SSC TIER II (MATHS) MOCK TEST - 34 (SOLUTION)

1. (B) Last two digits of 7^n
7^1 – 07
7^2 – 49
7^3 – 43
7^4 – 01
Cyclicity of 7^n is 4.
$145 = 4 \times 36 + 1$
$7^{145} \rightarrow 7^{4\times36+1} \rightarrow 7^1 \rightarrow 07$
$\Rightarrow$ Last two digits of 7^n is 07
$\therefore$ Required sum = 0 + 7 = 7

2. (D) Let Ajay and Vijay's present age be $2x$, $3x$.
4 years ago their age was $2x-4$, $3x-4$
A.T.Q.,
$2x-4 : 3x-4 = 3 : 5$

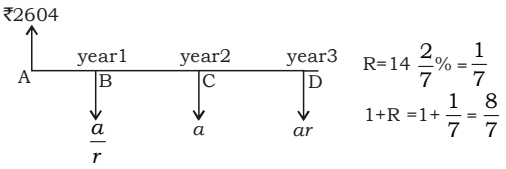
$$\frac{2x-4}{3x-4} = \frac{3}{5}$$

$10x - 20 = 9x - 12$
$x = 20 - 12 = 8$
$\therefore$ Vijay's present age = $3x$ = 24 years

3. (C) Let the installments be $\frac{a}{r}$, a, ar
Total payment = 3584

$$\therefore \frac{a}{r} + a + ar = 3584$$

$$\Rightarrow \frac{a}{r}(1 + r + r^2) = 3584 \quad \ldots(i)$$



Shifting all installment back to point A and equating

$$\frac{a}{r}\times\frac{7}{8} + a\times\frac{7}{8}\times\frac{7}{8} + ar\times\frac{7}{8}\times\frac{7}{8}\times\frac{7}{8} = ₹2604$$

$$\frac{a}{r}\left[\frac{448 + 392r + 343r^2}{512}\right] = 2604$$

$$\frac{a}{r}[448 + 392r + 343r^2] = 2604\times512 \quad \ldots(ii)$$

Dividing equation (i) by equation (ii)

$$\Rightarrow \frac{1 + r + r^2}{448 + 392r + 343r^2} = \frac{3584}{2604\times512} = \frac{1}{372}$$

$\Rightarrow 372 + 372r + 372r^2 = 448 + 392r + 343r^2$
$\Rightarrow 29r^2 - 20r - 76 = 0$
$\Rightarrow 29r^2 - 58r + 38r - 76 = 0$
$\Rightarrow 29r(r-2) + 38(r-2) = 0$
$\Rightarrow r = 2$ as $r \neq \frac{-38}{29}$ (G.P is increasing)

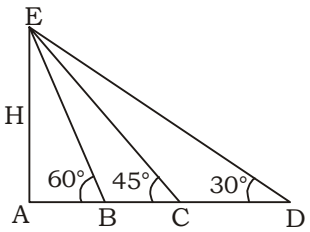
Now, $\frac{a}{2}(1 + r + r^2) = 3584 \quad \ldots(i)$

$$\frac{a}{2}(1 + 2 + 4) = 3584$$

$$\frac{a}{2} = \frac{3584}{7} = 512$$

$2a = 512 \times 4 = ₹2048$
$\therefore$ Last installment = $ar = 2a$ = ₹2048

4. (A)



Let the height of tower be H.
In ΔABE

$$\frac{H}{AB} = \tan60° = \sqrt{3}$$

$$\Rightarrow AB = \frac{H}{\sqrt{3}}$$

In ΔACE

$$\frac{H}{AC} = \tan45° = 1$$

$\Rightarrow AC = H$
In ΔADE

$$\frac{H}{AD} = \tan30° = \frac{1}{\sqrt{3}}$$

$\Rightarrow AD = \sqrt{3}\,H$
ATQ, speed of car is constant,
So, Distance α time

$$\frac{CD}{BC} = \frac{T_{CD}}{T_{BC}}$$

$$\frac{CD}{BC} = \frac{173\,sec}{T_{BC}}$$

$$\frac{CD}{BC} = \frac{AD - AC}{AC - AB} = \frac{\sqrt{3}H - H}{H - \frac{H}{\sqrt{3}}} = \frac{173}{T_{BC}}$$

$$\frac{\sqrt{3}-1}{\frac{\sqrt{3}-1}{\sqrt{3}}} = \frac{173}{T_{BC}}$$

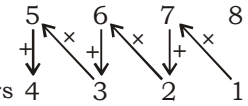
$$\sqrt{3} = \frac{173}{T_{BC}}$$

$$T_{BC} = \frac{173}{\sqrt{3}} = \frac{173}{1.73} = 100 \text{ sec}$$

As, BC = 500 m
and T_{BC} = 100 sec

$\therefore$ Speed of car = $\frac{BC}{T_{BC}} = \frac{500\,m}{100\,sec} = 5$ m/s

5. (D) Divisors 5 6 7 8



Remianders 4 3 2 1

Step1. $7 \times 1 + 2 = 9$
Step2. $9 \times 6 + 3 = 57$
Step3. $57 \times 5 + 4 = 289$

$\Rightarrow$ least such number = 289
Generalized number
N = n(product of divisors) + least such number.
where n = 0, 1, 2, ...

$\Rightarrow$ N = $n(5\times6\times7\times8) + 289$
$\Rightarrow$ N = $n(5\times2\times3\times7\times4\times2) + 289$
N = $n(5\times2\times2\times3\times7\times4) + 289$
N = $n(20 \times 84) + 289$
On division by 84, N will always have same remainder

$\therefore$ Required remainder = Remainder $\left(\frac{289}{84}\right)$
= 37

6. (B) Let $x = Ha$ and $y = Hb$
where H = HCF (x, y)
and x, y are coprime

$\Rightarrow$ LCM = Hab
A.T.Q,
HCF(x, y) + LCM(x, y) = H + Hab = 91
$\Rightarrow$ H + Hab = 13 × 7
$\Rightarrow$ H(1 + ab) = 13 × 7
when H=1, 1+ ab =91
$\Rightarrow$ ab = 90 = $2\times3\times3\times5$
Total possible pairs = $2^{3-1} = 2^2 = 4$
when H =7, 1+ ab =13
$\Rightarrow$ ab =12 = 2 × 6 = 2 × 2 × 3
Total possible pairs = $2^{2-1} = 2^1 = 2$
when H = 13, 1+ ab = 7
$\Rightarrow$ ab = 6 = 2 ×3
Total possible pairs = $2^{2-1} = 2^1 = 2$
when H = 91, 1 + ab = 1
$\Rightarrow$ ab = 0
No pair possible in this case
Hence total possible pairs = 4 + 2 + 2
$\therefore$ Required no. of pairs = 8 pairs

7. (A) $1080 = 2\times2\times2\times3\times3\times3\times5 = 2^3\times3^3\times5^1$

m	n	p
2^0	3^0	5^0
2^2	3^2	

$\Rightarrow m = 2$, $n = 2$ & $p = 1$

No of all possible perfect square factors
= $m \times n \times p = 2\times2 \times1 = 4$

8. (B) A.T.Q.,

$$x + \frac{6}{x} = 5 \Rightarrow x^2 - 5x + 6 = 0$$

$\Rightarrow$ x = 2 and 3
and , $(y - x)^3 = (y - 2)^3 = 1$
$\Rightarrow$ $(y - 2)^3 = 1^3$
$\Rightarrow$ $y - 2 = 1$
$\Rightarrow$ $y = 3$
$\Rightarrow$ $(x + y)^2 = (2 + 3)^2$
$\Rightarrow$ $(x + y)^2 = 5^2 = 25$
$\therefore$ $(x + y)^2 = 25$

9. (D) A,B and C can Complete the entire work in 20, 25 and 100 days respectively.
Let the total work be LCM (20, 25, 100) = 100 units

A's efficiency = $\frac{100 \text{ units}}{20 \text{ days}} = 5$ units/day

B's efficiency = $\frac{100 \text{ units}}{25 \text{ days}} = 4$ units/day

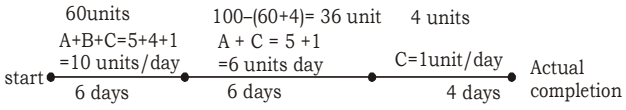
C's efficiency = $\frac{100 \text{ units}}{100 \text{ days}} = 1$ unit/day

