SSC MAINS (MATH) MOCK TEST - 9 (SOLUTION)

1.(D) Let $x = \sqrt{8+2\sqrt{8+2\sqrt{8}.....}}\ \infty$, then

$x = \sqrt{8+2x}$

squaring both sides, we get,

$x^2 = 8 + 2x$

$\Rightarrow x^2 - 2x - 8 = 0$

$\Rightarrow (x-4)(x+2) = 0$

$\therefore\ x = 4$

2.(A) $$\frac{(3.07)^2+(.0193)^2}{(.307)^2+(.00193)^2}$$

$$= \frac{(3.07)^2+(.0193)^2}{\left(\frac{3.07}{10}\right)^2+\left(\frac{.0193}{10}\right)^2}$$

$$= 100\left[\frac{(3.07)^2+(.0193)^2}{(3.07)^2+(.0193)^2}\right]$$

$= 100$

3.(B) Men to be arranged $= (6000 - 71) = 5929$

Number of men arranged in each row

$= \sqrt[2]{5929} = 77$

4.(B) $\sqrt{7}-\sqrt{5}, \sqrt{5}-\sqrt{3}, \sqrt{9}-\sqrt{7}, \sqrt{11}-\sqrt{9}$

On rationalizing each term

$$= \frac{2}{\sqrt{7}+\sqrt{5}}, \frac{2}{\sqrt{5}+\sqrt{3}}, \frac{2}{\sqrt{9}+\sqrt{7}}, \frac{2}{\sqrt{11}+\sqrt{9}}$$

Smallest denominator $= \sqrt{5}-\sqrt{3}$

So largest value $= \sqrt{5}-\sqrt{3}$

5.(C) Let the price of 1 book = ₹ x

and price of 1 pencil = ₹ y

According to the question:

$4x + 3y = 8x + y$

$2y = 4x$

$y = 2x$

Price of 4 books and 3 pencils

$= 4x + 3y$

$= 4x + 6x = 10x$

and if 6 books and 2 pencils $= 6x + 2y$

$= 6x + 4x = 10x$

Both are equal

6.(B)

8	13	21	32	46 (47)	63	83
	+5	+8	+11	+14	+17	+20

So 47 is wrong

7.(C) 1000 is not a perfect square so we need to make a perfect square.

	32
3	10 00
3	9
62	100
2	124
	24

we need 24 more plants

8.(A) $57^{25} - 1 \Rightarrow 7^1 - 1 = 6$ $[\because\ 25 = 4\times6+1]$

9.(A) Let the five consecutive integers be x, $x+1$, $x+2$, $x+3$, $x+4$, then

$x+x+1+x+2+x+3+x+4 = a$

$\Rightarrow\quad 5x + 10 = a$.....(i)

Also, $5x + 35 = b$.....(ii)

$$\frac{b-a}{100} = \frac{5x+35-5x-10}{100} = \frac{1}{4}$$

10.(A) I no. × II no. = L.C.M. × H.C.F.

$(x^2+2x-3) \times P = (x^3-7x+6) \times (x+3)$

$$P = \frac{(x^3-7x+6)(x+3)}{x^2+2x-3}$$

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

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

$= (x+3)(x-2)$

$= x^2 + x - 6$

11. (A) $4^{91}\left(1+4+4^2+4^3\right)$

$= 4^{91}(1+4+16+64)$

$= 4^{91}(85)$

$= 5 \times 17 \times 4^{91}$

Divisible by 17.

12. (B) $1 + 2 + 3 + ...99 + 100 + 99 + ...3 + 2 + 1$

$(1 + 2 + 3 + ...100) + (99 + 98 + ...3 + 2 + 1)$

By using the formula of sum of first 'n'

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

We get, $\frac{100(100+1)}{2} + \frac{99(99+1)}{2}$

$= 5050 + 4950 = 10000$

13.(A) Given

$x = 0.\overline{037}$

$x^{1\backslash 3} = \left(0.\overline{037}\right)^{1/3}$

$= (37/999)^{1/3}$

$= (1/27)^{1/3}$

$= 1/3$

$= 0.\overline{3}$

14.(B) Average age of the couple is 25 years

The sum $= 2 \times 25$

$= 50$ years

After 3 years, sum $= 50 + 2 \times 3$

$= 56$ years

Age of baby = 2 years

Then average $(\overline{X}) = \dfrac{\sum x}{n}$

$= \dfrac{56+2}{3} = 58/3 = 19\dfrac{1}{3}$ years

15.(C) Let minors be x

Consumption by adults $= 8 \times 15 = 120$

Total Consumption $= (x + 8) \times 10.8$

Average consumption by minors

$= \dfrac{(8+x)10.8 - 120}{x} = 6 \Rightarrow x = 7$

16. (C) Sum of 8 numbers $= 20 \times 8 = 160$

$\left(15\dfrac{1}{2}\right)\times 2 + \left(21\dfrac{1}{3}\right)\times 3 + x + x + 4 + x + 7 = 160$

$31 + 64 + 3x + 11 = 160$

$3x = 160 - 106 \Rightarrow x = 54/3 \Rightarrow x = 18$

8^{th} Number $= x + 7$

$= 18 + 7 = 25$

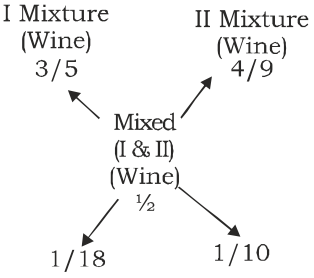
17.(C) Total brass = 33 kg

$\text{copper} = \dfrac{33 \times 7}{11} = 21$ kg

$\text{zinc} = \dfrac{33 \times 4}{11} = 12$ kg

$\dfrac{\text{copper}}{\text{zinc}} = \dfrac{21}{12+6} = \dfrac{21}{18} = 7:6$

18.(A)



$\therefore \quad I : II = \dfrac{1}{18} : \dfrac{1}{10} = 10 : 18 = 5 : 9$

Clearly, for 5l of I-Mixture required amount of II mixture = 9l.

