SSC TIER II (MATHS) MOCK TEST - 45 (SOLUTION)

1. (C) I. $3.\overline{36} + 1.\overline{33} - 2.\overline{05}$

$= 3 + 0.\overline{36} + 1 + 0.\overline{33} - 2 - 0.\overline{05}$

$= 3 + \frac{36}{99} + 1 + \frac{33}{99} - 2 - \frac{05}{99}$

$= (3 + 1 - 2) + \left(\frac{36}{99} + \frac{33}{99} - \frac{5}{99}\right)$

$= 2 + \frac{64}{99} = 2 + 0.\overline{64}$

$= 2.\overline{64} \neq 2.6\overline{4}$

$\therefore$ Statement I is not true

II. $\left(1+\sqrt{2}\right)^2 = 1 + 2 + 2\sqrt{2} = 3 + 2\sqrt{2}$

$\Rightarrow \left(1+\sqrt{2}\right)^4 = \left(3+2\sqrt{2}\right)^2 = 9 + 8 + 12\sqrt{2}$

$= 17 + 12\sqrt{2}$

$\Rightarrow \left(1+\sqrt{2}\right)^8 = \left(17+12\sqrt{2}\right)^2$

$= 289 + 288 + 408\sqrt{2}$

$= \left(577 + 408\sqrt{2}\right)$

$\Rightarrow \left(1+\sqrt{2}\right)^8 = \left(577+408\sqrt{2}\right)$

$\Rightarrow \left(1+\sqrt{2}\right) = \left(577+408\sqrt{2}\right)^{\frac{1}{8}}$

$\therefore \left(1+\sqrt{2}\right) = \sqrt{\sqrt{\sqrt{577+408\sqrt{2}}}}$

Statement II is true.

III. $8^{\sin\theta}.\ 16^{\cos\theta} = 2^{3\sin\theta}.\ 2^{4\cos\theta} = 2^{3\sin\theta + 4\cos\theta}$

when $3\sin\theta + 4\cos\theta$ is minimum, $2^{3\sin\theta + 4\cos\theta}$ will also be minimum

Now, we know

$-\sqrt{3^2+4^2} \le 3\sin\theta + 4\cos\theta \le \sqrt{3^2+4^2}$

$-5 \le 3\sin\theta + 4\cos\theta \le +5$

$\Rightarrow$ Minimum value of $8^{\sin\theta}.\ 16^{\cos\theta} = 2^{-5}$

$\therefore$ Statement III is true

2. (A) $A = \frac{(0.147+0.289)^2 - 0.01\times(1.47-2.89)^2}{1.47\times 0.0289}$

$\Rightarrow A = \frac{(0.147+0.289)^2 - (0.147-0.289)^2}{0.147\times 0.289}$

we know,

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

$\Rightarrow A = \frac{4\times 0.147\times 0.289}{0.147\times 0.289} = 4$

Now,

$B = \frac{5.6\times 0.36 + 0.42\times 3.2}{0.8\times 2.1}$

$= \frac{56\times 36 + 42\times 32}{8\times 210}$

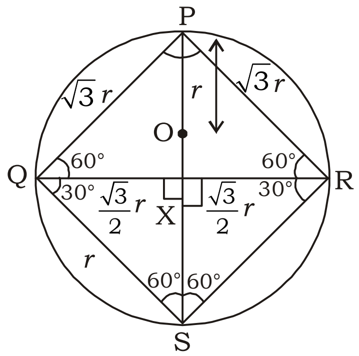
$= 1.2 + 0.8 = 2.0$

Now,

$(A^2 + B^2)^2 = (4^2 + 2^2)^2 = (16 + 4)^2$

$= (20)^2 = 400$

3. (B)



O is centre of the circle.

In equilateral triangle $r = \frac{2}{3}h$

where h = P × (Median of PQR)

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

$\Rightarrow \frac{\sqrt{3}}{2}a = \frac{3}{2}r \quad [a, \text{side of equilater } \Delta PQR]$

$\Rightarrow a = \sqrt{3}\,r = PQ = PR = QR$

Now,

PS is diameter $\Rightarrow \angle PQS = \angle PRS = 90°$

ΔPQR is equilateral $\Delta \Rightarrow \angle PQR = \angle PRQ = 60°$

$\Rightarrow \angle RQS = \angle QRS = 90° - 60° = 30°$

$\Rightarrow QSR = 360° - (60° + 90° + 90°) = 120°$

$\Rightarrow \angle QSP = 60° \Rightarrow \angle QXS = 90°$

In ΔPXQ

$QX = \frac{QR}{2} = \frac{\sqrt{3}r}{2}$

and $XS = PS - PX = 2r - \frac{3}{2}r$

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

$(QS)^2 = (QX)^2 + (XS)^2$

$\Rightarrow (QS)^2 = \left(\frac{\sqrt{3}}{2}r\right)^2 + \left(\frac{1}{2}r\right)^2$

$\Rightarrow$ $(QS)^2 = \frac{3}{4}r^2 + \frac{1}{4}r^2 = r^2$

$\Rightarrow$ QS = r
Similarly,
SR = r

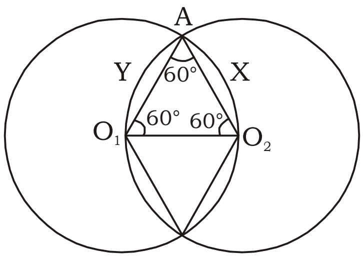
$\therefore$ Required perimeter = PQ + PR + RS + SQ

$= \sqrt{3}\,r + \sqrt{3}\,r + r + r$

$= 2\sqrt{3}\,r + 2r$

$= 2r\left(\sqrt{3}+1\right)$

4. (D)



Clearly,
$AO_1 = AO_2 = O_1O_2 = 1$ cm

$\Rightarrow$ ΔO_1O_2A is equilateral $\Rightarrow$ All angles 60°

$\Rightarrow$ Area $AO_2X = \frac{60°}{360°} \times \pi \times 1 - \frac{\sqrt{3}}{4}(1)^2$

$= \frac{\pi}{6} - \frac{\sqrt{3}}{4}$

Area of equilateral $\Delta\, AO_1O_2 = \frac{\sqrt{3}}{4}(1)^2 = \frac{\sqrt{3}}{4}$

$\therefore$ Required Area = 2 ×(Area of ΔAO_1O_2) + 4(Area of AXO_2)

$= 2 \times \frac{\sqrt{3}}{4} + 4\left(\frac{\pi}{6} - \frac{\sqrt{3}}{4}\right) = \frac{2\pi}{3} - \frac{\sqrt{3}}{2}$

5. (B) LCM (9, 2, 8, 5) = 360

$\frac{9}{13} = \frac{9\times40}{13\times40} = \frac{360}{520}$

$\frac{2}{3} = \frac{9\times40}{3\times180} = \frac{360}{540}$

$\frac{8}{11} = \frac{8\times45}{11\times45} = \frac{360}{495}$

$\frac{5}{7} = \frac{5\times72}{7\times72} = \frac{360}{504}$

$\frac{360}{540} < \frac{360}{520} < \frac{360}{504} < \frac{360}{495}$

$\Rightarrow$ $\frac{2}{3} < \frac{9}{13} < \frac{5}{7} < \frac{8}{11}$

6. (C) Let Average run for 12 innings = x
Total runs after 12 innings = $12x$
Average run in 13th innings = $(x + 5)$
Total runs in 13 innings = $13(x + 5)$
ATQ,

$\Rightarrow$ $13(x + 5) - 12x = 96$

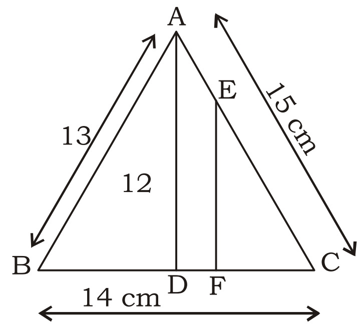
$\Rightarrow$ $13x + 65 - 12x = 96$

$\Rightarrow$ $x + 65 = 96$

$\Rightarrow$ $x = 96 - 65 = 31$

$\therefore$ Required average = $x + 5 = 31 + 5 = 36$ runs

7. (D)



Area of triangle = $\sqrt{S(S-a)(S-b)(S-c)}$

$S = \frac{13+14+15}{2} = 21$

$= \sqrt{21(21-13)(21-14)(21-15)}$

$= \sqrt{21\times8\times7\times6} = 84\ cm^2$

As, EF divides ABC into two equal halves.