A, B and C were supposed to do the work together

$\therefore$ Scheduled time = $\frac{100 \text{ units}}{(5+4+1) \text{ unit/days}}$
= 10 days

$\Rightarrow$ B left after 6 days

Drawing worker's-Time line



6 day's A, B, C work =(5+4+1)×6= 60units
4 day's C's work = 1× 4 = 4 units
Remaining work = 100 –(60+4) = 36 units
As, this remaining work was done by A & C
Time taken by A & C to complete 36 units

$= \frac{36 \text{ units}}{6 \text{ unit/days}} = 6$ days

Now,
A works for = 6 + 6 = 12 days
B works for = 6 days
C works for = 6 + 6 + 4 = 16 days
Ratio of A, B & C work =12×5 : 4×6 :16×1
= 60 : 24 :16 =15 : 6 : 4

$\therefore$ C's share = ₹15000 × $\frac{4}{(15+6+4)}$ = ₹2400

10. (C) Let the number be $10x + y$
A.T.Q.,

$$\frac{10x+y}{10y+x}=\frac{4}{7}$$

$\Rightarrow 70x + 7y = 40y + 4x$

$\Rightarrow 66x = 33y \Rightarrow \frac{x}{y}=\frac{1}{2}$

$\Rightarrow$ Possible numbers, xy = 12, 24, 36, 48 and its reverse yx = 21, 42, 63, 84
$\therefore$ Required sum = 12 + 21 + 24 + 42 + 36 + 63 + 48 + 84 = 330

11. (B) Average of 9 consecutive numbers is 5th number = let a_5 = T
Average of 12 consecutive numbers

$$= \frac{a_6+a_7}{2}$$

$a_6 = a_5 + 1 = T + 1$
$a_7 = a_5 + 2 = T + 2$

$\therefore$ New average $= \frac{a_6+a_7}{2}=\frac{T+1+T+2}{2}$

$$= \frac{2T+3}{2} = T + 1.5$$

$\therefore$ Required increase in average = 1.5

12. (C) 8cos A + 15 sin A + 15

$$= 17\left(\frac{8}{17}\cos A+\frac{15}{17}\sin A\right)+15$$

= 17(sinB cosA + cosB. sinA) + 15

$$\left[\text{Let}\frac{8}{17}=\sin B \,\&\, \frac{15}{17}=\cos B\right]$$

= 17 sin(A + B) + 15
Now,
$[+1 < \sin(A + B) \le -1]$

$\Rightarrow [\sin(A + B)]_{min} = -1$
$\Rightarrow [\sin(A + B)]max = 1$
$\therefore$ Required max value = 17 ×1+15 = 32
& Required min value = 17 × –1+15 = –2

13. (A)

	A	B	A + B
TIME	x	$x+12$	$x-4$

$$\frac{1}{x-4} = \frac{1}{x}+\frac{1}{x+12}$$

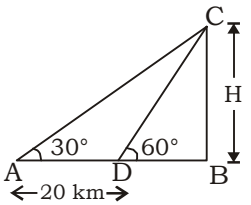
Let $y = x - 4$

$$\Rightarrow \frac{1}{y}=\frac{1}{y+4}+\frac{1}{y+16}$$

$\Rightarrow y = \sqrt{4\times16} = 8$ hrs
$\Rightarrow x = y + 4 = 8 + 4 = 12$ hrs
$\Rightarrow x - 4 = 12 - 4 = 8$ hrs
A + B will take 8 hr to complete the work
$\therefore$ A + B will take 16 hr to complete twice difficult work.

14. (A) $(3^{33} + 3^{33} + 3^{33}).(2^{33} + 2^{33}) = 6^x$
$3^{33}(1 + 1+ 1).2^{33}(1 + 1) = 6^x$
$\Rightarrow (3.3^{33}).(2.2^{33}) = 6^x$
$\Rightarrow 3^{34}.2^{34} = 6^x$
$\Rightarrow 6^{34} = 6^x \Rightarrow x = 34$

15. (C) Case A:



In ΔABC

$$\frac{AB}{H} = \cot 30°$$

$\Rightarrow AB = \sqrt{3}\,H$
In ΔBDC

$$\frac{DB}{H} = \cot 60°$$

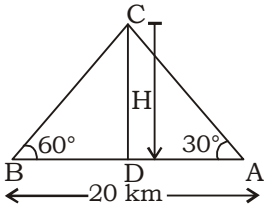
$$\Rightarrow BD = \frac{H}{\sqrt{3}} = 20$$

AD = AB – BD = 20

$$\Rightarrow \sqrt{3}\,H - \frac{H}{\sqrt{3}} = 20$$

$$\Rightarrow \frac{3H-H}{\sqrt{3}} = 20$$

$\Rightarrow 2H = 20\sqrt{3}$
$\Rightarrow H = 10\sqrt{3}$ km
Case B:



In ΔADC

$$\frac{AD}{H} = \cot 30°$$

$\Rightarrow AD = H\sqrt{3}$
In ΔBDC

$$\frac{BD}{H} = \cot 60°$$

$$\Rightarrow BD = \frac{H}{\sqrt{3}}$$

AB = AD + BD = 20

$$\Rightarrow \sqrt{3}\,H + \frac{H}{\sqrt{3}} = 20 \Rightarrow \frac{3H+H}{\sqrt{3}} = 20$$

$\Rightarrow$ $4H = 20\sqrt{3}$ $\Rightarrow$ $H = 5\sqrt{3}$ km

16. (B) $t = \dfrac{2\sin x}{1+\cos x+\sin x}$

$\Rightarrow \dfrac{2\sin x}{1+\cos x+\sin x} \times \dfrac{(1+\sin x-\cos x)}{(1+\sin x-\cos x)}$

$\Rightarrow t = 2\sin x \times \dfrac{1+\sin x-\cos x}{((1+\sin x)^2-\cos^2 x)}$

$\Rightarrow t = 2\sin x\left(\dfrac{1+\sin x-\cos x}{1+\sin^2 x+2\sin x-\cos^2 x}\right)$

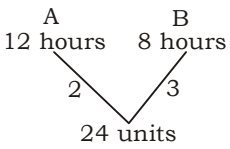
$\Rightarrow t = 2\sin x \times \dfrac{1+\sin x-\cos x}{(\cos^2 x+\sin^2 x)+\sin^2 x+2\sin x-\cos^2 x}$

$\Rightarrow t = 2\sin x\left(\dfrac{1+\sin x-\cos x}{2\sin^2 x+2\sin x}\right)$

$\Rightarrow t = 2\sin x \times \dfrac{(1+\sin x-\cos x)}{2\sin x(1+\sin x)}$

$\Rightarrow t = \dfrac{1-\cos x+\sin x}{1+\sin x}$

17. (C)



B's efficiency = (3 – 2) = 1 unit/day

$\therefore$ Time taken by B = $\dfrac{24}{1}$ days = 24 days

18. (B) $\cos A + \cos^2 A = 1$

$\Rightarrow \cos A = \sin^2 A$

$\Rightarrow \cos^2 A = \sin^4 A$

$\Rightarrow 1 - \sin^2 A = \sin^4 A$

$\Rightarrow 1 = (\sin^4 A + \sin^2 A)$

$\Rightarrow 1^3 = (\sin^4 A + \sin^2 A)^3$

$\Rightarrow 1 = \sin^{12} A + \sin^6 A + 3\sin^8 A + \sin^{10} A$

$\Rightarrow \sin^{12} A + \sin^6 A + 3\sin^8 A + 3\sin^{10} A - 1 = 0$

$\Rightarrow \sin^{12} A + 3\sin^{10} A + 3\sin^8 A + \sin^6 A - 1 = 10$

On comparing with given equation

$a = 1$, $b = 3$, $c = 3$, $d = 1$

Now, $a + \dfrac{2b}{c} + d = 1 + \dfrac{2\times 3}{3} + 1 = 1 + 2 + 1 = 4$

19. (B) Let the distance between cities be = x

Time taken by car A = $\dfrac{x}{72}$

Time taken by car B = $\dfrac{x}{90}$

A.T.Q.,

$\dfrac{x}{72} - \dfrac{x}{90} = 1$

LCM (72, 90) = 360

Value of x may be 360 or its multiple.

