SSC MAINS TEST - 15 (T-II) 2013 (SOLUTION)

1. (C) $\left(2-\frac{1}{3}\right)\left(2-\frac{3}{5}\right)\left(2-\frac{5}{7}\right).....\left(2-\frac{997}{999}\right)$

$= \frac{5}{3}\times\frac{7}{5}\times\frac{9}{7}\times..\frac{1001}{999} = \frac{1001}{3}$

2. (A) $3600 = 4 \times 9 \times 100$
$= 2^2 \times 3^2 \times 5^2 \times 2^2$
$= 2^4 \times 3^2 \times 5^2$
$3240 = 810 \times 4$
$= 3^2 \times 3^2 \times 2 \times 5 \times 2^2$
$= 3^4 \times 2^3 \times 5$
Third number $= 2^2 \times 3^5 \times 7^2$

3. (*) NOTE : READ $(0.021)^2$ in place of $(0.21)^2$ in the denominator of question then the solution is

$$\sqrt{\frac{100\,[(0.003)^2+(0.21)^2+(0.0065)^2]}{[(0.003)^2+(0.21)^2+(0.0065)^2]}} = 10$$

4. (B) $P(x) = 2\times3\times x^2\,(x-y)\,(x^2+xy+y)$
$Q(x) = 2\times3\times3x\times y^2\,(x-y)\,(x^2+y^2-2xy)$
$R(x) = 2\times2\times3\times x\times y\,(x-y)^3$
H.C.F. $= 6x\,(x-y)$

5. (A) $A - 10 = B + 10$
$\Rightarrow A - B = 20$ .... (i)
$\Rightarrow$ and $A + 20 = 2(B - 20)$
$\Rightarrow A - 2B = -60$ .... (ii)
From Eqs. (i) and (ii), A = 100, B = 80

6. (C) A number is divisible by 8 if the number formed by the last three digits is divisible by 8, i.e. 58N is divisible by 8.
Hence, N = 4
Again a number is divisible by 11 if the difference between the sum of digits at even place and sum of digits at the odd places is either 0 or divisible by 11,
i.e., $(M + 9 + 4 + 4 + 8) - (3 + 0 + 8 + 5 + N)$
$= M + 25 - (16 + N) = M - N + 9$
$(M - N) + 9$ must be zero or it must be divisible by 11.
($\because$ 584 is divisible by 8.
$\therefore$ N = 4)
i.e. $M - N = 2$
$\Rightarrow M = 2 + 4 = 6$
$\therefore M = 6, N = 4$

7. (D) Height of pole = 15 metre.
Speed of climbing = 5 metre/min
Speed of sliding = 3 metre/min
$\therefore$ Distance climbed by monkey in 11 min.
$= 5 \times 6 - 3 \times 5 = 15$ m.
$\therefore$ required time = 11 min.

8. (A) The four prime numbers are 5, 7, 11, 13 as $5 \times 7 \times 11 = 385$
$7 \times 11 \times 13 = 1001$
Hence, the first prime number is 5.

9. (B) Let the present ages be x and y yrs.
Then,
$x - y = 20$ ..... (i)
and $(x - 5) = 5(y - 5)$ ..... (ii)
From Eqs. (i) and (ii)
$20 + y - 5 = 5y - 25$
$\Rightarrow y = 10$ yrs and $x = 30$ yrs

10. (A) Let no. of persons buying the tickets on the three days are $2x$, $5x$, $13x$ respectively.
$\therefore$ No. of total tickets bought $= 20x$
then from question,
Total cost of tickets
$= 15\times2x+7.5\times5x+2.5\times13x$
$= (30 + 37.5 + 32.5)x$
$= (100.0)x$
$= ₹\ 100x$
$\therefore$ average cost of ticket per person
$= 100x/20x = ₹\ 5$

11. (D) Let the age's of three children be x_1, x_2 and x_3 yrs.
Then,

$$\frac{x_1+x_2+x_3}{3} = \frac{20}{100}\left(\frac{26+x_3}{2}\right)$$

$$\Rightarrow \frac{x_1+x_2+x_3}{3} = \frac{26+x_3}{10} \quad ... (i)$$

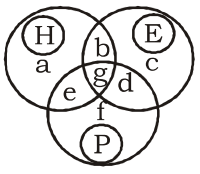
Also, $M + x_1 = 39$ ... (ii)
From Eqs. (i) and (ii), we cannot determine the value of x_2.

12. (D) Let x kg of good quality wheat is added in 150 kg of wheat.
ATQ,
95% of $(150 + x) = 135 + x$
$150 \times 95 + 95x = 5x$

$$\frac{750}{5} = x$$

$\Rightarrow x = 150$ kg

13. (D) Given, $b + c + d + g = 23$ .... (i)

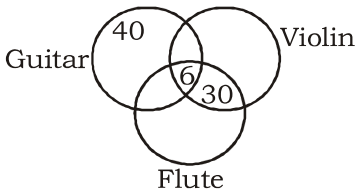


$a + b + g + e = 15$ .... (ii)
$e + f + g + d = 18$ .... (iii)
and $a + b + c + d + e + f + g = 50$ .... (iv)
Solving Eqs. (i), (ii),. (iii) and (iv)
$b = 3$, $f = 6$, $d = 6$, $c = 9$ and $g = 5$

14. (C) Let the price of sugar be ₹ x per kg.
$\therefore$ Initial expenditure $= ₹\ 30x$
New expenditure $= ₹\ 33x$
$\therefore$ New monthly consumption

$$= \frac{33x}{1.32x} = 25 \text{ kg}$$

15. (B)



$\therefore$ Required number of musician
$= 120 - (40 + 6 + 30)$
$= 44$

16.(*) Let weight of diamond = x
$\therefore$ From question,
Initial cost of diamond = kx^2
where k = constant
Let the weights of 4 pieces be
$y, 2y, 3y, 4y$ respectively,
$\therefore$ $x = y + 2y + 3y + 4y$
$x = 10y$.....(i)
again, from question,
$ky^2 + k(2y)^2 + k(3y)^2 + k(4y)^2 = 140000$
$30\,ky^2 = 140000$

$$30k\frac{x^2}{100} = 140000 \qquad \text{[using (i)]}$$

$$kx^2 = \frac{140000 \times 100}{30}$$

Kx^2 = ₹ 4.7 lakh (approx.)
$\therefore$ Initial cost of diamond = ₹ 4.7 Lakh

17. (A) Let the number of male and female participants at the start of seminar be $3x$ and x respectively.