$\therefore$ For 3 l of I–mixture required amount of

II mixture $= \dfrac{9}{5} \times 3 = \dfrac{27}{5} = 5\dfrac{2}{5} l$

19.(A) Students Failed in Hindi = 100% – 80% = 20%

Students Failed in mathematics

= 100%–75% = 25%

Students Failed in both subject = 18%

Students Passed in both subject

= 100–(25+20–18)

= 73%

Let total students be x

$\dfrac{x \times 73}{100} = 438 \Rightarrow x = 600$

Total students is 600

20.(D) Let C.P = x

$x \times \dfrac{100+r}{100} \times \dfrac{100-r}{100} = 1$

$x = \dfrac{100 \times 100}{(100+r)(100-r)}$

$= \dfrac{10000}{100^2 - r^2}$

$x = \dfrac{10000}{10000 - r^2}$

21. (C) $100 \times 68/100 = 68$ Kg.

Dry Fruits = 32 Kg + 20 kg = 52 kg

22.(D) Let, the total number of voters be x

$\therefore$ Number of votes cast in the election $= \dfrac{92}{100} x$

Number of votes obtained by winner $= \dfrac{48}{100} x$

$\therefore$ Number of votes obtained by the defeated Candidate $= \dfrac{(92-48)}{100} x$

$= \dfrac{44}{100} x$

From question,

$\dfrac{48x}{100} - \dfrac{44x}{100} = 1100$

$\Rightarrow \quad 4x = 110000$

$\therefore \quad x = 27500$

$\therefore$ Total no. of voters = 27,500

23.(C) According to the question

Let the numbers are a and b

$(a - b) : (a + b) : ab = 1 : 7 : 24$

Numbers are a = 8 b = 6

so product = 8 × 6 =48

24.(A) Let the Length of candles be L

The rate of burn of first candle $= \frac{L}{4}$ per hour

The rate of burn of second candle $= \frac{L}{3}$ per hour

Let after x hour the ratio be 2:1

$$L - \frac{x\,L}{4} = 2\left(L - \frac{x\,L}{3}\right)$$

$$L\left(1 - \frac{x}{4}\right) = 2\,L\left(1 - \frac{x}{3}\right)$$

$$\frac{4-x}{4} = 2\left(\frac{3-x}{3}\right)$$

$x = 2\frac{2}{5}$ hours = 2 hours 24 min.

25. (A) Cost of raw material = 4x
Cost of labour = 3x
Cost of miscellaneous = 2x
Total cost = 4x + 3x +2x
= 9x

$$\text{Amount} = \frac{4x \times 110}{100} + \frac{3x \times 108}{100} + \frac{2x \times 95}{100}$$
$$= 9.54x$$

$$\text{Percentage rise} = \frac{9.54x - 9x}{9x} \times 100 = 6\%$$

26.(A) Let the number be x

$3\overline{-x} : 5\overline{-x} :: 6\overline{-x} : 7\overline{-x}$

$(3-x)(7-x) = (5-x)(6-x)$
$x = 9$

27. (B) $a : b = \frac{2}{9} : \frac{1}{3}, b : c = \frac{2}{7} : \frac{5}{14}, d : c = \frac{7}{10} : \frac{3}{5}$

a : b = 2 : 3 b : c = 4 : 5
d : c = 7 : 6 c : d = 6 : 7
then,
a : b : c : d = 48 : 72 : 90 : 105
= 16 : 24 : 30 : 35

28.(D) Given,
Total earning of
A+B+C = 76000.....(i)
percentage of their saving are
30%, 25% & 20% respectively
Let, savings of A, B & C
be $4x$, $5x$ & $6x$ respectively
Now, 30% of A = $4x$

or, $30 \times \frac{A}{100} = 4x$

or, $A = \frac{40}{3}x$ .....(i)

also, 25% of B = $5x$

or, $25 \times \frac{B}{100} = 5x$

or, B = 20x.....(iii)
also, 20% of C = $6x$

or, $20 \times \frac{C}{100} = 6x$

or, C = 30x.....(iv)
on using (ii), (iii) & (iv) in (i), we get

$$\frac{40x}{3} + 20x + 30x = 76{,}000$$

or, $x = 1200$

$\therefore$ $A = \frac{40x}{3} = \frac{40}{3} \times 1200 = 16000$

B = 20x = 20 × 1200 = 24000
C = 30x = 30×1200 = 36000
$\therefore$ (A + B) – C = (40000 – 36000) = ₹ 4000

29.(C) Let money be P.

$$\frac{P \times 12 \times 4}{100} - \frac{P \times 15 \times 5}{100} = 1890$$

$$\frac{27P}{100} = 1890 \Rightarrow P = \frac{1890 \times 100}{27} \Rightarrow P = ₹\,7000$$

