SSC MAINS (MATHS) MOCK TEST-10 (SOLUTION)

1. (B) x — 4 — 8 — 2; y — 8 — 1; Sum → 3

x and y together can finish the job

$= \frac{8}{3} \times 60 = 160$ minutes

2. (A) $\frac{M_1D_1}{W_1} = \frac{M_2D_2}{W_2}$

$\frac{200 \times 50}{\frac{1}{4}} = \frac{(200+x)\times(150-50)}{\frac{3}{4}}$

$200 \times 50 \times 4 \times 3 = (200 + x) \times 100 \times 4$

$200 + x = 300$

$x = 100$

Extra workers needed = 100

3. (A) x can copy 80 pages in 20 hrs

x can copy 20 pages in $\frac{20}{80} \times 20 = 5$ hrs

x and y can copy 135 pages in 27 hrs

So, x and y can copy 20 pages in

$\frac{27}{135} \times 20 = 4$ hrs

$x + y$ — 4 — 20 — 5; x — 5 — 4; sum → 1

So, y can copy 20 pages in $\frac{20}{1} = 20$ hrs.

4. (B) ATQ,

x can complete the job = $6 \times 4 = 24$ days

y can complete the job = $12 \times \frac{4}{3}$

= 16 days

x — 24 — 48 — 2; y — 16 — 3; sum → 5

So, time taken by x and y to complete the job = $\frac{48}{5} = 9\frac{3}{5}$ days

5. (B) ATQ,

Amount paid by Mr. x

$= 10 - 8.5 - \frac{10 \times 8.5}{100}$

= 0.65%

Amount paid by Mr. y

$= -8.5 + 10 - \frac{10 \times 8.5}{100} = 0.65\%$

6. (D) Percentage profit

$= 25 - 10 - \frac{25 \times 10}{100} = 12.5\%$

7. (D) Total reduction

$= 20 + 10 - \frac{20 \times 10}{100} = 28\%$

8. (A) Total marked price = ₹ 120000

ATQ,

Total cost price $= 120000 \times \frac{3}{4} - 7500$

= ₹ 82500

So, cost of each window

$= ₹ \frac{82500}{25} = ₹ 3300$

9. (C) A : B = $\frac{1}{2} : \frac{1}{3} = 3 : 2$

B : C = $\frac{1}{5} : \frac{1}{3} = 3 : 5$

A : B : C = 9 : 6 : 10

So,

(A + B) : (B + C) = (9 + 6) : (6 + 10)

= 15 : 16

10. (D)

	A	**B**
For first 8 months	200 × 8	: 100 × 8
For next 2 months	200 × 2	: 50 × 2
For last 2 months	150 × 2	: 50 × 2
	2300	: 1000

Ratio of profit of A and B = 23 : 10

11. (D) Let each bus has 100 seats

After leaving, seats needed to be occupied

$= 3 \times 100 \times \frac{4}{5} \times \frac{3}{4} = 180$

Required fraction = $\frac{180}{200} = \frac{9}{10}$

12. (A)

	A	:	**B**	:	**C**
For first 6 months	300 × 6	:	500 × 6	:	0 × 6
For last 6 months	300 × 6	:	500 × 6	:	500 × 6
	3600	:	6000	:	3000

So,

Ratio of profit of A, B and C

= 3600 : 6000 : 3000 = 6 : 10 : 5

13. (A) Initially, ratio of story books and other books = 7 : 2

Story books = 1512

So, other books = $\frac{2}{7} \times 1512 = 432$

Finally, ratio of story books and other books = 15 : 4

Other books = 432

So, total story books = $432 \times \frac{15}{4} = 1620$

The number of story books collected
= 1620 – 1512 = 108

14. (A) Ratio of numbers = 7 : 9
Product of numbers = 1575

So, greater number $= 9 \times \sqrt{\frac{1575}{7 \times 9}} = 9 \times 5$
= 45

15. (C) ATQ,
The weight of 12th person
$= 95 + 33 + \frac{33}{11} = 131$ kg

16. (A) Largest 3-digit number formed by 0, 2 and 4 = 420
Smallest 3-digit number form by 0, 2 and 4 = 204

Average of numbers = $\frac{420 + 204}{2} = 312$

17. (A) Average of six numbers = 3.95
Average of first two numbers = 3.4
Average of next two numbers = 3.85
The average of remaining numbers
$= \frac{3.95 \times 6 - 3.4 \times 2 - 3.85 \times 2}{2} = 4.6$

