Quant Mega Quiz for SSC Tier – 1 (Solutions)

S1. Ans.(a)
Sol.
$A + B + C + D + E = 200$
$A + B = 70$
$C + D = 84$
$E = 200 - 70 - 84$
$= 200\text{-}154$
$= 46$

S2. Ans.(d)
Sol.
Let average be a
$$\frac{12 \times 8 + (x + 8)}{9} = x$$
$96 + x + 8 = 9x$
$104 = 8x$
$x = 13$
Total money spend $= 13 \times 9 = 117$

S3. Ans.(b)
Sol.
Sum of 11 players $= 11 \times 20 = 220$ years
When Age of Coach is included Average $= 20 \times \frac{110}{100} = 22$
$220 + \text{Age of Coach} = 22 \times 12$
$220 + \text{Age of Coach} = 264$
Age of Coach $= 44$

S4. Ans.(b)
Sol.
Consider Average of
$1, 2, 3 \rightarrow 2$
Average of
$1, 2, 3, 4, 5 \rightarrow 3$
Consider average of
$2, 3, 4 \rightarrow 3$
Average of
$2, 4, 4, 5, 6 \rightarrow 4$
So, the average increases by 1
New average becomes
$= k + 1$

S5. Ans.(d)

Sol.

Sum of 33 students = 33 × 47
= 1551
x + 1551 = 48 × 34
x + 1551 = 1632
x = 81 years

S6. Ans.(b)

Sol.

$S_{59} = 59 \times x$
$59 \times x + 181 = (x + 2) \times 60$
$59x + 181 = 60x + 120$
$x = 61$
Average after 60 innings
= 61 + 2
= 63

S7. Ans.(d)

Sol.

$S_{20} = 89.4 \times 20$
= 1788
$S_{19} = 1788 - 78$
= 1710
$S_{20} = 1710 + 87$
= 1797
Average $= \frac{1797}{20}$
= 89.85 kg

S8. Ans.(c)

Sol.

$Sum_x \Rightarrow 12000\ (M + F)$
$Sum_M \Rightarrow 15000 \times M$
$Sum_F \Rightarrow 8000 \times F$
$15000 \times M + 8000 \times F$
$= 12000 \times M + 12000 \times F$
$3000\ M = 4000\ F$
$M : F = 4 : 3$

S9. Ans.(c)

Sol.

$$52 = \frac{20 \times 80 + 25 \times 31 + x \times 55}{100}$$

$5200 = 1600 + 775 + x \times 55$

$5200 - 2375 = 55 \times x$

$55x = 2825$

$$x = \frac{2825}{55}$$

$= 51.3636$

$\cong 51.4$

S10. Ans.(c)

Sol.

Required Average

$$= \frac{100 + 100}{\frac{100}{60} + \frac{100}{40}}$$

$$= \frac{200}{\frac{5}{3} + \frac{5}{2}} = \frac{200 \times 6}{10 + 15}$$

$$= \frac{200}{25} \times 6 = 48/n$$

S11. Ans.(c)

Sol.

$2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 2$

$= 2\{(\sin^2\theta + \cos^2\theta)^3 - 3.\sin^2\theta.\cos^2\theta(\sin^2\theta + \cos^2\theta)\}$

$-3\{(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta.\cos^2\theta\} + 2$

$= 2(1 - 3\sin^2\theta.\cos^2\theta) - 3(1 - 2\sin^2\theta.\cos^2\theta) + 2$

$= 2 - 6\sin^2\theta.\cos^2\theta - 3 + 6\sin^2\theta.\cos^2\theta + 2$

$= 1$

S12. Ans.(c)

Sol.

$x = \text{cosec}\theta + \sin\theta$

And,

$y = \sec\theta + \cos\theta$

put $\theta = 45°$

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

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

by option (c)

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

$=\frac{3}{\sqrt{2}}\times\frac{3}{\sqrt{2}}\times\left(\frac{2}{9}+\frac{2}{9}\right)$

$=\frac{9}{2}\times\frac{4}{9}=2=2$ (Satisfy)

S13. Ans.(b)

Sol.

ATQ,

$\text{cosecA} + \text{cotA} = p$ ...(i)

And,

$\text{cosec}^2\text{A} - \text{cot}^2\text{A} = 1$

$\Rightarrow (\text{cosecA} - \text{cotA})(\text{cosecA} + \text{cotA}) = 1$

$\Rightarrow (\text{coscA} - \text{cotA}) = \frac{1}{p}$ ..(ii)

$\Rightarrow$ On adding eqn (i) & (ii) we get

$2\text{cosecA} = p + \frac{1}{p} = \frac{p^2+1}{p}$

$\Rightarrow \text{cosecA} = \frac{p^2+1}{2p}$

$\Rightarrow \text{sinA} = \frac{2p}{p^2+1}$

S14. Ans.(b)

Sol.