30.(A) Let initial amount = ₹ x

$$\frac{x}{3} \times \frac{7 \times 2}{100} + \frac{2}{5} \times \frac{x \times 10 \times 2}{100} + \frac{4 \times x \times 12 \times 2}{15 \times 100} = 1430$$

$$\frac{14x}{300} + \frac{4x}{50} + \frac{8x}{125} = 1430$$

$$\frac{7x}{150} + \frac{2x}{25} + \frac{8x}{125} = 1430$$

$$\frac{35x + 60x + 48x}{750} = 1430$$

$143x = 1430 \times 750$

$$x = \frac{1430 \times 750}{143} = ₹\,7500$$

31.(C) CP of Horse = x

C.P S.P

$$\left(x \times \frac{(100-25)}{100}\right) \times \frac{100+32}{100} = x \times \frac{115}{100} - 60$$

$x = 375$

32.(C) Let cost of 100 Articles is ₹100
(∴ 1Article =₹1)

50% of 100 Article — Rest (50%)

50 Articles — 50 Articles
↓ 20% Profit — ↓ 40% Profit

₹60 + 70 = 130

if 100 articles $\xrightarrow{25\%\text{Profit}}$ $\frac{\text{S.P}}{₹125}$

$\rightarrow$ Diff = 5 unit = 100

1 unit = 20

33.(B) Let Marked Price = x

$$\frac{x\,(100-10)}{100} = 108 \Rightarrow x = ₹\,120$$

34.(A) Let C. P. = ₹ x

$$\text{S.P.} = \frac{x \times 108}{100}$$

Again C. P. = $\frac{x \times 80}{100}$

$$\text{S.P.} = \frac{80x}{100} \times \frac{140}{100} = \frac{112x}{100}$$

$\therefore$ $\frac{112x}{100} - \frac{108x}{100} = 640$

x = ₹ 16000

35.(A) According to the Question

Price $\rightarrow$ 100 $\times$ 120

Sale $\rightarrow$ 100 $\times$ 85

= 10000 $\longrightarrow$ 10200

+2% increase

36.(D) According to the question

$$\text{He should purchase} = \frac{400}{320 \times 50\%}$$

= 5 shirts

37.(A) S. P. = $\frac{720 \times 115}{100}$ = ₹ 828

Marked price = ₹ x

we get,

$$\frac{x \times 90}{100} = ₹\,828$$

x = ₹ 920

38.(A) Let work done by a man in a day be x and work done by a woman be y

$\therefore$ From question,

$4x + 6y = 1/8$.....(i)

$3x + 7y = 1/10$.....(ii)

on solving (i) & (ii), we get

$x = \frac{11}{400}$ $\quad$ $y = \frac{1}{400}$

$$\text{required ratio} = \frac{x}{y} = \frac{11}{400} \div \frac{1}{400} = 11 : 1$$

39.(B) Given,

$1/B = 2/A$

or, $A = 2B$.....(i)

also, given $1/C = 3/A$

or, $A = 3C$ .....(ii)

also, given $\frac{1}{A} + \frac{1}{B} + \frac{1}{C} = \frac{1}{2}$ .....(iii)

on using (i) in (iii), we get

$$\frac{1}{2B} + \frac{1}{B} + \frac{3}{3C} = \frac{1}{2}$$

or, $\frac{1}{2B} + \frac{1}{B} + \frac{3}{2B} = \frac{1}{2}$ [using (i) & (ii)]

or, $\frac{1+2+3}{2B} = \frac{1}{2}$

or, $2B = 12$

or, $B = 6$ days

40.(A) $\frac{M_1 \times D_1}{W_1} = \frac{M_2 D_2}{W_2}$

$$\frac{100 \times 16}{1/7} = \frac{M_2 \times 80}{6/7}$$

$$M_2 = \frac{100 \times 16 \times 6}{80} \Rightarrow M_2 = 120$$

Required labourers = 120 – 100 = 20

41.(A) Given,

$A + B + C = 14{,}400$.....(i)

Let savings of A, B & C are $8x$, $9x$ & $20x$ respectively.

Also given percentage of expenditure of A, B & C are 80%, 85% & 75% respectively.

$\therefore$ Percentage of savings of A, B & C be 20%, 15% & 25% respectively.

Now, 20% of A = $8x$

or, $\frac{20 \times A}{100} = 8x$

or , $A = 40x$.....(ii)

Again, 15% of B = $9x$

or, $\frac{15 \times B}{100} = 9x$

or, $B = 60x$.....(iii)

again, 25% of C = $20x$

or, $\frac{25 \times C}{100} = 20x$

or, $C = 80x$ .....(iv)

on using (ii), (iii) & (iv) in (i), we get

$40x + 60x + 80x = 14{,}400$

or, $x = 80$

$\therefore$ $A = 40x = 40 \times 80 = 3{,}200$

$B = 60x = 60 \times 80 = 4{,}800$

$C = 80x = 80 \times 80 = 6{,}400$

42.(A) Speed = 15 km per hour

$= 15 \times \frac{5}{18} = \frac{25}{6}$ m / s.

Water flow out in one second
$= .2 \times .15 \times 25/6$ m^3
Volume of tank = $150 \times 100 \times 3$ m^3

Time taken = $\frac{150 \times 100 \times 3 \times 6}{.2 \times .15 \times 25}$

= 100 hours.

