1. (B) $\frac{P+Q}{P-Q}=\frac{50}{20}=\frac{5}{2}$

$\Rightarrow \frac{P}{Q}=\frac{5+2}{5-2}=\frac{7}{3}$

2. (D) 16 years ago my age = x years
8 years from present,
9x+16+8=3(x+8+16)
x=8

3. (C) $12:30=30:x \Rightarrow x:\sqrt{9\times 25}=5:1$

4. (A) $\frac{4x+h}{3x+h}=\frac{9}{7}\Rightarrow x=8$

$M\rightarrow 32,\ W\rightarrow 24$

$\frac{32-K}{24-K}=\frac{5}{3}\Rightarrow K=12$

5. (B) x^2-4x+3=0

$x+\frac{3}{x}=4, x^2+\frac{9}{x^2}+6=16$

$x^2+\frac{9}{x^2}=10\Rightarrow \frac{x^2}{3}+\frac{3}{x^2}=\frac{10}{3}$

6. (B) $\frac{65}{100}\times 40+(40+x)=\frac{50}{100}$

x=12 litres

7. (C) marks obtained =33% of maximum marks
= 288-24=264

Maximum marks=$\frac{264}{33}\times 100=800$

8. (D) Average marks of 6 students=

$76\times\frac{16-75}{6}\times 10=77\frac{2}{3}$

9. (C) original quantity =12x lit

In 9 litres of mixture, $A=\frac{7}{12}\times 9=\frac{21}{4}$ lit

$B=\frac{5}{12}\times 9=\frac{15}{4}$ lit

$\frac{7x-\frac{21}{4}}{5x-\frac{15}{4}+9}=\frac{7}{9}\Rightarrow x=3$, A=7x=21 lit

10. (B)Required Run rate=$\frac{282-(3.2\times 10)}{40}=6.25$

11. (C) Ratio of fares is 5:1
Ratio of passengers is 1:50

Ratio of money collected is

$5\times 1:1\times 50=5:50=1:10$

Amount collected from II class is

$\frac{10}{11}\times 2200=2000$

12. (C) $\frac{12.4x+26}{x+5}=12.2\Rightarrow x=175$

13. (C) Amount of milk after 3 operations

$=\left[40\left(1-\frac{4}{40}\right)^3\right]=40\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}=29.16$

14. (C)
Total weight of two students

$=45+45+\frac{150\times 48}{1000}=97.2\,kg$

So, Average weight $=\frac{97.2}{2}=48.6kg$

15. (C) $(24x+368)11=20\times 13x\times\frac{110}{100}$

x=184
1st bag 13x84=2392

16. (C) 90% of C.P-20=80% of 110% of CP.
90% of CP-Rs.20=88% of C.P.
2% of CP=Rs.20
CP=10xRs.100=Rs.1000

17. (A) 2x=Rs.1754-Rs.1492
2x=Rs.262
x=Rs.131
Cost price=Selling price +loss=
Rs.1492+Rs.131=Rs.1623

18. (A) 115% CP=80% MP

$\frac{CP}{MP}=\frac{80}{115}=\frac{16}{23}$

19. (D) Let total cost price of 10 horses be Rs.x
Then 10% of x-15% of (10500-x)=Rs.300
25% of x=Rs.1875; x=Rs.7500

20. (C) Assume 10 litres of wine initially
CP=25x10=250

$SP=250\times\frac{140}{100}=350$

Wine sold after mixing with water=$\frac{350}{25}=14$

$\frac{10}{14}\times 100=71\frac{3}{7}\%$

21. (C) MP=50/-

$$SP=\frac{80}{100}\times 50=40/-$$

$$\frac{125}{100}\times CP=40\Rightarrow CP=32/-$$

22. (B) The merchant gives 900 gm charging the price of 950 gm

$$\text{Profit percent}=\frac{50}{900}\times 100=5\frac{5}{9}\%$$

23. (D) MP=Rs.30, $SP=30\times\frac{100-15}{100}=25.50$

$$CP=25.50\times\frac{100}{100+20}=\text{Rs.}21.25=\text{cost of}$$

racket +cost of shuttle cock

cost of racket=Rs.21.25-Rs.1.50=Rs.19.75

24. (D) $A+B\to\frac{19}{23}$, $B+C\to\frac{8}{23}$, $A+B+C\to 1$

$$(A+B+C)-(B+C)\to 1-\frac{8}{23}=\frac{15}{23}$$

'A' gets $\frac{15}{23}\times 1058=690$

25. (A) work done by two pipes in 1 hr

$$\to\frac{1}{14}+\frac{1}{16}=\frac{15}{112}$$

Time taken $\to\frac{112}{15}=7$ hrs 28min.