Verification :

$\dfrac{360}{72} - \dfrac{360}{90} = 5 - 4 = 1$

$\therefore$ $x = 360$ km

20. (C) A.T.Q,

$12A = 16B = 15C$

$\Rightarrow A : B : C = \dfrac{1}{12} : \dfrac{1}{16} : \dfrac{1}{15}$

$\Rightarrow A : B : C = 16\times 15 : 12\times 15 : 12\times 16$

$= 4\times 5 : 3\times 5 : 4\times 4$

$\Rightarrow A : B : C = 20 : 15 : 16$

21. (B) $\tan\phi + \sin\phi = m$

$\tan\phi - \sin\phi = n$

Adding both equation, we get

$\tan\phi = \dfrac{(m+n)}{2}$

$\Rightarrow \cot\theta = \left(\dfrac{2}{m+n}\right)$

Substracting both equation, we get

$\sin\phi = \dfrac{m-n}{2}$

$\Rightarrow \operatorname{cosec}\theta = \dfrac{2}{m-n}$

As, $\operatorname{cosec}^2\theta - \cot^2\theta = 1$

$\Rightarrow \left(\dfrac{2}{m-n}\right)^2 - \left(\dfrac{2}{m+n}\right)^2 = 1$

$\Rightarrow \dfrac{4\left[(m+n)^2-(m-n)^2\right]}{(m^2-n^2)^2} = 1$

$\Rightarrow \dfrac{4(4mn)}{(m^2-n^2)^2} = 1$

$\Rightarrow (m^2-n^2)^2 = 4(4mn)$

$\Rightarrow (m^2-n^2) = \sqrt{4\times 4mn}$

$\Rightarrow (m^2-n^2) = 4\sqrt{mn}$

22. (B) $\sin\theta + \sin^2\theta = 1$ ...(i)

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

$\Rightarrow \sin\theta = \cos^2\theta$ ...(ii)

$\Rightarrow \dfrac{\sin\theta}{\cos\theta} = \cos\theta$

$\Rightarrow \tan\theta = \cos\theta$ ...(iii)

Putting value of $\sin\theta$ from eq(ii) to eq(i)

$\cos^2\theta + (\cos^2\theta)^2 = 1$ ...(iv)

Putting value of $\cos\theta$ from eq(iii) to eq(iv)

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

$\Rightarrow (\sec^2\theta - 1) + (\sec^2\theta - 1)^2 = 1$

$\Rightarrow \sec^2\theta - 1 + \sec^4\theta + 1 - 2\sec^2\theta = 1$

$\Rightarrow \sec^4\theta - \sec^2\theta = 1$ ...(v)

Squaring both sides

$\sec^8\theta + \sec^4\theta - 2\sec^6 = 1$

Multiplying both side by 3
$3\sec^8\theta + 3\sec^4\theta - 6\sec^6\theta = 3$
Adding equation (v)

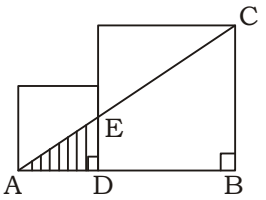
$\Rightarrow 3\sec^8\theta+3\sec^4\theta - 6\sec^6\theta +\sec^4\theta - \sec^2\theta = 3 +1 = 4$

$\Rightarrow 3\sec^8\theta - 6\sec^6\theta + 4\sec^4\theta - \sec^2\theta +1= 4 +1$

$\Rightarrow 3\sec^8\theta - 6\sec^6\theta + 4\sec^4\theta - \sec^2\theta +1= 5$

$\therefore 3\sec^8\theta - 6\sec^6\theta + 4\sec^4\theta - \sec^2\theta +1= 5$

23. (B)



According basic proportionality theorem (DE||BC)

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

$$\Rightarrow \frac{8}{28} = \frac{DE}{20}$$

$$\Rightarrow DE = \frac{8\times 20}{28} = \frac{2\times 20}{7} = \frac{40}{7}\text{ cm}$$

Now,

$$\text{Area of } \Delta ADE = \frac{1}{2}\times AD \times DE$$

$$= \frac{1}{2}\times 8 \times \frac{40}{7} = \frac{160}{7}\text{ cm}^2$$

$\therefore$ Required Area $= \frac{160}{7}\text{ cm}^2$

24. (A) $x = \frac{4\sqrt{ab}}{\sqrt{a}+\sqrt{b}}$

$$\Rightarrow \frac{x}{2\sqrt{a}} = \frac{2\sqrt{b}}{\sqrt{a}+\sqrt{b}} \ \&\ \frac{x}{2\sqrt{b}} = \frac{2\sqrt{a}}{\sqrt{a}+\sqrt{b}}$$

Applying componendo & dividendo

$$\frac{x+2\sqrt{a}}{x-2\sqrt{a}} = \frac{2\sqrt{b}+\sqrt{a}+\sqrt{b}}{2\sqrt{b}-\sqrt{a}-\sqrt{b}} = \frac{3\sqrt{b}+\sqrt{a}}{\sqrt{b}-\sqrt{a}} \quad ...(i)$$

and $\frac{x}{2\sqrt{b}} = \frac{2\sqrt{a}}{\sqrt{a}+\sqrt{b}}$

$$\frac{x+2\sqrt{b}}{x-2\sqrt{b}} = \frac{2\sqrt{a}+\sqrt{a}+\sqrt{b}}{2\sqrt{a}-\sqrt{a}-\sqrt{b}} = \frac{3\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}} \quad ...(ii)$$

Adding (i) and (ii)

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

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

$$= \frac{2\left(\sqrt{b}-\sqrt{a}\right)}{\sqrt{b}-\sqrt{a}} = 2$$

25. (A) Cummulative surface area of two pieces = 25% more than surface area of sphere.

$\Rightarrow$ Area of two pieces $= 1.25 \times 4\pi r^2 = 5\pi r^2$

$\Rightarrow$ Extra Area $= 5\pi r^2 - 4\pi r^2 = \pi r^2$

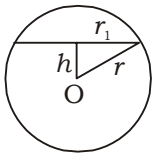
Now,
Extra Area = Area of 2 new equal circles created

$\Rightarrow$ Area of each new circle $= \frac{\pi r^2}{2}$

let the radius of new circle be r_1

Now, $\pi r_1^2 = \frac{\pi r^2}{2}$

$\Rightarrow r_1 = \frac{r}{\sqrt{2}}$



Now, r_1, h and r are sides of right angle triangles

$\Rightarrow h^2 + r_1^2 = r^2$

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

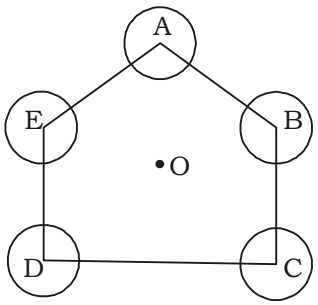
$\Rightarrow h^2 = \frac{r^2}{2}$

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

26. (C) Average of n(odd) number in AP = middle number
Average of n = 35 even numbers (AP) = 18^{th} term.

$\Rightarrow 18^{th}$ term = 44
let first term (smallest term) be = a
$T_n = a + (n-1)d$
$44 = a + (18-1)\times 2$
$44 = a + 34$
$a = 44 - 34 = 10$

27. (B)



Sum of all internal angle of pentagon
$= (5-2)\times 180° = 540°$

$\Rightarrow \angle A + \angle B + \angle C + \angle D + \angle E = 540°$

$\therefore$ Required area $= \frac{540°}{360°} \times \pi r^2$

$= 1.5\pi r^2$

28. (A) Area of $\Delta = \frac{1}{2} \times 8 \times 15 \times \sin\theta$

angle between sides (8 cm & 15 cm)
Maximum value of $\theta = 90°$

$(\text{Area})_{\max} = \frac{1}{2} \times 8 \times 15 = 60 \text{ cm}^2$

$\therefore$ Required Area $\angle 60 \text{ cm}^2$
$\therefore$ option (A) is correct.

29. (B) Let r be the circumradius of ΔABC,
$\therefore$ $R = 2 + r$
We know from the properties of equilateral triangle.

