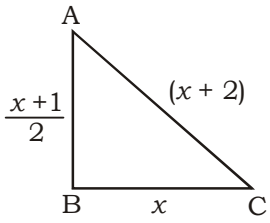
KD Campus
KD Campus Pvt. Ltd
2007, OUTRAM LINES, 1ST FLOOR, OPPOSITE MUKHERJEE NAGAR POLICE STATION, DELHI-110009

SSC MAINS (MATHS) MOCK TEST-18 (SOLUTION)

1. (B)



Let Base of triangle = x
Then : $AB^2 + BC^2 = AC^2$

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

$$\frac{x^2+1+2x}{4} + x^2 = (x+2)^2$$

$x^2 + 1 + 2x + 4x^2 = 4x^2 + 16 + 16x$
$x^2 - 14x - 15 = 0$
$(x-15)(x+1) = 0$
$x = 15$

Then AB = $\frac{15+1}{2} = 8$

$(15)^2 + (8)^2 = (17)^2$

2. (A) $\alpha^4 - \beta^4 = (\alpha-\beta)(\alpha+\beta)(\alpha^2+\beta^2)$

$= [(\alpha+\beta)^2 - 2\alpha\beta](\alpha+\beta)\sqrt{(\alpha+\beta)^2 - 4ab}$

$\because (\alpha+\beta) = \frac{-b}{a}$

$\therefore \alpha \times \beta = \frac{c}{a}$ Put the value.

$$\left(\frac{b^2-2ac}{a^2}\right)\left(\frac{-b}{a}\right)\sqrt{\left(\frac{b^2}{a^2} - 4\frac{c}{a}\right)}$$

$$\frac{-b}{a^4}(b^2-2ac)\sqrt{b^2-4ac}$$

$\because b^2 - 4ac = 0$

$$\frac{-b}{a^4}(b^2-2ac)\sqrt{D}$$

3. (B) $\left(\frac{5}{2}+2\right)$ km/h

$= \frac{9}{2}$ km/h

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{18}{\frac{9}{2}} = 4 \text{ hours}$$

4. (C) $\frac{4x^3 - x}{(2x+1)(6x-3)} = \frac{x(4x^2-1)}{(2x+1)3(2x-1)}$

$$= \frac{x(2x+1)(2x-1)}{3(2x+1)(2x-1)} = \frac{x}{3} = \frac{9999}{3} = 3333$$

5. (A) $P_1 + P_2 + P_3 + P_4 = 10000$

$$= \frac{10}{11}x\left(\frac{1331+1210+1100+1000}{1331}\right)$$

$= 10000$

$$= \frac{10x}{11} \times \frac{4641}{1331} = 10000$$

$x = 3155$ (Approx)
Now Amount After 1 year = 10000

$$10000 \times \left(1+\frac{10}{100}\right) = ₹11000$$

After giving 1 installment = 11000 – 3155
= 7845

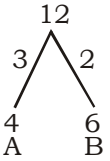
$$7845\left(1+\frac{10}{100}\right) = 8629.50$$

After second year installment
8629.50 – 3155 = 5474.50

$$\text{Now} = 5474.50\left(1+\frac{10}{100}\right) = 6022$$

Total money returned = 6022 +3155 +3155
= 12332

6. (B)



(A) 1 ——— 3
(B) 1 ——— 2
2 hours ——— 5
4 hours ——— 10
Remaining = 12 – 10 = 2

$= \frac{2}{3}$

Total time $= 4\frac{2}{3}$ hours

7. (C)

$$P = \frac{P \times \frac{50}{3} \times T}{100}$$

T = 6 year

8. (B) $x = \frac{1}{\sqrt{2}+1}$

$(x+1) = \frac{1}{\sqrt{2}+1} + 1$ (Both side added 1)

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

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

$= \sqrt{2}$

9. (A) $PQ = \sqrt{(13)^2-(11-6)^2}$

$PQ = \sqrt{(169-25)}$

$PQ = \sqrt{144}$

PQ = 12 cm

10. (A) $\pi(10+x)^2 \times 4 = \pi 10^2 (4+x)$

$100 + x^2 + 20x = 25(4+x)$

$x^2 + 20x + 100 = 100 + 25x$

$x^2 - 5x = 0$

$x = 5$

Required Increase = 5 cm

11. (C) Let total votes = 100%

$75\% = \frac{3}{4}$

$2\% = \frac{1}{50}$ (invalid vote)

$x \times \frac{3}{4} \times \frac{49}{50} \times \frac{3}{4} = 9261$

$x = 16800$

Total votes = 16800

12. (B) Time taken by Ram to cover the distance = 294 seconds.