Due to leakage, time taken

7 hrs 28min+32min=8 hrs

Work done by leak in 1 hr $\to\frac{15}{112}-\frac{1}{8}=\frac{1}{112}$

leak will empty the full cistern is 112 hrs.

26. (B) T is time taken to complete one round

$$T_A=\frac{1760\text{m}}{160\text{m/min}}=11\text{min};$$

$$T_B=\frac{44}{3}\text{min};$$

$$T_C=\frac{352}{21}\text{min};$$

A, B and C will meet again after

$$=\text{LCM}(11,\frac{44}{3},\frac{352}{21})$$

27. (D) A's 2 days work $=2\times\frac{1}{10}=\frac{1}{5}$

Remaining work=$1-\frac{1}{5}=\frac{4}{5}$

B completed 25% of remaining work

$$=\frac{1}{4}\left(\frac{4}{5}\right)=\frac{1}{5}$$

Remaining work $=\frac{4}{5}-\frac{1}{5}=\frac{3}{5}$

C completed the remaining work in

$$\frac{\frac{3}{5}}{\frac{1}{20}}=12\text{days}$$

28. (D)

29. (C) Fort left=4x200=800 soldier days

Remaining 80 soldiers, food last for

$$=\frac{800}{80}=10 \text{ days}$$

Extra days=10-4=6 days

30. (B) $\frac{1}{20}+\frac{1}{30}-\frac{1}{18}=\frac{1}{36}$

Tank filled in 36 hrs and hence one sixth of tank in 6 hrs i.e. at 2 pm

31. (C) $R\to\frac{1}{9}, K\to\frac{\frac{150}{100}}{9}=\frac{1}{6}$

$$R+K\to\frac{1}{9}+\frac{1}{6}=\frac{1}{18/5}$$

$\Rightarrow\frac{18}{5}$ days=$3\frac{3}{5}$ days

32. (B) $\frac{1}{20}-\frac{1/3}{8}=\frac{1}{120}=\frac{1/2}{60}$

33. (A) a+c=3b, a+b=2c, a+b+c=10

34. (B) $6632.55=6250\left(1+\frac{4}{2\times 100}\right)^t$

$$\frac{6632.55}{6250}=\left(1+\frac{42}{2\times 100}\right)\Rightarrow\frac{6632.55}{6250}=\left(\frac{51}{50}\right)^t$$

$$\Rightarrow\frac{132651}{125000}=\left(\frac{51}{50}\right)^t\Rightarrow\left(\frac{51}{50}\right)^3=\left(\frac{51}{50}\right)^t$$

t=3, time=$\frac{t}{2}=\frac{3}{2}$ (t=no.of half years)

35. (A) P=12,450, $n=\frac{9}{12}$, R=12%

$A=12,450\left(1+\frac{12}{4\times100}\right)^{4\times\frac{9}{12}}=13604.45$

CI=13604.45-12450=1154.45

36. (C) $\frac{P\times5\times3}{100}+\frac{P\times7\times5}{100}+\frac{P\times9\times4}{100}=7310$

$\frac{86P}{100}=7310\Rightarrow P\to8500$

37. (A) Difference between C.I and S.I for 2 years

$=\text{Principal}\times\left(\frac{R}{100}\right)^2=40$

38. (B) $\left[12500\left(1+\frac{20}{100}\right)^3\right]-$

$-\left[200\left(1+\frac{20}{100}\right)^2+2000\left(1+\frac{20}{100}\right)+2000\right]$

=21600-(2880+2400+2000)=14320

39. (C) $5100\left(1+\frac{4}{100}\right)^2=x\left(1+\frac{4}{100}\right)+x$

$\Rightarrow x=\frac{5100\times\left(1+\frac{4}{100}\right)^2}{2+\frac{4}{100}}$

$\frac{51\times104^2}{204}=2704$

40. (B) $\frac{150}{\frac{3}{4}s}-\frac{150}{S}=\frac{1}{2}$

S=100 kmph

$\frac{d}{75}-\frac{d}{100}=3$, d=900km

Initially, train has travelled for 3 hours=100x3=300km

Total distance=900+300=1200km

41. (A) Let x be the distance travelled by train @36kmph to reach the meeting point: $t_1=t_2\Rightarrow\frac{x}{36}=\frac{x+48}{42}$