18. (A) Let eight even numbers are
a, $a + 2$, $a + 4$, $a + 6$, $a + 8$, $a + 10$, $a + 12$ and $a + 14$
So,

$$\frac{a + (a+2) + (a+4) + (a+6) + (a+8) + (a+10) + (a+12) + (a+14)}{8} = 93$$

$a + 7 = 93$
$a = 86$
So, the largest number = 86 + 14 = 100

19. (C) $\frac{3a + 4b}{2} > 50$
$3a + 4b > 100$
$3(2b) + 4b > 100$
$10b > 100$
$b > 10$
So, $a = 2b > 20$
So, least value of a is 21

20. (C) Required average = $\frac{3^{30} + 3^{60} + 3^{90}}{3}$
= $3^{29} + 3^{59} + 3^{89}$

21. (C) Let C. P. of watch = ₹ 100

C.P. → S.P
100 —20% profit→ 120
↓ 10% less
90 —20% profit→ 108
(₹ 12)

So, actual cost price = $100 \times \frac{30}{12}$ = ₹ 250

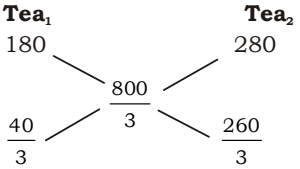
22. (A) Let cost price = ₹100
Loss = 20%
50% of selling price = ₹ 80
So, actual selling price = ₹ (80 × 2)
= ₹ 160

Percentage gain = $\frac{160 - 100}{100} \times 100$
= 60%

23. (D) Selling price of mixed tea = ₹ 320/ kg

Cost price of mixed tea = $320 \times \frac{5}{6}$

= ₹ $\frac{800}{3}$



Required ratio = $\frac{40}{3} : \frac{260}{3}$ = 2 : 13

24. (C) Selling price$_1$ = ₹ P
Profit = 12%

Cost price = ₹ $\left(\frac{100}{112} \times P\right)$
Selling price$_2$ = ₹ Q
Loss = 4%

Cost price = ₹ $\left(\frac{100}{96} \times Q\right)$
ATQ,
Cost price = Cost price

$\frac{100}{96} \times Q = \frac{100}{112} \times P$
Q : P = 96 : 112 = 6 : 7

25. (D) Selling price of B = Cost price of C = ₹ P
Loss of B = 25%
Selling price of A = Cost price of B

= ₹ $\left(P \times \frac{100}{75}\right)$
Profit of A = 20%
Cost price of A

= ₹ $\left(P \times \frac{100}{75} \times \frac{100}{120}\right)$ = ₹ $\frac{10}{9}P$

26. (A) Cost price = ₹ 25
Selling price = ₹ 30

Profit percent = $\frac{30 - 25}{25} \times 100 = 20\%$

27. (C) Let population of country = x
Population of country after increase in population = $x \times \frac{120}{100} \times \frac{120}{100} \times \frac{120}{100}$
= $1.728x$
Percentage increase

= $\frac{1.728x - x}{x} \times 100 = 72.8\%$

28. (A) The number of days the same amount of juice would last is = $35 \times \frac{100}{140}$ = 25 days

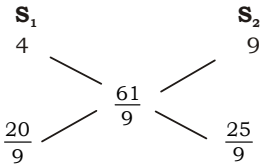
29. (C) Price of book after discount = ₹ 270
If discount is between 20% and 25% then maximum possible original price
= $270 \times \frac{100}{75}$ = ₹ 360

30. (C) Ratio of cost price and selling price = 10 : 11
Profit percent = $\frac{11-10}{10} \times 100 = 10\%$

31. (D) Let time taken upstream = $2x$
Then time taken downstream = x
Ratio of speed of downstream and upstream = 2 : 1
So, ratio of speed of boat in still water and of current is = $\frac{2+1}{2} : \frac{2-1}{2} = 3 : 1$

32. (D)
$P_1(\uparrow)$ 4 — 4
16
$P_2(\downarrow)$ 16 — $-\frac{1}{3}$
Sum $\longrightarrow \frac{1}{3}$
Time taken by both pipes to fill the tank
= $\frac{16}{3} = 5\frac{1}{3}$ hours

