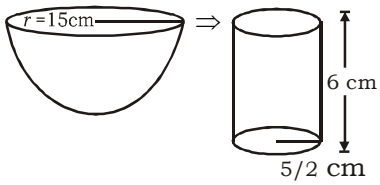
$\Rightarrow x = \frac{630}{42} = 15$

11. (A) $\pi r^2 \times 500$ (cm/sec) $\times T = 3 \times 5 \times 10000 \times 154$

$\frac{22}{7} \times 7 \times 7 \times 500 \times T = 15 \times 10000 \times 154$

$= \frac{15 \times 10000 \times 154}{22 \times 7 \times 500}$

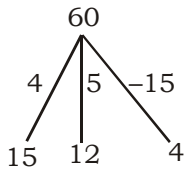
= 300 sec = 6 min

12. (D) 

$\frac{2}{3}\pi (15)^3 = n \times \pi \left(\frac{5}{2}\right)^2 \times 6$

$n = \frac{2}{3} \times 15 \times 15 \times 15 \times \frac{4}{25} \times \frac{1}{6}$

$n = 60$

13. (D) 

$4 \times 3 + 5 \times 2 = 22$

Required time = $\frac{22}{15-(5+4)} = \frac{22}{6} = 3\frac{2}{3}$

∴ 3 hr. 40 min after 11 A.M
= 2 : 40 P.M

14. (A) $\frac{xy}{x+y} = a \Rightarrow \frac{1}{a} = \frac{x+y}{xy} = \frac{1}{x} + \frac{1}{y}$

similarly, $\frac{1}{b} = \frac{1}{y} + \frac{1}{z}$

and $\frac{1}{c} = \frac{1}{z} + \frac{1}{x}$

so $\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right) = 2\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)$

$\therefore \frac{2}{x} = 2\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right) - 2\left(\frac{1}{y}+\frac{1}{z}\right)$

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

$= \frac{1}{a} + \frac{1}{b} + \frac{1}{c} - \frac{2}{b} = \frac{bc - ac + ab}{abc}$

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

15. (B) A B C
$(13 + x)$ $(6 + x)$ x
$13 + x + 6 + x + x = 76$

$19 + 3x = 76$

$x = \frac{57}{3} = 19$

A : B : C
32 25 19

16. (B) $16 \times 15\% + 14 \times 30\% = 30 \times x\%$
$\Rightarrow 16 \times 15 + 14 \times 30 = 30 \times x$

$x = \frac{240+420}{30} = \frac{660}{30} = 22$

17. (A)

	A	:	B
Income	$8x$		$11x$
Expenditure	$3y$		$4y$
Saving →	10,000		15,000

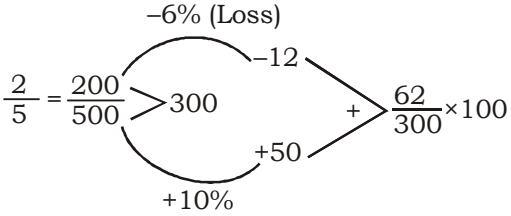
$8x - 3y = 10{,}000] \times 4$
$11x - 4y = 15{,}000] \times 3$
$32x - 12y = 40{,}000$
$33x - 12y = 45{,}000$
$- \quad + \quad = \quad -$
$-x = -5000$
$x = 5000$
Income of A = ₹40,000
Income of B = ₹55,000

18. (A) I II III

$9\frac{1}{11}\%$ (loss) 25% (Profit) $11\frac{1}{9}\%$ (Profit)

$\frac{1}{11}(l) \xrightarrow{\text{(C.P)}} 10 \xrightarrow{\text{S.P}} \frac{1\times2}{4\times2} \xrightarrow{} 5 \times 2 \; \frac{1}{9} \xrightarrow{} 10$

2 = 800
1 = 400
10 (selling price) = ₹4000

19. (B) 

$\Rightarrow 20\frac{2}{3}\%$

20. (A) $x = 3 - \sqrt{8}$

$\frac{1}{x} = 3 + \sqrt{8}$

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

$x - \frac{1}{x} = \sqrt{36-4} = \sqrt{32}$

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

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

$\Rightarrow 34\left(x+\frac{1}{x}\right)\left(x-\frac{1}{x}\right)$

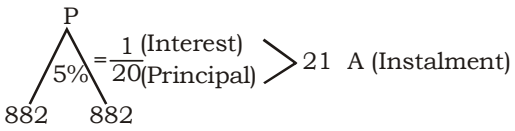
$\Rightarrow 34 \times 6 \times \sqrt{32}$

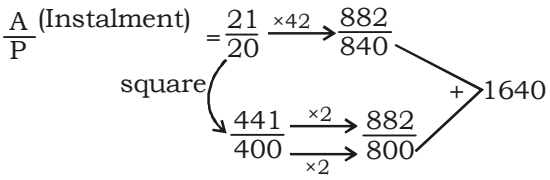
$\Rightarrow 34 \times 6 \times \sqrt{2\times2\times2\times2\times2}$