43.(D) Given,
1/A = 1/8.....(i)
also, given 1/A – 1/B = 1/20
or, 1/B = 1/A – 1/20
or, 1/B = 1/8 – 1/20
or, 1/B = 3/40
∴ B takes 40/3 min. to empty the tank
also, given rate of water flowing out = $6k\,l$

∴ Capacity of tank = $\frac{40}{3} \times 6k\,l = 80\ k\,l$

44.(C) Speed = $\frac{350 \times 60}{1000} = 21\ km/hr$

Total time taken = $\frac{84}{21} + 13 \times 6$
4 + 78 min = 5 hours + 18 min.

45.(A) Let total coaches be N
decrease in the speed = x
∴ $x \propto \sqrt{N}$
$x = K\sqrt{N}$ [K = constant]
$4 = K\sqrt{4}$
K = 2
∴ $24 = K\sqrt{N}$
$24 = 2\sqrt{N}$
$\sqrt{N} = 24/2$
N = 144 coaches
∴ Number of coaches that can be exactly pulled by the engine = 144 – 1 = 143 coaches

46.(A) Time taken by C = 114 min.
Time taken by B = 114/3 = 38 min.
Time taken by A = 38/2 = 19 min.

47.(A) Let correct time = t_1
∴ From question,

$$40\left(t_1 + \frac{11}{60}\right) = 50\left(t_1 + \frac{5}{60}\right)$$

$$\Rightarrow t_1 = \frac{19}{60}h = \frac{19}{60} \times 60 = 19 \text{ mins}$$

48.(C) Length of train = 120m.

Speed of train Ist = $\frac{120}{10} = 12$ m/s

Speed of train IInd = $\frac{120}{15} = 8$ m/s

time taken = $\frac{120+120}{12+8} = \frac{240}{20} = 12$ seconds

49.(D) Let the speed of the man = x km and the speed of the current = y km/h
According to the question

$\frac{D}{x-y} = 15$ .....(i) (Where D is distance)

$\frac{D}{x+y} = 10$ .....(ii)

Divide (i) by (ii)

$\Rightarrow \frac{x+y}{x-y} = \frac{15}{10} = \frac{3}{2}$

$\Rightarrow 2x + 2y = 3x - 3y$
$\Rightarrow x = 5y$

$\Rightarrow \frac{x}{y} = \frac{5}{1} = 5:1$

50.(A) $x^{\frac{1}{3}} + y^{\frac{1}{3}} = z^{\frac{1}{3}}$

$(x^{1/3} + y^{1/3})^3 = z$

$(x^{1/3})^3 + (y^{1/3})^3 + 3x^{1/3}y^{1/3}(x^{1/3} + y^{1/3}) = z$

$x + y + 3(xy)^{1/3} \cdot z^{1/3} = z$

$x + y - z = -3(xyz)^{1/3}$

$(x + y - z)^3 = -27xyz$

$(x + y - z)^3 + 27xyz = 0$

51.(C) Given,
or, $x^4 - 3x^3 - 2x^2 + 3x + 1 = 0$
or, $x^4 - 2x^2 + 1 - 3x^3 + 3x = 0$
or, $(x^2 - 1)^2 - 3x(x^2 - 1) = 0$
or, $(x^2 - 1)(x^2 - 1 - 3x) = 0$
taking, $x^2 - 3x - 1 = 0$

$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1) \times (-1)}}{2 \times 1}$

or, $x = \frac{3 \pm \sqrt{9+4}}{2}$

or, $x = \frac{3 \pm \sqrt{13}}{2}$

52.(D) $(1+m^2)\,x^2 + 2mcx + c^2 - a^2 = 0$
B = 2mc
A = $(1+m^2)$
C = $c^2 - a^2$

$\because$ roots are equal $\therefore$ D = 0

$B^2-4AC = 0$

$(2mc)^2 - 4(1+m^2)(c^2-a^2) = 0$

$4m^2c^2 - 4c^2 + 4a^2 - 4m^2c^2 + 4m^2a^2 = 0$

$-c^2 + a^2 + a^2m^2 = 0$

$c^2 = a^2(1+m^2)$

53.(D) Given,

$lx^2 + nx + n = 0$.....(i)

& $\alpha/\beta = p/q$ .....(ii)

Equation (i) $\Rightarrow$ $\alpha+\beta = -n/l$.....(iii)

& $\alpha\beta = n/l$ .....(iv)

Equation (ii) $\Rightarrow$ $\sqrt{\alpha/\beta} = \sqrt{p/q}$ .....(v)

& $\sqrt{\beta/\alpha} = \sqrt{q/p}$ .....(vi)

$\therefore$ $\sqrt{p/q} + \sqrt{q/p} + \sqrt{n/l}$

$= \sqrt{\alpha/\beta} + \sqrt{\beta/\alpha} + \sqrt{\alpha\beta}$ (using (v), (vi) & (iv))

$= \dfrac{\sqrt{\alpha}}{\sqrt{\beta}} + \dfrac{\sqrt{\beta}}{\sqrt{\alpha}} + \dfrac{\sqrt{\alpha\beta}}{1}$

