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

SSC MAINS (MATHS) MOCK TEST-19 (SOLUTION)

1. (D) Let two digit number be $10x + y$

$x + y = 13$ ..... (i)

$10y + x = 10x + y - 45$

or, $x - y = \frac{45}{9} = 5$ ..... (ii)

From equation (i) and (2)

$x = \frac{13+5}{2} = 9$ and $y = 4$

The required number = $10 \times 9 + 4 = 94$

2. (A) Let the middle number be x.

According to question,

$x - 2 + x + x + 2 = 176 \times \frac{1}{4} - 14$

$3x = 44 - 14$

$x = 10$

3. (B)

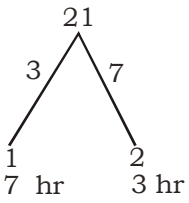
	1 ₹	50 – P	25 – P
Number of coins	1 :	1 :	1
Value	1 :	$\frac{1}{2}$:	$\frac{1}{4}$

$= \frac{7}{4} \overset{23}{11} 43.75$

$1 \overset{23}{11} 25$

$2 = 50$

4. (B)



Let after t hrs their height becomes in ratio 3 : 1.

$\frac{21-3t}{21-7t} = \frac{3}{1}$

$21 - 3t = 63 - 21t$

$42 = 18t$

$t = 2$ hours 20 minutes

5. (C)

	a%	b%	
1st month	1000	2000	1000
2nd month	1000	3000	

On this gets (1300 – 900 = 400)

$1000 \times \frac{b}{100} = 400$

$\Rightarrow b = 40\%$

his earning

In Ist month $\frac{40}{100} \times 2000 = 800$

$\frac{a}{100} \times 1000 = 100$

$a = \frac{100}{1000} \times 100 = 10\%$

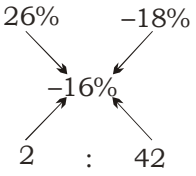
6. (A) Let the amount lent at 5% = ₹ x

$\frac{5}{100} \times x + \frac{4}{100} \times (2000 - x) = 92$

$\frac{x}{100} + 80 = 92$

$x =$ ₹ 1200

7. (A)



1st = 2 kg

2nd = 42 kg

8. (B) $\frac{A+C}{B} = \frac{2'4}{1'4} = \frac{8}{4}$

$\frac{A+B}{C} = \frac{3'3}{1'3} = \frac{9}{3}$

B = 4, C = 3, A = 5

(A + B + C)'s 1 day work = 4 + 3 + 5 = 12

A will take $\frac{144}{5} = 28\frac{4}{5}$ days

B will take $\frac{144}{4} = 36$ days

C will take $\frac{144}{3} = 48$ days

9. (B) $x = \frac{\sqrt{3}}{2}$

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

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

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

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

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

$$\frac{\sqrt{1+x}}{1+\sqrt{1+x}} + \frac{\sqrt{1-x}}{1-\sqrt{1-x}}$$

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

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

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

10. (A) Check through by options.
When $x = (a + b + c)^2$

$$\frac{x-a^2}{b+c} + \frac{x-b^2}{c+a} + \frac{x-c^2}{a+b}$$

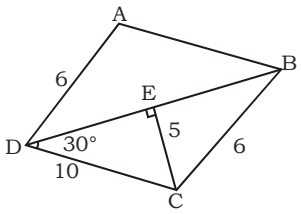
$$= \frac{(a+b+c)^2-a^2}{b+c} + \frac{(a+b+c)^2-b^2}{c+a} + \frac{(a+b+c)^2-c^2}{a+b}$$

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

$$+ \frac{(a+b+2c)(a+b)}{a+b}$$

$= 2a + b + c + a + 2b + c + a + b + 2c$
$= 4 (a + b + c)$

11. (B)



In $\triangle DEC$

$$\sin 30° = \frac{EC}{10}$$

$EC = 5$

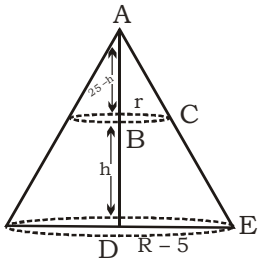
$$\cos 30° = \frac{ED}{CD}$$

$$\frac{\sqrt{3}}{2} = \frac{ED}{10}$$

$ED = 5\sqrt{3}$

In $\triangle ECB$
$EB^2 = BC^2 - EC^2$
$EB^2 = 6^2 - 5^2$
$EB^2 = 36 - 25$
$EB^2 = 11$
$EB = \sqrt{11}$
$ED = ED + EB$
$BD = 5\sqrt{3} + \sqrt{11}$