$\frac{\sin 36^\circ}{\cos 54^\circ} - \frac{\sin 54^\circ}{\cos 36^\circ}$

$\frac{\sin(90^\circ - 54^\circ)}{\cos 54^\circ} - \frac{\sin 54^\circ}{\cos(90^\circ - 54^\circ)}$

$\frac{\cos 54^\circ}{\cos 54^\circ} - \frac{\sin 54^\circ}{\sin 54^\circ}$

$1 - 1 = 0$

S15. Ans.(a)

Sol.

$\cos(40^\circ - \theta) - \sin(50^\circ + \theta) + \frac{\cos^2 40^\circ + \cos^2 50^\circ}{\sin^2 40^\circ + \sin^2 50^\circ}$

$\sin[90^\circ - (40^\circ - \theta)] - \sin(50^\circ + \theta) + \frac{\cos^2 40^\circ + \cos^2(90^\circ - 40^\circ)}{\sin^2 40^\circ + \sin^2(90^\circ - 40^\circ)}$

$\sin(50^\circ + \theta) - \sin(50^\circ + \theta) + \frac{\cos^2 40^\circ + \sin^2 40^\circ}{\sin^2 40^\circ + \cos^2 40^\circ}$

$0 + \frac{1}{1} = 1$

S16. Ans.(b)

Sol.

$\cot 12° \cot 38° \cot 52° \cot 60° \cot 78°$

$(\cot 12° \cot 78°)(\cot 38° \cot 52°)(\cot 60°)$

$[\cot 12° \cot (90° - 12°)][\cot 38° \cot (90° - 38°)] \cot 60°$

$(\cot 12° \tan 12°)(\cot 38° \tan 38°) \cot 60°$

$1 \times 1 \times \frac{1}{\sqrt{3}}$

S17. Ans.(a)

Sol.

$A + B = 90°$

$$\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}}$$

$$= \sqrt{\frac{\tan A \tan(90 - A) + \tan A \cot(90 - A)}{\sin A \sec(90 - A)} - \frac{\sin^2(90 - A)}{\cos^2 A}}$$

$$= \sqrt{\frac{\tan A \cot A + \tan A \tan A}{\sin A \operatorname{cosec} A} - \frac{\cos^2 A}{\cos^2 A}}$$

$= \sqrt{1 + \tan^2 A - 1}$

$= \tan A$

S18. Ans.(c)

Sol.

$\sec 5A = \operatorname{cosec}(A + 36°)$

$\operatorname{cosec}(90° - 5A) = \operatorname{cosec}(A + 36°)$

$90° - 5A = A + 36°$

$90° = 6A + 36°$

$54° = 6A$

$A = 9°$

S19. Ans.(a)

Sol.

$(\sin\theta + \sec\theta)^2 + (\cos\theta + \operatorname{cosec}\theta)^2$

Put $\theta = 45°$

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

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

$= 2 \times \frac{9}{2} = 9$

Put $\theta = 45°$ in option.

Option (a) satisfies.

S20. Ans.(b)

Sol.

$\sin\theta + \cos\theta = p$

$\sec\theta + \text{cosec}\,\theta = q$

$q(p^2 - 1)$

$= (\sec\theta + \text{cosec}\,\theta)[(\sin\theta + \cos\theta)^2 - 1]$

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

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

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

$= 2p$

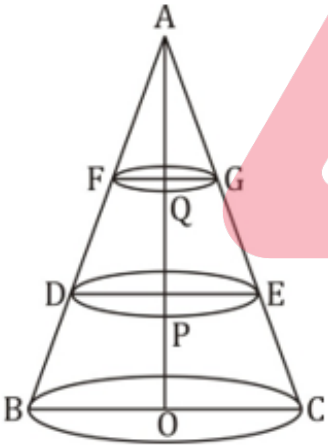
S21. Ans.(d)

Sol.

Let FQ = r_1, DP = r_2, BO = r_3 and

AQ = QP = PO = $\frac{h}{3}$

From ΔAFQ and ΔADP,



$\frac{FQ}{DP} = \frac{AQ}{AP}$

$\Rightarrow \frac{r_1}{r_2} = \frac{1}{2} = r_2 = 2r_1$

From ΔAFQ and ΔABO,

$\frac{FQ}{BO} = \frac{AQ}{AO}$

$\Rightarrow \frac{r_1}{r_3} = \frac{1}{3} = r_3 = 3r_1$

$\therefore\ V_1 : V_2 : V_3 = \frac{1}{3}\pi r_1^2 \times \frac{h}{3} : \frac{1}{3}\pi\frac{h}{3}(r_1^2 + r_2^2 + r_1r_2) : \frac{1}{3}\pi\frac{h}{3}(r_2^2 + r_3^2 + r_2r_3)$

$= r_1^2 : (r_1^2 + 4r_1^2 + 2r_1^2) : (4r_1^2 + 9r_1^2 + 6r_1^2)$

$= r_1^2 : 7r_1^2 : 19r_1^2$

$= 1 : 7 : 19$

S22. Ans.(b)

Sol.

$$\frac{\text{Vol. of cube}}{\text{Vol. of sphere}} = \frac{363}{49}$$

$$\Rightarrow \frac{x^3}{\frac{4}{3}\pi r^3} = \frac{363}{49}$$

$$\Rightarrow \frac{x^3}{r^3} = \frac{363}{49} \times \frac{4}{3} \times \frac{22}{7}$$