Time taken by usain Bolt to cover the distance = 300 seconds

	Ram	Usain Bolt
T	294	300
Speed	300	294

6 m

in 300 m required distance = 6 m

1 m ——— $\frac{6}{300}$

1000 m ——— $\frac{6}{300} \times 1000 = 20$ m

13. (D) A + B + C = 36 days

A + B : C

$2_{\times 4} : 1_{\times 4} \rightarrow 3_{\times 4}$

A + C : B

$3_{\times 3} : 1_{\times 3} \rightarrow 4_{\times 3}$

Then efficiency of A : B : C = 5 : 3 : 4

Total work = 12 × 36 = 432

Complete by C = $\frac{432}{4}$ = 108 days

14. (B) $(30)^{15} \times (22)^{11} \times (15)^{24}$

$= (2 \times 3 \times 5)^{15} \times (2 \times 11)^{11} \times (3 \times 5)^{24}$

$= 2^{15} \times 3^{15} \times 5^{15} \times 2^{11} \times 11^{11} \times 3^{24} \times 5^{24}$

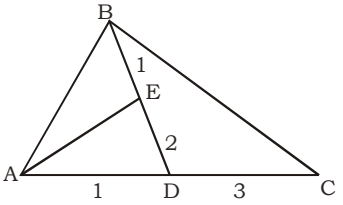
$= 2^{15+11} \times 3^{15+24} \times 5^{15+24} \times 11^{11}$

$= 2^{26} \times 3^{39} \times 5^{39} \times 11^{11}$

The number of Prime factor

= 26 + 39 + 39 + 11 = 115

15. (A)



Area of $\triangle ABD = \frac{1}{4}AC$

Now, Area of ABE = $\frac{1}{4}AC \times \frac{1}{3}BD$

$= \frac{1}{12}$ Area of $\triangle ABC$

Ratio = 1 : 12

16. (C) $90 \times 8\% + 50 \times 10\% = 140 \times 9\% - 60$

$= 1260\% - 1220\% = 60$

$40\% = 60$

$1\% — \frac{3}{2}$

$100\% = 150$

17. (D) Let CP = 100%

CP SP

$\frac{130}{100} \times (100\% - 950) = 125\% - 950$

$1300\% - 950 \times 13 = 1250\% - 950 \times 10$

$50\% = 950 \times 3$

$100\% = \frac{950 \times 3}{50} \times 100$

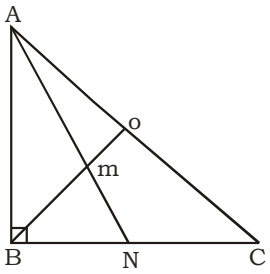
$= 5700$

18. (B) Diff. = $P\left(\frac{r}{100}\right)^2$

$40 = P\left(\frac{10}{100}\right)^2$

$P = 4000$

19. (B) Now by angle bisector theorem



$$\frac{AB}{AO} = \frac{BM}{MO}$$

$$\frac{BM}{MO} = \frac{a}{\frac{a}{\sqrt{2}}}$$

$Bm = 20\sqrt{2}$

$\because$ $BO = 20 + 20\sqrt{2}$

$= 20(1 + \sqrt{2})$ cm

Now since $BO = \frac{a}{\sqrt{2}} = \frac{AB}{\sqrt{2}}$

$AB = \sqrt{2}\,BO$

$AB = \sqrt{2} \times 20\,(1 + \sqrt{2})$

$= 20(\sqrt{2} + 2)$ cm

20. (C) Number of wrist watches sold in 2010 = 22.3 lakhs

$$\text{Required\%} = \frac{28.7 - 22.3}{22.3} \times 100$$

$= 28.7\%$

21. (D) Required Ratio = 3.5 : 9.5

= 7 : 19

22. (B) Required percent $= \frac{30.7 - 9.4}{30.7} \times 100$

$= \frac{21.2}{30.1} \times 100$

$= 69.05\%$

23. (D) Wall clock

24. (A) Percentage increase in the sales of table clock $= \frac{22.3 - 9.5}{9.5} \times 100$

$= 135\%$

25.(A) $\cos 36^{\circ}39' + \sin 36^{\circ}39'$

$$= \sqrt{2}\left(\frac{1}{\sqrt{2}}\cos 3q + \frac{1}{\sqrt{2}}\sin 3q\right)$$

$= \sqrt{2}\sin 45^{\circ}\cos 36^{\circ}39' + \cos 45 \times z\sin 36^{\circ}39'$