$\Rightarrow$ Area $\Delta EFC = \frac{1}{2} \times 84cm^2 = 42\ cm^2$

Also, Area ABFEA = 42 cm^2

Area of $\Delta ABC = \frac{1}{2}$ BC × AD = 84 cm^2

$\Rightarrow$ $AD = \frac{2\times84}{14} = 12$ cm

In ΔABD
$BD^2 = AB^2 - AD^2$

$\Rightarrow$ $BD^2 = 13^2 - 12^2 = (13+12)(13-12) = 25$

$\Rightarrow$ BD = 5 cm
Now,

Area of $\Delta ABD = \frac{1}{2} \times AD \times BD = \frac{1}{2} \times 12 \times 5$

$= 30\ cm^2$

$\therefore$ Required Area of Ttrapezium ADFE
= Area of ABDFEA – Area of ΔABD
= 42 – 30 = 12 cm^2

8. (A) $\frac{3\frac{1}{4} - \frac{4}{5}\text{ of }\frac{5}{6}}{4\frac{1}{3} \div \frac{1}{5} - \left(\frac{3}{10} + 21\frac{1}{5}\right)} = \frac{\frac{13}{4} - \frac{4}{5}\times\frac{5}{6}}{\frac{13}{3}\times5 - \left(\frac{3}{10} + \frac{106}{5}\right)}$

$= \frac{\left(\frac{13}{4} - \frac{2}{3}\right)}{\frac{65}{3} - \left(\frac{3+212}{10}\right)} = \frac{\frac{31}{12}}{\frac{65}{3} - \frac{215}{10}} = \frac{31}{12} \times \frac{30}{5}$

$= \frac{31}{2} = 15\frac{1}{2}$

∴ Required least fraction $= 15\frac{1}{2} - 15 = \frac{1}{2}$

9. (D) $\frac{1}{\sqrt{12-\sqrt{40}}} = \frac{1}{\sqrt{7+5-4\times7\times5}}$

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

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

Similarly,

$\frac{1}{\sqrt{8-\sqrt{60}}} = \frac{1}{\sqrt{(\sqrt{5})^2+(\sqrt{3})^2-2\times\sqrt{5}\times\sqrt{3}}} = \frac{1}{\sqrt{5}-\sqrt{3}}$

$= \frac{\sqrt{5}+\sqrt{3}}{2}$ and $\frac{2}{\sqrt{10+\sqrt{84}}} = \frac{\sqrt{7}-\sqrt{3}}{2}$

Now,
Value of Required expression

$= \frac{\sqrt{7}+\sqrt{5}}{2} - \frac{\sqrt{5}+\sqrt{3}}{2} - \frac{\sqrt{7}-\sqrt{3}}{2}$

$= \frac{\sqrt{7}+\sqrt{5}-\sqrt{3}-\sqrt{7}+\sqrt{3}}{2} = \frac{0}{2} = 0$

10. (C) No. of digits required
$= [\{(9-1)+1\}\times1 + \{(50-10)+1\}\times2]$
$= 9\times1 + 41\times2 = 9 + 82 = 91$

11. (D) Remaining no. of total balls after 1st ball is chosen = (12 + 6) – 1 = 17 balls
Remaining no. of black balls after 1st ball is chosen = 12 –1 = 11

∴ The probability that the second ball is also black $= \frac{11}{17}$

12. (A) Let x be the initial no. of people in the company.
ATQ,

$\frac{35x+5\times32}{x+5} = 34$

⇒ $35x + 160 = 34x + 170$

⇒ $x = 10$

13. (B) Let x be age & y be height
ATQ,

$y \propto \sqrt{x}$

⇒ $y = k\sqrt{x}$

At $x = 9$, $y = 4$

⇒ $4 = k\sqrt{9}$

⇒ $k = \frac{4}{3}$

Now,

$y = \frac{4}{3}\sqrt{x}$

At $x = (9 + 7) = 16$

$y = \frac{4}{3}\sqrt{16} = \frac{16}{3} = 5\frac{1}{3}$ ft

14. (A) Applying Alligation

–6%   14%

–4 %

{14–(–4)}% =18%   {–4–(–6)}% = (–4 + 6)% = 2%

⇒ Ratio of Amount = 18 : 2 = 9 : 1

⇒ Quantity sold at 14% profit $= \frac{1}{9+1}\times 50$

$= \frac{1}{10}\times 50$ kg = 5 kg

⇒ Quantity sold at 6% loss $= \frac{1}{9+1}\times50$

$= \frac{9}{10}\times50$ kg = 45 kg

15. (C) $\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-ab-bc-ca} = (a + b + c)$

⇒ $\frac{(1.5)^3+(4.7)^3+(3.8)^3-3\times1.5\times4.7\times3.8}{(1.5)^2+(4.7)^2+(3.8)^2-1.5\times4.7-4.7\times3.8-3.8\times15}$

$= (1.5 + 4.7 + 3.8) = 10$

16. (B) $8 - \left[7-\left\{x-\left(4-\frac{7}{2}\right)\right\}\right] = 5$

⇒ $8 - \left[7-\left\{x-\frac{1}{2}\right\}\right] = 5$

⇒ $8 - \left[7-x+\frac{1}{2}\right] = 5$

⇒ $8 - \left[\frac{15}{2}-x\right] = 5$

⇒ $8 - \frac{15}{2} + x = 5$

⇒ $\frac{1}{2} + x = 5$

⇒ $x = 4.5$

17. (B) Sum of temperature of first 3 days = 22×3 = 66
Sum of temperature of next 3 days = 24×3 = 72
Sum of temperature of whole week = 23.5×7 = 164.5

∴ Temperature of last day
= 164.5 – (66 + 72) = 26.5°C

18. (C) Let the speed of trains be a & b m/s.
when they are moving in same direction

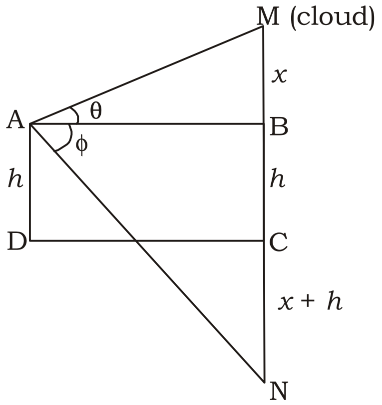
$a - b = \frac{100+80}{18} = 10$ ...(i)

when they are moving in opposite direction

$a + b = \frac{100+80}{9} = 20$ ...(ii)

from equation (i) & (ii)
$a = 15$ m/s, $b = 5$ m/s

19. (C)



Let A be the point h m above the lake & let MB = x
In ΔABM

$\tan\theta = \frac{MB}{AB}$

$\Rightarrow AB = \frac{MB}{\tan\theta} = \frac{x}{\tan\theta}$

$\Rightarrow AB = x\cot\theta$ ...(i)

In ΔABN

$\tan\phi = \frac{BN}{AB}$ [BN = BC + NC]

$\tan\phi = \frac{x+2h}{AB}$

$\Rightarrow AB = (x + 2h)\cot\phi$ ...(ii)

from (i) & (ii)