12. (D) $R = 5$ cm
$H = 25$ cm
$\triangle ABC \sim \triangle ADE$



$$\frac{25-h}{r} = \frac{25}{5}$$

$25 - h = 5r$
$h = 25 - 5r$

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

$$110 = \frac{1}{3} \times \frac{22}{7} \times (25 - 5r)(25 + r^2 - 5r)$$

$21 \times 5 = (25 - 5r)(25 + r^2 + 5r)$
$21 = (5 - r)(25 + r^2 + 5r)$
$21 = 5^3 - r^3$
$21 = 125 - r^3$
$r^3 = 104$
$r = \sqrt[3]{104}$ cm

13. (B) Ratio of capital investment

A	:	B	:	C
25,000	:	30,000	:	15,000
5	:	6	:	3

Let total profit be 100
Remaining profit = 70%

$$\text{A's share} = 30 + 70 \times \frac{5}{14} = 55\%$$

(B + C)'s share = 100 – 55 = 45%
When, difference 55 – 45 = 10, then total profit = 100
When difference ₹ 200, then total profit = 100 × 20 = ₹ 2000

14. (B) Volume of prism = Area of base × Height

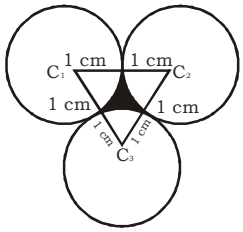
$$= \frac{1}{2} \times 10 \times 12 \times 20 = 1200 \text{ cm}^3$$

$$\text{Density of material} = 1200 \times \frac{6}{1000} = 7.2 \text{ kg}$$

15. (C) If PQ || BC
then, $\angle A = \angle A$
$\angle APQ = \angle ABC$
$\angle PQA = \angle BCA$
So, $\triangle APQ \sim \triangle ABC$
So, $\triangle APQ$ is an equilateral triangle

Area of $\triangle APQ = \frac{\sqrt{3}}{4} \times (5)^2 = \frac{25\sqrt{3}}{4}$ cm²

16. (B)



Required area $= \frac{\sqrt{3}}{4}(1+1)^2 - \frac{60° \times 3}{360°}[\pi(1)^2]$

$= \left(\sqrt{3} - \frac{\pi}{2}\right)$ cm²

17. (C) OA = OB $\Rightarrow \angle OBA = \angle OAB = 50°$
In $\triangle OAB$,
$\angle OAB + \angle OBA + \angle AOB = 108°$
$50° + 50° + \angle AOB = 180°$
$\angle AOB = 80°$
$\angle BOD = (180° - 80°) = 100°$

18. (B) $\frac{AB}{AC} = \frac{BD}{CD} \Rightarrow \frac{5}{AC} = \frac{2}{3} \Rightarrow$ AC = 7.5 cm

19. (D) Rate % $= \left[\left(\frac{y}{x}\right)^{\frac{1}{n}} - 1\right] \times 100$

Here, n = 3 – 2 = 1, x = 578.40

$\left[\left(\frac{614.55}{578.40}\right)^{\frac{1}{3-2}} - 1\right] \times 100$

$= \frac{(61455 - 57840)}{57840} \times 100 = 6\frac{1}{4}\%$

20. (A) Let C.P = 100

CP		SP
$\frac{120}{100} \times$ 85%	=	115% – 7.80

13% = 7.80
100% = ₹ 60

21. (B) Expenditure = $35 \times \frac{60}{100} = 21$ lakhs

22. (D)

23. (B) Income = $\frac{40 \times 32}{100} + 32$

$= \frac{1280 + 3200}{100}$

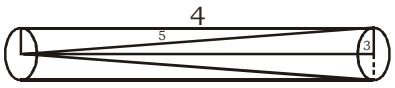
$= \frac{4480}{100}$

= 44.80 lakhs

24. (C) Required into = $\frac{\frac{45x}{100} + x}{\frac{55x}{100} + x} = \frac{145}{155} = 29 : 31$

25. (C) Profit = $31 \times \frac{55}{100} = 17$ lakhs

26. (A) According to the question,



Whole surface of remaining part
$= \pi rl + 2\pi rh + \pi r^2$

Hence, $l = \sqrt{h^2 + r^2}$

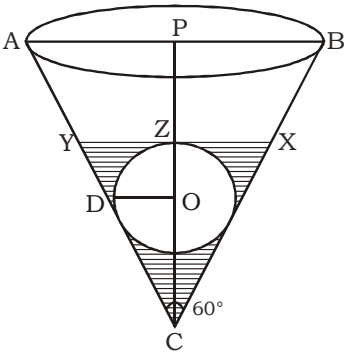
$l = \sqrt{4^2 + 3^2}$

$l = 5$

$= \pi r [1 + 2h + r]$

$= \frac{22}{7} \times 3 \times 16 = 48\pi$

27. (A)