$= \sqrt{2}\sin(45^{\circ} + 36^{\circ}39')$

Now $\sin(45^{\circ} + 36^{\circ}39') = 1$

$36^{\circ}39' = 45^{\circ}$

$6^{\circ}39' = 15$

26.(D) $x = 2y = 3z$

$\because$ $x = 3z$, $y = \frac{3z}{2}$

$$\frac{1}{2x} + \frac{1}{4y} + \frac{1}{6z} = \frac{24}{7}$$

$$= \frac{1}{2 \cdot 3z} + \frac{1}{4 \cdot \frac{3z}{2}} + \frac{1}{6z} = \frac{24}{7}$$

$$\frac{1}{6z} + \frac{1}{6z} + \frac{1}{6z} = \frac{27}{7}$$

$$\frac{1}{6z} \times 3 = \frac{24}{7}$$

$$z = \frac{7}{48}$$

27.(C) $\because$ r = 3.5

Total colour part

$= 24^{\circ}12'r^2 + 24^{\circ}12'r^2$

$= 4 \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}\,cm^2$

cost of paint = 10 cm^2 in ₹ 5

1 $cm^2 = \frac{5}{10} = \frac{1}{2}$

Total cost $= 4 \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{1}{2} =$ ₹ 77

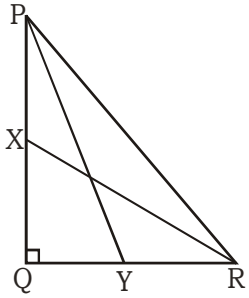
28.(C) $\because$ $x = \sqrt{3} + \sqrt{2}$

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

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

29.(C) $Py^2 = PQ^2 + Qy^2$

$$Py^2 = PQ^2 + \left(\frac{QR}{2}\right)^2 \quad \ldots\ldots\ldots \text{(i)}$$



and in $\triangle XQR$

$RX^2 = QX^2 + QR^2$

$RX^2 = \left(\frac{PQ}{2}\right)^2 + QR^2$ ..... (ii)

adding (i) and (ii)

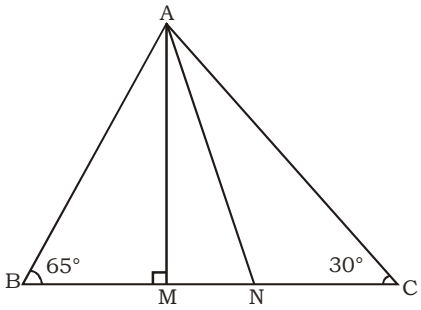
$Py^2 + RX^2 = \frac{5PQ^2}{4} + \frac{5QR^2}{4}$

$4(Py^2 + RX^2) = 5\,PR^2$

$4\,Py^2 + 4RX^2 = 4PR^2 + PR^2$

$Py^2 + RX^2 - PR^2 = \left(\frac{PR}{2}\right)^2$

30.(A)



In DABC

$\angle BAC = 180° - 65° - 30° = 85°$

$\angle BAN = \frac{85°}{2} = 42.5°$

In $\triangle ABM$

$\angle BAM = 180° - 90° - 65° = 25°$

$\angle MAN = \angle BAN - \angle BAM$

$= 42.5° - 25° = 17.5°$

or

Direct $= \frac{1}{2}(65° - 30) = 17.5$

31.(B) $\sqrt{2 + \sqrt{2(1 + \cos 4q)}}$

$\sqrt{2 + 2\cos^2 2q}$

$= \sqrt{2 + \sqrt{4\cos^2 2q}}$

$= \sqrt{2 + 2\cos 2q}$

$= \sqrt{2(1 + \cos 2q)}$

$= \sqrt{2(2\cos^2 q)}$

$= \sqrt{4\cos^2 q} = 2\cos\theta$

32.(C) $\frac{P \times 8 \times 3}{100} = \frac{1}{2}\left[4000\left(1 + \frac{10}{100}\right)^2 - 4000\right]$

$= \frac{24P}{100} = \frac{1}{2}\left[4000 \times \frac{121}{100} - 4000\right]$

$P = \frac{420 \times 100}{24}$

$P = 1750$

33.(A) Mean proportional between $\left(2 + \sqrt{3}\right)$ and $\left(8 - \sqrt{48}\right)$ Mean proportional $= \sqrt{ab}$