$x\cot\theta = (x + 2h)\cot\phi$

$\Rightarrow x(\cot\theta - \cot\phi) = 2h\cot\phi$

$\Rightarrow x = \frac{2h\cot\phi}{\cot\theta - \cot\phi}$

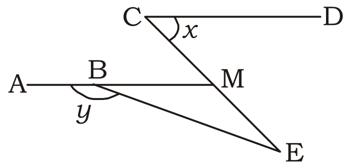
Height of the cloud above the lake = $x + h$

$= \frac{2h\cot\phi}{\cot\theta - \cot\phi} + h$

$= \frac{2h\cot\phi + h\cot\theta - h\cot\phi}{\cot\theta - \cot\phi} = \frac{h\cot\phi + h\cot\theta}{\cot\theta - \cot\phi}$

$= h\left|\frac{\cot\phi + \cot\theta}{\cot\theta - \cot\phi}\right| = h\left[\frac{\tan\phi + \tan\theta}{\tan\phi - \tan\theta}\right]$

20. (D)



$\angle CMB = x = \angle DCM$
[Alternate interior angles]

In ΔBME

$\angle 1 = 180° - x$

$\angle 2 = 180° - y$

$\Rightarrow \angle CEB = 180° - (\angle 1 + \angle 2)$

$= 180° - (180° - x + 180° - y)$

$= x + y - 180° = x + y - \pi$

21. (B) Let the numbers be $33x$ & $33y$
where x, y are coprime
ATQ,

$33x + 33y = 528$

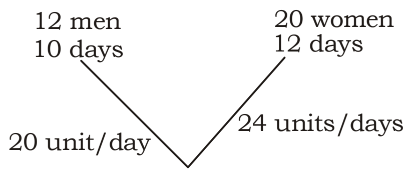
$\Rightarrow (x + y) = 16$

$\therefore$ Pairs of x, y (coprime) = (1, 15)(3, 13) (5,11) (9, 7)

$\therefore$ No of pairs of $33x$, $33y$ = 4

22. (D) Only 10080 is divisible by 7
Ten thousand's digit = 1
Number formed by digits in units and ten place = 80 = divisible by 4
sum of digits = 1+0+0+8+0 = 9 = divisible by 3
10080, is divisible by 5 & 7 both.

23. (A)



Let total work be LCM(12 × 10, 20 × 12) = 240 units

1 men efficiency = $\frac{24}{12} = 2\frac{\text{unit}}{\text{day}}$,

1 women efficiency = $\frac{20}{20}$ = 1 unit/day

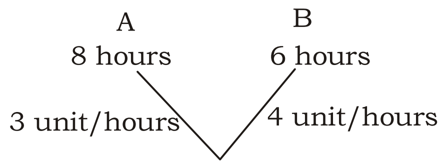
8 men's & 4 women's 9 days work
= (8×2 + 4×1)× 9 = 180 units

$\Rightarrow$ Remaining work = 240 –180 = 60 unit

Now,
8 men's & 14 women's efficiency
= (8×2 + 14×1) = 30 unit/days

$\therefore$ Required no. of days
= 60 units/30 units/day = 2 days

24. (D)



Let volume = 24 units
work done by both pipe in 2 hours

= (3 + 4)×2 = 14 units
Remaining units = 24 – 14 = 10 units

∴ Required time = $\frac{10}{4} = 2\frac{1}{2}$ hours

25. (C) Let work of each man = 1 unit/day
12 day's work = 12×20 = 240 units
Total work
= 240 units + (20 + 5)×(30 – 12 – 2) units
= (240 + 400) units = 640 units.

∴ Required time = $\frac{640 \text{ units}}{20\frac{\text{units}}{\text{day}}}$ = 32 days

26. (C) Number 476*xy*0 is divisible by 33
⇒ It must be divisible by 3, 11 both
⇒ Sum of digits = 4 + 7 + 6 + x + y + 0 = 3n
where n = 1, 2, 3......
and, 0 – y + x – 6 + 7 – 4 = 11m
where m = 0, 1, 2, 3......
Now, 17 + x + y = 3n ...(i)
$x - y - 3 = 11m$ ...(ii)
$x = 8$ & $y = 5$ satisfies equations.

27. (A)
A — 6 days — 4 unit/day
B — 8 days — 3 unit/day
C — 12 days — 2 unit/day

Let total work = LCM(12, 8, 6) = 2×2×3×2
= 24 units
Ratio of their work = 4 : 3 : 2
⇒ Ratio of their share = 4 : 3 : 2

∴ B's share = 1350 × $\frac{3}{9}$ = ₹450

28. (B) A = $400\left(1+\frac{(10/2)}{100}\right)^3$

$= 400 \times \left(1+\frac{5}{100}\right)^3$

$= 400 \times \left(1+\frac{1}{20}\right)^3$

$= 400 \times \left(\frac{21}{20}\right)^3$

$= 400 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$ = ₹463.05

29. (B) Let x, y, z be amount given to A, B & C respectively
ATQ,

$x\left(1+\frac{5\times2}{100}\right) = y\left(1+\frac{5\times3}{100}\right) = z\left(1+\frac{5\times4}{100}\right)$

⇒ $x\left(\frac{110}{100}\right) = y\left(\frac{115}{100}\right) = z\left(\frac{120}{100}\right)$

⇒ $110x = 115y = 120z$
⇒ $22x = 23y = 24z$
⇒ $x : y : z$ = 23×24 : 22×24 : 22×23 = 552 : 528 : 506
= 276 : 264 : 253
∴ Required amount

$= 7930 \times \frac{276}{276+264+253}$ = ₹2760

30. (B) Let r be the annual simple interest rate.
simple interest in 3 years

$= \frac{12000\times3\times r}{100} = 3600$

Now, Remaining principal = 12000 – 6500 = 5500
Simple interest in next 2 years

$= \frac{5500\times2\times r}{100} = 110r$

Now, he need to pay
= $360r + 110r + 550$
ATQ, $360r + 110r + 550 = 9260$
⇒ $470r = 9260 - 5500 = 3730$
⇒ r = 8%

31. (A) S.I for 10 years = $\frac{1000\times5\times10}{100}$ = ₹500
Now, P_{new} = ₹1500 (after 10 years)
A = ₹2000
∴ S.I. = ₹500

$500 = \frac{1500\times5\times T}{100}$

$T = \frac{500\times100}{1500\times5} = 6\frac{2}{3}$ years

∴ Total time = $10 + 6\frac{2}{3} = 16\frac{2}{3}$ years

32. (C) Let P be the required amount.
Interest on 500, at 12% and after 4 years

$= \frac{500\times4\times12}{100}$ = ₹240

ATQ,
Interest on P,
at 10% for 4 years = ₹480 – ₹240
= ₹240

⇒ $\frac{P\times10\times4}{100} = 240$

⇒ P = ₹600

33. (C) D = ₹48
R = 20%
T = 3

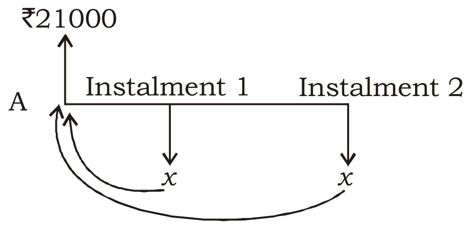
$P = \frac{D\times100^3}{R^2(300+R)}$

$= \frac{48\times100^3}{20^2(320)}$ = ₹375

34. (B) S = 4 + 32 + 108 +......+ 4000
S = 4(1 + 8 + 27 +.......+ 1000)
$S = 4(1^3 + 2^3 + 3^3 + ... + 10^3)$
$S = 4(1^3 + 2^3 + 3^3 + ... + 9^3 + 10^3)$
S = 4(2025 + 1000) = 4(3025)
S = 12100