$\Rightarrow 204 \times 4\sqrt{2}$

$= 816\sqrt{2}$

21. (C)





Sum borrowed = ₹1640

Short:-

$\frac{20}{21}\times\frac{41}{21}\times 882 = 1640$

22. (A) $\frac{19}{6} = \frac{300+R}{100}$

$\Rightarrow 1900 = 1800 + 6R$

$\Rightarrow 100 = 6R$

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

23. (B) $\Rightarrow \frac{x^3+3x}{3x^2+1} = \frac{341}{91}$

$\Rightarrow \frac{x^3+3x+(3x^2+1)}{x^3+3x-(3x^2+1)} = \frac{341+91}{341-91}$ [By C & D]

$\Rightarrow \frac{(x+1)^3}{(x-1)^3} = \frac{432}{250}$

$\Rightarrow \left(\frac{x+1}{x-1}\right)^3 = \frac{216}{125}$

$\Rightarrow \left(\frac{x+1}{x-1}\right)^3 = \left(\frac{6}{5}\right)^3$

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

$6x - 6 = 5x + 5$

$x = 11$

24. (B) $\frac{x}{2x^2+5x+2} = \frac{x}{x\left(2x+5+\frac{2}{x}\right)}$

$\Rightarrow \frac{1}{2\left(x+\frac{1}{x}\right)+5}$

$\left[\text{Let}\left(x+\frac{1}{x}\right)=y\right]$

$\because \frac{1}{2y+5} = \frac{1}{6}$

$\Rightarrow 2y + 5 = 6$

$y = \frac{1}{2}$

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

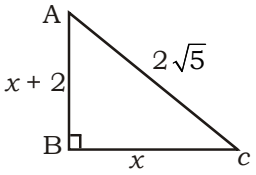
25. (A) Required Average speed

$= 75 \times \frac{60}{100} \times \frac{150}{100}$

$= 75 \times \frac{3}{5} \times \frac{3}{2}$

$= 67.5$ km/hr.

26. (D)



In ΔABC

$(x + 2)^2 + x^2 = (2\sqrt{5})^2$

$\Rightarrow x^2 + 4 + 4x + x^2 = 20$

$\Rightarrow 2x^2 + 4x - 16 = 0$

$\Rightarrow x^2 + 2x - 8 = 0$

$\Rightarrow (x - 2)(x + 4) = 0$

$x = 2$

$AB = 4, BC = 2$

$\cos^2 A - \cos^2 C$

$= \left(\frac{4}{2\sqrt{5}}\right)^2 - \left(\frac{2}{2\sqrt{5}}\right)^2 = \frac{3}{5}$

27. (B) $\frac{\sin^3\theta}{\cos^3\theta}\cdot\cos^2\theta + \frac{\cos^3\theta}{\sin^3\theta}\cdot\sin^2\theta - \frac{1-2\sin^2\theta\cdot\cos^2\theta}{\sin\theta\cdot\cos\theta}$

$\Rightarrow \frac{\sin^3\theta}{\cos\theta} + \frac{\cos^3\theta}{\sin\theta} - \frac{1-2\sin^2\theta\cdot\cos^2\theta}{\sin\theta\cdot\cos\theta}$

$$\Rightarrow \frac{\sin^4\theta+\cos^4\theta}{\sin\theta\cdot\cos\theta} - \frac{1-2\sin^2\theta\cdot\cos^2\theta}{\sin\theta\cdot\cos\theta}$$

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

$= 0$

28. (A) $2^{3\sin\theta}\cdot 2^{4\cos\theta}$

$= 2^{3\sin\theta + 4\cos\theta}$ $\left(\begin{matrix}a\sin\theta+b\cos\theta \\ \min = -\sqrt{a^2+b^2}\end{matrix}\right)$

$= 2^{3\sin\theta + 4\cos\theta}$

$= 2^{-5} = \frac{1}{2^5}$

29. (B) $\sqrt[3]{5} - 1 = a\sqrt[3]{25} + b\sqrt[3]{5} + c$

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

$\Rightarrow a = 0$
$b = 1$
$c = -1$
so, $a + b + c = 0$

30. (B) $\tan\theta + \sec\theta = m$
$\Rightarrow \sec\theta = m - \tan\theta$
On squaring both sides, we get
$(\sec\theta)^2 = (m - \tan\theta)^2$
$\Rightarrow \sec^2\theta = m^2 + \tan^2\theta - 2m\tan\theta$
$\Rightarrow \sec^2\theta - \tan^2\theta = m^2 - 2m\tan\theta$
$1 = m^2 - 2m\tan\theta$ $(\because \sec^2\theta - \tan^2\theta = 1)$