33. (A) Average speed of farmer = $\frac{61}{9}$ km /hr



Ratio of time with speed of 4 km/hr and 9 km/hr = $\frac{20}{9} : \frac{25}{9} = 4 : 5$
So, distance travelled on foot = 4 × 4 = 16 kms

34. (C) ATQ,
Upstream speed = $\frac{36}{6}$ = 6 kms/hr
Downstream speed = $\frac{48}{6}$ = 8 kms/hr
The speed of current = $\frac{8-6}{2}$ = 1 km/hr

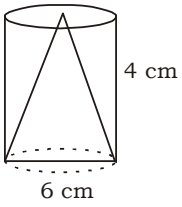
35. (C) Let principal = P
ATQ,
$P\left(1+\frac{10}{100}\right)^2 - P\left(1+\frac{10}{100}\right) = 132$
$P\left(\frac{121}{100}-\frac{11}{10}\right) = 132$
$P = \frac{132\times100}{11}$ = ₹ 1200

36. (B) ATQ,
$\frac{P \times 5 \times 1}{100} = 365$
P = ₹ 7300
So, principal = ₹ 7300

37. (C) Amount = $S\left(1+\frac{2r}{100}\right)^3 = S\left(1+\frac{r}{50}\right)^3$

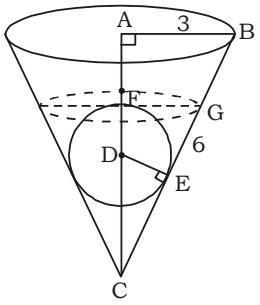
38. (A) ATQ,
$P\left(1+\frac{10}{100}\right)^2 = 2420$
P = ₹ 2000

39. (A)



The whole surface area
= Area of base + curved surface area of cylinder + curved surface of cone
= $\pi r^2 + 2\pi rh + \pi rl$
= $\pi(3)^2 + 2\pi(3) \times 4 + \pi \times 3 \times \sqrt{3^2+4^2}$
= $9\pi + 24\pi + 15\pi = 48\pi$

40. (A)



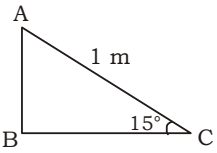
AC = $\sqrt{6^2-3^2} = 3\sqrt{3}$
In Δ ABC and Δ CDE
∠E = ∠A
∠C = ∠C
Δ ABC ⌴ Δ EDC
$\frac{DE}{CD} = \frac{AB}{BC}$
$CD = \frac{1\times6}{3} = 2$
CF = CD + DF = 2 + 1 = 3
$FG = \frac{3\times3}{3\sqrt{3}} = \sqrt{3}$
Required volume = $\frac{1}{3} \times \pi \times \left(\sqrt{3}\right)^2 \times 3 - \frac{4}{3}\pi(1)^3 = \frac{9\pi}{3} - \frac{4\pi}{3} = \frac{5\pi}{3}$

41. (A) Area of triangle

$= \frac{1}{2} \times$ inradius $\times$ sum of length of sides

$= \frac{1}{2} \times 6 \times 50 = 150$ sq. cm

42. (C)



$\frac{AB}{AC} = \sin 15°$

$AB = \frac{\sqrt{3}-1}{2\sqrt{2}} \times 1 = \frac{\sqrt{3}-1}{2\sqrt{2}}$

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

Area of Δ ABC

$= \frac{1}{2} \times \left(\frac{\sqrt{3}-1}{2\sqrt{2}} \times 100\right) \times \left(\frac{\sqrt{3}+1}{2\sqrt{2}} \times 100\right)$ cm^2

$= \frac{1}{2} \times \frac{3-1}{8} \times 10000 = 1250$ sq. cm.

43. (C) Height of glass $= \left(\frac{\text{Number of drops} \times \text{volume of drops}}{\frac{1}{3} \times \text{Base area}}\right)$

$\Rightarrow h = \frac{32000 \times \frac{4}{3} \times \pi \times \left(\frac{1}{20}\right)^3}{\frac{1}{3} \times \pi \times \left(\frac{h}{2}\right)^2}$

$\Rightarrow h^3 = 64$

$\therefore h = 4$ cm

44. (C) ATQ,

Height = 4 $\times$ circumference

$h = 4c$

Volume of cylinder $= \pi r^2 h$

$= \frac{(2\pi r)^2}{4\pi} \times h$

$= \frac{c^2}{4\pi} \times 4c = \frac{c^3}{\pi}$

45. (B)