35. (B) Let x be total marks & P be passing marks.
ATQ,
32% of x = P – 16 ...(i)
36% of x = P + 10 ...(ii)
substracting equation (ii) from (i)
4% of x = 26
25 × 4% of x = 25×26
100% of x = x = 650
from equation (i)
P = 32% of x + 16 = 208 +16
= 224
∴ Required percentage $= \frac{224}{650} \times 100 = 34.46\%$

36. (D)



$R = 10\% = \frac{1}{10}$

$1 + R = \frac{11}{10}$

Shifting Instalments back to point A and equating

$x \times \frac{10}{11} + x \frac{10}{11} \times \frac{10}{11} = 21000$

$\Rightarrow \frac{10}{11} x\left(1 + \frac{10}{11}\right) = 21000$

$\Rightarrow \frac{10}{11} x\left(\frac{21}{11}\right) = 21000$

$\Rightarrow x = \frac{21000 \times 11 \times 11}{21 \times 10}$

= ₹12100

37. (B) I. $(\sin\alpha - \text{cosec}\alpha)^2 + (\cos\alpha - \sec\alpha)^2$
$= \sin^2\alpha + \text{cosec}^2\alpha - 2 + \cos^2\alpha + \sec^2\alpha - 2$
$= \text{cosec}^2\alpha + \sec^2\alpha + (\sin^2\alpha + \cos^2\alpha) - 4$
$= \text{cosec}^2\alpha + \sec^2\alpha + 1 - 4$
$= 1 + \cot^2\alpha + 1 + \tan^2\alpha + 1 - 4$
$= \cot^2\alpha + \tan^2\alpha + 3 - 4 = \tan^2\alpha + \cot^2\alpha - 1$
⇒ Statement 1 is incorrect.
II. 3cos80°.cosec10° + 2cos59°.cosec31°
= 3cos(90°–10°) cosec10°+2cos(90–31) cosec 31°
= 3 sin10°.cosec10°+ 2 sin31°cosec31°
= 3 + 2 = 5
⇒ statement II is correct

38. (A) tan15°.cot75° + tan75°.cot15°
= tan15°.cot(90°–15°) + tan(90°–15°)cot15°
= tan15°.tan15° + cot15°cot15°
$= \tan^2 15° + \cot^2 15°$
Now, $\tan 15° = 2 - \sqrt{3}$

$\Rightarrow \frac{1}{\tan 15°} = \cot 15° = (2 + \sqrt{3})$

$\Rightarrow \tan^2 15° + \cot^2 15° = (2 - \sqrt{3})^2 + (2 + \sqrt{3})^2$

$= 4 + 3 - 4\sqrt{3} + 4 + 3 + 4\sqrt{3}$
= 14

39. (A) $\Sigma = \sin^2 1° + \sin^2 5° + \sin^2 9° + ... + \sin^2 89°$
$\Sigma = (\sin^2 1° + \sin^2 89°) + (\sin^2 5° + \sin^2 85°) + ... + (\sin^2 44° + \sin^2 46) + \sin^2 45°$
Let n be the total number of terms.
$T_n = a + (n-1)d$
⇒ 89° = 1+(n–1)×4
⇒ (n–1) = 22
⇒ n = 23
$\Sigma = (\sin^2 1° + \cos^2 1°) + (\sin^2 5° + \sin^2 85°) + ... + (\sin^2 44° + \sin^2 46°) + \sin^2 45°$
$= (1+1+1+.......+11\text{terms}) + \sin^2 45°$

$= 11 + \left(\frac{1}{\sqrt{2}}\right)^2 = 11\frac{1}{2}$

40. (A) $\frac{1 + 2\sin 60°\cos 60°}{\sin 60° + \cos 60°} + \frac{1 - 2\sin 60°\cos 60°}{\sin 60° - \cos 60°}$

$= \frac{\sin^2 60° + \cos^2 60° + 2\sin 60°\cos 60°}{\sin 60° + \cos 60°}$

$+ \frac{\sin^2 60° + \cos^2 60° - 2\sin 60°\cos 60°}{\sin 60° - \cos 60°}$

$= \frac{(\sin 60° + \cos 60°)^2}{\sin 60° + \cos 60°} + \frac{(\sin 60° - \cos 60°)^2}{\sin 60° - \cos 60°}$

= sin60°+ cos60°+ sin60°– cos60°= 2sin60

$= 2 \times \frac{\sqrt{3}}{2} = \sqrt{3}$

41. (A) $2^x = 4^y = 8^z$
$\Rightarrow 2^x = 2^{2y} = 2^{3z}$
$\Rightarrow x = 2y = 3z$
$\Rightarrow x : y : z = 2 \times 3 : 1 \times 3 : 1 \times 2 = 6 : 3 : 2$

Now, $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{8z} = 7$

Putting $x = 6k$, $y = 3k$ & $z = 2k$

$\frac{1}{2(6k)} + \frac{1}{4(3k)} + \frac{1}{8(2k)} = 7$

$\Rightarrow \frac{1}{12k} + \frac{1}{12k} + \frac{1}{16k} = 7$

$\Rightarrow \frac{4}{48k} + \frac{4}{48k} + \frac{3}{48k} = 7$

$\Rightarrow \dfrac{11}{48k} = 7$

$\Rightarrow k = \dfrac{11}{48 \times 7}$

$\Rightarrow x = 6k = 6 \times \dfrac{11}{48 \times 7} = \dfrac{11}{56}$

42. (A) $x = \sqrt{3} - \dfrac{1}{\sqrt{3}}$, $y = \sqrt{3} + \dfrac{1}{\sqrt{3}}$

$\Rightarrow x + y = \sqrt{3} - \dfrac{1}{\sqrt{3}} + \sqrt{3} + \dfrac{1}{\sqrt{3}} = 2\sqrt{3}$

$x.y = \left(\sqrt{3} - \dfrac{1}{\sqrt{3}}\right)\left(\sqrt{3} + \dfrac{1}{\sqrt{3}}\right) = 3 - \dfrac{1}{3} = \dfrac{8}{3}$

Now,

$\dfrac{x^2}{y} + \dfrac{y^2}{x} = \dfrac{x^3 + y^3}{xy}$

$= \dfrac{(x+y)^3 - 3xy(x+y)}{xy}$

$= \dfrac{\left(2\sqrt{3}\right)^3 - 3 \times \dfrac{8}{3} \times 2\sqrt{3}}{\dfrac{8}{3}} = \dfrac{24\sqrt{3} - 16\sqrt{3}}{\dfrac{8}{3}}$

$= \dfrac{8\sqrt{3}}{\dfrac{8}{3}} = 3\sqrt{3}$

43. (B) $\dfrac{x - a^2}{b^2 + c^2} + \dfrac{x - b^2}{c^2 + a^2} + \dfrac{x - c^2}{a^2 + b^2} = 3$

$\Rightarrow \dfrac{x - a^2}{b^2 + c^2} - 1 + \dfrac{x - b^2}{c^2 + a^2} - 1 + \dfrac{x - c^2}{a^2 + b^2} - 1 = 0$

$\Rightarrow \dfrac{x - a^2}{b^2 + c^2} - 1 + \dfrac{x - b^2}{c^2 + a^2} - 1 + \dfrac{x - c^2}{a^2 + b^2} - 1 = 0$

$\Rightarrow \dfrac{x - a^2 - b^2 - c^2}{b^2 + c^2} + \dfrac{x - a^2 - b^2 - c^2}{c^2 + a^2} + \dfrac{x - a^2 - b^2 - c^2}{a^2 + b^2} = 0$

$\Rightarrow (x - a^2 - b^2 - c^2)\left[\dfrac{1}{b^2 + c^2} + \dfrac{1}{c^2 + a^2} + \dfrac{1}{a^2 + b^2}\right] = 0$