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

On putting the value of $\tan\theta$ in Initial equation, we get

$\frac{m^2-1}{2m} + \sec\theta = m$

$\Rightarrow \sec\theta = m - \left(\frac{m^2-1}{2m}\right)$

$\therefore \sec\theta = \frac{2m^2-m^2+1}{2m} = \frac{m^2+1}{2m}$

31. (A) $\frac{(1+\sec\theta-\tan\theta)\cos\theta}{(1+\sec\theta+\tan\theta)(1-\sin\theta)}$

$$= \frac{\left(1+\frac{1}{\cos\theta}-\frac{\sin\theta}{\cos\theta}\right)\cos}{\left(1+\frac{1}{\cos\theta}+\frac{\sin\theta}{\cos\theta}\right)(1-\sin\theta)}$$

$$= \frac{\left(\frac{\cos\theta+1-\sin\theta}{\cos\theta}\right)\cos\theta}{(\cos\theta+1+\sin\theta)(1-\sin\theta)}$$

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

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

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

$(\because 1 - \sin^2\theta = \cos^2\theta)$

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

32. (A) $\frac{\sqrt{7}}{\sqrt{9+7+2\times3\sqrt{7}}-\sqrt{9+7-2\times3\times\sqrt{7}}}$

$\Rightarrow \frac{\sqrt{7}}{(3+\sqrt{7})-(3-\sqrt{7})}$

$= \frac{\sqrt{7}}{3+7-3+\sqrt{7}} = \frac{1}{2}$

33. (A) Let A = 30° and B = 45°

then $P = \frac{1}{\sqrt{2}}$ and $q = \frac{\sqrt{3}}{\sqrt{2}}$ and $\tan A = \frac{1}{\sqrt{3}}$

Now $\frac{p}{q}\sqrt{\frac{q^2-1}{1-p^2}} = \frac{1/\sqrt{2}}{\sqrt{3}/\sqrt{2}} = \frac{1}{\sqrt{3}} = \tan A$

34. (C) $2 - \cos x + \sin^2 x$
$= 2 - \cos x + 1 - \cos^2 x$
$-(\cos^2 x + \cos x) + 3$

$= \left[\left(\cos x+\frac{1}{2}\right)^2 - \frac{1}{4}\right] + 3$

$= \frac{13}{4} - \left(\cos x+\frac{1}{2}\right)^2$

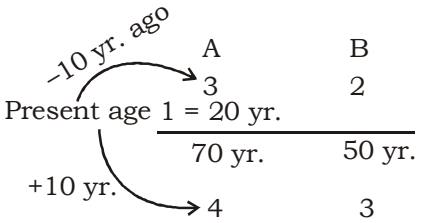
$\therefore$ maximum value occurs at $\cos x = -\frac{1}{2}$

and it is $\frac{13}{4}$

and minimum value occurs at $\cos x = 1$
and it is 1

$\therefore$ the required ratio is $\frac{13}{4}$

35. (A)



total = 70 + 50 = 120 yrs.

36. (D) Let the total number of swans be x. The number of swans playing on the shore of the pond = $\frac{7}{2}\sqrt{x}$

Number of swan inside the pond = 2

$\therefore x = \frac{7}{2}\sqrt{x} + 2$

$\Rightarrow 2(x-2) = 7\sqrt{x}$

$\Rightarrow 4(x^2 - 4x + 4) = 49x$

$\Rightarrow 4x^2 - 16x + 16 - 49x = 0$

$\Rightarrow 4x^2 - 65x + 16 = 0$

on solving $x = 16$

Number of swans = 16

37. (D) $\frac{y+7+7}{3} = 3$, $\frac{x-3+9}{3} = 4$

$\Rightarrow y = -5$, $x = 6$

$\Rightarrow (x, y) = (6, -5)$

Area = $\left|\frac{1}{2}\left[x_1(y_2-y_3)+x_2(y_3-y_1)+y_3(y_1-y_2)\right]\right|$

$= \left|\frac{1}{2}\left[6(-7+7)-3(7+5)+9(-5-7)\right]\right|$

= 72 unit²

38. (B) Let rate of population increase = R% per annum

So, $4800 = 3600\left(1+\frac{R}{100}\right)^3$

$\Rightarrow \frac{4}{3} = \left(1+\frac{R}{100}\right)^3$

Now, the population after 3 years

$= 4800\left(1+\frac{R}{100}\right)^3$

$= 4800 \times \frac{4}{3}$

= 6400

39. (A) Interior − exterior = 108

Interior + exterior = 180

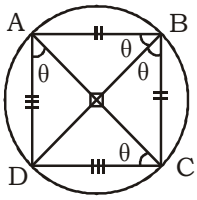
Interior = $\frac{180+108}{2}$ = 144

exterior = 36

So, $\frac{180(n-2)}{n}$ = 144

n = 10

40. (C)