46. (C) ATQ,

Area of isosceles triangle

$= \frac{b}{4}\sqrt{4a^2 - b^2}$ sq. units

47. (C) External diameter = 728 m

Internal diameter = 700 m

So, breadth of road

$= \frac{\text{External diameter} - \text{internal diameter}}{2}$

$= \frac{728 - 700}{2} = 14$ m

48. (B) Radius of circle = 84 cm

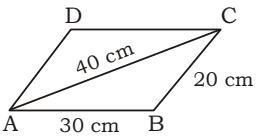
Perimeter of square = Circumference of circle $= 2\pi r = 2 \times \frac{22}{7} \times 84 = 528$ cms

Length of the side of square $= \frac{528}{4}$

$= 132$ cm

49. (A) Increase in area $= 5 + 5 + \frac{5 \times 5}{100} = 10.25\%$

50. (D)



$S = \frac{20 + 30 + 40}{2} = 45$ cm

Area of Δ ABC

$= \sqrt{45(45-20)(45-30)(45-40)}$

$= \sqrt{45 \times 25 \times 15 \times 5}$

$= 75\sqrt{15}$ cm^2

Area of $\square$ ABCD = 2 $\times$ Area of ΔABC

$= 2 \times 75\sqrt{15}$

$= 150\sqrt{15}$ cm^2

51. (D) Let side of square = a cm

Area of square = πa^2 cm^2

Area of new square

$= \pi\left(a \times \frac{150}{100}\right)^2 = \frac{9}{4}\pi a^2$

Required ratio $= \frac{9}{4}\pi a^2 : \pi a^2 = 9 : 4$

52. (A) Area of circle = 324 π sq cm

Length of longest chord

= Diameter $= 2 \times \frac{\sqrt{324\pi}}{\pi} = 36$ cm

53. (A) Let length of longer diagonal = x

ATQ,

$\frac{1}{2} \times \left(\frac{1}{2} \times x\right) \times x = 256$

$x = \sqrt{256 \times 2 \times 2} = 32$ cm

Length of larger diagonal = 32 cm

54. (D) $m = \sqrt{5 + \sqrt{5 + \sqrt{5 + ...\infty}}}$

$m^2 = 5 + \sqrt{5 + \sqrt{5 + \sqrt{5 + ...\infty}}}$

$m^2 = 5 + m$

$m^2 - m = 5$ ...(i)

$n = \sqrt{5 - \sqrt{5 - \sqrt{5 - .....\infty}}}$

$n^2 = 5 - \sqrt{5 - \sqrt{5 - \sqrt{5 - ...\infty}}}$

$n^2 = 5 - n$

$n^2 + n = 5$ ...(ii)

$m^2 - m = n^2 + n$

$m^2 - n^2 - m - n = 0$

$(m + n)(m - n) - 1(m + n) = 0$

$(m + n)(m - n - 1) = 0$

So, $m - n - 1 = 0$

55. (C) $\frac{3-5x}{2x} + \frac{3-5y}{2y} + \frac{3-5z}{2z} = 0$

$\frac{3-5x}{2x} + \frac{5}{2} + \frac{3-5y}{2y} + \frac{5}{2} + \frac{3-5z}{2z} + \frac{5}{2}$

$= \frac{5}{2} + \frac{5}{2} + \frac{5}{2}$

$\frac{3-5x+5x}{2x} + \frac{3-5y+5y}{2y} + \frac{3-5z+5z}{2z} = \frac{15}{2}$

$\frac{3}{2x} + \frac{3}{2y} + \frac{3}{2z} = \frac{15}{2}$

$\frac{2}{x} + \frac{2}{y} + \frac{2}{z} = \frac{15}{2} \times \frac{2}{3} \times 2 = 10$

56. (A) ATQ,

Related speed of Anita and Romita = $\frac{42}{6}$ = 7 km/hr

Speed of Anita = 4 km/hr

Speed of Romita = (7 – 4) = 3 km/hr

57. (C) Side of square = $\frac{1}{2}(x + 1)$

Diagonal of square = $\frac{3-x}{\sqrt{2}}$

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

$3 - x = x + 1$

$x = 1$ unit

Side of square = 1 unit

58. (A) $2S = a + b + c$

Let $a = 1$, $b = 2$ and $c = 3$

$s = \frac{1+2+3}{2} = 3$

$s(s - c)(s - a)(s - b)$

$= 3 \times (3 - 3) + (3 - 1)(3 - 2)$

$= 2$

(A) $ab = 1 \times 2 = 2$ (✓)