$\Rightarrow x - a^2 - b^2 - c^2 = 0$

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

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

44. (A) $\dfrac{(x+1)(x+2)}{(x+3)(x+4)} = \dfrac{(x+3)}{(x+7)}$

$\Rightarrow \dfrac{x^2 + 3x + 2}{x^2 + 7x + 12} = \dfrac{x + 3}{x + 7}$

$\Rightarrow x^3 + 3x^2 + 2x + 7x^2 + 21x + 14 = x^3 + 7x^2 + 12x + 3x^2 + 21x + 36$

$\Rightarrow x^3 + 10x^2 + 23x + 14 = x^3 + 10x^2 + 33x + 36$

$\Rightarrow 23x + 14 = 33x + 36$

$\Rightarrow 14 - 36 = (33 - 23)x$

$\Rightarrow 10x = -22$

$\Rightarrow x = -\dfrac{22}{10}$

$\Rightarrow x = -2\dfrac{1}{5}$

45. (B) $x^9 + x^7 - 194x^5 - 194x^3$

$= x^9 - 194x^5 + x^7 - 194x^3$

$= x^5(x^4 - 194) + x^3(x^4 - 194)$

$= (x^4 - 194)(x^5 + x^3)$

$= (x^4 - 194)\ x^3(x^2 + 1)$

$= (x^4 - 194)\ x^3\ 4x$ $\quad \left[\begin{array}{l} x^2 - 4x + 1 = 0 \\ \Rightarrow x^2 + 1 = 4x \end{array}\right]$

$= +4x^4(x^4 - 194)$

Now, $x^2 - 4x = 1 = 0$

$\Rightarrow x + \dfrac{1}{x} = 4$

$\Rightarrow x^2 + \dfrac{1}{x^2} = 14$

$\Rightarrow x^4 + \dfrac{1}{x^4} = 194$

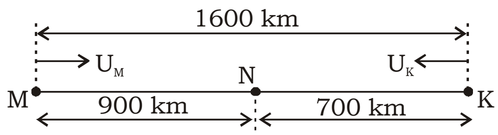
$\Rightarrow (x^4 - 194) = -\dfrac{1}{x^4}$

$\Rightarrow x^4(x^4 - 194) = -1$

$= +4x^4(x^4 - 194) = -4$

$\therefore x^9 + x^7 - 194x^5 - 194x^3 = -4x^4(x^4 - 194) = -4$

46. (B)



At point N, time is constant.

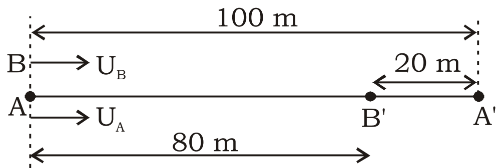
$\Rightarrow D \propto S$

$\Rightarrow \dfrac{MN}{NK} = \dfrac{U_M}{U_K}$

$\Rightarrow \dfrac{U_M}{U_K} = \dfrac{900}{700} = \dfrac{9}{7}$

$\therefore$ Required Ratio = 9 : 7

47. (B)



Here, time = constant

$D \propto S$

$\dfrac{D_A}{D_B} = \dfrac{U_A}{U_B}$

$\Rightarrow \frac{100}{80} = \frac{U_A}{U_B}$

$\Rightarrow \frac{U_A}{U_B} = \frac{5}{4}$

Here, Distance is constant.

Let A takes t see

$\Rightarrow$ B takes $(t + 4)$ sec

$U \propto \frac{1}{T}$

$\Rightarrow \frac{U_A}{U_B} = \frac{T_B}{T_A}$

$\Rightarrow \frac{5}{4} = \frac{t+4}{t}$

$\Rightarrow 5t = 4t + 10$

$\Rightarrow t = 16$ sec

$\therefore$ Required speed $= \frac{100\,\text{m}}{16\,\text{sec}}$

$= \frac{25}{4}$ m/s

$= 6\frac{1}{4}$ m/s

48. (A)

	A : B
Ratio of time =	8 : 20
	= 2 : 5

Ratio of speed = 5 : 2

[As Distance = Constant]

First meeting at starting point = LCM(8,20) = 40 min

From the speed ratio, we know this is the 7th (=5 +2) meeting.

$\therefore$ Time of first meeting $= \frac{40}{7}$ min $= 5\frac{5}{7}$ min

49. (A) Let Father's age be = $20x$

younger son age = $4x$

elder son age = $5x$

when elder son has lived thrice time his present age

Age of elder son = $3\times5x = 15x$

Age of father = $20x + 10x = 30x$

younger son age = $4x + 10x + 14x$

ATQ, $30x - (2 \times 14x) = 3$

$\Rightarrow 30x - 28x = 3$

$\Rightarrow 2x = 3$

$\Rightarrow x = 15$

$\therefore$ Father's age = $20x = 20\times1.5 = 30$ years

50. (B)

	Boat		Road		Rail
Ratio of distance =	$4x$	:	$3x$	:	$6x$
Ratio of speed =	$4y$	:	$3y$	:	$6y$

Ratio of time = $\frac{4x}{4y} : \frac{3x}{3y} : \frac{6x}{6y}$

= 1 : 1 : 1

51. (C) Let number of ₹ 1 coins = $3x$

Number of 50p coin = $5x$

Number of 10p coins = $7x$

ATQ,

$3x \times 1 + 5x \times \frac{1}{2} + 7x \times \frac{1}{10} = 155$

$\Rightarrow x\left(3 + \frac{5}{2} + \frac{7}{10}\right) = 155$

$\Rightarrow x\left(\frac{30+25+7}{10}\right) = 155$

$\Rightarrow x\left(\frac{62}{10}\right) = 155$

$\Rightarrow x = 25$

$\therefore$ Required number of coins

$= 3x + 5x + 7x = 15x = 15 \times 25 = 375$

52. (C) Let the third pipe fill the tank in = x hr

Second pipe fill the tank in = $(x + 4)$hr

First Pipe fill the tank in = $(x + 9)$hr

ATQ,

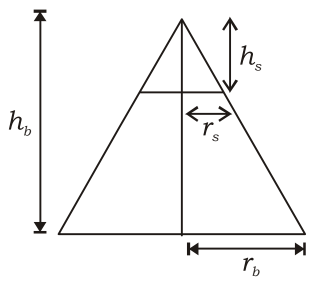
$\frac{1}{x} = \frac{1}{x+4} + \frac{1}{x+9}$

$\Rightarrow x = \sqrt{4\times9} = 6$ hrs

$\therefore$ Time taken by first pipe = $x + 9$

= 6 + 9 = 15 hrs

53. (D)



Here,

$\frac{r_b}{r_s} = \frac{h_b}{h_s}$

Volume of small cone $= \frac{\text{Volume of big cone}}{27}$

$\Rightarrow \frac{1}{3}\pi(r_s)^2\, h_s = \frac{\frac{1}{3}\pi(r_b)^2(h_b)}{27}$

$\Rightarrow \frac{r_b^2 \times h_b}{r_s^a \times h_s} = 27$

$\Rightarrow \frac{r_b \times r_b \times h_b}{r_s \times r_s \times h_s} = \frac{3\times3\times3}{1\times1\times1}$

$\Rightarrow \frac{h_b}{h_s} = \frac{3}{1}$

$\Rightarrow h_s = \frac{h_b}{3} = \frac{30}{3} = 10$ cm

∴ Required height
= (30 −10) = 20 cm

54. (B) For the Frustum — For the cylinder
$r_1 = 9$ cm — $r = 4$ cm
$r_2 = 4$ cm — $h = 10$ cm
$h = 12$ cm

$l = \sqrt{h^2 + (r_1 - r_2)^2}$

$= \sqrt{12^2 + (9-4)^2}$

$= \sqrt{144 + 25}$

$= \sqrt{169}$

= 13 cm

∴ Area of the sheet required
= area of frustum + area of cylinder
$= \pi(r_1 + r_2)l + 2\pi rh$