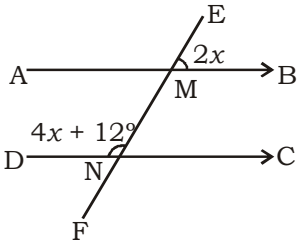
$\angle DAC = \angle DCA = \theta$

$\angle DBC = \angle DAC = \theta$

$\angle ACD = \angle ABD = \theta$

$\therefore \angle ABC = 2\theta$

41. (B)



Let $\angle EMB = 2x$, $\angle MNC = 2x$ (corresponding angles)

$4x + 12 + 2x = 180$ (Linear angle)

$6x = 168$

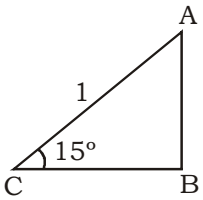
$x = 28°$

42. (B) Chair left = $132 \times \frac{3}{4} = 99$

Tables left = $108 \times \frac{5}{6} = 90$

So, number of people who can work = 90

43. (B)



$\sin 15° = \frac{AB}{1}$

$\Rightarrow AB = \sin 15°$

$\cos 15° = \frac{BC}{1}$

$\Rightarrow BC = \cos 15°$

$\therefore$ Area = $\frac{1}{2} \times AB \times BC$

$= \frac{1}{2}\sin 15^\circ \cdot \cos 15^\circ$

$= \frac{2\sin 15^\circ \cdot \cos 15^\circ}{2 \times 2}$ (multiply 2/2)

$= \frac{\sin 30^\circ}{4} = \frac{1}{8} m^2 = \frac{1}{8} \times 100 \times 100$

$= 1250 \text{ cm}^2$

44. (A) 20% yearly = 10% half yearly.

$\frac{13310}{10,000} = \left(\frac{11}{10}\right)^n$

$= \left(\frac{11}{10}\right)^3 = \left(\frac{11}{10}\right)^n$

$n = 3$ half years

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

45. (A) $\frac{1}{15} + \frac{1}{35} + \frac{1}{63} + \frac{1}{99} + \frac{1}{143}$

$= \frac{1}{3\times 5} + \frac{1}{5\times 7} + \frac{1}{7\times 9} + \frac{1}{9\times 11} + \frac{1}{11\times 13}$

$\frac{1}{\text{Diff}} \left\{\left(\frac{1}{3}-\frac{1}{5}\right)+\left(\frac{1}{5}-\frac{1}{7}\right)+\left(\frac{1}{7}-\frac{1}{9}\right)+\left(\frac{1}{9}-\frac{1}{11}\right)+\left(\frac{1}{11}-\frac{1}{13}\right)\right\}$

$= \frac{1}{2}\left(\frac{1}{3}-\frac{1}{13}\right) = \frac{1}{2}\left(\frac{13-3}{39}\right)$

$= \frac{1}{2} \times \frac{10}{39} = \frac{5}{39}$

46. (A)

Perimeter = 2 (Length + Breadth)

$20 = 2(3x + 2x)$

$20 = 10x$

$x = 2$

length = $3 \times 2 = 6$ cm

Breadth = $2 \times 2 = 4$ cm

Area = $6 \times 4 = 24 \text{ cm}^2$

47. (D) $x = \sqrt{a\sqrt[3]{b \cdot x}}$

squaring both side

$x^2 = a\sqrt[3]{bx}$

cubing both side

$x^6 = a^3 bx$

$x^5 = a^3 b$

$x = \sqrt[5]{a^3 b}$

48. (C) $\tan 2\theta \cdot \tan 3\theta = 1$(given)

$= 3\theta + 2\theta = 90^\circ$

$5\theta = 90^\circ$

$\Rightarrow 2\cos^2 \frac{5\theta}{2} - 1$

$= 2\cos^2 \frac{90}{2} - 1$

$= 2\cos^2 45^\circ - 1$

$= 2 \times \frac{1}{2} - 1 = 0$

49. (A) Number of stoppage for express train

$= \frac{600}{75} - 1 = 7$

Duration of stoppage

$= 7 \times \frac{3}{60} = \frac{7}{20}$ hrs.

total time = $\frac{600}{100} + \frac{7}{20}$

$= \frac{127}{20}$ hrs.