(B) $abc = 1 \times 2 \times 3 = 6$ (×)

(C) 0 (×)

(D) $\frac{a+b+c}{2} = \frac{1+2+3}{2} = 3$ (×)

59. (D) ATQ,

$p^3 + m^3 + 3pm(p + m) = (p + m)^3$

$72 + 3\ pm(6) = (6)^3 = 216$

$18\ pm = 144 \Rightarrow pm = 8$

60. (D) ATQ,

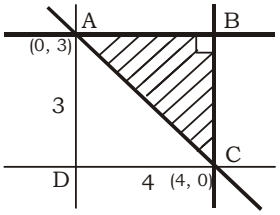
$x^m \times m^n = 1$

$x^{m+n} = x^0$

$m + n = 0$

$m = -n$

61. (C)



Area of Δ ABC = Area of Δ OAC

$= \frac{1}{2} \times 3 \times 4 = 6$ sq. units

62. (D) $\frac{2p}{p^2 - 2p + 1} = \frac{1}{4}$

$\frac{p^2 - 2p + 1}{2p} = \frac{4}{1}$

$p - 2 + \frac{1}{p} = 8$

$p + \frac{1}{p} = 10$

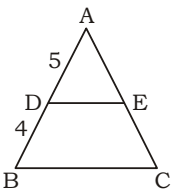
63. (C) ATQ,

$K^2 = 2K - 1$

$(K - 1)^2 = 0$

$K = 1$

64. (D)



In Δ ADE and Δ ABC

∠A = ∠A

∠ADE = ∠ABC

So,

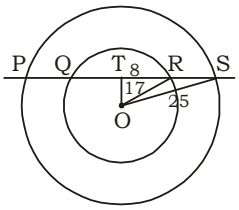
ΔADE ~ ΔABC

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

$\frac{AD}{DE} = \frac{AD + DB}{BC}$

$\frac{DE}{BC} = \frac{5}{5+4} = \frac{5}{9} = 5 : 9$

65. (D)



In Δ TRO

RT = $\frac{16}{2}$ = 8 cm

OR = 17 cm

OT = $\sqrt{17^2 - 8^2}$ = 15 cm

In Δ TSO

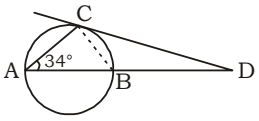
OT = 15 cm

OS = 25 cm

TS = $\sqrt{25^2 - 15^2}$ = 20 cm

So, length of PS = 2 × 20 = 40 cm

66. (A)



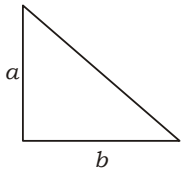
∠CBA = 180° – ∠ACB – ∠CAB

= 180° – 90° – 34°= 56°

67. (A) In equilateral triangle

Inradius : outer radius = 1 : 2

68. (B)



ATQ,

$\sqrt{a^2 + b^2}$ = 10

$\frac{1}{2}ab$ = 20

ab = 40

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

= $(10)^2$ + 2(40) = 180

69. (B) Perimeter of triangle = 24 cms

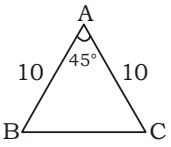
Circumference of in-circle= 44 cms

Inradius = $\frac{44}{2\pi} = \frac{44 \times 7}{2 \times 22}$ = 7 cms

Area of triangle = $\frac{1}{2}$ × radius × perimeter of triangle

= $\frac{1}{2}$ × 7 × 24 = 84 cm^2

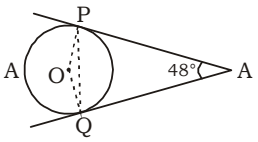
70. (C)



Area of Δ ABC = $\frac{1}{2}$ × ab sinθ

= $\frac{1}{2}$ × 10 × 10 × sin 45° = $25\sqrt{2}$ sq. cm

71. (C)