Total distance 2x+48

42. (B) Average speed = (total distance)/(total time)

43. (A) Distance travelled by train from A to B in half an hour=80 kmph x $\frac{1}{2}$ hr=40km

So, remaining distance to be covered =220-40=180km

Relative speed=80+100=180 kmph [Two trains are moving in opposite direction]

Time to meet each other=$\frac{180\text{km}}{180\text{kmph}}=1\text{hr}$

Total distance from station A=40km+80kmphx1hr

=40+80=120 km

44. (B) stopping time

$=\frac{25\text{km}}{65\text{kmph}}\times60=23\frac{1}{13}\text{min}.$

45. (B) S_B-S_A=70/7=10 , S_B+S_A=70/1=70

46. (D) S is speed

$\frac{S_p}{S_r}=\sqrt{\frac{t_R}{t_p}}=\sqrt{\frac{25}{16}}=\frac{5}{4}$

To reach the meeting point, time taken by Pallavi and Richa is same.

$\frac{d_p}{d_r}=\frac{5}{4}$ [ratio of distance travelled by Pallavi and Richa before they met]

Total distance=$d_p+d_r=\frac{120}{5}\times216\text{m}$

47. (D) $t_{v.s}$-$t_{d.s}$=6

$\frac{d}{7-3}-\frac{d}{7+3}=6\Rightarrow d=40\text{km}.$

48. (C) $x\times y=\text{LCM}\times\text{HCF}=3\times105$

$\frac{x+y}{xy}=\frac{1}{x}+\frac{1}{y}=\frac{36}{3\times105}=\frac{4}{35}$

49. (D) share ratio is

$\frac{1}{3}\times\frac{1}{3}:\frac{1}{6}\times\frac{1}{6}:\frac{1}{2}\times1=1:4:18$

C's share $=\frac{18}{23}\times16,100=12600/-$

50. (B) Circumference: $2\pi r = \frac{2260}{113} = 20$

$r = \frac{35}{11}$ m

Diameter $2r = \frac{70}{11} = 6\frac{4}{11}$ metres.

51. (B) By substitution $x = a^2 + b^2 + c^2$ satisfies the given equation.

52. (B)

$$n - \left(\frac{1}{n+1} + \frac{2}{n+1} + \ldots\ldots + \frac{n}{n+1}\right) = n - \frac{n}{2} = \frac{n}{2}$$

53. (B) $\frac{b}{a} \times \frac{c}{b} = \frac{5}{4} \times \frac{16}{15} = \frac{4}{3}$

$$\therefore \frac{c^2 - b^2}{c^2 + b^2} = \frac{\left(\frac{c}{a}\right)^2 - 1}{\left(\frac{c}{a}\right)^2 + 1} = \frac{16-9}{16+9} = \frac{7}{25}$$

54. (A) $\frac{2}{\sqrt{2}} = \frac{5}{m} \Rightarrow m = \frac{5}{\sqrt{2}}$

55. (D) a+b+c+d=1

a=b=c=d=$\frac{1}{4}$ [To get maximum value]

(1+a)=(1+b)=(1+c)=(1+d)=$\frac{5}{4}$

Maximum value of

(1+a)(1+b)(1+c)(1+d)=$\left(\frac{5}{4}\right)^4$

56. (D) x+y+z=0 $\Rightarrow x^3+y^3+z^3=3xyz$

$$\frac{z^2}{xy} + \frac{x^2}{yz} + \frac{y^2}{zx} = 3$$

57. (A) N+12 is common multiple of 50,30,70,90,

N+12 is LCM of 50,30,70,90=9450

N=9438

58. (D) LCM of 2,4,6,8,10,12 = 120 sec = 2 min

In 30 min they ring 15 times together after initial tolling together. $\therefore$ Total number of times=15+1=16