$= \sqrt{\left(2 + \sqrt{3}\right)8 - \sqrt{48}}$

$= \sqrt{\left(2 + \sqrt{3}\right)4\left(2 - \sqrt{3}\right)}$

$= 2\sqrt{(2)^2 - \left(\sqrt{3}\right)^2} = 2$

34. (C) Let the number 2a, a, $\frac{2a}{3}$

$= \frac{2a + a + \frac{2a}{3}}{3} = 88$

$= \frac{\frac{11a}{3}}{3} = 88$ a = 72

Smallest number = $72 \times \frac{2}{3} = 48$

35. (B) $= \frac{18 - 16}{16} \times 100 = \frac{100}{8} = 12.5\%$

36. (D) $S_1 \times t_1 = S_2 \times t_2$

$10 \times (t + 2) = 15 \times t$

$5t = 20$

$t = 4h$

Now distance covered to reach KD Campus $= S_1 \times t_1$

$= 10 \times (4 + 2)$

$= 60$ km

Speed required at 12 Noon

$= \frac{60}{5} = 12$ km/h

37. (B) $T_5 = a + (n - 1)d$

$2 = -14 + 4d$

$d = 4$

$\because \quad S_n = \frac{n}{2}(2a + (n - 1)d)$

$40 = \frac{n}{2}(-28 + (n - 1)d)$

$80 = -28n + 4n^2 - 4n$

$n^2 - 8n - 20 = 0$

$n = 10$

38. (D) $\because \frac{(2n-4)}{n} \times 90 - \frac{360}{n} = 132$

$180n - 360 - 360 = 132n$

$180n - 132n = 720$

$n = 15$

39. (B) $\text{Đ}OQR = \text{Đ}OQR = 90°$

$PQ = \sqrt{OP^2 - OQ^2}$

$= \sqrt{(13)^2 - (5)^2} = 12$

$\because$ Area of PQOR $= 2 \times \frac{1}{2} \times 5 \times 12 = 60\ cm^2$

40. (A) $5x - 9y = 1300 \times 5$ ... (i)

$3x - 5y = 900 \times 9$ ... (ii)

$25x - 45y = 6500$

$27x - 45y = 8100$

$2x = 1600$

$x = 800$

Now income of Ist person $= 5 \times 800 = 4000$

second $\frac{23}{11}$ $800 \times 3 = 2400$

41. (D)

42. (A)

43. (A) a, a + 2, a + 4 .....

sum = na + 2 + 4 + ... upto n term

sum = na + sn

$= S_n = \frac{2(2^n - 1)}{2-1}$

Average $= a + \frac{2(2^n - 1)}{n}$

44. (C) A : B : C

24000 : 32000 : 18000

12 : 16 : 9

Let total profit = 100 x

Extra share of A $= 100x \times \frac{15}{100} = 15x$

Extra share of B $= 100x \times \frac{12}{100} = 12x$

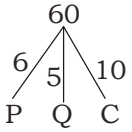
Remaining profit $= 100x - (15x + 12x) = 73x$

Share of C $= \frac{9}{37} \times 73x = 65700$

$x = 3700$

Total profit $= 3700 \times 100 = 370000$

45. (B)



$= 11 - 10 \equiv 1$ unit

$60 \times \frac{1}{4} = 15$

7 am + 15 hrs = 10 pm

46. (D) $\equiv$ 1 Rs : 50P

Value $13x : 11x$

Coins $\boxed{13x : 22x}$

$13x + 22x = 210$

$x = 6 = 13 \times 6 = ₹\ 78$

47. (A)

32.2%	–28
45%	+36
diff ® 12.8%	= 64 marks

1% $\longrightarrow \frac{64}{12.8} = 5$ marks

Passing % $= 32.2 + \frac{28}{5} = 37.8\ \%$

48. (B) $\equiv$ P $\xrightarrow{4\ year}$ 7000

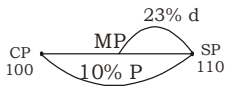
P $\xrightarrow{8\ year}$ 10000

$\frac{A_2}{A_1} = \frac{10}{7}$

$= P \times \frac{10}{7} = 7000$

P = 4900

49. (B) Let CP = 100



10% ——— 56

100% ——— 560

SP ——— $560 \times \frac{110}{100} = 610$

MP ——— $610 \times \frac{100}{77} = ₹\ 800$

50. (D) $x + y = \frac{D}{T}$ ..... (i)

$x - y = \frac{D}{2T}$ ..... (ii)

$2x = \frac{D}{T} + \frac{D}{2T}$

$x = \frac{3D}{4T}$

$y = \frac{D}{4T}$

Ratio = 3 : 1

51. (B)

$\frac{AB}{BC} = \frac{2}{1}$

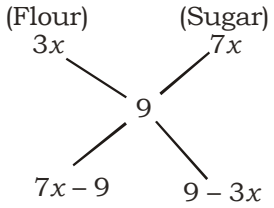
AB = $2x$

BC = x

$\because$ AC = $2x + x^2$

$$\sin A + \cot C = \frac{x}{\sqrt{5x}} + \frac{x}{2x} = \frac{2+\sqrt{5}}{2\sqrt{5}}$$