$= \dfrac{(\alpha+\beta)+(\alpha\beta)}{\sqrt{\alpha}.\sqrt{\beta}}$

$= \dfrac{-n/l + n/l}{\sqrt{\alpha}.\sqrt{\beta}}$

$= 0/\sqrt{\alpha}.\sqrt{\beta} = 0$

54.(B) $3x^2 + 2x + 1 = 0$

$\alpha+\beta = -2/3$

$\alpha\beta = 1/3$

Product of roots $= \dfrac{1-\alpha}{1+\alpha}\times\dfrac{1-\beta}{1+\beta} = 3$

sum of roots $= \dfrac{1-\alpha}{1+\alpha} + \dfrac{1-\beta}{1+\beta} = 2$

Required equation is

x^2 – (sum of the roots) x + product of roots = 0

$x^2 - 2x + 3 = 0$

55.(B) $4x^2 + 4x + 9$

$(2x)^2 + 2.2x + 1 + 8$ make a perfect square

$(2x+1)^2 + 8$

for minimum $(2x+1)^2 = 0$ $\therefore$ $0 + 8 = 8$

We have minimun value of $4x^2 + 4x + 9$ is 8

56.(B) Given, $x = 1+\sqrt{2}+\sqrt{3}$ .....(i)

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

$= \dfrac{1}{\sqrt{3}+\sqrt{2}}$

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

$= \dfrac{\sqrt{3}-\sqrt{2}}{3-2}$

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

(i) + (ii) $\Rightarrow$ $x + \dfrac{1}{x+1} = 1+\sqrt{2}+\sqrt{3}+\sqrt{3}-\sqrt{2}$

$= 1+2\sqrt{3}$

57.(A) $x^2+y^2+z^2+2 = 2(y-x)$

$(x^2+2x+1)+(y^2-2y+1)+z^2 = 0$

$(x+1)^2+(y-1)^2+z^2 = 0$

$x=-1,\ y=1,\ z=0$

$\therefore$ $x^3+y^3+z^3 = (-1)^3+(1)^3+0^3$

$= -1+1+0 = 0$

58.(A) $\dfrac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}\times\dfrac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}$

$= \dfrac{1+\sqrt{1-x^2}}{x} = \dfrac{1+1/2}{\sqrt{3}/2} = \sqrt{3}$

59.(C) $x = 5+2\sqrt{6}$

$\sqrt{x} = \sqrt{5+2\sqrt{6}}$

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

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

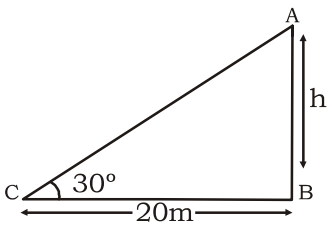
$\sqrt{x} = \sqrt{3}+\sqrt{2}$

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

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

$= 2\sqrt{3}$

60.(B)



According to the question

Let the height of the telegraph pole = h

so, in ΔABC

$\tan 30^\circ = \frac{h}{20}$

$h = \frac{20}{\sqrt{3}} = \frac{20}{3}\sqrt{3} = AB$

and $\cos 30^\circ = \frac{20}{AC}$

$AC = \frac{20 \times 2}{\sqrt{3}} = \frac{40}{\sqrt{3}}$

so height of the pole = AB + AC

$= \frac{20}{\sqrt{3}} + \frac{40}{\sqrt{3}} = \frac{60}{\sqrt{3}}$

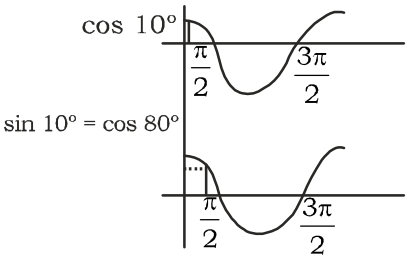
$= \frac{60\sqrt{3}}{3} = 20\sqrt{3}$

61.(B) $x = \sin^{14}\theta + \cos^{20}\theta$

Even power means no negative value and max value will be 1 and never be zero.

$0 < x \le 1$

62.(A)



Here $\cos 10^\circ > \cos 80^\circ$

so, $\cos 10^\circ - \cos 80^\circ > 0$ or positive

63.(D) $1 + \sin x + \sin^2 x ..... \infty = 4 + 2\sqrt{3}$

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

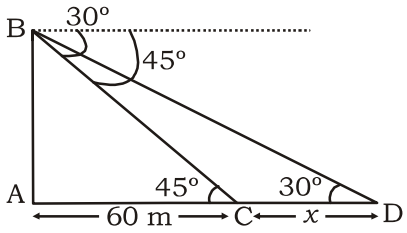
$\Rightarrow \frac{1}{1-\sin x} = 4 + 2\sqrt{3}$

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

$\Rightarrow \sin x = \frac{\sqrt{3}}{2} = \sin\frac{\pi}{3} = \sin\frac{2\pi}{3}$

so $x = \frac{\pi}{2} = \text{or} \frac{2\pi}{3}$

64.(A)



Let height of the tower = AB

So, In ΔABC

$\tan 45^\circ = \frac{AB}{AC}$

so, AB = 60 m. $[\because \tan 45 = 1]$

Also, In ΔADB

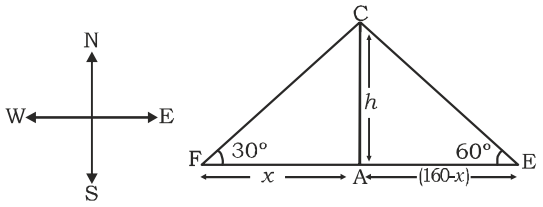
$\tan 30^\circ = \frac{60}{60+x} \Rightarrow \frac{1}{\sqrt{3}} = \frac{60}{60+x}$