$= \frac{22}{7}[(9+4)\times 13 + 2\times 4\times 10]$

$= \frac{22}{7}(169 + 80)$

$= \frac{22}{7} \times 249$

= 782.57 cm^2

55. (C) Curved surface area of cone
= Area of sector of circle

$\Rightarrow \pi rl = \pi R^2 \frac{120°}{360°}$

Here, $l = R$

$r = 15 \times \frac{120°}{360°} = 5$ cm

$h = \sqrt{225 - 25} = 10\sqrt{2}$ cm

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

$= \frac{1}{3} \times \pi \times (5)^2 \times 10\sqrt{2}$

$= 250\sqrt{2}\,\frac{\pi}{3}\pi$ cm^3

56. (A) Let the increment in cm be x
New volume of cylinder $= \pi(10 + x)^2 \times 4$
New volume of cylinder $= \pi 10^2(4 + x)$
ATQ,
$\pi(10 + x)^2 \times 4 = \pi \times 10^2 \times (4 + x)$
$\Rightarrow (10 + x)^2 \times 4 = 100(4 + x)$
$\Rightarrow (10 + x)^2 = 25(4 + x)$
$\Rightarrow 100 + x^2 + 20x = 100 + 25x$
$\Rightarrow x^2 - 5x = 0$
$\Rightarrow x(x - 5) = 0$
$\Rightarrow x = 0$ cm or $x = 5$ cm
∴ $x = 5$ cm

57. (C) Let $x = 35\alpha$ and $y = 35b$
where a, b are coprime
ATQ,
$x + y = 1085$
$35\alpha + 25\beta = 1085$
$\alpha + \beta = 31$
$\Rightarrow$ Possible value of (α, β)
= (1, 30)(2, 29)(3, 28)(4, 27)(5, 26)
(6, 25)(7, 24)(8, 23)(9, 22)(10, 21)
(11, 20)(12, 19)(13,18)(14,17)(15,16)
∴ No. of possible pair of (x, y) = 15

58. (A) Let x be the initial no. of people in the company
ATQ,

$\frac{35x + 5\times 32}{x + 5} = 34$

$\Rightarrow 35x + 160 = 34x + 170$
$\Rightarrow x = 10$

59. (D)

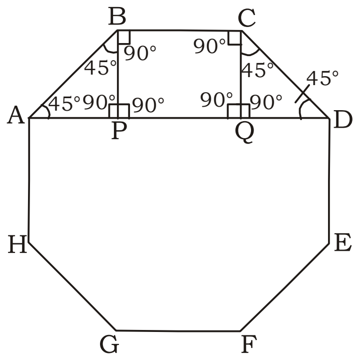
Divisors	3	4	7
Remainders-	2	1	4

Least such number = [(4×4+1)×3] +2
= 51 + 2 = 53
N = Generalized number = (3×4×7)n + 53
where n = 0, 1, 2, 3 ....
N = 84n + 53
∴ Required remainder = 53

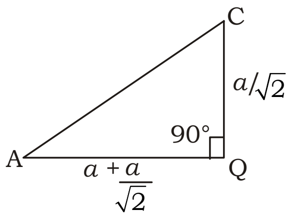
60. (D) Sum of all external angle = 360°

Each external angle $= \frac{360°}{8} = 45°$

Each internal angle = 180° – 45° = 135°



Joining A and D and drawing perpendiculor from B and C to AD.
Let AB = BC = CD = a
$\Rightarrow$ PQ = a [BPQC is a rectangle]
$\Rightarrow$ AP = BP = CQ = QD = $a/\sqrt{2}$
Now, smallest diagonal is AC and largest diagonal is AE
In ΔACQ,



$$AC = \sqrt{(AQ)^2 + (CQ)^2}$$

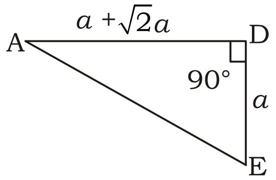
$$= \sqrt{\left(a + \frac{a}{\sqrt{2}}\right)^2 + \left(\frac{a}{\sqrt{2}}\right)^2}$$

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

$$= a\sqrt{1 + \frac{1}{2} + 2 \times 1 \times \frac{1}{\sqrt{2}} + \frac{1}{2}}$$

$$= a\sqrt{2 + \sqrt{2}}$$

In ΔADE



$$AE = \sqrt{\left(a + \sqrt{2}a\right)^2 + a^2}$$

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

$$= a\sqrt{1 + 2 + 2\sqrt{2} + 1} = a\sqrt{4 + 2\sqrt{2}}$$

$$= \sqrt{2}\ a\ \sqrt{2 + \sqrt{2}}$$

∴ Required ratio = AE : AC

$$= \sqrt{2}\ \sqrt{2 + \sqrt{2}} : a\sqrt{2 + \sqrt{2}}$$

$$= \sqrt{2} : 1$$

61. (C) $a^2 - b^2 = 288$

$(a - b)(a + b) = 25 \times 32$

when $(a + b)$ is even, $a - b$ must be even.

when $(a + b)$ is odd, $a - b$ must be odd.

Possible solutions:

$(a - b)(a + b) = 2 \times 144$

$(a - b)(a + b) = 4 \times 72$

$(a - b)(a + b) = 6 \times 48$

$(a - b)(a + b) = 8 \times 36$

$(a - b)(a + b) = 12 \times 24$

$(a - b)(a + b) = 16 \times 18$

For each equation, we get one nutural number solution.

∴ Number of possible natural number pairs = 6

for each natural number pairs, we have four pair of intgral solution.

For example

$a + b = 144$

$a - b = 2$

$a = \frac{144 + 2}{2}$ $\quad$ $b = \frac{144 - 2}{2}$

$a = 73$ $\quad$ $b = 71$

Natural number pairs = (73, 71)

corresponding integral pairs

= (73, 71)(–73, 71)

(73, –71)(–73, –71)

∴ Required number of integral pairs

= 6×4 = 24

62. (A) $\angle CAD = \angle CBD = 60°$[On same segment]

Now,

$\angle BAD = \angle BAC + \angle CAD$

$= 30° + 60° = 90°$

$\angle BAD + \angle BCD = 180°$ [ABCD is cyclic]

⇒ $90° + \angle BCD = 180°$

⇒ $\angle BCD = 180° - 90° = 90°$

63. (D) EF||DC

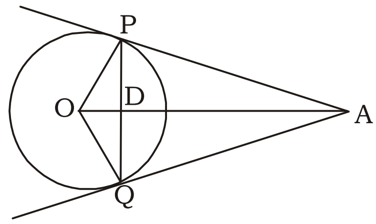
$\Delta EGF \sim \Delta CGD$ (By AA similarity)

⇒ $\frac{EG}{GC} = \frac{EF}{DC}$

⇒ $\frac{5}{10} = \frac{EF}{18}$

⇒ $EF = \frac{18 \times 5}{10} = 9$ cm

64. (A)



$\angle PAQ = 68°$

⇒ $\angle PAO = \frac{68°}{2} = 34°$

In ΔAPD

$\angle APD + \angle PAD + \angle ADP = 180°$

⇒ $\angle APD + 34° + 90° = 180°$

⇒ $\angle APD = 56°$

⇒ $\angle APD = \angle APQ = 56°$

∴ $\angle APQ = 56°$

65. (A) Total profit = ₹60000

Reinvestment = 40%

Bonus to employees = 30% of 60°% =18%

Charity = 20% of 60% = 12%

⇒ Advertisement =100 – (40 +18+12) = 30%

∴ Amount spent on advertisement

$= ₹60000 \times \frac{30}{100}$

$= ₹18000$

66. (D)