Distance travelled by local train without stoppage

$= \frac{127}{20} \times 50 = 317.5$ km

Number stoppage for local train = $\frac{317.5}{25}$

= 12 (In whole number)

Duration = $\frac{12 \times 1}{60} = \frac{1}{5}$

So distance travelled in $\frac{1}{50} = \frac{1}{5} \times 50 = 10$ km

$\therefore$ Required distance = 317.5 – 10

= 307.5 km

50. (B) Let x be the total score in an innings.

so, the highest score = $\frac{2}{9}x$

and the next highest score = $\frac{2}{9}$ of the remaining runs

$= \frac{2}{9}\left(x - \frac{2}{9}x\right)$

So, according the question

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

$\Rightarrow x - x + \frac{2}{9}x = \frac{8\times 9}{2}$

$\Rightarrow x = \frac{8\times 9\times 9}{2\times 2} = 162$

51. (C) $(142^2 - 1) = (142 + 1)(142 - 1)$

$= \overset{143}{\wedge}_{13\times 11} \times 141$

$\therefore$ Divisible by 13

52. (B) Total Income (100%) = 25,000

food 45% = $\frac{25000}{100} \times 45$

= 11250

(total) 100% = 25000

Rent 14% = $\frac{25000}{100} \times 14 = 3500$

total = 11250 + 3500 = ₹14750

53. (A) Spending on education : Spending on food

15% : 45%

1 : 3

54. (B) % of expenditure on rent than on the fuel

$= \frac{14}{9} \times 100 = 156\%$

55. (B) fuel + education + others = 30%

100% = 360°

$1\% = \frac{360}{100}$

$30\% = \frac{360}{100} \times 30 = 108°$

56. (D) Work remaining = 60%

$\therefore$ work done = 40% = $\frac{2}{5}$

$10 \times \frac{2}{5}(A + B) = 2.5A + 8.5B$

$\Rightarrow 4(A + B) = 2.5A + 8.5B$

$\Rightarrow 1.5A = 4.5B$

A = 3, B = 1

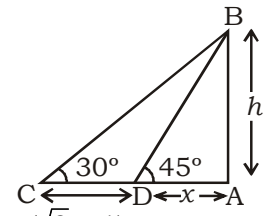
so, work done by A alone in $\frac{10\times(3+1)}{3}$

$= \frac{40}{3}$ days

and work done by B alone in $\frac{10\times(3+1)}{1}$

= 40 days.

57. (C)



$50(\sqrt{3} - 1)$m

CD = 50 $(\sqrt{3} - 1)$ m

Let AB be the building and its height be 'h' and AD be 'x'

$\frac{h}{x} = \tan 45°$

$\therefore h = x$ ...(i)

$\frac{h}{x + 50(\sqrt{3}-1)} = \tan 30°$

$h = \frac{x}{\sqrt{3}} + \frac{50(\sqrt{3}-1)}{\sqrt{3}}$ ...(ii)

from equation (i) and (ii)

$\Rightarrow h - \frac{h}{\sqrt{3}} = \frac{50(\sqrt{3}-1)}{\sqrt{3}}$

$\Rightarrow h(\sqrt{3} - 1) = 50(\sqrt{3} - 1)$

$h = 50$ m

58. (B) Total circumference = $2\pi r$

$2 \times \frac{22}{7} \times 84 = 24 \times 22$

circuference of circle

= perimeter of square

$4a = 24 \times 22$

$a = 6 \times 22 = 132$ cm

59. (C) Let number be 4a, 4b

($\because$ HCf = 4, a, b are co-prime number)

LCM = $4ab$

$\frac{4a + 4b}{4ab} = \frac{7}{12}$

$\Rightarrow \frac{a + b}{ab} = \frac{7}{12}$

$\Rightarrow a = 4, b = 3$

numbers are 16, 12

Smaller number = 12

60. (B) Required Average = $\frac{xy^2 + yx^2}{x + y}$

$= \frac{xy(x + y)}{(x + y)} = xy$

61. (D) A $\rightarrow \frac{7}{2} \rightarrow$ 28 days

(whole work) $1 \rightarrow 32$ days

$B \rightarrow \frac{5}{6} \rightarrow 20$ days

(whole work) $1 \rightarrow 24$

	96(unit)
A→	32 | 3
B→	24 | 4

Both will work by (A + B) = $\frac{96}{7}$

$= 13\frac{5}{7}$ days

62. (B) $a : b = \frac{2}{9} : \frac{1}{3} = 2 : 3$

$b : c = \frac{2}{7} : \frac{5}{14} = 4 : 5$

$d : c = \frac{7}{10} : \frac{3}{5} = 7 : 6$

×	a	:	b	:	c	:	d
↓	2		3		3		3
	4		4		5		5
	6		6		6		7
	48	:	72	:	90	:	105

16 : 24 : 30 : 35

63. (A) speed of Suraj = $\frac{550}{1}$ m/min

speed of Rohit = $\frac{33000}{45}$ m/min

∴ Required ratio = $\frac{550}{\frac{2200}{3}}$

= 3 : 4

64. (B) Required Price = 19000 × (8 – 7.5)%

= 19000 × $\frac{0.5}{100}$ = ₹95

65. (C) Passed boys = 60%
Failed boys = (100 – 60)% = 40%
Failed girls = (100 – 50)% = 50%