Then, $\dfrac{3x-16}{x+6} = \dfrac{2}{1}$

$\Rightarrow$ $3x - 16 = 2x + 12$

$\Rightarrow$ $x = 28$

$\therefore$ Total number of participants at the start of seminar $= 3x + x$
$= 4 \times 28$
$= 112$

18. (B) (17 + 19) = 36% of the cost price = ₹ 162

$\therefore$ Cost price $= \dfrac{162}{36} \times 100$
$= ₹\,450$

19. (A) Original price of 250 chairs.
$= 250 \times 50 = ₹\,12500$
Price after discount

$$= 12500 \times \frac{80}{100} \times \frac{85}{100} \times \frac{95}{100}$$

$= ₹\,8075$

20.(D) SP = ₹ 17,940, Discount = 8%

$\therefore$ MP $= \dfrac{17940}{0.92} = ₹\,19500$

$\because$ Gain = 19.6% (given)

$\therefore$ CP $= \dfrac{17940}{1.196} = ₹\,15000$

New SP without discount = ₹ 19500
Gain = (19500 – 15000) = ₹ 4500

$\therefore$ Gain percent $= \dfrac{4500}{15000} \times 100 = 30\%$

21. (B) S. I. $= \dfrac{p \times r \times t}{100}$

$$r = \frac{S.I. \times 100}{p \times t} = \frac{620 \times 100}{2000 \times 5} = 6.2\%$$

if r = 6.2 + 3 = 9.2%

$$\text{then, S. I.} = \frac{p \times r \times t}{100} = 2000 \times \frac{92 \times 5}{10 \times 100} = ₹\,920$$

$\therefore$ Amount = ₹ 2000 + ₹ 920 = ₹ 2920

22.(B) Given
P = ₹ 3000
r = 10% p.a.
n = 3 year
Let the total amount given by man = A
Now, by formula

$$\text{Amount} = P\left(1+\frac{r}{100}\right)^n - A\left[\left(1+\frac{r}{100}\right)^{n-1} + \left(1+\frac{r}{100}\right)^{n-2}\right]$$

$$= 3000\left(1+\frac{10}{100}\right)^3 - 1000\left[\left(1+\frac{10}{100}\right)^2 + \left(1+\frac{10}{100}\right)^1\right]$$

$= 3993 - 1210 - 1100 = ₹\,1683$

23. (A) Amount remaining after

$$1 \text{ yr} = 4000\left(1+\frac{7.5}{100}\right) - 1500 = ₹\,2800$$

$$2 \text{ yr} = 2800\left(1+\frac{7.5}{100}\right) - 1500 = ₹\,1510$$

$$3 \text{ yr} = 1510\left(1+\frac{7.5}{100}\right) - 1500 = ₹\,123.25$$

24. (B) Let the work be finished in x days.
Then,

$$1 = \frac{x}{8} + \frac{(x-1)}{16} + \frac{2}{24}$$

$$\Rightarrow \quad \frac{11}{12} = \frac{2x + x - 1}{16}$$

$$\Rightarrow \quad 3x - 1 = \frac{16 \times 11}{12}$$

$$\Rightarrow \quad x = \frac{47}{9} = 5 \text{ days}$$

25. (A) Anu's 1 day work $= \dfrac{1}{10}$ part

Manu's 1 day work $= \dfrac{125}{100} \times \dfrac{1}{10} = \dfrac{1}{8}$ part

Sonu's 1 day work $= \dfrac{160}{100} \times \dfrac{1}{8} = \dfrac{1}{5}$ part

Total work $= \dfrac{1}{10} + \dfrac{1}{8} + \dfrac{1}{5} = \dfrac{17}{40}$

Total days $= \dfrac{40}{17} = 2\dfrac{6}{17}$ days

26. (C) In 600 m race, ratio of distances

A	:	B
600	:	540
10	:	9

In 500 m race, ratio of distances

B	:	C
500	:	475
20	:	19

$\therefore$ A : B : C = (10 × 20) : (9 × 20) : (19 ×9)
= 200 : 180 : 171
So, when A runs 200 m $\rightarrow$ C runs 171 m

When A runs 1 m $\rightarrow$ C runs $\frac{171}{200}$ m

When A runs 400 m $\rightarrow$ C runs $\frac{71\times 400}{200}$
= 342m
A can beat C by 400 – 342 = 58 m

27. (B) Let the speed of train on onward journey be x km/h.
Then, the speed of train on return journey = 0.8 x km/h.

Total time = $\frac{500}{x} + \frac{1}{2} + \frac{500}{0.8x}$

$\Rightarrow 23 = \frac{1125}{x} + \frac{1}{2}$

$\Rightarrow x = 1125 \times \frac{2}{45} = 50$ km/h

$\therefore$ Speed of train on return journey
= 40 km/h

28. (D) $\frac{A}{B} = \frac{3\times 3}{4\times 3} = \frac{9}{12} : \frac{B}{C} = \frac{3\times 4}{4\times 4} = \frac{12}{16}$
$\therefore$ A : B : C = 9 : 12 : 16

$\therefore$ A's share = $\frac{9}{37} \times 370 = ₹\ 90$

29. (B) X's investment = (700 × 3)

$+ \left(700\times\frac{5}{7}\times 3\right) + \left(500+200\times\frac{3}{5}\right)\times 6$
= ₹ 7320
Y's investment = 600 × 12 = ₹ 7200
$\therefore$ X's share from profit

$= \frac{7320}{(7320+7200)} \times 726 = ₹\ 366$

30.(C) Let two train meet at a distance x from Delhi
then, $x = 60 \times t_1$ (Mumbai express)
also, $x = 80 \times (t_1 - 2)$ (Rajdhani express)
$\Rightarrow$ $60\ t_1 = 80\ t_1 - 160$
or, $20\ t_1 = 160$
or, $t_1 = 8h$
$\therefore$ Required distance $x = 60 \times t_1$
$= 60 \times 8$
$= 480$ km

31. (A) Let the length of platform be x m, length of first train be y m and length of second train be $\frac{y}{2}$ m.
As both trains are travelling in opposite direction.