I: $\frac{2}{3} = \frac{20}{30}$ II: $\frac{4}{5} = \frac{24}{30}$

$\frac{7}{10} = \frac{21}{30}$

3 : 1

$\therefore$ Required Ratio = 3 : 1

67. (B) $y^2 = (64x^3 \div 27a^{-3})^{-2/3}$

$\Rightarrow y^2 = \left(\frac{4^3 x^3}{3^3 a^{-3}}\right)^{-2/3}$

$= \left(\frac{4^3 x^3 a^3}{3^3}\right)^{-\frac{2}{3}}$

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

$\Rightarrow y^2 = \left(\frac{4xa}{3}\right)^{-2}$

$= \left(\frac{3}{4xa}\right)^2$

$\Rightarrow y^2 = \left(\frac{3}{4xa}\right)^2$

$\Rightarrow y = \frac{3}{4ax}$

68. (B) ATQ,

$\frac{A}{2} = \frac{2}{3}B = \frac{3}{4}C = \frac{4}{5}D$

$\Rightarrow$ A : B = 4 : 3
and, B : C = 9 : 8
and, C : D = 16 : 15

$\Rightarrow$ A : B : C : D = (4×9×16):(3×9×16):(3×8×16):(3×8×15)
A : B : C : D = 576 : 432 : 384 : 360

$\therefore$ Required Ratio = A : D = 576 : 360
= 8 : 5

69. (D) Let their initial investment be x, $2x$, $4x$
Ratio of their investment during whole years

$= \left(x \times 6 + \frac{3x}{2} \times 6\right) : (2x \times 6 + 4x \times 6) : (4x \times 6 + 3x \times 6)$

$= 15x : 36x : 42x$

$= 5x : 12x : 14x = 5 : 12 : 14$

$\therefore$ Required Profit share ratio = 5 :12 :14

70. (A) Profit share of A and B
= 52000×12 : 39000×8 = 2 : 1
Let the total profit = ₹x
B recieve 25% as commission for managing business.
Remaining 75% of the total profit will be shared between A and B in the ratio 2 : 1.
ATQ,

$0.25x + \frac{1}{3} \times 0.75x = 20000$

$\Rightarrow x = 40000$

$\therefore$ Required profit share of A
= 40000 – share of B = 40000 – 20000
= ₹20000

71. (B) Let efficiency of boys and women be x, y respectively.
ATQ,
$6(6x + 8y) = (14x + 10y) \times 4$

$\Rightarrow 12(3x + 4y) = 8(7x + 5y)$

$\Rightarrow 3(3x + 4y) = 2(7x + 5y)$

$\Rightarrow 9x + 12y = 14x + 10y$

$\Rightarrow 2y = 5x$

$\Rightarrow y = 2.5x$

Let $x = 2$ & $y = 5$
Total work = $6(6x + 8y)$
= 6(6×2 + 8×5) = 6(12 + 40)
= 6 × 52
Now,
Combined efficiency of 1 boy & 1 women
= 2 + 5 = 7 unit/days

$\therefore$ Required number of days

$= \frac{6 \times 52 \text{ units}}{7 \text{ unit/day}} = \frac{312}{7}$ days

$= 44\frac{4}{7}$ days

72. (C) ATQ,

$25 < \frac{26 + 29 + n + 35 + 43}{5} < 35$

$\Rightarrow 125 < 133 + n < 175$

$\Rightarrow -8 < n < 42$

and, $n > \frac{26 + 29 + 35 + 43}{4} = 33.25$

$\therefore 33 < n < 42$

73. (A) E = Expense, S = Saving, I = Income
E : S = 5 : 3

$\Rightarrow$ I : E : S = 5 + 3 : 5 : 3 = 8 : 5 : 3
let income = 800 units, Expenses = 500 units, Savings = 300 units
New Income = 800 +200 = 1000 units
New Expenses = 500 + 300 = 800 units

$\Rightarrow$ New savings = 200 units
ATQ,
300 units – 200 units = ₹3500

$\Rightarrow$ 1 unit = ₹35

$\therefore$ New income = 1000 units = ₹35000

74. (C)

	M_1	M_2	M_3
Production ⇒	25%	35%	40%
Defective products ⇒	2%	4%	5%
Non defective product	98%	96%	95%

∴ Non defective products percentage
= 25×0.98 + 35×0.96 + 40×0.95 = 96.1%

75. (C)

Day	Initail Amount	Sales	Remaining	Rotten	for next day
I.	x	$0.5x$	$0.5x$	$0.05x$	$0.45x$
II.	$0.45x$	$0.225x$	$0.225x$	$0.0225x$	$0.2025x$
III.	$0.2025x$	$0.10125x$	$0.10125x$	$0.010125x$	

⇒ Total rotten mangoes
= $(0.05 + 0.0225 + 0.010125)x = 1983$

⇒ $x = 24000$

76. (A) $P_1 \propto \frac{T}{V}$

$\Rightarrow P = K\frac{T}{V}$

$P_2 = K\frac{T+0.4T}{V-0.2V}$

$= \frac{K\times 1.4T}{0.8V} = K\frac{7}{4}\frac{T}{V}$

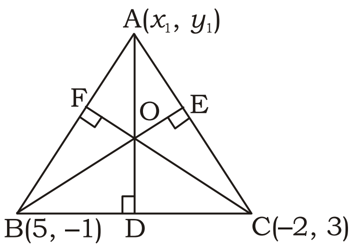
$\frac{P_2 - P_1}{P_1} = \left(\frac{\frac{7}{4}\frac{T}{V}-\frac{T}{V}}{\frac{T}{V}}\right) = \left(\frac{\frac{7}{4}-1}{1}\right) = \frac{3}{4}$

percetage increase = $\frac{3}{4}\times 100 = 75\%$

∴ New pressure will be increased by 75%

77. (C) Let $A(x_1, y_1)$ be the third vertex.
let AD, BE, CF be the perpendicular from the vertices on the opposite side BC, CA, AB respectively.

⇒ Orthocentre = Intersection of AD, BE & CF.



Slope of BO × slope of BC = –1 [BA ⊥ OC]

$\Rightarrow \frac{y_1 - 0}{x_1 - 0}\times\frac{3-(-1)}{-2-5} = -1$

$\Rightarrow y_1 = \frac{7x_1}{4}$

Slope of CA × slope of OB = –1

$\Rightarrow \frac{-1-0}{5-0}\times\frac{y_1-3}{x_1+2} = -1$

$\Rightarrow 5x_1 + 10 = y_1 - 3$

$\Rightarrow x_1 = -4$

$\Rightarrow 5x_1 + 10 = \frac{7x_1}{4} - 3$

$\Rightarrow y = \frac{7x_1}{4} = \frac{7(-4)}{4} = -7$

∴ Required coordinate of A = $(x_1, y_1) = (-4, -7)$

78. (A) Let the initial amount of honey in the Jar was K,

$\Rightarrow 512 = K\left(1-\frac{20}{100}\right)^4$

$\Rightarrow 512 = K\left(1-\frac{1}{5}\right)^4$

$\Rightarrow 512 = K\left(\frac{4}{5}\right)^4$

$\Rightarrow K = \frac{512\times 625}{256}$

⇒ K = 1250 gm

∴ K = 1.25 kg

79. (A)

G   30
    25
(30–25)   (25–G)

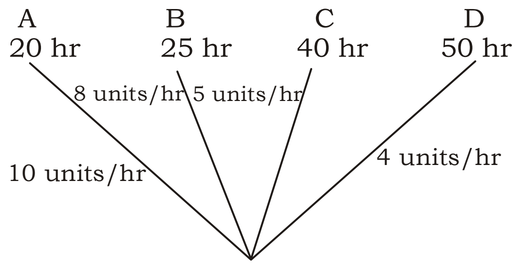
ATQ,

$\Rightarrow \frac{30-25}{25-G} = \frac{x}{2x}$

$\Rightarrow \frac{30-25}{25-G} = \frac{1}{2}$

⇒ G = 15 kg

80. (B)



Let Tank volume = 5×5×2×2×2 = 200 units

At 10:00 am units filled = 4 hrs by A + 2hrs by B + 1 hrs by C
= (4×10+2×8+1×5+0×4) = 40+16+5
= 61 units

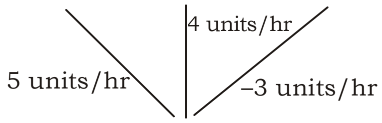
Now,
Combined efficiency = 10 + 8 + 5 + 4
= 27 units/hr

⇒ Time after 10:00 am to fill the tank

$= \frac{200-61}{27} = 5.14$ hrs = 5 hrs 9 min

∴ Required time
=10:00 am + 5 hr 9 min
= 3:09 pm

81. (A) A 12 hr, B 15 hr, C 20



Tank volume = 3×5×4 units = 60 units
let tank will be filled after x hours.