$r = \frac{\text{sides}}{\sqrt{3}} = \frac{4}{\sqrt{3}}$

$\therefore$ Radius of circle circumcribing the figure

$= R = 2 + \frac{4}{\sqrt{3}} = \frac{(2\sqrt{3}+4)}{\sqrt{3}}$

$\therefore$ Required area $= \pi.R^2 = \pi.\frac{(2\sqrt{3}+4)^2}{(\sqrt{3})^2}$

$= \frac{\pi}{3}(4 + 2\sqrt{3})^2$

30. (D) Let x be number of boys
& y be number of girls
A.T.Q.,

$\frac{\frac{x}{2}+y}{\frac{x}{2}} = \frac{3}{2}$

$\Rightarrow \frac{x}{2} + y = \frac{3}{2}\cdot\frac{x}{2}$
$\Rightarrow 2x + 4y = 3x$
$\Rightarrow 4y = x$

$\therefore$ Required percentage $= \frac{y}{x+y} \times 100$

$= \frac{y}{4y+y} \times 100$

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

31. (D) Let the number be N
A.T.Q,
$N = 6q_1 + 5$ ...(i)
$N = 5q_2 + 3$ ...(ii)

Multiplying equation (i) by 5
and equation (ii) by 6
$5N = 30q_1 + 25$ ...(iii)
$6N = 30q_2 + 18$ ...(iv)
Substracting equation (iii) from eq(iv)
$6N - 5N = 30(q_2 - q_1) + 18 - 25$
$\Rightarrow N = 30(q_2 - q_1) - 7$ ...(v)
Adding and substrating 30
$\Rightarrow N = 30(q_2 - q_1 - 1) + 30 - 7$
$\Rightarrow N = 30x + 23$ [where $x = (q_2 - q_1 - 1)$]
For least value of N, $x = 0$
$\Rightarrow N = 23$
$\therefore$ Required number = 23
$\therefore$ Required sum of digits of number = 2 + 3 = 5

32. (A) Let the efficiency of a man = 2 units/day
efficiency of a woman(minimum) =1unit/day
efficiency of a woman(maximum) = 2units/day

Case A
when efficiency of a woman =1 unit/day
Total work = $(4 \times 2 + 6\times 1)24 = 14\times 24$ units

$\therefore$ Required time(maximum) $= \frac{14\times 24}{(2\times 2 + 6\times 1)}$

$= \frac{14\times 24}{10} = 33.6$ days

Case B
when efficiency of a woman =2 units/day
Total work = $(4\times 2 + 6\times 2)\times 24$ units
$= 20\times 24$ units

$\therefore$ Required time(minimum) $= \frac{20\times 24}{(2\times 2 + 6\times 2)}$

$= \frac{20\times 24}{16}$ days = 30 days

$\therefore$ Required range = 30 to 33.6 days

33. (A) $5^x = 30^{-y} = 6^z = k$

$5 = k^{\frac{1}{x}}$

$30 = k^{\frac{-1}{y}}$

$6 = k^{\frac{1}{z}}$

Now, $5 \times 6 = 30$

$\Rightarrow k^{\frac{1}{x}} \cdot k^{\frac{+1}{z}} = k^{\frac{-1}{y}}$

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

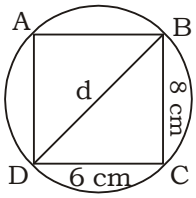
$\Rightarrow \frac{1}{x} + \frac{1}{z} = \frac{-1}{y}$

$\Rightarrow \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 0$

$\Rightarrow \frac{xy+yz+zx}{xyz} = 0$

$\Rightarrow \frac{xy+yz+zx}{3xyz} = 0$

34. (A)



Sum of opposite angles of cyclic quadrileteral = 180°

$\Rightarrow \angle A + \angle C = 180°$

& $\angle B + \angle D = 180°$

A.T.Q.,

$\angle A = \angle C$ & $\angle B = \angle D$

$\Rightarrow \angle A = \angle B = \angle C = \angle D = 90°$

$\Rightarrow$ ABCD is a rectangle.

Now, in right angle ΔBCD

$\Rightarrow d^2 = (6)^2 + (8)^2$

$\Rightarrow d^2 = 36 + 64$

$\Rightarrow d^2 = 100$

$\Rightarrow d = 10$ cm

$\Rightarrow r = 5$ cm

$\therefore$ Area of circle $= \pi r^2 = \pi(5)^2 = 25\pi$ sq. cm.

35. (C) Let CP = ₹100

MP = 100 + 25% of 100 = ₹125

S.P = ₹125 – 10% of 125

= ₹125 –12.5 = 112.5

$\therefore$ profit% $= \frac{12.5}{100} \times 100 = 12.5$

36. (B) CP:15 mango $\rightarrow$ ₹20

$\Rightarrow$ 60 mangos $\rightarrow$ ₹80

SP:20 mango $\rightarrow$ ₹15

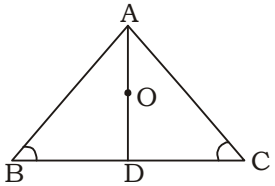
$\Rightarrow$ 60 mangos $\rightarrow$ ₹45

As, SP < CP $\Rightarrow$ loss

Loss% $= \frac{80-45}{80} \times 100 = \frac{35}{80} \times 100$

$\therefore$ Loss $= 43\frac{3}{4}\%$

37. (D)



In equilateral triangle, or the centre, centroid and incentre all lies at one point.

$\Rightarrow$ Point O is also centroid

for centriod : AO : OD = 2 : 1

$\Rightarrow$ AO : AD = 2 : 3

Now, In ΔADC, $\angle D = 90°$

$AD^2 = AC^2 - DC^2 = 10^2 - 5^2 = 100 - 25 = 75$

$\Rightarrow AD = 5\sqrt{3}$

$\Rightarrow AO = 5\frac{\sqrt{3}}{3} \times 2 = \frac{10\sqrt{3}}{3}$ cm.

38. (C) Let the number of males = x

$\Rightarrow$ Number of females = $9800 - x$

A.T.Q,

$\frac{108}{100}x + (9800 - x) \times \frac{105}{100} = 10458$

$\Rightarrow 108x + 9800 \times 105 - 105x = 1045800$

$\Rightarrow 3x + 1029000 = 1045800$

$\Rightarrow x = \frac{1054800 - 1029000}{3} = \frac{16800}{3} = 5600$

39. (B) Let the principal be ₹x and time in y years

A.T.Q.,

$\frac{x \times 10 \times y}{100} = 35 - x$

$\Rightarrow y = \frac{35-x}{x} \times 10$ ...(i)

& $\frac{x \times 8 \times y}{100} = 30 - x$

$\Rightarrow y = \frac{(30-x)}{x} \times 12.5$ ...(ii)

Equating (i) and (ii)

$\frac{10}{x}(35 - x) = \frac{12.5}{x}(30 - x)$

$\Rightarrow 350 - 10x = 375 - 12.5x$

$\Rightarrow 2.5x = 25 \Rightarrow x =$ ₹10

$\Rightarrow y = \frac{35-10}{10} \times 10 = 25$ years

$\therefore$ Required time = 25 years.

40. (A) $x = \frac{\sqrt{2}+1}{\sqrt{2}-1} = \frac{(\sqrt{2}+1)(\sqrt{2}+1)}{(\sqrt{2}-1)(\sqrt{2}+1)}$

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

$\frac{1}{x} = \frac{1}{(3+2\sqrt{2})} = \frac{(3-2\sqrt{2})}{(3+2\sqrt{2})(3-2\sqrt{2})} = \frac{3-2\sqrt{2}}{9-8}$

$\frac{1}{x} = (3 - 2\sqrt{2})$

Now, $x + \frac{1}{x} = 3 + 2\sqrt{2} + 3 - 2\sqrt{2} = 6$

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

Now, $\frac{x^5+x^4+x^2+x}{x^3}$

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

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

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

$= (6)^2 - 2 + 6$

$= 36 - 2 + 6 = 36 + 4 = 40$

41. (C) Let T be the maximum & p be the passing marks

A.T.Q.,

$30\%\ T = P + 20$

$20\%\ T = P - 5$

$10\%\ T = 20 + 5$

$\Rightarrow 10\%\ T = 25$

$\Rightarrow T = 250$

Now, $20\%\ T = P - 5$

$\Rightarrow P = 20\%\ T + 5 = \frac{1}{5} \times 250 + 5 = 55$

$\therefore$ Required percentage $= \frac{55}{250} \times 100 = 22$

42. (C) Let the age of A and B be $7x$, $9x$

Difference between ages remains constant.