$\triangle ABC$ = equilateral $\triangle$
$\Rightarrow \angle ACB = 60°$ and $\angle BCP = 30°$
$\triangle CDO$, $\angle CDO = 90°$ (Angle b/w radius and tangent is 90)
OD = 1P = 1 cm
OC = 2P = 2(1) = 2 cm
then, CZ = OC + OZ = 2 + 1 = 3 cm
$\triangle CZY$, $\angle CZY = 90°$

$CZ = \sqrt{3}P = 3$ cm

Now, In cone XYC

$r = ZY = \sqrt{3}$ cm

h = CZ = 3 cm

Volume of cone = $\frac{1}{3}\pi r^2 h = \frac{1}{3}\pi\left(\sqrt{3}\right)^2 (3) = 3\pi \text{cm}^2$

Volume of sphere = $\frac{4}{3}\pi$ cm³ (r_s = 1 cm)

$= \frac{4}{3}\pi \text{cm}^3$

Volume of water that can immerse the ball

$= \left(3p - \frac{4p}{3}\right)\text{cm}^3 = \frac{5p}{3}\text{cm}^3$

28. (C) Rate (R_1) = 4%, t_1 = 1 year
Case (I): When interest is compounded half yearly.

New Rate% = $\frac{6}{2}$ = 3%

Time (t_2) = 1 × 2 = 2 years

Effective Rate% for 2 years = $3 + 3 + \frac{3 \times 3}{100}$ = 6.09%

According to the question, 2.09% of sum = ₹ 104.50

Sum = ₹ $\frac{104.50}{2.09} \times 100$ = ₹ 5000

29. (B) $8\frac{3}{4}\% = \frac{35}{400} \div \frac{7}{80}$

$= x \times \frac{80}{87} \times \frac{167}{87} = 13360$

x = ₹ 7569

30. (C) M.P. of racket = ₹ 30
After discount S.P. = 85% of 30

$= \frac{85}{100} \times 30$ = ₹ 25.50

S.P. of racket = 25.50 – 1.50 = ₹ 24

C.P. of racket = $24 \times \frac{100}{120}$ = ₹ 20

31. (D) $450 \times \frac{90}{100} \times \frac{(100 - x)}{100} = 344.25$

$(100 - x) = 85$

x = 15%

32. (D) 20% = $\frac{1}{5}$, 30% = $\frac{3}{10}$

10% = $\frac{1}{10}$

$x \times \frac{4}{5} \times \frac{7}{10} \times \frac{9}{10} = 10080$

x = 20000

33. (B) $\sqrt{-\sqrt{3} + \sqrt{3 + 8\sqrt{7 + 4\sqrt{3}}}}$

$\Rightarrow \sqrt{-\sqrt{3} + \sqrt{3 + 8\sqrt{4 + 3 + 2 \times 2 \times \sqrt{3}}}}$

$\Rightarrow \sqrt{-\sqrt{3} + \sqrt{3 + 8\sqrt{\left(2 + \sqrt{3}\right)^2}}}$

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

$\Rightarrow \sqrt{-\sqrt{3} + \sqrt{3 + 16 + 8\sqrt{3}}}$

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

$\Rightarrow \sqrt{-\sqrt{3} + 4 + \sqrt{3}} \Rightarrow \sqrt{4} = 2$

34. (C) $\frac{0.96^3 - 0.1^3}{0.96^2 + 0.096 + 0.1^2}$

$\Rightarrow$ a = 0.96

$\Rightarrow$ b = 0.1

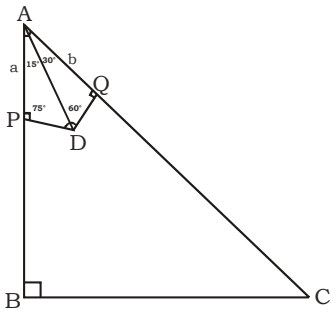
$\Rightarrow \frac{a^3 - b^3}{a^2 + ab + b^2}$