In □ APQO

∠O + ∠APO + ∠OQA + ∠A

= 360°

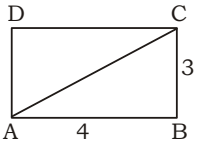
∠O = 360° – 90° – 90° – 48° = 132°

So,

∠OPQ = $\frac{180° - 132°}{2}$ = 24°

So, ∠APQ = 90° – 24° = 66°

72. (C)



In rectangle ABCD,

AB = 4 m

BC = 3 m

So, length of diagonal AC

= $\sqrt{AB^2 + BC^2}$ = $\sqrt{4^2 + 3^2}$ = 5 m

73. (A) Side of triangle = 3 : $1\frac{1}{4}$: $3\frac{1}{4}$

= 3 : $\frac{5}{4}$: $\frac{13}{4}$ = 12 : 5 : 13

$(12)^2 + (5)^2$ = 144 + 25

= 169 = $(13)^2$

So triangle is a right-angled triangle.

74. (A) $2\sin^2\theta = 3\cos\theta$

$\Rightarrow 2(1 - \cos^2\theta) = 3\cos\theta$

$\Rightarrow 2 - 2\cos^2\theta = 3\cos\theta$

$\Rightarrow 2\cos^2\theta + 3\cos\theta - 2 = 0$

$\Rightarrow 2\cos^2\theta + 4\cos\theta - \cos\theta - 2 = 0$

$\Rightarrow 2\cos\theta(\cos\theta + 2) - 1(\cos\theta + 2) = 0$

$\Rightarrow (2\cos\theta - 1)(\cos\theta + 2) = 0$

Either

$\Rightarrow 2\cos\theta - 1 = 0$ or $\cos\theta + 2 = 0$

$\Rightarrow \cos\theta + 2$ never be zero.

So

$\Rightarrow 2\cos\theta - 1 = 0$

$\Rightarrow \cos\theta = \frac{1}{2} = \cos 60°$

$\therefore \theta = 60°$

75. (D) a, b and c are the sides of the triangle
$a^2 + b^2 + c^2 = ab + bc + ca$ (given)
$2a^2 + 2b^2 + 2c^2 = 2ab + 2bc + 2ca$
$a^2 + b^2 - 2ab + b^2 + c^2 - 2bc + c^2 + a^2 - 2ca = 0$
$(a - b)^2 + (b - c)^2 + (c - a)^2 = 0$
So,
$a = b = c$

All angles of the triangle are equal i.e. $\frac{180°}{3}$

$= 60°$
$\sin^2A + \sin^2B + \sin^2C = 3\sin^2 60°$

$= 3 \times \frac{3}{4} = \frac{9}{4}$

76. (C) $a\sin\theta + b\cos\theta = c$
squaring both sides,
$a\sin^2\theta + b\cos^2\theta + 2ab\sin\theta\cos\theta = c^2$ ...(i)
$a^2 + b^2 = a^2 + b^2$ ...(ii)
Subtracting equation (ii) from (i)
$a^2 - a^2\sin^2\theta + b^2 - b^2\cos^2\theta - 2ab\sin\theta\cos\theta = a^2 + b^2 - c^2$
$\Rightarrow a^2(1-\sin^2\theta) + b^2(1 - \cos^2\theta) - 2ab\sin\theta\cos\theta = a^2 + b^2 - c^2$
$\Rightarrow a^2\cos^2\theta + b^2\sin^2\theta - 2ab\sin\theta\cos\theta = a^2 + b^2 - c^2$
$\Rightarrow (a\cos\theta - b\sin\theta)^2 = a^2 + b^2 - c^2$
$\therefore a\cos\theta - b\sin\theta = \pm\sqrt{a^2 + b^2 - c^2}$

77. (C) $\sin\theta + \cos\theta = \sqrt{2}\sin(90° - \theta)$
$\Rightarrow \sin\theta + \cos\theta = \sqrt{2}\cos\theta$
$\Rightarrow \sin\theta = \sqrt{2}\cos\theta - \cos\theta$
$\Rightarrow \cos\theta(\sqrt{2} - 1) = \sin\theta$
$\Rightarrow \frac{\cos\theta}{\sin\theta} = \frac{1}{\sqrt{2} - 1}$
$\Rightarrow \cot\theta = \frac{1}{\sqrt{2} - 1} \times \frac{\sqrt{2} + 1}{\sqrt{2} + 1}$
$\Rightarrow \cot\theta = \frac{\sqrt{2} + 1}{2 - 1}$
$\therefore \cot\theta = \sqrt{2} + 1$