$\Rightarrow 9x - 7x = 2$

$2x = 2$

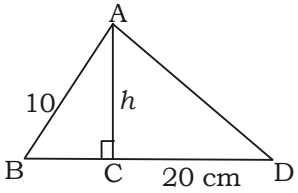
$x = 1$

$\therefore$ Their ages are = 7, 9

$\Rightarrow$ After 6 years their ages are = 13, 15

$\therefore$ Required sum of age = 15 + 13 = 28 years

43. (A)



A.T.Q.,

Area $= \frac{1}{2} \times 20 \times h = 80$

$\Rightarrow h = 8$ cm

In ΔABC

$AB^2 = BC^2 + AC^2$

$\Rightarrow 10^2 = BC^2 + 8^2$

$\Rightarrow BC = 6$ cm

$\Rightarrow CD = BD - BC = 20 - 6 = 14$ cm

In ΔACD

$AD^2 = AC^2 + CD^2$

$\Rightarrow AD^2 = 8^2 + 14^2$

$\Rightarrow AD^2 = 64 + 196$

$\Rightarrow AD = \sqrt{260}$ cm

44. (D) C.I(Annually) $= ₹10,00,000 \times \frac{10}{100} = ₹100,000$

C.I (Semiannually) $= ₹10,00,000 \times \frac{5}{100}$

$+ ₹10,00,000 \times \frac{5}{100} + ₹10,00,000 \times \frac{5}{100} \times \frac{5}{100}$

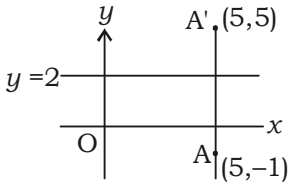
$= 50,000 + 50,000 + 2500$

$= ₹100,000 + 2500$

$\therefore$ Required difference = ₹2500

45. (B) Centroid $= \left(\frac{1+4-2}{3}, \frac{-5+0+2}{3}\right)$

$= (1, -1)$



Reflection point A' = (5, 5)

$\therefore$ Required Distance $= \sqrt{(5-1)^2+(5-(-1)^2)}$

$= \sqrt{(4)^2+(6)^2}$

$= \sqrt{16+36} = \sqrt{52}$

46. (B) D is mid point of B and C

$\Rightarrow$ Coordinates of D $= \left(\frac{5+3}{2}, \frac{-4+2}{2}\right) = (4,-1)$

Equation of AD : A(–1, –3) & D(4, –1)

$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

$\Rightarrow y - (-3) = \frac{-1-(-3)}{4-(-1)}(x-(-1))$

$\Rightarrow y + 3 = \frac{2}{5}(x+1)$

$\Rightarrow 5y + 15 = 2x + 2$

$\Rightarrow 2x - 5y = 13$

47. (A) We know

$5AC^2 = 4(AD^2 + EC^2)$

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

$\Rightarrow 125 = 4\left(\frac{45}{4} + CE^2\right)$

$\Rightarrow 125 = 45 + 4CE^2$

$\Rightarrow CE^2 = \frac{125-45}{4} = 20$

$\Rightarrow CE = 2\sqrt{5}$ cm

48. (C) $(316)^{3^{4n}} \Rightarrow$ always has unit digit as 6

$\Rightarrow$ Unit digit of $(316)^{3^{4n}} + 1 \Rightarrow 7$

As,
45! = multiple of 4
23! = multiple of 4

$(34)^{45!} = (34)^{4m} \xrightarrow{\text{Unit digit}} (4)^{\text{even}} = (4)^2 \Rightarrow 6$

$(36)^{23!}$ alway has unit digit as 6

$\therefore$ Required unit digit = unit digit of $(7\times6\times6) = 2$

49. (A) A.T.Q.,

$\frac{n(n+1)}{2} = 703$ m where m = 1,2,3....

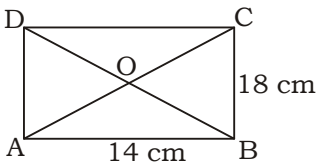
For the least value of n, m = 1

$\frac{n(n+1)}{2} = 703$

$\Rightarrow n(n+1) = 1406$

$\Rightarrow n(n+1) = 37\times38 \Rightarrow n = 37$

50. (B)



Applying Appollonius theorem

$AB^2 + BC^2 = 2(BO^2 + AO^2)$

$\Rightarrow AB^2 + BC^2 = 2(BO^2 + 64)$

$\Rightarrow 196 + 324 = 2(BO^2 + 64)$

$\Rightarrow BO^2 = 196 \Rightarrow BO = 14$ cm

$\Rightarrow BD = 2BO = 28$ cm

51. (D) $\frac{m}{n} = \frac{1}{2}$

Ratio of their interior angle $= \frac{\frac{(m-2)\times180}{m}}{\frac{(n-2)\times180}{n}}$

$= \frac{(m-2)n}{(n-2)m}$

A.T.Q.,

$\frac{(m-2)n}{(n-2)m} = \frac{3}{4}$

$\Rightarrow \frac{m-2}{n-2}\left(\frac{2}{1}\right) = \frac{3}{4}$

$\Rightarrow 8(m-2) = 3(n-2)$

$\Rightarrow 8m - 16 = 3n - 6$

$\Rightarrow 8m - 3n = 10$

$\Rightarrow 8m - 3\times2m = 10$

$\Rightarrow 2m = 10$

$\Rightarrow m = 5,\ n = 10$

52. (C) $\angle EAY + \angle YAO + \angle OAB = 180°$

$\Rightarrow 60° + 35° + \angle OAB = 180°$

$\Rightarrow \angle OAB = 180 - 95°$

$\Rightarrow \angle OAB = 85°$

In $\angle AOB$

$\angle BAO + \angle AOB + \angle OBA = 180°$

$\Rightarrow 85° + x° + 20° = 180°$

$\Rightarrow x° = 180 - 105$

$\Rightarrow x = 75°$

53. (C) BD bisects $\angle B$

$\Rightarrow \frac{2x}{3y+8} = \frac{x}{2y}$

$\Rightarrow \frac{2x}{x} = \frac{3y+8}{2y} \Rightarrow 2 = \frac{3y+8}{2y}$

$\Rightarrow 4y = 3y + 8$

$\Rightarrow y = 8$

Now,
$BC = 3y + 8 = 24 + 8 = 32$
$DC = 2y = 16$
In ΔBCD

$\Rightarrow BD^2 = BC^2 - CD^2 = (32^2 - 16^2)$

$\Rightarrow BD^2 = (32 - 16)(32 + 16)$

$\Rightarrow BD^2 = 16 \times 48$ ...(i)

In ΔBDA

$BD^2 = AB^2 - AD^2$

$\Rightarrow BD^2 = (2x)^2 - x^2 = 3x^2$ ...(ii)

equating (i) & (ii)

$\Rightarrow 16 \times 48 = 3x^2$

$\Rightarrow x^2 = 16 \times 16$

$\Rightarrow x = 16$

54. (C) Let the number be $48x$, $48y$
where x, y are coprime
A.T.Q,
$48x + 48y = 384$
$x + y = 8$ Possible solution
x, y are coprime $\Rightarrow x = 1,\ y = 7$
$x = 3,\ y = 5$

$\Rightarrow 48y - 48x = 48(y - x)$
$x = 1$ and $y = 7$, $48y - 48x = 48(7-1) = 288$
$x = 3$ and $y = 5$, $48y - 48x = 48(5-3) = 96$

$\therefore$ Required difference = 228

55. (A) Let the marks of one the students be x
The marks of other student = $x + 9$
A.T.Q,

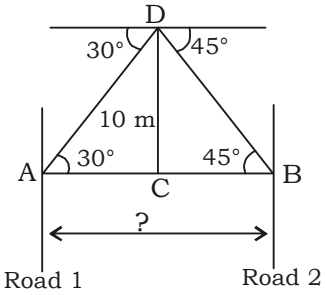
$\frac{x+9}{x+x+9} = \frac{56}{100}$

$\Rightarrow \frac{x+9}{2x+9} = \frac{14}{25}$

$\Rightarrow 25x + 225 = 28x + 126$

$\Rightarrow 3x = 99$
$\Rightarrow x = 33$
$\Rightarrow x + 9 = 42$
$\therefore$ Required Individuel marks = 42, 33