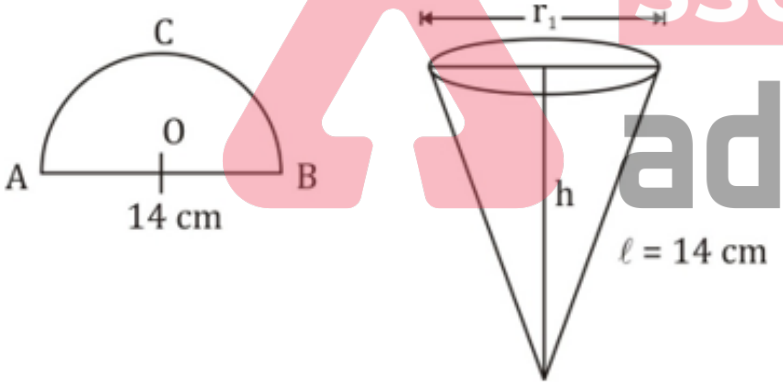
$$= \frac{121 \times 4 \times 22}{49 \times 7}$$

$$\Rightarrow \frac{x^3}{r^3} = \frac{11 \times 11 \times 11 \times 2 \times 2 \times 2}{7 \times 7 \times 7}$$

$$\therefore \frac{x}{r} = \frac{11 \times 2}{7} = \frac{22}{7}$$

S23. Ans.(b)

Sol.



Length of semicircular sheet (ACB) = πr

$$= \frac{22}{7} \times 14 = 44 \text{ cm}$$

Slant height of cone = ℓ =14 cm

Circumference of the base of the cone $= 2\pi r_1 = \frac{44}{7} r_1$

$$\Rightarrow 44 = \frac{44}{7} r_1 \Rightarrow r_1 = 7 \text{ cm}$$

$$\therefore h = \sqrt{\ell^2 - r_1^2} = \sqrt{14^2 - 7^2}$$

$$= 7\sqrt{3} \text{ cm}$$

$$= 7 \times 1.732 = 12 \text{ cm}$$

S24. Ans.(a)

Sol.

$$\text{Volume of bucket} = \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_2 r_2)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 45(28^2 + 7^2 + 28 \times 7)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 45(784 + 49 + 196)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 45 \times 1029 = 48510\ \text{cm}^3$$

S25. Ans.(c)

Sol.

$$\text{Required ratio} = \frac{1}{3}\pi r^2 h : \frac{2}{3}\pi r^3 : \pi r^2 h$$

$$= \frac{1}{3}\pi r^3 : \frac{2}{3}\pi r^3 : \pi r^3$$

(Height of cone = radius of hemisphere = r)

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

S26. Ans.(d)

Sol.

$(x + 2)(y - 2) = xy - 28$

$xy + 2y - 2x - 4 = xy - 28$

$x - y = 12$ ...(i)

$(x - 1)(y + 2) = xy + 33$

$xy - y + 2x - 2 = xy + 33$

$2x - y = 35$ ...(ii)

From (i) & (ii)

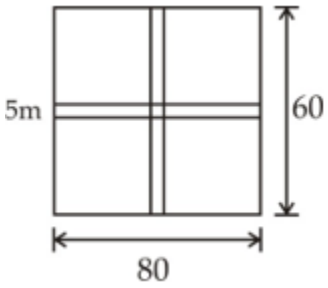
$x = 23$

$y = 11$

Area $= 23 \times 11 = 253$

S27. Ans.(b)

Sol.



Area of roads = (l + b –w) w
= (80 + 60 – 5) ×5
= 675 m^2
Cost of spreading pebbles per m^2= Rs 10
Cost of covering the roads with pebbles
= 675 ×10
= Rs 6750

S28. Ans.(d)

Sol.

Let the length, breadth and weight of the room be 4x, 3x and 2x m respectively.

$4x \times 3x = \frac{240}{5}$

$12x^2 = \frac{240}{5}$

$x^2 = 4$

$x = 2$

L = 8m, B = 6m, H = 4m

Area of 4 walls = $2(l + b) \times h$

= 2 (8 + 6) ×4

= 8 × 14

= 112

Cost = 112 × Rs 2.50

= Rs 280

S29. Ans.(a)

Sol.

Ratio of parallel sides = 5 : 3

Parallel sides = 5x & 3x

$1440 = \frac{1}{2}(5x + 3x) \times 24$

$8x = \frac{1440 \times 2}{24}$

x= 15

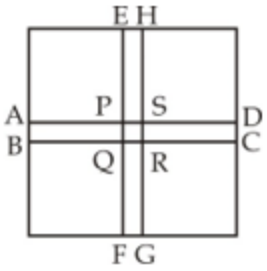
length of larger side of the plot = 5x

= 5 ×15

= 75 m

S30. Ans.(b)

Sol.



Total area of the roads

= area (ABCD) + area (EFGH) – area (PQRS)

= (55 × 4) + (35 ×4) – (4 ×4)

= 344 m^2

Cost of saving = $344 \times \frac{75}{100}$

= Rs 258