59. (C) ax>1, bx<1

$$\sqrt{(ax-1)^2} + \sqrt{(bx-1)^2} = ax - 1 + 1 - bx = (a-b)x$$

60. (D) T.M=$\frac{600}{4} + \frac{1200}{2} \Rightarrow 750/-$

Money removed $= \frac{72}{4} + \frac{288}{2} = 162$

Required % $= \frac{162}{750} \times 100 = 21.6\%$

61. (B) Total profit $\rightarrow x$

Amount of profit $= x - \frac{3x}{10} = \text{Rs.}\frac{7x}{10}$

Ratio =5000:6000:4000=5:6:4

P share= $\left(\left(\frac{7x}{10} \times \frac{5}{15}\right) + \frac{3x}{10}\right) = \text{Rs.}\frac{8x}{15}$

Q share $= \frac{7x}{10} \times \frac{6}{15} = \text{Rs.}\frac{7x}{25}$

R share= $\frac{7x}{10} \times \frac{4}{15} = \text{Rs.}\frac{14x}{75}$

$$\frac{7x}{25} + \frac{14x}{75} + 200 = \frac{8x}{15} \Rightarrow x = 3000$$

62. (D) $\theta_1 + \theta_2 = 60^0$, $\theta_1 - \theta_2 = 30^0$

$\theta_1 = 45^0$, $\theta_2 = 15^0$

$\sin 90^0 + \tan 45^0 = 1 + 1 = 2$

63. (A) Let b be the length of broken part and h be the unbroken part.

height of tree=h+b

$$\tan 60^0 = \frac{h}{75} \Rightarrow h = 75\sqrt{3}$$

$$\cos 60^0 = \frac{75}{b} \Rightarrow b = 75 \times 2$$

$$h + b = 75\left(\sqrt{3} + 2\right)$$

64. (C) $r = \sqrt{3} \Rightarrow \sqrt{4 + 2\sqrt{3}} = \sqrt{3} + 1$

65. (D)

$$1 + \cot^2\theta + 2\tan^2\theta + \cot^2\theta$$

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

$$\frac{\tan^2\theta + \cot^2\theta}{2} \geq 1 \Rightarrow \tan^2\theta + \cot^2\theta \geq 2$$

$$\Rightarrow 1 + 2(\tan^2\theta + \cot^2\theta) \geq 1 + 2(2) = 5$$

66. (C) Let each side =K

Then

$$K^2 = \left(\sec^2 A - 1\right)\left(\sec^2 B - 1\right)\left(\sec^2 C - 1\right)$$

$$K^2 = \tan A . \tan B . \tan C$$

67. (C) $a^2+\frac{1}{a^2}=x^2\left(\sin^2\theta+\cos^2\theta\right)+$

$y^2\left(\sin^2\theta+\cos^2\theta\right)=x^2+y^2$

68. (D)

$$x^2+\frac{1}{x^2}\geq 2\Rightarrow 2\sin\left(\frac{\pi x}{2}\right)\geq 2\Rightarrow \sin\left(\frac{\pi x}{2}\right)\geq 1$$

$$\Rightarrow \sin\left(\frac{\pi x}{2}\right)=1\Rightarrow x=1,\therefore x-\frac{1}{x}=0$$

69. (A) height of tower A=12x4=48m
height of B can be 48-12=36 m or 48+12=60 m

70. (C) $\tan 30^0=\frac{h}{d};\tan 60^0=\frac{h}{d-20}$

$$\frac{h}{\tan 30}-20=\frac{h}{\tan 60^0}\Rightarrow h\left[\sqrt{3}-\frac{1}{\sqrt{3}}\right]=20$$

$h=10\sqrt{3}$

71. (B)
72. (A)
73. (C) with x=0 equation, triangle cannot be formed
74. (B) r_1=sphere radius, r_2=hemisphere radius

$$4\pi r_1^{\,2}=3\pi r_2^{\,2}\Rightarrow \frac{r_1}{r_2}=\frac{\sqrt{3}}{2}$$

Ratio of Volumes of sphere to hemisphere

$$=\frac{\frac{4}{3}\pi r_1^{\,3}}{\frac{2}{3}\pi r_2^{\,3}}=2\left(\frac{r_1}{r_2}\right)^3=\frac{3\sqrt{3}}{4}$$

75. (B) $\angle APB=90^0$ (by rule)

$\Rightarrow \angle PAB+\angle PBA=90^0\Rightarrow \angle PBA=90^0-35^0$

76. (A)
C is a point at which chord AB of larger circle touches the smaller circle of same centre O.