52. (D) Cost of rasgulla = $15 \times \frac{3}{5} = 9$ kg



$$\frac{9-3x}{7x-9} = \frac{3}{5} \Rightarrow x = 2$$

Price of sugar = $7x$ = ₹ 14

53. (C) Rice Wheat

$\frac{25}{25x}$ $\frac{x}{}$ $\frac{9}{45x}$ $\frac{5x}{}$

$70x = 350$

$x = 5$

Then price of rice = 5 kg

Price of wheat = 25 kg

Increase = $25 \times \frac{120}{100} = 30$ kg

New price of wheat = 30 kg

Then, = $9 \times 30 = 270$

Let price of rice = y

$5 \times y + 9 \times 30 = 350$

y = 16

Hence decrease % of rice

$$\frac{25-16}{25} \times 100 = 36\%$$

54. (D) r = 21 cm

h = 20 cm

$l = \sqrt{h^2 + r^2} = 29$ cm

Area of sheet = total surface area of the cone

$\pi rl + \pi r^2$

$= \pi r(l + r)$

$= \frac{22}{7} \times 21\ (29 + 21) = 3300\ cm^2$

55. (B) $1 + x = 1 + \frac{\sqrt{3}}{2}$ (adding both side 1)

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

$$1 + x = \frac{4+2\sqrt{3}}{4}$$

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

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

56. (C) $a^m \square a^n = a^{mn}$

$a^{m+n} = a^{mn}$

$m + n = mn$

$\because$ $m(n-2) + n(m-2)$

$mn - 2m + nm - 2n$

$= (m + n) - 2m + (m + n) - 2n$

$= 2m + 2n - 2m - 2n = 0$

57. (C) The unit digit of $(316)^{3^{4n}}$ is always 6 so the unit digit of $(316)^{3^{4n}} + 1$ will be 7

58. (C) $\left(\frac{20}{100\% - 20\%}, \frac{240}{6}\right) = ₹\ 10$

59. (A) Let speed of Bolt = x

Let speed of Suraj = y

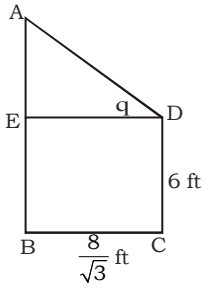
$$\frac{x}{y} = \frac{\frac{800}{(t+20)}}{\frac{600}{t}} = \frac{2}{3}$$

t = 20 seconds

speed of Bolt = $\frac{800}{40}$ = 20 m/sec

speed of Suraj = $\frac{600}{20} = 30$ km/sec

60. (C) AB = Three = $\frac{26}{3}$ feet



BE = CD = 6 feet

$AE = AB - DE = \frac{26}{3} - 6$

$\frac{28-18}{3} = \frac{8}{3}$ feet

from $\triangle AED$

$$\tan 60^\circ = \frac{AE}{ED} = \frac{\frac{8}{3}}{\frac{8}{\sqrt{3}}}$$

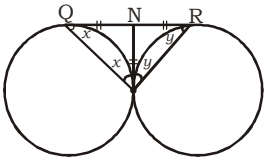
$$\tan 60^\circ = \frac{1}{\sqrt{3}}$$

$60^\circ = 30^\circ$

61. (C)

QR is common tangent and no is also common tangent

$\because$ QN = NP = NR



In $\triangle QPN$

$\angle NQP = \angle NPR$

$\angle P + \angle Q + \angle R = 180^\circ$

$x + y + x + y = 180^\circ$

$x + y = 90^\circ$

62. (D) $(5x)^2 - (4x)^2 = 81$

$x^2 = 9$

$x = 3$

Value of A = 4 × 3 = 12

63. (C) P = 16000

R = 20%

Time = 9 months

$$\text{Time} = \frac{9}{12} \times 4 = 3$$

$$\text{Rate} = \frac{20}{4} = 5\% = \left(\frac{1}{20}\right)$$

P	A
20	21
20	21
20	21
8000	9261

800 —— 1600

1 —— 2

2 × 1261 = ₹ 2522

64. (A) $\frac{36+n}{50+n} = \frac{3}{4}$

144 + 4n = 150 + 3n

n = 6

65. (D) Let the number of men = x

25 × 40 = 1000 works

$$1000 = 25 \times 24 \times \frac{1}{3} + 12 \times \frac{2}{3} \times x$$

$1000 = 200 + 8x$

$x = 100$

Extra men = 100 – 25 = 75 men

66. (B) $= \frac{154}{100} \times \frac{5}{7} \times \frac{5}{4} \times 960 =$ ₹ 1320

67. (D) Let ₹ x be deposited into elder son's account and ₹ y in younger one.