$\Rightarrow \frac{(a - b)(a^2 + b^2 + ab)}{(a^2 + ab + b^2)}$

$\Rightarrow$ a – b

$\Rightarrow$ 0.96 – 0.1 = 0.86

35. (C) from $\triangle$AQD



Sin60° = $\frac{AQ}{AD}$

$\frac{\sqrt{3}}{2} = \frac{b}{AD}$

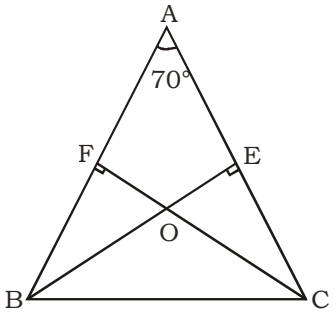
AD = $\frac{2b}{\sqrt{3}}$

From $\triangle$APD

Sin 75° = $\frac{AP}{AD}$

Sin 75° = $\frac{a}{2b} \times \sqrt{3} = \frac{\sqrt{3}a}{2b}$

36. (D)



Given: $\angle A = 70°$

AEOF is a quadrilateral

$\Rightarrow$ In a quadrilateral sum of all angles are 360°

$\angle A + \angle F + \angle 0 + \angle E = 360°$

$70° + 90° + \angle O + 90° = 360°$

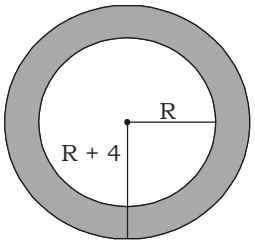
$\angle O = 360° - 250°$

$\angle O = 110°$

$\angle BOC = 110°$

(vertically opposite angles)

37. (D) Let the radius of swimming Pool = R



$4\sqrt{12}R^2 \times \frac{11}{25} = 4\sqrt{12}(R+4)^2 - 4\sqrt{12}R^2$

$R^2 \times \frac{11}{25} = R^2 + 16 + 8R - R^2$

$\frac{11}{25} R^2 = 16 + 8R$

By option (d)

R = 20

$11 \times (20)^2 - 200 \times 20 - 400 = 0$

$4400 - 4000 - 400 = 0$

Therefore radius of pool R = 20 cm

38. (B) A : B : C

$25x$: $16x$: $24x$

Total capital of A in 1 year

$= 25x \times 3 + (37.5x) \times 9$

$= 75x + 337.5x = 412.5\,x$

Total capital of B in 1 year

$= 16x \times 12 = 192\,x$

Total capital of C in 1 year

$= 24 \times 12\,x = 28x$

	A	:	B	:	C
Capital	$412.5x$	:	$192x$	:	$288x$

According to the question,

$(412.5x + 192x + 288x) = 35700$

$= \frac{35700}{892.5} = ₹\,40$

A = 412.5 × 40 = ₹ 16500

39. (C)

$\Rightarrow \frac{4}{15}$ of $\frac{5}{8} \times 6 + 15 - 10$

$\Rightarrow \frac{4}{15}$ of $\frac{5}{8} \times 6 + 15 - 10$

$\Rightarrow 1 + 15 - 10$

$\Rightarrow 6$

40. (C) $(2467)^{153} \times (341)^{72}$

$\overset{235}{92}$

$(7)^{153} \times (1)^{72}$

(153/4 = remainder = 1)

$7^1 \times 1$

	Result	Unit digit
7^1 =	7	7
7^2 =	49	9
7^3 =	343	3
7^4 =	2401	1

$\Rightarrow$ 7

41. (D)

$\Rightarrow$ n (n + 1) (n + 2) = 1(1 + 1)(1 + 2) = 6

42. (B) Sum of first n natural no. = $\frac{n(n+1)}{2}$

$\Rightarrow$ (999 × 500) – (99 × 50)

$\Rightarrow$ 499500 – 4950

$\Rightarrow$ 494550

43. (C) $3(x + y) = \frac{7}{2}(x - y)$

$6x + 6y = 7x - 7y$

$x = 13y$

y = speed of current = 1.5 km/h

$x = 13 \times 1.5$

x = 19.5 km/h

44. (B)

Gold	:	Copper	:	Tin		Total
$2_{\times 2}$	:	$3_{\times 2}$	:	$1_{\times 2}$	=	$6_{\times 2}$
4	:	6	:	2	=	12

Copper	:	Tin	:	Lead		Total
5	:	4	:	3	=	12

Weight of lead = $\frac{3}{12+12} = \frac{3}{24} = \frac{1}{8}$ kg

45. (D) 40 ———— 90 Milk

x ———— 80 Milk

$x = \frac{40 \times 10}{80}$ = 5 litres

46. (D) Time = 5 years

loan amount : interest amount
= 5 : 2

Rate of interest = $\frac{2}{5} \times \frac{100}{5} = 8\%$

Let, Principal = 100

Principal : Interest rate

$100 \xrightarrow{\times \frac{1}{4}} 25$: $8 \xrightarrow{\times \frac{1}{4}} 2$