So, $y + \frac{y}{2} = (48 + 42) \times \frac{5}{18} \times 12$

$\Rightarrow \frac{3}{2}y = 300$

$\Rightarrow y = 200$ m
Now,

$y + x = 48 \times \frac{5}{18} \times 45 = 600$

$\Rightarrow x = 600 - 200 = 400$ m

32. (D) Let the speed of current be x m/min.
Then, speed with current
= (48 + x) m/min
& Speed against the current
= (48 – x) km/h
ATQ,

$\Rightarrow \frac{200}{(48-x)} - \frac{200}{(48+x)} = 10$

$\Rightarrow 40x = (48)^2 - x^2$

$\Rightarrow x^2 + 40x - 2304 = 0$

$\Rightarrow (x + 72)(x - 32) = 0$

$\Rightarrow x = 32$ m/min

33. (C) Let the first instalment be 'a' and the common difference between any two consecutive instalments be 'd'.
Using the formula for the sum of an AP.

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

We have,

$3600 = \frac{40}{2}[2a + (40-1)d]$
$= 20(2a + 39d)$

$\Rightarrow 180 = 2a + 39d$ ... (i)

Again, $2400 = \frac{30}{2}[2a + (30-1)d]$

$160 = 2a + 29d$ ... (ii)

Solving Eqs. (i) and (ii),
$20 = 10d$

$\Rightarrow d = 2$

Therefore,
$180 = 2a + 39 \times 2$

$\Rightarrow 2a = 102 \Rightarrow a = 51$

Value of 8th instalment
= 51 + (8 – 1) × 2
= 51 + 14 = Rs. 65

34. (C) Let n be the number of members in the club.

Then, $250 = \frac{n}{2}\left[2\times 7 + (n-1)\frac{3}{12}\right]$

$\Rightarrow 250 = \frac{n}{2}\left[14 + \frac{1}{4n} - \frac{1}{4}\right]$

$\Rightarrow 250 = 7n + \frac{n^2}{8} - \frac{n}{8}$

$\Rightarrow n = 25$

35. (C) Let the cost price of one table be ₹ x.
Then,
Cost price of other table will be ₹ $(2200 - x)$
ATQ,

$$x \times \frac{95}{100} + (2200 - x) \times \frac{106}{100} = 2200$$

$\Rightarrow$ $95x + 233200 - 106x = 220000$
$\Rightarrow$ $11x = 13200$
$\Rightarrow$ $x = ₹1200$
and $2200 - x = ₹\ 1000$

36. (A) Let P and M denote Pintu and Mintu respectively.
Case 1:- $P + n = 4(M - n)$
$\Rightarrow$ $P - 4M = -5n$ ... (i)
Case 2:- $(P - n) = 3(M + n)$
$\Rightarrow$ $P - 3M = 4n$ ... (ii)
Solving Eqs. (i) and (ii), we get
$M = 9n$ and $P = 31n$
Put $n = 1$, we get $P = 31$

37. (A) Together both pipes can fill the tank in

$$\left(\frac{20 \times 30}{20 + 30}\right)\text{h} = 12\text{h}$$

One third tank can be filled in 4 h.
Now, there is a leak which can empty the tank in (12×4)h = 48h
So, two-third tank can be filled in

$$\frac{2}{3} \times \left(\frac{12 \times 48}{48 - 12}\right)\text{h} = 10\frac{2}{3}\text{h}$$

So, total time to fill the tank

$$= 4 + 10\frac{2}{3} = 14\frac{2}{3}\text{h}.$$

38. (C) Work done by both the pipes in 4 min

$$= 4\left(\frac{1}{15} + \frac{1}{10}\right) = \frac{2}{3}\text{work}.$$

When all the pipes working together.

Work done $= \frac{1}{15} + \frac{1}{10} - \frac{1}{5} = \frac{-1}{30}$

$= \frac{-1}{30}$ part of th tank is emptied in 1 min

$\therefore$ $\frac{2}{3}$ of the tank can be emptied in $\frac{2 \times 30}{3}$
= 20 min

39. (A) Required average $= \frac{10 \times 4.5 + 30 \times 3.5}{40}$

$= \frac{45 + 105}{40}$

$= \frac{150}{40} = \frac{15}{4}$

40.(A) Let the quantity of haematite mined be x kg.
ATQ,
Pure Iron = 8000 kg

$$x \times \frac{80}{100} \times \frac{25}{100} = 80000$$

$\therefore$ $x = \frac{80000 \times 100 \times 100}{80 \times 25}$
= 400000 kg

41. (D) Let his sales were x.
Then,

$$1000 + \frac{2.5}{100}(x - 4000) = \frac{5}{100}x + 600$$

$\Rightarrow$ $2.5x = 30000$
$\Rightarrow$ $x = ₹\ 12000$

42.(A) Quantity of alcohol in 1 l mixture of first bottle $= \frac{2}{10} \times 1 = \frac{1}{5}l$
As second bottle does not contains alcohol.
So, required fraction $= \frac{1}{3} \times \frac{1}{5} = \frac{1}{15}l$

43. (C) Let the man purchased x pairs of brown socks.
Price of black socks and brown socks be ₹ $2a$ and ₹ a per pair respectively.
ATQ,

$$\therefore \quad \frac{3}{2}(4 \times 2a + x \times a) = x \times 2a + 4 \times a$$

$$\Rightarrow \quad 12a + \frac{3}{2}xa = 2xa + 4a$$

$$\Rightarrow \quad 12 + \frac{3}{2}x = 2x + 4$$

$$\Rightarrow \quad \frac{x}{2} = 8$$

$$\Rightarrow \quad x = 16$$

$\therefore$ Required ratio $= \frac{4}{16} = \frac{1}{4}$

44.(B) Given, C. P. of the goods = ₹ 840

$\therefore$ C.P. of 1/4 of the goods $= \frac{1}{4} \times 840 = ₹\ 210$

& C. P. of the remaining quantity of goods = ₹ 840 – ₹ 210 = ₹ 630
Let x % be the profit at which the remaining quantity of goods be sold.
then, from question,

$$210 \times \frac{80}{100} + 630 \times \frac{(100 + x)}{100} = 840 \times \frac{120}{100}$$

$$168 + \frac{63}{10}(100 + x) = 1008$$

$$x = 33\frac{1}{3}\%$$

45. (A) Let he bought x number of CDs.
$\therefore$ $(x - 1) \times 6 = 114$
$\Rightarrow$ $x - 1 = 19$
$\Rightarrow$ $x = 20$