56. (A)



In ΔCBD

$\tan 45° = \frac{CD}{CB}$

$\Rightarrow 1 = \frac{CD}{CB}$
$\Rightarrow CB = CD = 10$ m
$\Rightarrow$ In ΔACD

$\tan 30° = \frac{DC}{AC}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{DC}{AC}$

$\Rightarrow AC = 10\sqrt{3}$ m
$\Rightarrow$ Distance between roads = AC + CB
$= 10 + 10\sqrt{3}$
$= 27.32$ m

57. (C) $\frac{\sqrt{5+x}+\sqrt{5-x}}{\sqrt{5+x}-\sqrt{5-x}} = 3$

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

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

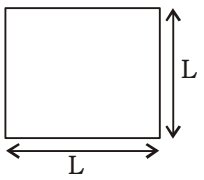
$\Rightarrow \frac{5+x+5-x+2\sqrt{(5+x)(5-x)}}{2x} = 3$

$\Rightarrow \frac{2\times 5+2\sqrt{(5+x)(5-x)}}{2x} = 3$

$\Rightarrow 5 + \sqrt{(5+x)(5-x)} = 3x$

$\Rightarrow \sqrt{25-x^2} = 3x - 5$
$\Rightarrow 25 - x^2 = (3x-5)^2$
$\Rightarrow 25 - x^2 = 9x^2 + 25 - 30x$
$\Rightarrow 10x^2 = 30x$
$\Rightarrow x = 3$

58. (D)



Let the length of side of the square is = L
Circumference of circular base of cylinder
$2\pi R = L$

$\Rightarrow R = \frac{L}{2\pi}$

$\therefore$ Required Ratio = $\frac{\frac{L}{2\pi}}{L} = \frac{1}{2\pi}$

59. (A) Volume of the hemisphere = $\frac{2}{3}\pi R^3$

Volume of cone = $\frac{1}{3}\pi R^2 H$

ATQ,

$\frac{2}{3}\pi R^3 = \frac{1}{3}\pi R^2 H$

$\Rightarrow 2R^3 = R^2H$
$\Rightarrow 2R = H$
$\Rightarrow H = 2R$

60. (C) Volume sphere = $\frac{4}{3}\pi.(7)^3$

Let the increase in height be h

Increase in volume $\Rightarrow \pi r^2 h = \frac{4}{3}\pi(7)^3$

$\Rightarrow \pi(84)^2 h = \frac{4}{3}\pi\, 7^3$

$\Rightarrow h = \frac{4}{3}\times\frac{7^3}{(84)^2} = \frac{1372}{21168} = 0.064$ cm

61. (B) Volume of tank = $1.54\times3\times5$ m^3
Let t be the required time
Water travel distance in pipe in t time $= 5t$
Volume of all water that travelled in pipe in t time
$= \pi(0.07)^2 \times 5t$
A.T.Q.,
$\pi(0.07)^2 \times 5t = 1.54 \times 3 \times 5$

$t = \frac{1.54\times3\times5\times7}{22\times5\times(0.07)^2} = 300$ sec $= 5$ min

62. (C) Area of semicircle with diameter AB

$= \frac{\pi}{2}\times\left(\frac{21}{2}\right)^2 = 173.25$ cm^2

Area of semicircle with diameter BC

$= \frac{\pi}{2} \times (14)^2 = 308$

Area of ΔABC [Right angle at B]

$= \frac{1}{2} \times 21 \times 28 = 294 \text{ cm}^2$

Area of semicircle with diameter AC

$= \frac{\pi}{2}(17.5)^2 = 481.25 \text{ cm}^2$

$\therefore$ Required area = (173.25 + 308) – (481.25 – 294)
= 481.25 – 481.25 + 294 = 294 cm^2

63. (A) Number is divisible by 36 = 9 × 4
Hence it must be divisible by both 9 & 4.
$\Rightarrow$ $x = 0$ must be divisible by 4
$\Rightarrow$ $x = 2, 4, 6, 8, 0$
and,
$x + 2 + 3 + 6 + x + 0$ must be divisible by 9.
$11 + 2x = 9m$, where m = 0,1, 2, 3,....
$\Rightarrow$ $x = 8$, when m = 3
Hence value of $x = 8$

64. (B) $7^{x-1} + 11^{x-1} = 170$
As, 170 is positive integer, so $(x-1)$ has to be only positive number.
x can be integer or non integer
As, $7^{x-1} + 11^{x-1}$ is always increasing, there can't be more than one value of x.

65. (D) A : B = B : C = C : D = 3 : 4
let A : B = 1 : x
A.T.Q,

$A : B = 3 : 4 = 1 : \frac{4}{3}$

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

A : B = 1 : x
$\Rightarrow$ B : C = x : x^2
$\Rightarrow$ C : D = x^2 : x^3
$\Rightarrow$ A : B : C : D = 1 : x : x^2 : x^3

Now, Required share $= \frac{1400 \times x^2}{1 + x + x^2 + x^3}$

$= \frac{1400 \times \left(\frac{4}{3}\right)^2}{1 + \frac{4}{3} + \left(\frac{4}{3}\right)^2 + \left(\frac{4}{3}\right)^3}$

$= \frac{1400 \times \frac{16}{9}}{\frac{27 + 36 + 48 + 64}{27}}$

$= 1400 \times \frac{48}{27 + 36 + 48 + 64}$

= ₹384

66. (A) Area of park = 60 × 40 = 2400 m^2
Area of lawn = 2109 m^2
$\Rightarrow$ Area of Road = (2400 – 2109) m^2=291 m^2
$\Rightarrow$ Area of road = $x(l + b - x)$
A.T.Q.,
$x(60 + 40 - x) = 291$
$\Rightarrow$ $x^2 - 100x + 291 = 0$
$\Rightarrow$ $(x - 97)(x - 3) = 0$
$\Rightarrow$ $x = 3$ or 97
as $x \neq 97$ $\Rightarrow x = 3$ m
$\therefore$ Required breadth = 3 m

67. (A) $\alpha + \beta = -\left(\frac{-1}{1}\right)$

$\Rightarrow \alpha + \beta = 1$

and $\alpha\beta = \frac{1}{1}$

$\Rightarrow \alpha\beta = 1$
Equation whose roots are = α^3 and β^3
$(x - \alpha^3)(x - \beta^3) = x^2 - (\alpha^3 + \beta^3)x + \alpha^3\beta^3 = 0$
$\Rightarrow$ $x^2 - (\alpha^3 + \beta^3)x + \alpha^3\beta^3 = 0$
Now, $\alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta) = 1^3 - 3 \times 1(1)$
= 1 – 3 = – 2
and $\alpha^3.\beta^3 = (\alpha\beta)^3 = 1$
$\therefore$ Required equation = $x^2 - (-2)x + 1$
= $x^2 + 2x + 1$

68. (D) $\frac{\text{wine (left)}}{\text{water added}} = \frac{343}{169}$

$\frac{\text{wine (left)}}{\text{(initial amount)}} = \frac{343}{(343 + 169)} = \frac{343}{512}$

A.T.Q,

$\frac{343}{512} = \left(1 - \frac{15}{k}\right)^3$

$\Rightarrow \left(\frac{7}{8}\right)^3 = \left(1 - \frac{15}{k}\right)^3$

$\Rightarrow$ k = 120 litre
$\therefore$ The initial amount of wine = 120 litre

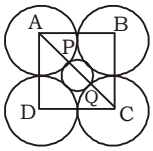
69. (B) $\sqrt{\frac{\left(3\frac{1}{4}\right)^4 - \left(4\frac{1}{3}\right)^4}{\left(3\frac{1}{4}\right)^2 - \left(4\frac{1}{3}\right)^2}} = \sqrt{\frac{\left(\frac{13}{4}\right)^4 - \left(\frac{13}{3}\right)^4}{\left(\frac{13}{4}\right)^2 - \left(\frac{13}{3}\right)^2}}$