$\Rightarrow 5x + 4(x-1) - 3(x-2) = 60$
$\Rightarrow 5x + 4x - 4 - 3x + 6 = 60$
$\Rightarrow 6x = 58$
$\Rightarrow x = \frac{58}{6}$
$\Rightarrow x = \frac{29}{3} = 9\frac{2}{3}$ hours

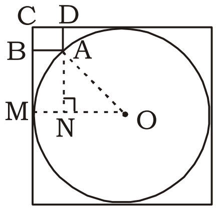
82. (B) Let r be the ratio & h be the height of cylinder.
ATQ,
r + h = 35 cm
and, $2\pi r^2 + 2\pi rh = 1540$
$\Rightarrow 2\pi r(r + h) = 1540$
$\Rightarrow 2\pi r(35) = 1540$
$\Rightarrow 2\pi r = 44$ cm
∴ Circumterence of the base of cylinder

83. (C) $x \neq 0 \Rightarrow$ least value of $x = 1$
and $y > x \Rightarrow$ least value of $y = 2$

y	x	z	$x+y \times z$	No. of numbers
2	1	0,1	1×1×2	2
3	1, 2	0,1,2	2×1×3	6
.				
.				
.				
9	1,2,3...,7,8	0,1,2,3...7,8	8×1×9	72

∴ Required number of numbers = 1×1×2 + 2×1×3 + 3×1×4 + 4×1×5 + 5×1×6 + 6×1×7 + 7×1×8 + 8×1×9 = 240

84. (C)



Draw the perpendicuter OM and AN as shown in figure and join the point A and O, where O is the centre of circle.
In ΔANO
$(OA)^2 = (ON)^2 + (AN)^2$
$\Rightarrow (OA)^2 = (MO - MN)^2 + (DN - DA)^2$
$\Rightarrow r^2 = (r - 10)^2 + (r - 20)^2$
$\Rightarrow r = 50$ cm

85. (C) Let a be the common root
$a^3 + 3a^2 + 4a + 5 = 0$
$a^3 + 2a^2 + 7a + 3 = 0$
Comparing these two equations
$a^3 + 3a^2 + 4a + 5 = a^3 + 2a^2 + 7a + 3$
$\Rightarrow (a^2 - 3a + 2) = 0$
$\Rightarrow (a-2)(a-1) = 0$
$\Rightarrow a = 1, 2$
∴ Number of common roots = 2

86. (A) $\angle OCT = 90°$ [OC = radius & CT = tangent]
$\Rightarrow \angle OCT = \angle OCA + \angle ACT = 90°$
$\Rightarrow \angle OCA = 90° - 50° = 40°$
$\Rightarrow \angle OCA = \angle CAO = 40°$ [OC=OA = radius]
$\Rightarrow \angle COA = 180 - (\angle OCA + \angle CAO)$
$\Rightarrow \angle COA = 180° - 80° = 100°$
Now,
$\angle CAB = \angle ACT + \angle ATC$
[$\angle CAB$ external angle of ΔACT]
$\angle CAB = 50° + 30° = 80°$
$\angle CAB = \angle CAO + \angle OAB = 80°$
$\angle OAB + 40° = 80°$
$\angle OAB = 40°$
$\angle OAB = \angle ABO = 40°$ [OA = OB = radius]
$\angle BOA = 180° - (\angle DAB + \angle ABO)$
$= 180° - (40° + 40°) = 100°$

87. (D) $y = \cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{3+....}}}}$

$\Rightarrow y = \cfrac{1}{2+\cfrac{1}{3+y}}$

$\Rightarrow y = \frac{3+y}{6+2y+1}$

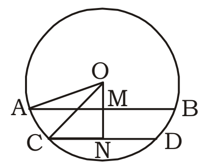
$\Rightarrow 2y^2 + 6y + y = 3 + y$
$\Rightarrow 2y^2 + 6y - 3 = 0$

$\Rightarrow y = \frac{-6 \pm \sqrt{36+24}}{4} = \frac{-3 \pm \sqrt{15}}{2}$

∴ $y = \frac{\sqrt{15} - 3}{2}$ [As $y > 0$]

88. (A) Let B, G be the number of boy & girls respectively.
ATQ,
${}^{B}C_2 = 190 \Rightarrow B = 20$
${}^{G}C_2 = 45 \Rightarrow G = 10$
$\Rightarrow$ Total number of players = 20+10 = 30
∴ Number of matches between single boy & single girl.
$= 20C_1 \times 10C_1 = 20 \times 10 = 200$

89. (D) Case A. Both chord same side of centre



$OM = \sqrt{(AO)^2 - (AM)^2} = \sqrt{(20)^2 - (16)^2}$

= 12 cm

$ON = \sqrt{(OC)^2 - (CN)^2} = \sqrt{(20)^2 - (12)^2} = 16\text{ cm}$

∴ Required distance = 16 – 12 = 4 cm

Case B. Both chord opposite side of centre.

∴ Required distance distance = 16 +12 = 28 cm

90. (A) $\sqrt{1 + \frac{1}{1^2} + \frac{1}{2^2}} = \frac{3}{2} = 2 - \frac{1}{2}$

$\sqrt{1 + \frac{1}{1^2} + \frac{1}{2^2}} + \sqrt{1 + \frac{1}{2^2} + \frac{1}{3^2}} = \frac{3}{2} + \frac{7}{6} = \frac{8}{3}$

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

$\sqrt{1 + \frac{1}{1^2} + \frac{1}{2^2}} + \sqrt{1 + \frac{1}{2^2} + \frac{1}{3^2}} + \sqrt{1 + \frac{1}{3^2} + \frac{1}{4^2}}$

$= \frac{3}{2} + \frac{7}{6} + \frac{13}{12}$

$= \frac{15}{4} = 4 - \frac{1}{4}$

If clearly indicates that

$\Rightarrow \sqrt{1 + \frac{1}{1^2} + \frac{1}{2^2}} + \sqrt{1 + \frac{1}{2^2} + \frac{1}{3^2}} + \ldots\ldots\ldots$

$\ldots\ldots + \sqrt{1 + \frac{1}{2007^2} + \frac{1}{2008^2}} = 2008 - \frac{1}{2008}$

91. (C) Required number of persons = 450 + 250 + 150 +75 +50 +25 = 1000

92. (B) Required number of persons = 250 + 150 = 400

93. (C) Required ratio = 250 : 75 = 10 : 3

94. (C) Age group 15 – 20

Ratio = $\frac{450}{1000} = \frac{9}{20}$

95. (D) Required percentage = $\frac{25}{500} \times 100 = 5$

96. (D) Expenditure on clothing & miscellaneous

= (20 + 30)% of 25000 = ₹12500

97. (C) Total expenditure = $\frac{15000}{(10+20)} \times 100$

= 50,000

98. (D) 360° = 100%

$54° = \frac{54}{3.6} \times 100\% = 15\%$

Now, Miscellaneous food = 30% –15%

15% = 54°

99. (B) Required percentage = $\frac{15-10}{15} \times 100$

= 33.33%

100. (D) $90° = \frac{90}{360} \times 100\% = 25\%$

Travelling & entertainment joint cover 25% which is equal to 90°.

SSC TIER II (MATHS) MOCK TEST - 45 (ANSWER KEY)

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

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