46. (*) Ratio of the efficiencies of A, B, C & D

$$= \frac{1}{32} : \frac{1}{20} : \frac{1}{30} : \frac{1}{24}$$

= 15 : 24 : 16 : 20

$\therefore$ C's share $= \frac{40}{99} \times 25$

$= ₹\ 10.10$

47. (C) Let the number of computers required = N

Tasks done by the computers

6 h = 30 tasks

1 h = 5 tasks

3 h = 15 tasks

So, 15 N = 80

$\Rightarrow$ N = 5.33 $\approx$ 6

48. (A) Let the distance be 'd' km and usual speed of the Toy train be 's' km/h

$\therefore$ Usual time (t) = $\frac{d}{s}h$ ..... (i)

$\therefore$ $t - \frac{1}{2} = \frac{d}{s+4}$ ..... (ii)

and $t + \frac{1}{3} = \frac{d}{s-4}$ ..... (iii)

Solving Eqs. (i), (ii) and (iii),

d = 60 km, s = 20 km/h and t = 3 h

49. (B) Let 'a' be first term and d be the common difference.

Then, $S_n = \frac{n}{2}[2a + (n-1)d]$

$S_{2n} = \frac{2n}{2}[2a + (2n-1)d]$

and $S_{3n} = \frac{3n}{2}[2a + (3n-1)d]$

Given

$S_{2n} = 3S_n$

$\therefore$ $\frac{2n}{2}[2a + (2n-1)d] = 3\frac{n}{2}[2a + (n-1)d]$

$\Rightarrow$ $4a + (4n-2)d = 6a + (3n-3)d$

$\Rightarrow$ $d(4n - 2 - 3n + 3) = 2a$

$\Rightarrow$ $d = \frac{2a}{n+1}$

$\therefore$ $S_n = \frac{2an^2}{n+1}$

and $S_{3n} = \frac{12an^2}{n+1}$

$\therefore$ $\frac{S_n}{S_{3n}} = \frac{12an^2}{n+1} \times \frac{n+1}{12an^2} = \frac{1}{6}$

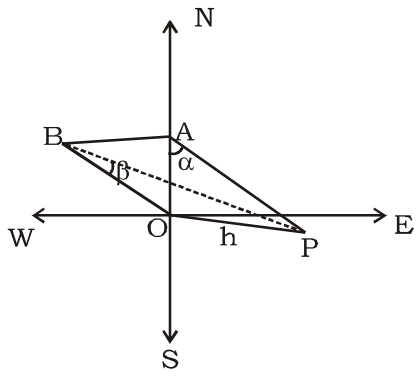
$\Rightarrow$ $\frac{S_{3n}}{S_n} = 6$

50. (C) $a = -3$, $d = 3$

$\therefore T_{10} = a + (10-1)d$

$T_{10} = -3 + 9 \times 3 = 24$

51. (A)



In ΔOAP:-

$\tan\alpha = \frac{h}{OA}$

$\Rightarrow$ OA = h cot α

In ΔOBP:-

$\tan\beta = \frac{h}{OB}$

$\Rightarrow$ OB = h cot β

Now:-

In ΔOAB:-

$OB^2 = OA^2 + AB^2$

$\Rightarrow$ $AB^2 = OB^2 - OA^2$

$AB^2 = h^2\cot^2\beta - h^2\cot^2\alpha$

$AB^2 = h^2[\cot^2\beta - \cot^2\alpha]$

$AB^2 = h^2[(\text{cosec}^2\beta - 1) - (\text{cosec}^2\alpha - 1]$

$= h^2[\text{cosec}^2\beta - \text{cosec}^2\alpha]$

$AB^2 = h^2\left\{\frac{\sin^2\alpha - \sin^2\beta}{\sin^2\alpha\sin^2\beta}\right\}$

$\therefore$ $h = \frac{AB\sin\alpha\sin\beta}{\sqrt{\sin^2\alpha - \sin^2\beta}}$

52. (B) $\sec\theta + \tan\theta = P$

$(\sec\theta + \tan\theta)^2 = P^2$ (on squaring)

$\Rightarrow \left(\frac{1+\sin\theta}{\cos\theta}\right)^2 = P^2$

$\Rightarrow \frac{(1+\sin\theta)^2}{1-\sin^2\theta} = P^2$

$\Rightarrow \frac{1+\sin\theta}{1-\sin\theta} = P^2$

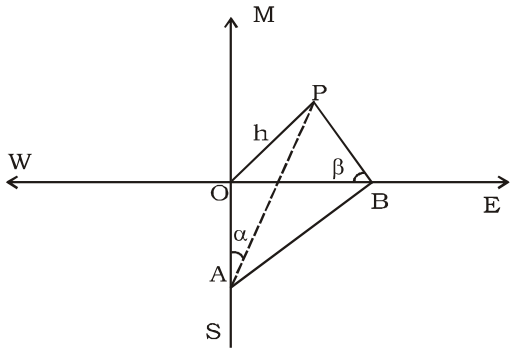
Applying C & D :-

$\Rightarrow \frac{1+\sin\theta+1-\sin\theta}{1+\sin\theta-(1-\sin\theta)} = \frac{P^2-1}{P^2+1}$

$\Rightarrow \frac{2}{2\sin\theta} = \frac{P^2-1}{P^2+1}$

$\Rightarrow \sin\theta = \frac{P^2+1}{P^2-1}$

53. (A)



In ΔOAP:-

$$\tan\alpha = \frac{h}{OA}$$

$\Rightarrow OA = h\cot\alpha$ .... (i)

In ΔOBP:-

$$\tan\beta = \frac{h}{OB}$$

$\Rightarrow OB = h\cot\beta$ .... (ii)

Since ΔOAB is a right angle triangle.