Failed boys = 1000 × $\frac{40}{100}$ = 400

Failed girls = 800 × $\frac{50}{100}$ = 400

Required % failed condidates

= $\frac{400+400}{1000+800} \times 100$

= $\frac{800}{1800} \times 100$ = 44.4%

66. (A) Let the number be 'a'

$\frac{1}{7}a - \frac{1}{11}a = 100$

$\frac{11a-7a}{77} = 100$

$4a = 77 \times 100$

$a = 77 \times 25$

$a = 1925$

67. (B) $\left[5^{9\times\frac{1}{6}\times\frac{1}{3}}\right]^4 \left[5^{9\times\frac{1}{6}\times\frac{1}{3}}\right]^4$

$= \left[5^{\frac{1}{2}}\right]^4 \left[5^{\frac{1}{2}}\right]^4$

$= 5^2 \times 5^2$

$= 5^4$

68. (A) Area of two circles = $\pi(5^2 + 12^2)$

$= 169\pi cm^2$

$\Rightarrow \pi r^2 = 169\pi$

$r^2 = 169$

$r = 13$ c.m

∴ radius of third circle = 13 cm

69. (C) $l + b + h = 24$ cm

length of diagonal = 15 cm.

$\sqrt{l^2+b^2+h^2} = 15$

$l^2 + b^2 + h^2 = 225$

$(l + b + h)^2 - 2(lb + bh + lh) = 225$

$(24)^2 - 2(lb + bh + lh) = 225$

$576 - 225 = 2(lb + bh + lh)$

$351 = 2(lb + bh + lh)$

∴ total surface area = 351 cm²

70. (D) Volume of cone = Lateral surface Area

$\frac{1}{3}\pi r^2 h = \pi r l \quad (l = \sqrt{h^2+r^2})$

$\frac{rh}{3} = \sqrt{h^2+r^2}$

squaring both sides.

$\frac{1}{9} = \frac{h^2+r^2}{r^2h^2}$

$\frac{1}{9} = \frac{h^2}{r^2h^2} + \frac{r^2}{r^2h^2}$

$\frac{1}{9} = \frac{1}{r^2} + \frac{1}{h^2}$

71. (A) $a + \frac{1}{b} = b + \frac{1}{c}$

$\Rightarrow (a - b) = \frac{1}{c} - \frac{1}{b} = \frac{(b-c)}{bc}$ ...(i)

similarly,

$$b - c = \frac{c-a}{ca} \quad \text{...(ii)}$$

$$c - a = \frac{a-b}{ab} \quad \text{...(iii)}$$

multiplying by equation (i), (ii) and (iii)

$$(a-b)(b-c)(c-a) = \frac{(a-b)(b-c)(c-a)}{(abc)^2}$$

$$abc = \pm 1$$

72. (C) $\cos\theta = \frac{1}{2}\left(a + \frac{1}{a}\right)$

squaring both sides,

$$\cos^2\theta = \frac{1}{4}\left[\left(a + \frac{1}{a}\right)^2\right]$$

$$2\cos^2\theta = \frac{1}{2}\left[\left(a + \frac{1}{a}\right)^2\right]$$

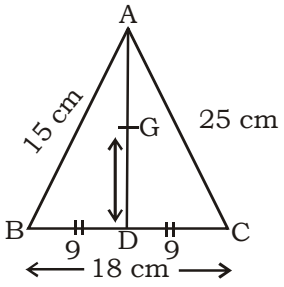
subtracting 1 from both sides,

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

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

$$\text{LH.S} = \frac{1}{2}\left(a^2 + \frac{1}{a^2}\right)$$

73. (D)



By appollonius theorem,
$AB^2 + AC^2 = 2(AD^2 + BD^2)$
$\Rightarrow 225 + 625 = 2(x^2 + 81)$

$$\Rightarrow \frac{850}{2} = x^2 + 81$$

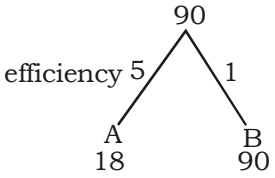
$\Rightarrow x^2 = 425 - 81 = 344$
$\Rightarrow x^2 = 4 \times 86$

$$\Rightarrow x = \sqrt{4 \times 86} = 2\sqrt{86}$$

$$GD = \frac{1}{3} \times 2\sqrt{86} = \frac{2}{3}\sqrt{86} \text{ cm}$$

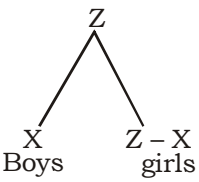
74. (C) A = 5B

$$\frac{A}{B} = \frac{5}{1}$$



If both pipe open together = $\frac{90}{6}$ = 15 min

75. (C)



$$\text{girls part} = \frac{z-x}{z} = 1 - \frac{X}{Z}$$

76. (B) According to the question
Average age of eleven cricket players is 20 years.
total age = 11× 20 = 220
If the age of coach is included then the average age increases by 10%

$$= 20 + \frac{10}{100} \times 20 = 22 \text{ years}$$

$\therefore$ total age of eleven player and coach = 22 × 12 = 264 yr.
Age of coach = 264 – 220
= 44 years.