$= \sqrt{\left(\frac{13}{4}\right)^2 + \left(\frac{13}{3}\right)^2}$

$= \sqrt{169 \times \frac{25}{144}} = 13 \times \frac{5}{12} = \frac{65}{12}$

$= 5\frac{5}{12}$

70. (B) Let radius of internal circle = r



ABCD is square with side 2R

$\Rightarrow$ Diagonal = AC = $\sqrt{2}$ (2R) = 2$\sqrt{2}$ R

PQ=AC– AP –AQ=2$\sqrt{2}$ R –R–R =(2$\sqrt{2}$ –2)R

$\Rightarrow$ $2r = 2R(\sqrt{2}-1)$

$\Rightarrow$ $r = R(\sqrt{2}-1)$

71. (A) $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$

Squaring both sides

$\sin^2\theta + \cos^2\theta + 2\sin\theta.\cos\theta = 2\cos^2\theta$

$\Rightarrow$ $2\sin\theta\cos\theta = \cos^2\theta - \sin^2\theta$

$\Rightarrow$ $2\sin\theta\cos\theta = (\cos\theta + \sin\theta)(\cos\theta - \sin\theta)$

$\Rightarrow$ $\cos\theta - \sin\theta = \dfrac{2\sin\theta\cos\theta}{\sqrt{2}\cos\theta} = \sqrt{2}\sin\theta$

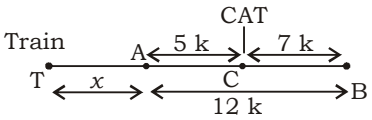
72. (B) Required sum

$= \text{Difference} \times \left(\dfrac{100}{r}\right)^2 \times \left(\dfrac{100}{300+r}\right)$

$= 122 \times \left(\dfrac{100}{5}\right)^2 \times \left(\dfrac{100}{305}\right)$

= ₹16000

73. (B)



Let the speed of train be u and the speed of cat be v and the train whistles at a point T, x km from A.

$\dfrac{u}{v} = \dfrac{x}{5\text{k}} = \dfrac{x+12\text{k}}{7\text{k}}$

$7x = 5(x + 12\text{ k})$

$\Rightarrow \dfrac{x}{\text{k}} = \dfrac{30}{1} \Rightarrow \dfrac{u}{v} = \dfrac{30}{5\times1} = \dfrac{6}{1}$

$\therefore$ Required ratio = 6 : 1

74. (D) Let work =3000 units =30 men ×100 days

Number of available days = 75 – 25

= 50 days

Number of men required = $\dfrac{3000}{50}$ =60 men

$\therefore$ He should increase (60 – 30) = 30 men

75. (C) let the number of apples be x

$\Rightarrow$ C.P. = $\dfrac{5x}{6}$

$\Rightarrow$ 20% of apples get wasted, Apple sold= $\dfrac{4x}{5}$

$\Rightarrow$ S.P = $\dfrac{4x}{5} \times \dfrac{7}{4} = \dfrac{7x}{5}$

Now,

$= \left(\dfrac{\text{S.P}}{\text{C.P}} - 1\right) \times 100 = \left(\dfrac{\frac{7x}{5}}{\frac{5x}{6}} - 1\right) 100$

$= \left(\dfrac{7\times6}{25} - 1\right) \times 100 = \left(\dfrac{42-25}{25}\right) \times 100$

= 17 × 4 = 68% profit

76. (A) $x = \dfrac{1}{2+\sqrt{3}} \times \dfrac{(2-\sqrt{3})}{(2-\sqrt{3})} = 2-\sqrt{3}$

$y = 2 + \sqrt{3}$

$xy = (2-\sqrt{3})(2+\sqrt{3}) = 4 - 3 = 1$

$x^2 + y^2 = (x+y)^2 - 2xy = (2-\sqrt{3}+2+\sqrt{3})^2 - 2$

= 16 – 2 = 14

$\therefore$ $8xy\,(x^2 + y^2) = 8 \times 14 = 112$

77. (B) Let t_1 & t_2 be original and changed time. S_1 & S_2 be original & changed speed

$S_1 \times S_2 = \dfrac{\text{Distance} \times (S_1 \sim S_2)}{(t_1 \sim t_2)} = \dfrac{80}{1} \times 4 = 320$

$t_1 \times t_2 = \dfrac{\text{Distance} \times (t_1 \sim t_2)}{(S_1 - S_2)}$

$\Rightarrow$ $S_1 \times (S_1 + 4) = 16 \times 20$

$\Rightarrow$ $S_1 \times (S_1 + 4) = 320$

S_1 = 16 km/hr S_2 = 20 km/hr

78. (A) $P = 1 + \sqrt{2} + \sqrt{3}$

$\Rightarrow$ $P - 1 = \sqrt{2} + \sqrt{3}$

$\Rightarrow$ $\dfrac{1}{P-1} = \dfrac{1}{(\sqrt{2}+\sqrt{3})}$

$\Rightarrow$ $\dfrac{1}{P-1} = \dfrac{(\sqrt{2}-\sqrt{3})}{(\sqrt{2}+\sqrt{3})(\sqrt{2}-\sqrt{3})} = \dfrac{\sqrt{2}-\sqrt{3}}{-1} = \sqrt{3}-\sqrt{2}$

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

$\Rightarrow$ $P + \dfrac{1}{P-1} + 3 = 4 + 2\sqrt{3}$

$\Rightarrow$ $P + \dfrac{1}{P-1} + 3 = (1)^2 + (\sqrt{3})^2 + 2\times1\times\sqrt{3}$

$\Rightarrow$ $P + \dfrac{1}{P-1} + 3 = (1+\sqrt{3})^2$

$\Rightarrow$ $\sqrt{P + \dfrac{1}{P-1} + 3} = (1+\sqrt{3})$

79. (A) Required Rate

$$= \frac{2 \times \text{Difference in C.I. \& S.I.}}{\text{S.I.}} \times 100$$

$$= \frac{2 \times 0.8}{40} \times 100 = 4\%$$

and, Required sum

$$= \frac{\text{Interest} \times 100}{\text{Rate} \times \text{time}} = \frac{40 \times 100}{4 \times 2}$$

= ₹500

80. (D) $P + \frac{2P}{3} + \frac{P}{2} + \frac{P}{7} = 97$

Here, we can clearly see, P must be divisible by 3, 2, 7

⇒ P must be multiple of 42

⇒ option (D) only such option

⇒ check option D

$$42 + 2 \times \frac{42}{3} + \frac{42}{2} + \frac{42}{7}$$

42 + 28 + 24 + 6 = 97

Hence option (D) is correct

81. (D) $\sqrt{a^2+b^2+ab} + \sqrt{a^2+b^2-ab} = 1$

$$\Rightarrow \sqrt{a^2+b^2+ab} = 1 - \sqrt{a^2+b^2-ab}$$

Squaring Both side

$$a^2+b^2+ab = 1 + a^2+b^2 - ab - 2\sqrt{a^2+b^2-ab}$$

$$\Rightarrow 2ab = 1 - 2\sqrt{a^2+b^2-ab}$$

$$\Rightarrow \sqrt{a^2+b^2-ab} = \frac{1-2ab}{2}$$

Squaring Both sides

$$a^2 + b^2 - ab = \frac{1+4a^2b^2-4ab}{4}$$

$$\Rightarrow 4a^2 + 4b^2 - 4ab = 1 + 4a^2b^2 - 4ab$$

$$\Rightarrow 4a^2b^2 - 4a^2 - 4b^2 = -1$$

$$\Rightarrow a^2b^2 - a^2 - b^2 = -\frac{1}{4}$$

Now,

$(1 - a^2)(1 - b^2) = 1 - a^2 - b^2 + a^2b^2$

$$= 1 + (a^2b^2 - a^2 - b^2) = 1 - \frac{1}{4} = \frac{3}{4}$$

82. (C) A.T.Q.,

Let the length of train be L

$$\Rightarrow \frac{L+260}{20} = 23$$

⇒ L = 200 m

∴ length larger train = 200 × 2.5 = 500 m

Speed of larger train = $72 \times \frac{3}{4} = 54$ km/h

= 15 m/s

∴ Required time $= \frac{500+200}{20+15} = \frac{700}{35} = 20$ sec

83. (B) Let distance travelled by car be x

and time by car be t

A.T.Q.,

$$\frac{x}{t} = 25$$

$$\Rightarrow \frac{434-x}{t-8} = 65$$

$$\Rightarrow \frac{434-x}{\frac{x}{25}-8} = 56$$

$$\Rightarrow 434 - x = 65\left(\frac{x}{25} - 8\right)$$

$$\Rightarrow 434 - x = \frac{13}{5}x - 8 \times 65$$

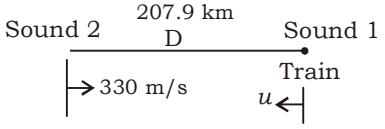
⇒ 5 × 434 – 5x = 13x – 8×65 ×5

⇒ 5 × 434 + 8×65×5 = 18x

⇒ 18x = 4770

⇒ x = 265 km

84. (C) Analysing the situation when sound 1 reached train.