$\therefore AB^2 = OA^2 + OB^2$

$d^2 = h^2\cot^2\alpha + h^2\cot^2\beta$

$$\therefore h = \frac{d}{\sqrt{\cot^2\alpha + \cot^2\beta}}$$

54. (A) $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$

$\Rightarrow \sin\theta = (\sqrt{2} - 1)\cos\theta$

$$\Rightarrow \cot\theta = \frac{1}{\sqrt{2}-1} = \frac{\sqrt{2}+1}{\sqrt{2}-1} = \sqrt{2}+1$$

55. (B) $a^{\frac{1}{3}} + b^{\frac{1}{3}} + c^{\frac{1}{3}} = 0$

$$\Rightarrow a^{\frac{1}{3}} + b^{\frac{1}{3}} = -c^{\frac{1}{3}}$$

$$\Rightarrow \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right)^3 = \left(-c^{\frac{1}{3}}\right)^3$$

$$\Rightarrow a + b + 3a^{\frac{1}{3}}.b^{\frac{1}{3}}\left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right) = -c$$

$$\Rightarrow a + b + c = 3a^{\frac{1}{3}}.b^{\frac{1}{3}}.c^{\frac{1}{3}}$$

$\Rightarrow (a+b+c)^3 = 27abc$

56. (B) Volume of the cubiod $= 3x^2 - 27$

$= 3(x^2 - 9)$

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

$\therefore$ possible dimensions are 3, $(x-3)$, $(x+3)$ Ans.

57(C) $\because$ $x^2 - 1$ is a factor of the polynomial

$P(x) = ax^4 + bx^3 + cx^2 + dx + e$

$\therefore$ $P(-1) = 0$ or $P(1) = 0$

$\Rightarrow a(-1)^4 + b(-1)^3 + c(-1)^2 + d(-1) + e = 0$

or, $a - b + c - d + e = 0$

$\Rightarrow a + c + e = b + d$ Ans.

58. (B) $217x + 131y = 313$ ..... (i)

$131x + 217y = 827$ ..... (ii)

Adding equation (i) and (ii):-

$348x + 348y = 1740$

$x + y = 5$ ..... (A)

Subtracting (ii) from (i):-

$86x - 86y = 86$

$x - y = 1$ ..... (B)

Now:-

from (A) and (B):-

$2x = 6$

$x = 3$

and, $x + y = 5$

$\therefore y = 2$

59. (A) $\because \Delta POB \sim \Delta QOA$

$$\Rightarrow \frac{ar(\Delta POB)}{ar(\Delta QOA)} = \frac{PO^2}{QO^2}$$

$$\Rightarrow \frac{150}{ar(\Delta QOA)} = \frac{5^2}{7^2}$$

$$\therefore ar(\Delta QOA) = \frac{150\times 49}{25} = 294 \text{ cm}^2$$

60. (B) $\because$ PQ | | BC & also P is the mid point of AC.

$\Rightarrow$ Q is the mid point of AB.

Now,

$PB^2 = PQ^2 + QB^2$

$$= \left(\frac{1}{2}BC\right)^2 + \left(\frac{1}{2}AB\right)^2 \quad \left[\because PQ = \frac{1}{2}BC\right]$$

$$= \frac{1}{4}[BC^2 + AB^2]$$

$$= \frac{1}{4}AC^2$$

$$\therefore PB = \frac{1}{2}AC \text{ Ans.}$$

61. (B) OD = 8 cm

OB = 13 cm

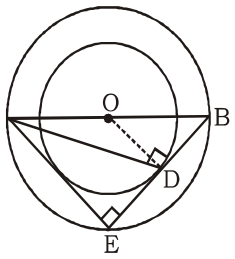
$BD^2 + OD^2 = OB^2$

[BD is a tangent]

$BD^2 = 13^2 - 8^2$

$= 169 - 64$

$BD^2 = 105 = DE^2$



$\because$ OD $\perp$ BE & AE $\perp$ BE

$\Rightarrow$ OD | | AE, also 'O' is the mid point of AB.

$$\Rightarrow \therefore OD = \frac{1}{2}AE$$

$$\Rightarrow 8 = \frac{1}{2}AE$$

$AE = 16$ cm

In ΔAED,

$AD^2 = AE^2 + DE^2$

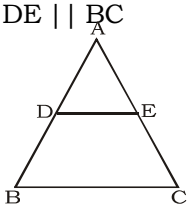
$= 16^2 + 105$

$= 256 + 105$

$= 361$

$\Rightarrow AD = 19$cm

62. (C) DE || BC



$\Rightarrow \frac{AD}{AB} = \frac{AE}{AC}$ ($\because \Delta ADE \sim \Delta ABC$)

$\therefore$ $AE = \frac{3 \times 5.6}{8} = 2.1$ cm

63. (D) r_1 & r_2 be the outer & inner radii of the cylinderical pipe.

$2\pi r_1 h - 2\pi r_2 h = 44$

$2\pi(r_1 - r_2) \times 14 = \frac{44 \times 7}{2 \times 22 \times 14} = \frac{1}{2}$

$r_1 - r_2 = \frac{1}{2}$ .... (i)

Again

$\pi r_1^2 h - \pi r_2^2 h = 99$

$\frac{22}{7}(r_1^2 - r_2^2) \times 14 = 99$

$r_1^2 - r_2^2 = \frac{99 \times 7}{22 \times 14} = \frac{9}{4}$

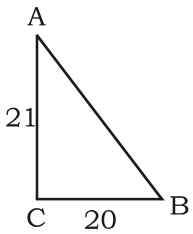
$(r_1 + r_2)(r_1 - r_2) = \frac{9}{4}$

$r_1 + r_2 = \frac{9}{4} \div \frac{1}{2} = \frac{5}{2}$ .... (ii)

On solving (i) & (ii)

$r_1 = 2.5$ cm, $r_2 = 2$ cm

64. (A)



Given that:-

Height of pryamid = 21 cm

[square] Base = 40 cm

Now:-

Height of triangle $= \sqrt{20^2 + 21^2}$

$= \sqrt{400 + 441}$

$= \sqrt{841} = 29$ cm

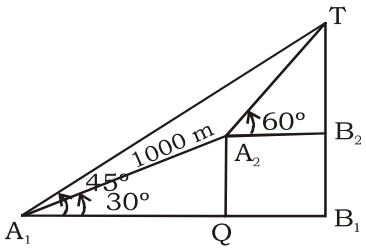
Slant Surface Area of Pyramid

$= 4 \times$ {Area of triangle}

$= 4 \times \left[\frac{1}{2} \times 40 \times 29\right]$

$= 4 \times 20 \times 29 = 2320$ cm^2.