77. (C) According to the question

$$\text{Average of } \frac{x + \frac{1}{x}}{2} = m$$

Put $x = 1$

$$\therefore \frac{1 + \frac{1}{1}}{2} = m$$

$m = 1$

$$\therefore \frac{x^2 + \frac{1}{x^2}}{2} = \frac{1^2 + \frac{1}{1^2}}{2} = 1$$

Now check from the option
option (C), $2m^2 - 1$, put $m = 1$
$2 \times 1 - 1 = 1$ (satisfied)

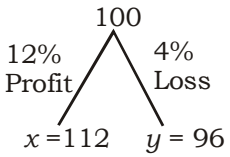
78. (A) M.P of pen = ₹12

$$\text{After I}^{\text{st}} \text{ Discount} = \frac{85}{100} \times 12 = 10.20$$

$$\text{II}^{\text{nd}} \text{ Discount \%} = \frac{10.20 - 8.16}{10.20} \times 100$$

$= \frac{2.04}{10.20} \times 100 = 20\%$

79. (B) Let C.P = 100



$\frac{y}{x} = \frac{96}{112} = \frac{6}{7} = 6 : 7$

80. (A) Let the first part = ₹x

$\therefore$ Hence second part = ₹$(12000 - x)$

According to the question

$$\frac{x \times 12 \times 3}{100} = \frac{(12000 - x) \times 9 \times 16}{2 \times 100}$$

$\Rightarrow 36x = 72(12000 - x)$

$x = 24000 - 2x$

$3x = 24000$

$x =$ ₹8000

Ist part = ₹8000

IInd part = ₹(12,000 – 8000)

= ₹4000

$\therefore$ Hence maximum part = ₹8000

81. (A) Bus fare : Train fare

2 : 3 (given)

Now as given in question, bus fare is increased by 10% & train fare is decreased by 5%

$$2 \times \frac{110}{100} : 3 \times \frac{95}{100}$$

= 44 : 57

82. (D) Bottles Required = $\frac{\frac{2}{3}\pi \times 15^3}{\pi \times \left(\frac{5}{2}\right)^2 \times 6}$

$= \frac{2}{3} \times \frac{15 \times 15 \times 15 \times 2 \times 2}{5 \times 5 \times 6}$

= 60

83.(B) Upstream speed, U = $\frac{24}{6}$

= 4 km/hr.

Downstream speed 'D' = $\frac{20}{4}$ = 5 km/hr.

speed of boat in still water x,

$\frac{D+U}{2} = \frac{9}{2}$ = 4.5 km/hr.

speed of current

$\frac{D-U}{2} = \frac{1}{2}$ = 0.5 km/hr

4.5 km/h and 0.5 km/hr.

84. (D) Father (f) + son (s) = 100

F + s = 100 …(i)

$\frac{F-5}{s-5} = \frac{2}{1}$

(F – 5) = 2(S – 5)

F – 5 = 2S – 10

F – 2S = – 5 …(ii)

By (i) & (ii)

F + S = 100

F – 2S = –5

– + +

3S = 105

S = 35

f = 100 – 35 = 65

ratio of age after 10 years

father : son

65 + 10 : 35 + 10

75 : 45

5 : 3

85. (D) Total area of play ground.

$= 750 \times 2\pi rh$

$= 750 \times 2 \times \frac{22}{7} \times \frac{70}{2} \times 150$

$= 2475 \times 10^4$ cm^2

= 2475 m^2

$\therefore$ total cost of travelling = 2475 × 2

= ₹4950

86. (B) sum of P and Q = 5050 × 2 = 10100

sum of Q + R = 6250 × 2 = 12500

sum of P + R = 5200 × 2 = 10400

$(P + Q + R) = \frac{33000}{2} = 16500$

Monthly income of P = 16500 – 12500

= ₹4000

87. (B) Let the price be 100 x

So, new price of the article

$= 100x\left(1+\frac{r}{100}\right)\left(1-\frac{r}{100}\right)$

$= 100x\left(\frac{100+r}{100}\right)\left(\frac{100-r}{100}\right)$

given $10 = \frac{10000 - r^2}{100}\ x$

$x = \frac{1000}{10,000 - r^2}$

$\therefore\ 100x = \frac{100000}{10000 - r^2}$

88. (D) $40\% = \frac{2 \rightarrow \text{Alcohol}}{5 \rightarrow \text{Mixture}}$