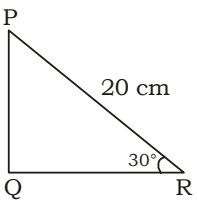
78. (A) $3(\sec^2\theta + \tan^2\theta) = 5$
$3(\tan^2\theta + 1 + \tan^2\theta) = 5$
$6\tan^2\theta + 3 = 5$
$6\tan^2\theta = 5 - 3 = 2$
$\tan^2\theta = \frac{2}{6} = \frac{1}{3}$
$\cos 2\theta = \frac{1 - \tan^2\theta}{1 + \tan^2\theta} = \frac{1 - \frac{1}{3}}{1 + \frac{1}{3}}$
$= \frac{3 - 1}{3 + 1} = \frac{2}{4} = \frac{1}{2}$

79. (C) $x\cos^2 30°\sin 60° = \frac{\tan^2 45°.\sec 60°}{\operatorname{cosec} 60°}$
$\Rightarrow x \times \left(\frac{\sqrt{3}}{2}\right)^2\left(\frac{\sqrt{3}}{2}\right) = \frac{(1)^2 \times (2)}{\frac{2}{\sqrt{3}}}$
$\Rightarrow x \times \frac{3\sqrt{3}}{8} = \sqrt{3}$
$\therefore x = \frac{8}{3} = 2\frac{2}{3}$

80. (B) $\tan\alpha = 2$ (given)
$\frac{\operatorname{cosec}^2\alpha - \sec^2\alpha}{\operatorname{cosec}^2\alpha + \sec^2\alpha}$
$= \frac{\frac{1}{\sin^2\alpha} - \frac{1}{\cos^2\alpha}}{\frac{1}{\sin^2\alpha} + \frac{1}{\cos^2\alpha}}$
$= \frac{\frac{1}{\sin^2\alpha}\left[1 - \frac{\sin^2\alpha}{\cos^2\alpha}\right]}{\frac{1}{\sin^2\alpha}\left[1 + \frac{\sin^2\alpha}{\cos^2\alpha}\right]}$
$= \frac{1 - \tan^2\alpha}{1 + \tan^2\alpha} = \frac{1 - 4}{1 + 4} = -\frac{3}{5}$

81. (C) $\sin(\theta + 30°) = \frac{3}{\sqrt{12}} = \frac{3}{2\sqrt{3}}$
$\Rightarrow \sin(\theta + 30°) = \frac{\sqrt{3}}{2} = \sin 60°$
$\Rightarrow \theta + 30° = 60°$
$\Rightarrow \theta = 30°$
$\therefore \cos^2\theta = \cos^2 30°$
$= \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{3}{4}$

82. (A)



$\frac{QR}{PR} = \cos 30°$
$\Rightarrow QR = \frac{\sqrt{3}}{2} \times 20$
$= 10\sqrt{3}$ cm
and $\frac{PQ}{PR} = \sin 30°$

$\therefore$ PQ = $\frac{1}{2} \times 20 = 10$ cm

Area of Δ PQR = $\frac{1}{2} \times$ PQ $\times$ QR

= $\frac{1}{2} \times 10 \times 10\sqrt{3} = 50\sqrt{3}$ cm^2

83. (A) $4\cos^2\theta - 4\sqrt{3}\cos\theta + 3 = 0$

$\Rightarrow (2\cos\theta)^2 - 2 \times 2\cos\theta \times \sqrt{3} + \left(-\sqrt{3}\right)^2 = 0$

$\Rightarrow \left(2\cos\theta - \sqrt{3}\right)^2 = 0$

$\Rightarrow 2\cos\theta - \sqrt{3} = 0$

$\Rightarrow 2\cos\theta = \sqrt{3}$

$\Rightarrow \cos\theta = \frac{\sqrt{3}}{2}$

$\Rightarrow \cos\theta = \cos 30°$

$\therefore \theta = 30°$

84. (A) $\frac{x+y}{x-y} = \frac{y\left(\frac{x}{y}+1\right)}{y\left(\frac{x}{y}-1\right)} = \frac{\frac{x}{y}+1}{\frac{x}{y}-1} \quad \left[\because \frac{x}{y} = \frac{3}{2}\right]$