65. (A)



$A_1A_2 = 1000$ m $= 1$ km and

$\angle A_2A_1B_1 = 30°$

$\angle TA_2B_2 = 60°$

In ΔA_1A_2Q

$\sin 30° = \frac{A_2Q}{A_1A_2}$

$\therefore A_2Q = \frac{1}{2} \times 1 = \frac{1}{2}$ km $= B_2B_1$ .....(i)

$\cos 30° = \frac{A_1Q}{A_1A_2}$

$\Rightarrow A_1Q = \frac{\sqrt{3}}{2} \times 1 = \frac{\sqrt{3}}{2}$ km .....(ii)

In ΔTB_1B_2:-

$\tan 45° = \frac{TB_1}{A_1B_1} = \frac{x}{A_1B_1}$ .....(iii)

In ΔTA_2B_2:-

$\tan 60° = \frac{TB_2}{A_2B_2} = \frac{TB_1 - B_2B_1}{QB_1} = \frac{TB_1 - B_2B_1}{A_1B_1 - A_1Q}$

$\Rightarrow \sqrt{3} = \frac{x - \frac{1}{2}}{x - \frac{\sqrt{3}}{2}}$ [From (i), (ii) and (iii)

$\Rightarrow x = 1.366$ km

66. (A) Volume of water in the reserviour

$= 0.075 \times 0.055 \times 18 \times 30 \times 60$ m^3

$= 133.65$ m^3

Now:-

Volume = Area × height

or, $133.65 = 10.3 \times 3.75 \times h$

$\therefore$ $h = \frac{133.65}{10.8 \times 3.75} = 3.3$ m

67. (A) Let:-

$\sec\theta + \tan\theta = K$ ..... (i)

Then:-

$\sec^2\theta - \tan^2\theta = 1$

$K(\sec\theta - \tan\theta) = 1$

$\sec\theta - \tan\theta = \frac{1}{K}$ ..... (ii)

Adding (i) and (ii):-

$2\sec\theta = K + \frac{1}{K}$

$2\left[x - \frac{1}{4x}\right] = K + \frac{1}{K}$

or, $2x - \frac{1}{2x} = K + \frac{1}{K}$

$\Rightarrow \quad K = 2x$

$\Rightarrow \quad \frac{1}{K} = -\frac{1}{2x}$

$\therefore \sec\theta + \tan\theta = K = 2x \text{ or } -\frac{1}{2x}$

68. (A) $\sin\theta + \sin^2\theta + \sin^3\theta = 1$

$\Rightarrow \sin\theta + \sin^3\theta = 1 - \sin^2\theta$

$\Rightarrow \sin\theta[1 + \sin^2\theta] = \cos^2\theta$

$\Rightarrow \sin^2\theta[1 + \sin^2\theta]^2 = \cos^4\theta$

[on squarring]

$\Rightarrow (1 - \cos^2\theta)[1 + (1 - \cos^2\theta)]^2 = \cos^4\theta$

$\Rightarrow (1 - \cos^2\theta)[2 - \cos^2\theta]^2 = \cos^4\theta$

$\Rightarrow (1 - \cos^2\theta)[4 - 4\cos^2\theta + \cos^4\theta] = \cos^4\theta$

$\Rightarrow 4 - 4\cos^2\theta + \cos^4\theta - 4\cos^2\theta + 4\cos^4\theta - \cos^6\theta = \cos^4\theta$

$\Rightarrow -\cos^6\theta + 4\cos^4\theta - 8\cos^2\theta + 4 = 0$

$\Rightarrow \cos^6\theta - 4\cos^4\theta + 8\cos^2\theta = 4$

69. (A) $3x = 2x + x$

$\therefore \cot(3x) = \cot(2x + x)$

or, $\cot 3x = \frac{\cot 2x \cot x - 1}{\cot 2x + \cot x}$

or, $\cot 3x.\cot 2x + \cot 3x.\cot x = \cot 2x.\cot x - 1$

$\therefore \cot 2x.\cot x - \cot 3x.\cot 2x - \cot 3x.\cot x = 1$

70. (A) $\text{cosec}\,\theta - \sin\theta = m$

$\frac{1}{\sin\theta} - \sin\theta = m$

$\frac{1 - \sin^2\theta}{\sin\theta} = m$

$\frac{\cos^2\theta}{\sin\theta} = m$

$m = \cot\theta \,.\, \cos\theta$

$\sec\theta - \cos\theta = n$

$\frac{1}{\cos\theta} - \cos\theta = n$

$\frac{\sin^2\theta}{\cos\theta} = n$

$n = \tan\theta \,.\, \sin\theta$

$\left[mn^2\right]^{\frac{2}{3}} + \left[m^2n\right]^{\frac{2}{3}}$

$\Rightarrow \left[(\cot\theta.\cos\theta).(\tan\theta.\sin\theta)^2\right]^{\frac{2}{3}} + \left[(\cot\theta.\cos\theta)^2.(\tan\theta.\sin\theta)\right]^{\frac{2}{3}}$

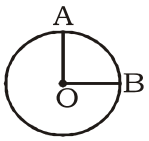
$\Rightarrow \left[(\cot\theta.\tan\theta.\sin^2)\right]^{\frac{2}{3}} + \left[(\cot\theta.\sin\theta.\cos^2)\right]^{\frac{2}{3}}$

$\Rightarrow \left[\cos\theta.\frac{\sin\theta}{\cos\theta}.\sin^2\theta\right]^{\frac{2}{3}} + \left[\frac{\cos\theta}{\sin\theta}.\sin\theta.\cos^2\theta\right]^{\frac{2}{3}}$

$\Rightarrow [\sin^3\theta]^{\frac{2}{3}} + [\cos^3\theta]^{\frac{2}{3}}$

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

71. (A)



A = (4, 3)

B = (x, 5)

Origin at (2, 3)

Now:-

$OA^2 = OB^2$

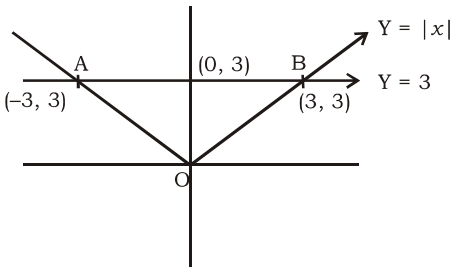
or, $(2 - x)^2 + (3 - 3)^2 = (2 - 4)^2 + (3 - 3)^2$

or, $4 + x^2 - 2x + 4 = 4$

or, $(2 - x)^2 = 0$

$\therefore \quad x = 2$

72. (B)



Y = $|x|$

Y = 3

Now:-

Area of $\Delta AOB = \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 6 \times 3$

= 9 sq. unit.