ATQ,

$$x\left(1+\frac{4}{100}\right)^3 = y\left(1+\frac{4}{100}\right)^5$$

$$\frac{x}{y} = \frac{676}{625}$$

Total 676 + 625 = 1301

= ₹ 390300

Required answer = 676 × 300 = ₹ 202800 and 625 × 300 = ₹ 187500

68. (B) S. I for one year $= \frac{225}{3} =$ ₹ 75

When lent on C.I

P

1st year 2nd year

75 75 → S.I

153 → Given

So, C.I for the second year

= 150 – (75 + 75) = ₹ 3

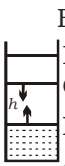
Required rate $= \frac{3}{75} \times 100 = 4\%$

69. (A) $\frac{1}{2} \times 4\sqrt{12}r^2 = 4\sqrt{12}(r-n)^2$

- $r = \sqrt{2}(r - n)$
- $r = \sqrt{2}r - \sqrt{2}n$
- $r(\sqrt{2} - 1) = \sqrt{2}n$
- $r = \frac{\sqrt{2}n}{\sqrt{2}-1}$

70.(D) Volume of each bricks = $10 \times 5 \times 4 = 200$ cm³

Total volume of 500 bricks = $5000 \times 200 = 1000000$ cm³



Volume of water = $1000000 \times \frac{80}{100}$

$800 \times 500 \times h = 800000$ cm³

$h = \frac{800000}{800 \times 500}$

$= 2$ cm

AC = AB + BC

$= 2 \times 100 + 2$

$= 202$ cm

Required height = 400 – 202 = 198 cm

or 1.98 m

71.(B) $\frac{2x^4 - 162}{(x^2+9)(2x-6)}$

$\frac{2(x^4-81)}{2(x^2+9)(x-3)} = \frac{(x^2+9)(x^2-9)}{(x^2+9)(x-3)}$

$\frac{x^2-9}{x-3} = \frac{(x+3)(x-3)}{(x-3)}$

$x + 3$

72.(B) $[\sin\theta + \cos\theta]^2 = \left(\frac{b}{a}\right)^2$

$\sin^2\theta + \cos^2\theta + 2\sin\theta \cdot \cos\theta = \frac{b^2}{a^2}$

$1 + 2 \times \frac{c}{a} = \frac{b^2}{a^2}$

$\frac{a+2c}{a} = \frac{b^2}{a^2}$

$a^2 - b^2 + 2ac = 0$

73.(C) Radius of outer circle = $\frac{1}{2} \times 2.4$ cm

Radius of inner circle = 1.2 cm – 0.2 cm

Area of the circular circle = $\pi(R^2 - r^2)$

$= \pi(R + r)(R - r)$

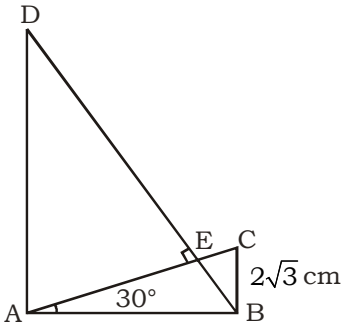
$= \frac{22}{7} \times 2.2 \times 0.2$

$= \frac{9.68}{7}$ cm²

Weight of lead = $\frac{9.68 \times 3.5 \times 11.4 \times 100}{7 \times 1000}$ kg

$= 5.5$ kg

74.(D)



In $\triangle ABC$,

$\tan 30° = \frac{2\sqrt{3}}{AB}$

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

AB = 6 cm

In $\triangle BAD$,

$\tan 60° = \frac{AD}{AB}$

$\frac{\sqrt{3}}{1} = \frac{AD}{AB}$

AD = $6\sqrt{3}$ cm

75.(A) $4ab(a^2 + b^2) = 2 \times ab \times 2(a^2 + b^2)$

$= 2 \times \left\{\frac{(a+b)^2 - (a-b)^2}{4}\right\} \times \left\{(a+b)^2 + (a-b)^2\right\}$

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

$= 2 \times \frac{1}{4} \times 5 = \frac{5}{2}$

76.(A) $\sin\theta + \cos\theta = 1$

On squaring both sides, we get

$\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = 1$

$1 + 2\sin\theta\cos\theta = 1$

$\Rightarrow 2\sin\theta\cos\theta = 0$

$\Rightarrow \sin\theta\cos\theta = 0$

77.(C) as AE is an exterior angle bisector

Let CE = x, BE = BC + EC = $12 + x$

$\Rightarrow \frac{12+x}{x} = \frac{10}{6}$

$\Rightarrow (12 + x)\,6 = 10x$

$\Rightarrow$ $72 + 6x = 10x$

$\Rightarrow$ $4x = 72$

$\Rightarrow$ $x = 18$cm

78.(C) Given AB = AC

$\Rightarrow \angle ACB = \angle ABC = 50^\circ$

$\therefore$ $BAC = 180^\circ - (50 + 50) = 80^\circ$

$\therefore$ $\angle BDC = \angle BAC = 80^\circ$ (angles in the same segment)

79. (B) Let x be a +ve integer.

Now, for $x = 1$

(A) $\frac{x}{x} = 1$,

(B) $\frac{x+1}{x} = \frac{2}{1} = 2$

(C) $\frac{x}{x+1} = \frac{1}{2} = 0.5$

and (D) $\frac{x+2}{x+3} = \frac{3}{4} = 0.75$

$\therefore$ (B) $\frac{x+1}{x}$ has the greatest value. Ans.