$\Rightarrow x = 60(\sqrt{3} - 1) = 60 \times (1.73 - 1)$

$\Rightarrow x = 60 \times 0.73 = 43.8$ m

Required Speed $= \frac{43.8}{5} \times \frac{18}{5} = 31.5$ km/hr

65.(A)



In ΔAFC

$\tan 30^\circ = \frac{h}{x} \Rightarrow x = \sqrt{3}\,h$ .....(i)

In ΔAEC

$\tan 60^\circ = \frac{h}{160-x} = \sqrt{3}$

$\Rightarrow \sqrt{3}\,(160-x) = h$

$\Rightarrow \sqrt{3}\,(160 - \sqrt{3}h) = h$ From (i)

$\Rightarrow 4h = 160\sqrt{3} \Rightarrow h = \frac{160\sqrt{3}}{3}$ ft $= 40\sqrt{3}$ ft

66.(A) $\frac{\tan 3x}{\tan x} = \frac{\sin 3x.\cos x}{\cos 3x.\sin x}$

$= \frac{(3\sin x - 4\sin^3 x)\cos x}{(4\cos^3 x - 3\cos x)\sin x}$

or, $\frac{\tan 3x}{\tan x} = \frac{(3 - 4\tan^2 x)}{(4\cos^2 x - 3)}$ .....(i)

$\text{Max}\left|\frac{\tan 3x}{\tan x}\right| = \frac{3 - 4\times 0}{4-3} = \frac{3}{1} = 3$

(when $x = 0^\circ$)

$\text{Min}\left|\frac{\tan 3x}{\tan x}\right| = \frac{3-4}{-3} = \frac{-1}{-3} = \frac{1}{3}$

$\therefore \frac{\tan 3x}{\tan x}$ vary from $\frac{1}{3}$ to 3.

{clearly, $\tan 3x / \tan x$ never lies between $-1/3$ and 0}

67.(B) $\tan 20^\circ \tan 80^\circ \cot 50^\circ$

$= \tan 20^\circ \tan 80^\circ \tan 40^\circ$

$[\because \cot(90^\circ - 40^\circ) = \tan 40^\circ]$

$= \tan[3\times20^\circ]$

$[\because \tan\theta\tan(60^\circ+\theta)\tan(60^\circ-\theta) = \tan3\theta]$

$= \tan 60^\circ$

$= \sqrt{3}$

68.(C) $\sin 18^\circ + \cos 36^\circ$

$= \frac{\sqrt{5}-1}{4} + \frac{\sqrt{5}+1}{4}$

$= \frac{\sqrt{5}-1+\sqrt{5}+1}{4} = \frac{2\sqrt{5}}{4} = \frac{\sqrt{5}}{2}$

69.(B) We have,

$$\cos\frac{2\pi}{7}+\cos\frac{4\pi}{7}+\cos\frac{6\pi}{7}$$

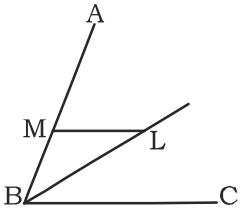
$$=\frac{1}{2\sin\frac{\pi}{7}}\left[2\sin\frac{\pi}{7}\cos\frac{2\pi}{7}+2\sin\frac{\pi}{7}\cos\frac{4\pi}{7}+2\sin\frac{\pi}{7}\cos\frac{6\pi}{7}\right]$$

$$=\frac{1}{2\sin\frac{\pi}{7}}\left[\sin\frac{3\pi}{7}-\sin\frac{\pi}{7}+\sin\frac{5\pi}{7}-\sin\frac{3\pi}{7}+\sin\pi-\sin\frac{5\pi}{7}\right]$$

$$=\frac{1}{2\sin\frac{\pi}{7}}\left[-\sin\frac{\pi}{7}+\sin\pi\right]$$

$$=\frac{1}{2\sin\frac{\pi}{7}}\left[-\sin\frac{\pi}{7}+0\right] = -\frac{1}{2}$$

70.(C)



BL is bisecter of $\angle ABC$

so, $\angle MBL = \angle LBC = x$ (let)

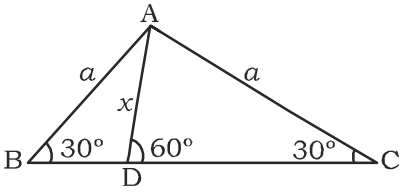
ML ∥ BC

$\angle LBC = \angle MLB = x$

$\angle MLB = \angle BML$

Can't be 90° then triangle does not exist

71.(C)



In ΔADC

$\angle DAC = 180 - 60 - 30 = 90^\circ$

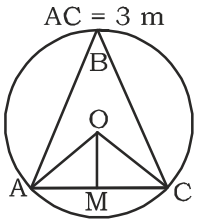
In ΔDAC

$$\tan 60^\circ = \frac{AC}{AD} = \sqrt{3} = \frac{a}{x}$$

$$x = \frac{a}{\sqrt{3}}$$

72.(C) It is true that congruent triangles will be similar but opposite is not true. Also III will be true.

73.(C)



Given OA = 3 cm

and $OM \perp AC$

Let $\angle AOM = \theta$

In ΔAOM

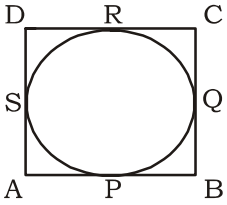
$$\sin\theta = \frac{AM}{OA}$$

$$\sin\theta = \frac{AC}{20A} = \frac{3}{2\times3} = \frac{1}{2}$$

$\sin\theta = \sin 30^\circ$

$\theta = 30^\circ$

74.(C)



We know that tangents from an external point on the circumference of the circle will be equal.