$AC=\sqrt{5^2-3^2}=4$cm.
length of tangent AB=2xAC=8cm

77. (B) $\Delta ABC\sim\Delta DAC$
78. (A) length of transverse common tangent

$$8=\sqrt{d^2-\left(r_1+r_2\right)^2}=\sqrt{d^2-(9)^2}$$

$d^2=64+81=145\Rightarrow d=\sqrt{145}$

79. (A) $DE\parallel BC$ (by basic proportionality theorem)

$$\frac{AD}{DB}=\frac{AE}{EC}$$

80. (B) In a cyclic quadrilateral sum of opposite angles is supplementary
81. (D) $2\pi r=a,\quad v=\pi r^2h$,

$$v=\frac{\pi a^2h}{4\pi^2}\Rightarrow h=\frac{4\pi v}{a^2}$$

82. (C) $\cos^2\alpha+\sin^2\beta=2$,

$\cos^2\alpha=1\ \&\ \sin^2\beta=1$

83. (A) Volume=base area$\times$ height

$$=\frac{1}{2}\left(\frac{a}{\sqrt{2}}\right)\left(\frac{a}{\sqrt{2}}\right)h\Rightarrow V=\frac{a^2h}{4}\ \text{cm}^3$$

84. (A) Required area

$$=\frac{\pi}{2}\times\left(\frac{AC}{2}\right)^2=\frac{\pi}{2}\left(\frac{AB^2+BC^2}{4}\right)$$

$$=\frac{\pi}{2}\left(\frac{AB}{2}\right)^2+\frac{\pi}{2}\left(\frac{BC}{2}\right)^2=100\text{cm}^2$$

85. (B) Ratio of surface areas=100:400=1:4
$=1^2:2^2$
$r_1:r_2=1:2$
Ratio of volumes=$1^3:2^3$=1:8

K%=$\frac{7}{8}\times 100=87.5\%$

86. (D) $\frac{49\pi}{100}=\pi r^2\Rightarrow r=0.7$

Height, $h=\sqrt{l^2-r^2}=2.4$km

87. (C) $\sin\left(\frac{\pi}{n}\right)=\frac{a/2}{R}\Rightarrow R=\frac{a}{2}\cos ec\left(\frac{\pi}{n}\right)$
88. (A) Diagonal of field= distance covered in 2 minutes=$\frac{3000}{60}\times 2=100$m

Area of field =$\frac{1}{2}\times 100\times 100=5000\text{m}^2$

89. (C) Total surface area of prism=(Perimeter of base x height)+2x Area of base
=(36x5)+(2x54)=288cm^2
90. (A) Circumference of cylinder= $2\pi r=6\pi$
$h=d=6$cm
Volume of cylinder= $\pi r^2h=54\pi$c.c

91. (B) Each Interior angle= $\frac{(n-2)180^0}{n}$

$\frac{(n-2)180^0}{n}=105$

$75n=360 \Rightarrow n=\frac{360}{75}$ [n is not a perfect integer so 105^0 cannot be an interior angle]

92. (A) $\angle PAD = 180-2(\angle ADP)$

From parallelogram,

$\angle A+\angle B+\angle C+\angle D=360^0$

$\angle A+\angle C+2\angle D=360^0$

$(\angle PAD+\angle PAB)+\angle C+(180-\angle PAD)=360^0$

$\angle PAB+\angle C=\angle PAB+\angle BCD=180^0$

93. (D) O is centre of circle $\angle AOC=160^0$

PAOC is a quadlilateral

$[\angle OAP=\angle OCP=90^0]$

$\angle APC=20^0$

94. (C) $\Delta ABE \sim \Delta ACD$ [similar triangles]

$\frac{ar(\Delta ABE)}{ar(\Delta ACD)}=\left(\frac{AB}{AC}\right)^2=\left(\frac{AB}{\sqrt{2}AB}\right)^2=\frac{1}{2}$

95. (A) $\angle ACB=60^0$,

$\angle ACD=30^0$ (CD bisects $\angle ACB$)

Now, $\angle ACD+\angle ACE=180^0$

$\angle ACE=150^0$

Also, AC=CE

$\angle CAE=\angle CEA=\frac{1}{2}(180^0-150^0)=15^0$

96. (C)
97. (B)
98. (D)
99. (B)
100. (B)