80. (A) Let x represents number of students & y represents the number of rows.

Then,

No. of students in each row = $\frac{x}{y}$

Case : (I)

$\left(\frac{x}{y}+4\right) \times (y - 2) = x$

$2y^2 - 4y = x$ ... (i)

Case : (II)

$\left(\frac{x}{y}-4\right) \times (y + 4) = x$

$y^2 + 4y = x$ ... (ii)

From eqn (i) & (ii)

$2y^2 - 4y = y^2 + 4y$

$y(y - 8) = 0$

$y = 8$

Total no. of students

$x = 2(8)^2 - 4 \times 8$

$= 128 - 32$

$\Rightarrow$ $x = 96$ Ans.

81. (B) Number of men = $\frac{2}{5} \times 25 = 10$

Number of women = $\frac{3}{5} \times 25 = 15$

Amount distributed among men and women

$= 275 \times 80\%$

$= ₹ 220$

Let the wages paid to a man be ₹ $5x$ and to a woman be ₹ $4x$, then

$\Rightarrow$ $10 \times 5x + 15 \times 4x = 220$

$\Rightarrow$ $50x + 60x = 220$

$\Rightarrow$ $x = 2$

$\therefore$ Wages received by a woman

$= 2 \times 4 = ₹ 8$

82. (C) $x^2 + \frac{1}{x^2} + 2 = 3$

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

$\Rightarrow$ $x^4 + 1 = x^2$

$\therefore$ $x^4 - x^2 + 1 = 0$

Now, $x^{206} + x^{200} + x^{90} + x^{84} + x^{18} + x^{12} + x^6 + 1$

$= x^{200}(x^6 + 1) + x^{84}(x^6 + 1) + x^{12}(x^6 + 1) + 1(x^6 + 1)$

$= (x^6 + 1)(x^{200} + x^{84} + x^{12} + 1)$

$= (x^2 + 1)(x^4 - x^2 + 1)(x^{200} + x^{84} + x^{12} + 1)$

$\therefore$ 0 Ans.

83. (A) If $\frac{x^2}{y^2} + tx + \frac{y^2}{4}$ is a perfect square

It must be equal to

$\left(\frac{x}{y}\right)^2 + \left(\frac{y}{2}\right)^2 \pm 2 \times \frac{x}{y} \times \frac{y}{2}$

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

On comparing, we have

$tx = \pm x$

$t = \pm 1$ Ans.

84. (C) $a = \frac{1}{100}$, $b = \frac{1}{5}$, $c = \frac{1}{10}$

or $a = 0.01$, $b = 0.2$, $c = 0.1$

$\therefore$ $b > c > a$

85. (A) $\frac{\frac{1}{2} \div \frac{1}{2} \times \frac{1}{2}}{\frac{1}{2} + \frac{1}{2} \times \frac{1}{2}} = \frac{\frac{1}{2} \times 2 \times \frac{1}{2}}{\frac{3}{4}} = \frac{1}{2} \times \frac{4}{3} = \frac{2}{3}$

86. (A) Part of the cistern filled in 3 min

$= \frac{3}{12} + \frac{3}{16} = \frac{21}{48} = \frac{7}{16}$

Let remaining $\frac{9}{16}$ part was filled in x min

Then, $\frac{x}{12} \times \frac{7}{8} + \frac{x}{16} \times \frac{5}{6} = \frac{9}{16}$

$\Rightarrow \quad x\left(\frac{7+5}{96}\right) = \frac{9}{16}$

$\Rightarrow \quad x = \frac{9}{16} \times \frac{96}{12} = 4.5$ min

87. (A) Length of train $= 12 \times 15 = 180$ m

Time $= 18$ s

Speed $= \frac{180}{18} = 10$ m/s

New distance $= 15 \times 10 = 150$ m

$\therefore$ Required time $= \frac{150}{10} = 15$s

88. (B) $\frac{a^{1/2}+a^{-1/2}}{1-a} + \frac{(1-a^{-1/2})}{1+\sqrt{a}}$

$\Rightarrow \frac{2}{(1-\sqrt{a})(1+\sqrt{a})} + \frac{1-a^{-1/2}}{(1+\sqrt{a})}$

$\Rightarrow \frac{2+(1-\sqrt{a})(1-a^{-1/2})}{1-a}$

$\Rightarrow \frac{2+1-a^{-1/2}-a^{-1/2}+1}{1-a}$

$\Rightarrow \frac{2+2-(a^{-1/2}+a^{+1/2})}{1-a}$

$\Rightarrow \frac{2+2-2}{1-a} = \frac{2}{1-a}$

89. (C) $(1 - \sin^2 A) = \frac{0.8}{\sec A}$

$\Rightarrow \cos^2 A \cdot \sec A = 0.8$

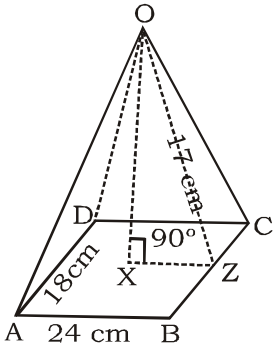
$\Rightarrow \quad \cos A = 0.8 = \frac{4}{5}$