AP = AS

BP = BQ

CR = CQ

DR = DS

$\Rightarrow$ AP+BP+CR+DR = AS+BQ+CQ+DS

$\Rightarrow$ AB+CD = AD + BC

75. (A) According to the questions sides are $5x$ and $12x$

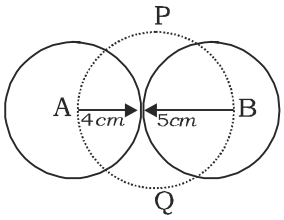
$= \frac{1}{2}\times5x\times12x = 270$

$x^2 = 9$

$x = 3$

= Hypotenuse = $13x$ = 13 × 3 = 39 cms.

76.(A)

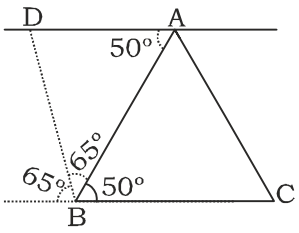


Radius of circle APBQ = $\frac{5+4}{2} = \frac{9}{2}$

Area of circle APBQ = πR^2 = $\pi\left[\frac{9}{2}\right]^2 = \frac{81\pi}{4}$ sq. cm.

77.(C) Area of square > Area of rectangle

78.(A)



$\angle ABC = 50°$

$\angle DAB = \angle ABC$ [alternate angle]

$\angle DAB = 50°$

In $\angle ADB$

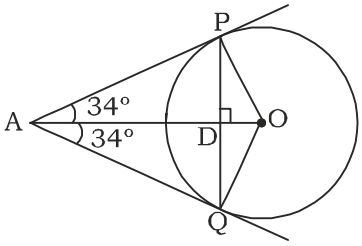
$\angle A + \angle D + \angle B = 180°$

$50° + \angle ADB + 65° = 180°$

$\angle ADB = 180° - 115°$

$\angle ADB = 65°$

79.(A)



$\because$ $\angle PAQ = 68°$

$\therefore$ $\angle PAO = 68 / 2 = 34°$

In ΔAPD

$\angle APD + \angle PAD + \angle ADP = 180°$

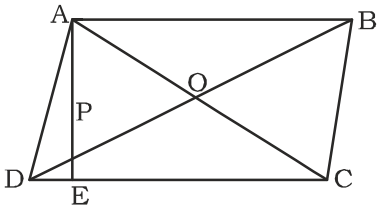
$\angle APD + 34° + 90° = 180°$

$\angle APD = 56°$

$\angle APD = \angle APQ = 56°$

$\angle APQ = 56°$

80.(A)



Area of the rhombus = $\frac{1}{2} \times d_1 \times d_2$

$= \frac{1}{2} \times 55 \times 48 = 1320$ cm^2

Area of the rhombus = base × height
= DC×AE

$\Rightarrow$ so DC × AE = 1320

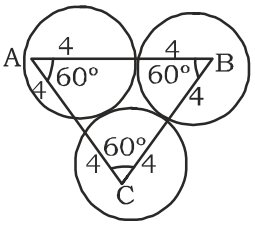
$P \times \sqrt{\left(\frac{55}{2}\right)^2 + \left(\frac{48}{2}\right)^2} = 1320$

$P \times \sqrt{\frac{5329}{4}} = 1320$

$P = \frac{1320}{36.5} = 36.16$

so, 36. < P < 37 cm

81.(B)



Area of circular segment = $3 \times \frac{\theta}{360°} \times \pi r^2$

$= 3 \times \frac{60}{360°} \times \pi (4)^2$

$= 8\pi$ cm^2

Area of the $\Delta ABC = \frac{\sqrt{3}}{4} \times (8)^2 = 16\sqrt{3}$ cm^2

$\therefore$ Area of the portion included between them = $(16\sqrt{3} - 8\pi)$ cm^2

82.(B) Let the radius of the circle be r and side of the square be a.

so, $2\pi r = 4a$ $\rightarrow$ given

$a = \frac{\pi r}{2}$

Area of the square = $\left(\frac{\pi r}{2}\right)^2$

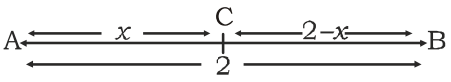
$= 2.46r^2$.....(i)

Area of the circle = πr^2

$= 3.14r^2$.....(ii)

so (ii) > (i) option (B) is correct

83.(B) Given
$AC^2 = AB \times CB$



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

$\Rightarrow \quad x^2 + 2x - 4 = 0$

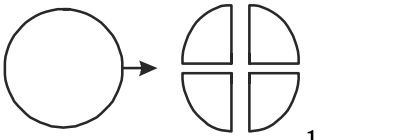
$\Rightarrow \quad x = \dfrac{-2 \pm \sqrt{4+16}}{2 \times 1} = -1 \pm \sqrt{5}$

$\Rightarrow \quad BC = 2 - (-1 \pm \sqrt{5})$

$= 3 - \sqrt{5}$ [leaving $(3+\sqrt{5})$ because it is greater than 2]

84.(C) By the property of triangle

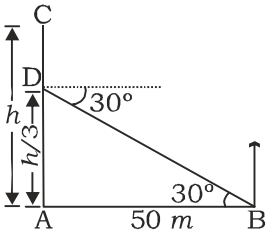
85.(C) According to the question



$4\pi r^2 \longrightarrow 4\pi r^2 + 8 \times \dfrac{1}{2} \times \pi r^2$

$\Rightarrow \quad 8 \times \pi r^2$

86.(D)



Let height of the pillar = h metres.