$= \frac{\left(\frac{3}{2}+1\right)}{\left(\frac{3}{2}-1\right)} = \frac{\frac{5}{2}}{\frac{1}{2}} = \frac{5}{2} \times \frac{2}{1} = \frac{5}{1} = 5 : 1$

85. (D) 50% of x = 30% of y

$\Rightarrow \frac{50}{100}x = \frac{30}{100}y$

$\Rightarrow \frac{x}{y} = \frac{30}{100} \times \frac{100}{50}$

$\Rightarrow \frac{x}{y} = \frac{3}{5}$

$\therefore x : y = 3 : 5$

86. (A) $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + ... + \frac{1}{\sqrt{8}+\sqrt{9}}$

$= \frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + ... + \frac{1}{\sqrt{9}+\sqrt{8}}$

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

$+ .... + \frac{1}{\sqrt{9}+\sqrt{8}} \times \frac{\sqrt{9}-\sqrt{8}}{\sqrt{9}-\sqrt{8}}$

$= \frac{\sqrt{2}-1}{2-1} + \frac{\sqrt{3}-\sqrt{2}}{3-2} + ... + \frac{\sqrt{9}-\sqrt{8}}{9-8}$

$= \sqrt{2} - 1 + \sqrt{3} - \sqrt{2} + ... + \sqrt{9} - \sqrt{8}$

$= \sqrt{9} - 1 = 3 - 1 = 2$

87. (B) Let number = x

ATQ,

$(x - 25)^2 = x^2 - 25$

$\Rightarrow x^2 - 50x + 625 = x^2 - 25$

$\Rightarrow 50x = 625 + 25$

$\Rightarrow 50x = 650$

$\therefore x = 13$

88. (A) Total armies = 36562

ATQ,

$36562 = (191)^2 + 81$

So, remaining armies = 81

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

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

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

90. (A) $\sqrt{72+\sqrt{72+\sqrt{72+.....}}} = x$

$\Rightarrow x^2 = 72 + \sqrt{72+\sqrt{72+.....}}$

$\Rightarrow x^2 = 72 + x$

$\Rightarrow x^2 - x - 72 = 0$

$\Rightarrow x^2 - 9x + 8x - 72 = 0$

$\Rightarrow x(x - 9) + 8(x - 9) = 0$

$\Rightarrow (x + 8)(x - 9) = 0$

$\Rightarrow x = -8$ or 9

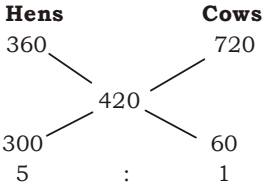
So, $\sqrt{72+\sqrt{72+\sqrt{72+.....}}} = 9$

91. (D) Total heads = 180

Total legs = 420

If all heads are of cows, then legs should be = 180 × 4 = 720

If all heads are of hens, then legs should be = 180 × 2 = 360



So, number of cows = $\frac{1}{1+5} \times 180 = 30$

92. (D) $n(n + 1)(n + 2)$ is always divisible by 6.

93. (C) $(11111)^2 = 123454321$

94. (D) Time exceed by A only = 8 hours

Time exceed by B only = $4\frac{1}{2}$ hours

So, time required to finish the work together by A and B = $\sqrt{8 \times 4\frac{1}{2}}$ hrs

= $\sqrt{36}$ hrs = 6 hrs

95. (D) Person earns ₹ 2000 for 50 hours

Regular wages per hour = ₹ $\frac{2000}{50}$ = ₹ 40

Additional wages per hour = ₹ 40 × $\frac{3}{2}$ = ₹ 60

Total earning = ₹ 2300

So, Additional earning = ₹ (2300 – 2000)
= ₹ 300

Extra hours worked = $\frac{300}{60}$ = 5 hours

96. (C) Required ratio = 100 : 70 = 10 : 7

97. (D) Average mark in the second term

= $\frac{80+80+75+65+60}{5}$ = 72

98. (B) Number of students travelling by public bus = $\frac{54°}{360°}$ × 800 = 120

99. (D) Students who use institute's bus

= $\frac{216°}{360°}$ × 800 = 480

Students do not use institute bus
= (800 – 480) = 320

100. (A) Number of students who go to institute on foot = $\frac{(360° - 216° - 18° - 54°)}{360°}$

= $\frac{72°}{360°}$ × 800 = 160

SSC MAINS (MATHS) MOCK TEST- 10 (ANSWER KEY)

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