$\Rightarrow \quad \sin A = \frac{3}{5}$

$\Rightarrow \quad \tan A = \frac{3}{4}$

So, $\tan A + \frac{1}{\cos A} = \frac{3}{4} + \frac{5}{4} = \frac{8}{4} = 2$

90. (C)



Let OABCD be the right pyramid whose

AB = DC = 24 cm

BC = AD = 18 cm

If Z is the mid point of side BC, then OZ = slant height = l = 17 cm

In ΔOXZ, $\angle X = 90^\circ$

$\Rightarrow$ OX = height $= \sqrt{OZ^2 - XZ^2}$

$\Rightarrow \quad h = \sqrt{17^2 - \left(\frac{DC}{2}\right)^2}$

$\Rightarrow \quad h = \sqrt{17^2 - 12^2}$

$\Rightarrow \quad h = 12.04$ cm

Now,

Volume $= \frac{1}{3}$ area $\times$ height

$= \frac{1}{3} \times 24 \times 18 \times 12.04$

$= 1733.76$ cm^3

$= 1733.5$ cm^3 (approx.)

91. (D) 8B2 is divisible by 3 so B may be 2, 5 and 8.

ATQ,

$$\begin{array}{r} 3\ 3\ 5 \\ +5\ A\ 7 \\ \hline 8\ B\ 2 \end{array}$$

So, $3 < B \leq 9$

Value of A are (8 – 1 – 3) or (5 – 1 – 3)

i.e. 4 or 1

Largest possible value of A = 4.

92. (A) S.P. of piano

$= 15000 \times \frac{80}{100} \times \frac{90}{100} \times \frac{90}{100}$

$= ₹\ 9720$

93. (C) New average is $= 120 - 5 \times 11 = 65$

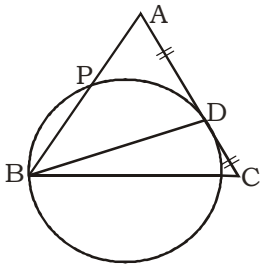
94. (B) Area of equilateral triangle $= 9\sqrt{3}$ m^2

Side of triangle $= \sqrt{\frac{9\sqrt{3}}{\frac{\sqrt{3}}{4}}} = 6$ m

Length of median $= \frac{\sqrt{3}}{2} \times$ side

$= 3\sqrt{3}$ m

95.(C) AB = BC and AD = CD



AB = 2 AD

Now, AD is a tangent

$AD^2 = AP \times AB$

$\left(\frac{AB}{2}\right)^2 = AP \times AB$

$AB = 4AP$

96.(C)

97.(B)

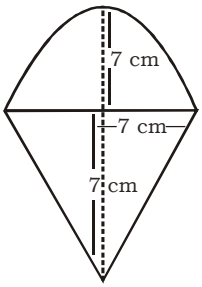
98. (B) Volume of frustum = $\frac{1}{3}\pi h (r^2 + Rr + R^2)$

Where $\pi = \frac{22}{7}$, h = 6, R = 4, r = 2

$\frac{1}{3} \times \frac{22}{7} \times 6 (4 + 8 + 16)$

$\frac{1}{3} \times \frac{22}{7} \times 6 \times 28 = 176 \text{ m}^3$

99.(A)



Height of hemispherical part = 7 cm = radius of hemispherical part

ATQ,

Radius of hemispherical part = height of the cone = 7 cm

Volume of ice cream

= Volume of cone + hemispherical part

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

$= \frac{1}{3}\pi r^2 (h + 2r)$

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

$\frac{22}{7} \times 21 = 21 \times 7 \times 7 = 1078 \text{ cm}^3$

100.(B) $a = b \times \frac{20}{100}$ ..... (i)

$b = c \times \frac{20}{100}$ ..... (ii)

$c = d + \frac{d}{3}$ ..... (iii)

a : b ⇒ 1 : 5 : 5 : 5
b : c ⇒ 6 : 6 : 5 : 5
c : d ⇒ 4 : 4 : 4 : 3
a : d : c : d ⇒ 24 : 120 : 100 : 75

Let a = 24 k, b = 120 k, c = 100 k

$= \frac{2a}{b+c} \times \frac{200}{100} = \frac{2 \times 24k}{120k + 100k} \times \frac{20}{100}$

$= \frac{48k}{220k} \times \frac{1}{5} = \frac{12}{275}$

SSC MAINS (MATHS) MOCK TEST-18 (ANSWER KEY)

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