In ΔDAB, $\tan 30^\circ = \dfrac{h/3}{50}$

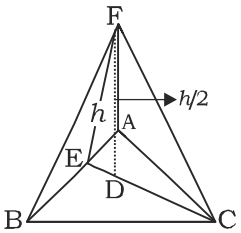
$\dfrac{1}{\sqrt{3}} = \dfrac{h}{3 \times 50} \Rightarrow h = 50\sqrt{3}$ metres

87.(D) Given,
$l + b + h = 19$.....(i)
& diagonal of cuboid = 11
or, $\sqrt{l^2 + b^2 + h^2} = 11$
or, $l^2 + b^2 + h^2 = 121$.....(ii)
we know that surface area of cuboid
$= 2(lb + bh + hl)$
Now, $(l+b+h)^2 = l^2 + b^2 + h^2 + 2(lb + bh + hl)$
$\Rightarrow \quad 2(lb + bh + hl) = (l+b+h)^2 - (l^2 + b^2 + h^2)$
$= (19)^2 - (11)^2$
$= 361 - 121$
$= 240 \text{ cm}^2$
$\therefore$ surface area of cuboid = 240 cm^2

88.(C) Let height be h m.
Volume of remaining field = Volume of soil
$[18 \times 15 - 7.5 \times 6].\ h = 7.5 \times 6 \times 8$

$h = \dfrac{7.5 \times 6 \times 8}{270 - 45} \Rightarrow h = .16\text{m} = 16 \text{ cm}$

89.(C)



Let slant height be h cm
Pyramid height = $h/2$
In ΔEDF

$h^2 = \left(\dfrac{h}{2}\right)^2 + \left(\dfrac{2}{\sqrt{3}}\right)^2 \Rightarrow h^2 = \dfrac{h^2}{4} + \dfrac{4}{3} \Rightarrow h = \dfrac{4}{3}$

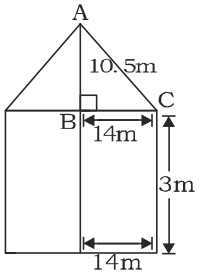
height = $\dfrac{4}{3} \times \dfrac{1}{2} = \dfrac{2}{3}$

Volume of pyramid = $\dfrac{1}{3}$ (Area of base) × height

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

$= \dfrac{8}{9}\sqrt{3} \text{ cm}^3$

90.(C)



In ΔABC

$AC = \sqrt{10.5^2 + 14^2}$

$AC = 17.5m$

$l = 17.5\ m$

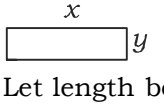
Total surface area = $\pi r l + 2\pi r h$

$= \dfrac{22}{7} \times 14 \times 17.5 + 2 \times \dfrac{22}{7} \times 14 \times 3$

$= 1034 \text{ m}^2$

The cost of painting = 1034 × 2
= ₹ 2068

91.(A)



Let length be x
breadth be y
$(x+14)(y-6) = xy$
$xy - 6x + 14y - 84 = xy$
$14y - 6x = 84$ .....(i)
$(x-14)(y+10) = xy$

$xy + 10x - 14y - 140 = xy$

$10x - 14y = 140$.....(ii)

solving (i) & (ii) we get,

$x = 56, \quad y = 30$

92.(D) From graph, in standard (viii) the failure of girls is minimum.

93.(*) Note :Read more in place of less in question then, the solution is

Average result of the girls =

$$\frac{80+80+40+90+70+70}{6} = \frac{430}{6} = 71.67$$

clearly from graph in standard (ix) the results of boys is more than the average result of the girls.

94. (A) From graph,

The ratio of results of girls and boys in the standard (vi)

= 80:70

again,

the ratio of results of girls and boys in the standards (ix)

= 70:80

clearly, in pair (vi), & (ix) of standard the results of girls and boys are in inverse proportion.

95.(*) Note : Read less in place of more in question then, the solution is

Average result of the boys

$$= \frac{60+70+60+60+80+60}{6} = 390/6 = 65$$

Clearly from graph, in standard (vii) the results of girls is less than the average result of the boys.

96.(A) No. of students come by bus = $\frac{7200 \times 50^\circ}{360^\circ} = 1000$

97.(D) Total angle = $20^\circ + 50^\circ = 70^\circ$

required no. = $\frac{7200 \times 70^\circ}{360^\circ} = 1400$

98.(B) The ratio of number of students who come by foot to the students who used two-wheeler

$$= \frac{20^\circ}{120^\circ} = \frac{1}{6} = 1:6$$

99.(B) Ratio of students who come by car to that by cycle

$$= \frac{1200}{2200} = 6:11$$

100.(*) Number of students come by (cycle + bus)

$$= \frac{(110^\circ+50^\circ)}{360^\circ} \times 7200 = \frac{160^\circ}{360^\circ} \times 7200 = 3200$$

Number of students come by

Two-wheeler = $\frac{120^\circ}{360^\circ} \times 7200 = 2400$

$\therefore$ Exceed % = $\frac{3200-2400}{2400} \times 100$

$$= \frac{800}{2400} \times 100 = \frac{100}{3} = 33\frac{1}{3}\%$$

SSC MAINS (MATHS) MOCK TEST - 9 (ANSWER SHEET)

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