73. (A) From the figure

$\cos\theta = \frac{5}{10} = \frac{1}{2}$

$\therefore \quad \theta = 60°$

Now, reflex $\angle AOB = 360° - 120° = 240°$

Now, length of the belt

$= \frac{\pi r\theta}{180°}$

$= \frac{\pi \times 5 \times 240°}{180°}$

$= \frac{20\pi}{3}$ cm

74. (A) Reflex $\angle AOC = 360° - 40° = 320°$

Required area $= \frac{\pi r_1^2 \times 320°}{360°} - \frac{\pi r_2^2 \times 320°}{360°}$

$= \frac{22}{7} \times \frac{320}{360}\left[r_1^2 - r_2^2\right]$

$= \frac{22}{7} \times \frac{320}{360}[14^2 - 7^2]$

= 410.67 cm^2.

75. (A) Volume of regular tetrahedron:-

$$V = \frac{a^3}{6\sqrt{2}}$$

$\therefore \quad a^3 = 6\sqrt{2} \times 2.45$

$a = 2.75$ m

$\therefore$ height $= a \times \sqrt{\frac{2}{3}} = 2.75 \times 0.816$

$= 2.245$ m

76. (B) Volume of the cube = a^3 cubic unit

Volume of the cylinder

$$= \pi \times \left(\frac{a}{2}\right)^2 \times a = \frac{\pi}{4}a^3 \text{ cubic unit}$$

Volume of the cone

$$= \frac{1}{3}\pi\left(\frac{a}{2}\right)^2 \times a = \frac{\pi}{12}a^3 \text{ cubic unit}$$

Required Ratio $= a^3 : \frac{\pi}{4}a^3 : \frac{\pi}{12}a^3$

$= 1 : \frac{\pi}{4} : \frac{\pi}{12}$

$= 12 : 3\pi : \pi$ Ans.

77. (D) Base of the ice cream cup:-

$2\pi r = 28$ cm

$2 \times \frac{22}{7} \times r = 28$ cm

$\therefore \quad r = \frac{28 \times 7}{2 \times 22}$

$r = 4.4545$ cm

Now, height of cup will be h cm.

$\therefore \quad h = \sqrt{l^2 - r^2}$

$= \sqrt{14^2 - (4.4545)^2}$

$= \sqrt{196 - 19.8429}$

$= \sqrt{176.1570}$

$= 13.12$ cm (approx.)

78. (D) Let the number of camels = x

According to question:-

$$\frac{1}{4}x + 2\sqrt{x} + 15 = x$$

Replace x and by y^2 :-

$$\frac{1}{4}y^2 + 2y + 15 = y^2$$

or, $y^2 - \frac{1}{4}y^2 - 2y - 15 = 0$

or, $3y^2 - 8y - 60 = 0$

$$y = \frac{+8 \pm \sqrt{8^2 + 4 \times 3 \times 60}}{2 \times 3}$$

$$y = \frac{8 \pm \sqrt{784}}{6}$$

$$y = 6, \frac{-10}{3}$$

Now:-

$y^2 \rightarrow x$

$\therefore \quad x = (6)^2 = 36$

$\therefore$ No. of camels = 36 m

79. (D) $\frac{a}{b} + \frac{b}{a} = -1$

or, $\frac{a^2 + b^2}{ab} = -1$

or, $a^2 + b^2 = -ab$

or, $(a^2 + b^2 + ab) = 0$

Now:-

$(a^3 - b^3) = (a - b)(a^2 + b^2 + ab)$

$= (a - b) \times 0 = 0$

$= 0$

80. (D) Multiplying with $\frac{3}{5}$

$$\frac{3}{5}\left(5a + \frac{1}{3a}\right) = 5 \times \frac{3}{5}$$

$$3a + \frac{1}{5a} = 3$$

Squaring both sides:-

$$9a^2 + \frac{1}{25a^2} + 2 \times 3a \times \frac{1}{5a} = 9$$

$$\Rightarrow 9a^2 + \frac{1}{25a^2} = 9 - \frac{6}{5}$$

$$= \frac{45 - 6}{5} = \frac{39}{5}$$

81. (D) $\because \Delta AOB \sim \Delta COD$

$\therefore \frac{OB}{OD} = \frac{OA}{OC}$

$OB \times OC = OA \times OD$

$(x - 3)(x - 5) = (3x - 19) \times 3$

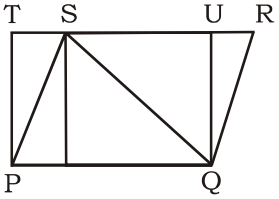
$x^2 - 8x + 15 = 9x - 57$

$x^2 - 17x + 72 = 0$

$(x - 9)(x - 8) = 0$

$x = 9, 8$

82. (D) Given,



Area of PQRS = P

Area of PQUT = R

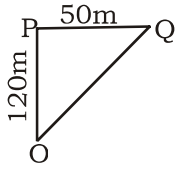
Area of PSQ = T

Now, area of triangle $= \frac{1}{2}$ Area of parallelogram PQRS.

Area of parallelogram = area of rectangle (constructed on the same base and between the same parallels)

Hence, options (a), (b) and (c) are correct.

83. (C) Let O be the starting point.



OQ is the desired shortest distance.