Water : Alcohol
3 2

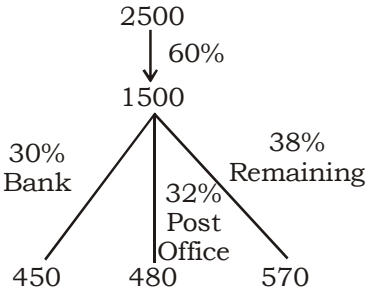
Required % = $\frac{2}{(5+1)} \times 100$

$= \frac{2}{6} \times 100$

$= \frac{1}{3} \times 100$

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

89. (B) According to the question



Hence, required number of share holders is = 570

90. (D) According to the question

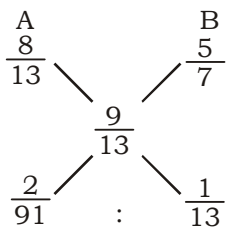
	milk		water
Vessel A	8	:	5
Vessel B	5	:	2

Now mixture containing $69\frac{3}{13}\%$

milk i.e $\frac{900}{13 \times 100} = \frac{9}{13}$ milk

$\therefore$ Now using Aligation

A B



new ratio = 2 : 7

91. (B) $3 + \frac{1}{\sqrt{3}} + \frac{1}{3+\sqrt{3}} + \frac{1}{\sqrt{3}-3}$

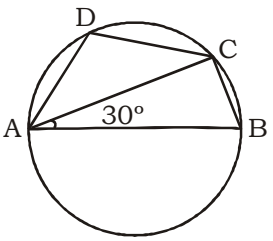
$= 3 + \frac{1}{\sqrt{3}} + \frac{1}{3+\sqrt{3}} - \frac{1}{3-\sqrt{3}}$

$= 3 + \frac{1}{\sqrt{3}} + \left[\frac{3-\sqrt{3}-3-\sqrt{3}}{9-3}\right]$

$= 3 + \frac{1}{\sqrt{3}} - \frac{\sqrt{3}}{3}$

$= 3 + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{3}} = 3$

92. (B) According to question



given AB is a diameter
$\angle CAB = 30^\circ$
As we know that
$\angle ACB = 90^\circ$
$\therefore \angle ACB + \angle CAB + \angle CBA = 180^\circ$
$\angle CBA = 180^\circ - 90^\circ - 30^\circ$
$\angle CBA = 60^\circ$

Note : In a cyclic trapezium sum of opposite angle is 180°
$\therefore \angle D + \angle B = 180^\circ$
$\angle D = 180^\circ - 60^\circ$
$\angle D = 120^\circ$

93. (C) Area of four walls = $2h(l + b)$
$l = 2b$ and $h = 4$ m
$\therefore 120 = 8 \times 3b$

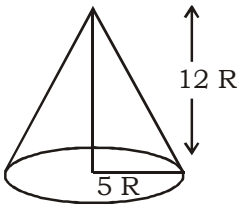
$b = \frac{120}{8} = 5$ and $l = 10$

$\therefore$ Area of floor = $l \times b = 10 \times 5 = 50\ m^2$

94. (B)

	Height		Shadow
stick →	12	:	8
	3	:	2
	×20		×20
tower →	60 m	:	40 m

95. (B)



$\frac{1}{3}\pi (5R)^2 \times 12\ R = \frac{2200}{7}$

$\frac{22}{7} \times \frac{25 \times 12}{3} R^3 = \frac{2200}{7}$

$R^3 = \frac{2200}{7} \times \frac{21}{22 \times 25 \times 12}$

R = 1

so radius = 5 cm

height = 12 cm

slant height = 13 cm

96. (D) $a + b = \frac{46}{3}$

$a - b = \frac{14}{3}$

$a = \frac{\frac{46}{3} + \frac{14}{3}}{2} = \frac{60}{3 \times 2} = 10$

$b = \frac{\frac{46}{3} - \frac{14}{3}}{2} = \frac{32}{3 \times 2} = \frac{16}{3}$

$a \times b = \frac{16}{3} \times 10 = 53\frac{1}{3}$

97. (C) $\frac{\text{Corporation tax}}{\text{Excise duty}} = \frac{27.5}{21.5} = \frac{55}{43} = 55 : 43$

98. (D) 100% = 360°

Customs duty 13.33% = $\frac{360}{100} \times 13.33$

= 48° (Approx)

99. (C) 20.17% of 1200

$\frac{20.17}{100} \times 1200$

= 242 crores (Approx)

100. (C) (27.5 + 13.33 + 20.17) – (21.5 + 17.5)

= 60 – 39

= 22%

SSC MAINS (MATHS) MOCK TEST-14 (ANSWER KEY)

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