D = 330 m/s × 630 sec = 207900 m

= 207.9 km

330 m/s = 66 × 18 km/hr

A.T.Q,

$$\Rightarrow \frac{207.9}{66 \times 18 + u} = \frac{10}{60}$$

$$\Rightarrow \frac{207.9}{66 \times 18 + u} = \frac{1}{6}$$

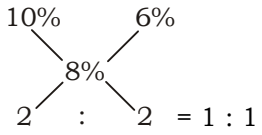
⇒ 207.9×6 = 66 ×18 = u

⇒ u = 207.9×6 – 66 ×18

⇒ u = 59.4 km/hr

85. (A) Annual interest = $\frac{2880}{4.5}$ = ₹640

Average interest rate = 8%



= ₹4000, ₹4000

$\therefore$ Required income $= \frac{4000 \times 10\% \times 2}{100} = ₹800$

86. (B) Price × consumption = Expenditure
As, Expenditure = constant
Price × consumption = constant

Price decrease = $-10\% = \frac{-1}{10}$

$\Rightarrow$ Consumption increase = $\frac{+1}{10-1} = \frac{+1}{9}$

$\frac{1}{9} \rightarrow 6.2$ kg

Total Amount $= 1 \rightarrow 6.2 \times 9$ kg $= 55.8$ kg

New total amount $= 1 + \frac{1}{9} \rightarrow 55.8 + 6.2$
$= 62$ kg

$\therefore$ Required new price $= \frac{₹279}{62\,\text{kg}} = ₹4.5/\text{kg}$

87. (A) Without stoppage speed $= 60\frac{\text{km}}{\text{hr}}$

$\Rightarrow \frac{60\,\text{min}}{60\ \text{km}} = \frac{1\,\text{min}}{\text{km}}$

With stoppage speed = 40 km/hr

$\Rightarrow \frac{60\,\text{min}}{40\ \text{km}} = \frac{\frac{3}{2}\text{min}}{1\ \text{km}} = \frac{1\frac{1}{2}\text{min}}{\text{km}}$

$\therefore$ Per km stoppage $= 1\frac{1}{2}\text{min} - 1\text{min} = \frac{1}{2}$ min

$\therefore$ Per km actual time $= \frac{1}{40}$ hr

$\therefore$ Required stoppage time/hr $= \frac{\frac{1}{2}\text{min}}{\frac{1}{40}\text{hr}}$

$= \frac{1}{2} \times 40$ min/hr
$= 20$ min/hr

88. (D) As, we know the radius of C_1, C_2, C_3, C_4, C_5 are in Geometric progression.
Let comman ratio = a
$r_1 = 16$,
$\Rightarrow r_2 = 16a$, $r_3 = 16a^2$, $r_4 = 16a^3$, $r_5 = 16a^4$
A.T.Q.,
$16a^4 = 256$
$\Rightarrow a^4 = 16$
$\Rightarrow a = 2$
$\Rightarrow r_2 = 32$ cm, $r_3 = 64$ cm, $r_4 = 128$ cm
$\therefore$ Required distance $= r_2 + 2r_3 + r_4 = 32 +$
$64 \times 2 + 128 = 288$ cm

89. (C) As we know,
Each internal angle of hexagon = 120°
and central angles = 60°

Area of regular hexagon $= 6.\frac{\sqrt{3}}{4}a^2$

$= 6.\frac{\sqrt{3}}{4} \times 144 = 216\sqrt{3}\ \text{cm}^2$

Area of triangle UPQ $= \frac{1}{2} \times 12 \times 12 \times \sin 120°$

$= \frac{1}{2} \times 12 \times 12 \times \sin(180 - 60°)$

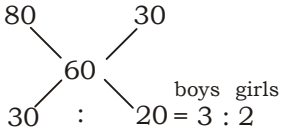
$= \frac{1}{2} \times 12 \times 12 \times \sin 60°$

$= \frac{1}{2} \times 12 \times 12 \times \frac{\sqrt{3}}{2} = 36\sqrt{3}\ \text{cm}^2$

Similarly, Area of QRS $= 36\sqrt{3}\ \text{cm}^2$
and Area of UTS $= 36\sqrt{3}\ \text{cm}^2$

$\therefore$ Required Area $= 216\sqrt{3} - (3 \times 36\sqrt{3})$
$= 108\sqrt{3}\ \text{cm}^2$

90. (C) Average money recieved $= \frac{3900}{65} = 60$p



$\therefore$ Number of boys $= \frac{3}{5} \times 65 = 39$

$\therefore$ Number of girls $= \frac{2}{5} \times 65 = 26$

91. (D) Required difference
$= 100000 \times \frac{(14 \times 65 - 18 \times 20)}{100 \times 100}$
$= 10 \times (910 - 360) = 5500$

92. (B) Suzuki $= 100000 \times \frac{10}{100} \times \frac{95}{100} = 9500$

Hyundai $= 100000 \times \frac{14}{100} \times \frac{65}{100} = 9100$

Fiat $= 100000 \times \frac{18}{100} \times \frac{20}{100} = 3600$

Toyota $= 100000 \times \frac{9}{100} \times \frac{55}{100} = 4950$

93. (C) $100000 \times \frac{10}{100} \times \frac{5}{100} = 500$

94. (A) Required difference

$$=100000\times\left[\left(\frac{23}{100}\right)\times\left(\frac{40}{100}\right)-\left(\frac{19}{100}\right)\times\left(\frac{30}{100}\right)\right]$$

$$=\frac{100000}{100\times100}\times(920-570)=3500$$

95. (D) Required percentage

$$=\left[\frac{23}{100}\times\frac{60}{100}+\frac{17}{100}\times\frac{55}{100}+\frac{18}{100}\times\frac{80}{100}+\frac{19}{100}\times\frac{30}{100}+\frac{14}{100}\times\frac{35}{100}+\frac{10}{100}\times\frac{5}{100}+\frac{9}{100}\times\frac{48}{100}\right]$$

$$=\left[\frac{23}{100}\times\frac{60}{100}+\frac{17}{100}\times\frac{55}{100}+\frac{18}{100}\times\frac{80}{100}+\frac{19}{100}\times\frac{30}{100}+\frac{14}{100}\times\frac{35}{100}+\frac{10}{100}\times\frac{5}{100}+\frac{9}{100}\times\frac{48}{100}\right]\times100$$

$= 52.96 = 53$

96. (D) Average price of vegetables in Agra in:

$$\text{Jan}=\frac{1}{4}\times(20+40+60+70)=₹47.5$$

$$\text{Feb}=\frac{1}{4}\times(30+50+60+70)=₹52.5$$

$$\text{March}=\frac{1}{4}\times(10+40+70+80)=₹50$$

$$\text{May}=\frac{1}{4}(30+50+70+80)=₹57.50$$

97. (A) Rate of beans in Agra in may = ₹50
Rate of onion in vrindavan in april

$$=40\times\frac{4}{3}=53.33$$

$\therefore$ Required percentage $=\frac{50}{53.33}\times100$

$= 93.75$

98. (D) Price of Potato in Agra in Jan = ₹20
Price of Potato in Agra in May = ₹30

$\therefore$ Percentage increase $=\frac{(30-20)}{20}\times100$

$= 50$

99. (C) Rate of tomato in agra in Jan = ₹70
Rate of Potato in varindavan in Feb

$$=60\times\frac{6}{5}=₹72$$

$\therefore$ Required Ratio = 70 : 72 = 35 : 36

100. (B) For onion $=\frac{1}{5}\times(60+70+80+40+70)=₹64$

For potato $=\frac{1}{5}\times(20+60+40+50+30)=₹40$

For tomato $=\frac{1}{5}\times(70+30+70+60+80)=₹62$

For bean $=\frac{1}{5}\times(40+50+10+20+50)=₹34$

SSC TIER II (MATHS) MOCK TEST - 34 (ANSWER KEY)

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

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