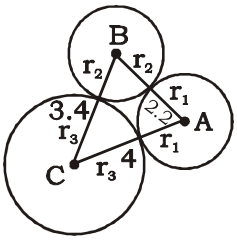
$\therefore \quad (OQ)^2 = (50)^2 + (120)^2$

$\therefore \quad = 2500 + 14400$

$= 16900$

$\therefore \quad OQ = 130$ m

84. (B) Let r_1, r_2 and r_3 be the radii of three circles, then



$r_1 + r_2 = 2.2$ ..... (i)

$r_2 + r_3 = 3.2$ ..... (ii)

$r_1 + r_3 = 4.0$ ..... (iii)

Adding Eqs. (i), (ii) and (iii)

$2(r_1 + r_2 + r_3) = 9.6$

$\Rightarrow \quad r_1 + r_2 + r_3 = 4.8$

$\therefore \quad r_3 = (4.8 - 2.2) = 2.6$

$r_1 = (4.8 - 3.4) = 1.4$

$r_2 = (4.8 - 4.0) = 0.8$

$\therefore$ The diameter are $2 \times 1.4 = 2.8$,

$2 \times 0.8 = 1.6$ and $2 \times 2.6 = 5.2$

85. (A) $l + b + h = 19$ cm

length of diagonal = 11 cm

Now:-

$\sqrt{l^2 + b^2 + h^2} = 11$ cm

$\Rightarrow \quad l^2 + b^2 + h^2 = 121$ cm^2

$\therefore$ Area of cuboid

$= 2\{lb + bh + lh\}$

$= (l + b + h)^2 - \{l^2 + b^2 + h^2\}$

$= 19^2 - 121$

$= 361 - 121$

$= 240$ cm^2

86. (A) The base is isosceles triangle.

$\therefore$ Area of base $= \frac{b}{4}\sqrt{4a^2 - b^2}$

$= \frac{40}{4}\sqrt{4 \times (25)^2 - 40^2}$

$= 300$ m^2

$\therefore$ Height $= \frac{\text{Volume}}{\text{Area}} = \frac{2400}{300} = 8$m

87. (A) The base of a rhombus whose perimeter $= 4a = 130$

$\therefore a = \frac{130}{4} = 32.5$ m

One diagonal, $d_1 = 33$ m

Now:-

$\frac{d_2}{2} = \sqrt{a^2 - \left(\frac{d_1}{2}\right)^2}$

$\frac{d_2}{2} = \sqrt{(32.5)^2 - (16.5)^2}$

$\therefore \quad d_2 = 56$ m

Now:-

Area of base $= \frac{d_1 d_2}{2} = \frac{33 \times 56}{2} = 924$ m^2

Now:-

Volume of prism = Area × height

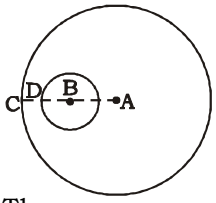
$= 924 \times 2.6$

$= 2402.40$ m^3

88. (D) To construct a triangle sum of any two sides is greater than the third side. Hence, option (d) is the correct answer.

89. (D) Given, AC $= \frac{a}{2}$

BD $= \frac{b}{2}$ and CD = c



Then,

AB = AC – BC

$= \frac{a}{2} - (BD + CD)$

$= \frac{a}{2} - \frac{b}{2} - c$

$= \frac{1}{2}(a - b) - c$

90. (C) $\tan\theta = \frac{20}{21}$

$= \frac{1 - \sin\theta + \cos\theta}{1 + \sin\theta + \cos\theta}$

Dividing by :- $\cos\theta$

$\frac{\frac{1}{\cos\theta} - \tan\theta + 1}{\frac{1}{\cos\theta} + \tan\theta + 1}$

$\tan\theta = \frac{20}{21} = \frac{P}{b}$

$\therefore \quad h = \sqrt{21^2 + 20^2}$

$= \sqrt{441 + 400}$

$h = 29$

$\cos\theta = \frac{b}{h} = \frac{21}{29}$

$$\Rightarrow \frac{\frac{29}{21}-\frac{20}{21}+1}{\frac{29}{21}+\frac{20}{21}+1} = \frac{29-20+21}{29+20+21} = \frac{30}{70} = \frac{3}{7}$$

91. (D) Cannot be determined.
92. (D) Cannot be determined.
93. (B)

Agriculture = 18% × 1.2 = 21.6%	18 × 150% = 27
Traction = 13% × 1.2 = 15.6%	13 × 150% = 19.5
Other = 4% × 1.2 = 4.8%	4 × 150% = 6
Domestic = 11% × 1.2 = 13.2%	11 × 150% = 16.5
Commercial = 6% × 1.2 = 7.2%	6 × 150% = 9
Industrial = 48% × 1.2 = 57.6%	48 × 150% = 72

Only agriculture and commercial increases by more than 50% during the same period.

94. (C)
95. (B) Industrial + Agriculture will be more will be more than 50%.
96. (A) 20%.
97. (B) In 1998, the production of total fruits = 100

The Guava production in 1999

$$= 100 \times \frac{15}{100} = 15 \text{ tonnes}$$

In 1996 = 10% lower than 1998

$$= 15 \times \frac{90}{100} = 13.5 \text{ tonnes}$$

98. (A) Mangoes produced in 2001

$$= 150 \times \frac{26}{100} = 39 \text{ tonnes}$$

25% exported earned

$$= 39 \times \frac{25}{100} = 9.75 \text{ tonnes}$$

Total revenue earned
= 9.75 × 1000 kg × 20 = 1.95 lakh

99. (C) When total fruit production is increased by 12% in 2003, then

$$= 175 \times \frac{112}{100} = 196 \text{ tonnes}$$

Production of mangoes

$$= 196 \times \frac{26}{100} = 50.96 \text{ tonnes}$$

100. (C) Total fruit production in 1998 = 100 tonnes

Grapes production in 1998

$$= 100 \times \frac{14}{100} = 14 \text{ tonnes}$$

$$\text{Half of grapes exported} = \frac{14}{2}$$

$$= 7 \text{ tonnes}$$

$$\text{Price tonnes} = \frac{1.4 \times 100000}{7}$$

$$= ₹\ 20000$$

SSC MAINS (MATHS) MOCK TEST -15 (ANSWER SHEET)

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