Hence Require ratio = 25 : 2

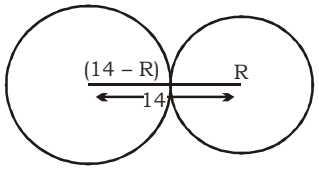
47. (D) Let a = 8h

$b = 4\frac{1}{2}h = \frac{9}{2}h$

Time required to finish the work together

$= \sqrt{8 \cdot \frac{9}{2}} = 6$ h

48. (B) Let the radius of smallest circle = R

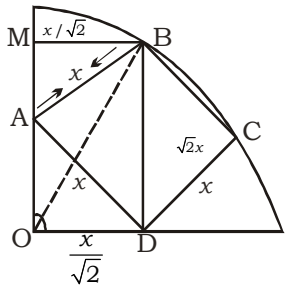


$\pi(14-R)^2 + \pi R^2 = 130\pi$

$196 + R^2 - 28R + R^2 = 130$

$R = 3$ cm

49. (C) Let ABCD is a square of x unit side



Then $\angle AOD = 90°$

Then, $OD = \frac{x}{\sqrt{2}} = MB$

diagonal of square ABCD = $\sqrt{2}x$

$\Rightarrow$ then MB OD will be a rectangle

MB || OD, $MB = OD = \frac{x}{\sqrt{2}}$

BD || MO, $MO = BD = \sqrt{2}x$

$R = \sqrt{\left(\frac{x}{\sqrt{2}}\right)^2 + \left(\sqrt{2}x\right)^2} = \frac{\sqrt{5}x}{\sqrt{2}}$

50. (A) $x^2 + y^2 + 2x + 1 = 0$

$\Rightarrow x^2 + 2x + 1 + y^2 = 0$

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

$\Rightarrow x + 1 = 0$

$\Rightarrow x = -1$

$y = 0$

$\Rightarrow x^{31} + y^{35}$

$= (-1)^{31} + (0)^{35} = -1$

51. (D) Given,

$x = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$, $y = \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$

$\Rightarrow \frac{x^2+y^2+2xy-xy}{x^2+y^2-2xy+xy}$

$\Rightarrow \frac{(x+y)^2-xy}{(x-y)^2+xy}$

Now, $x + y = \frac{\left(\sqrt{5}-\sqrt{3}\right)}{\left(\sqrt{5}+\sqrt{3}\right)} + \frac{\left(\sqrt{5}+\sqrt{3}\right)}{\left(\sqrt{5}-\sqrt{3}\right)}$

$\Rightarrow x + y = \frac{\left(\sqrt{5}+\sqrt{3}\right)^2 + \left(\sqrt{5}+\sqrt{3}\right)^2}{\sqrt{5}^2 - \sqrt{3}^2}$

$\Rightarrow x + y = 8$ ..... (i)

Again, $x - y = \frac{\left(\sqrt{5}-\sqrt{3}\right)\left(\sqrt{5}+\sqrt{3}\right)}{\left(\sqrt{5}+\sqrt{3}\right)\left(\sqrt{5}-\sqrt{3}\right)}$

$= \frac{4 \cdot \sqrt{5} \cdot \sqrt{3}}{2}$

$\Rightarrow (x - y) = 2\sqrt{15}$ ..... (ii)

And, $xy = \frac{\left(\sqrt{5}-\sqrt{3}\right)}{\left(\sqrt{5}+\sqrt{3}\right)} \times \frac{\left(\sqrt{5}+\sqrt{3}\right)}{\left(\sqrt{5}-\sqrt{3}\right)}$

On substituting values in the expression

$\Rightarrow \frac{(x+y)^2-xy}{(x-y)^2+xy}$

$\Rightarrow \frac{8^2-1}{\left(2\sqrt{15}\right)^2+1} \Rightarrow \frac{63}{61}$

52. (B) Given,

$\frac{m-a^2}{b^2+c^2} + \frac{m-b^2}{c^2+a^2} + \frac{m-c^2}{a^2+b^2} = 3$

$\Rightarrow m = ?$

$\Rightarrow \frac{m-a^2}{b^2+c^2}+\frac{m-b^2}{c^2+a^2}+\frac{m-c^2}{a^2+b^2}=1+1+1$

Put $m = a^2 + b^2 + c^2$ from option (b)

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

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

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

$\Rightarrow m = a^2 + b^2 + c^2$

53. (B) $1 \times \frac{S(S+10)}{10}=\frac{S(S+20)}{20}\times\left(1+\frac{45}{60}\right)$

$S = 60$ km/h

Then, Put S = 60

$\frac{60 \times 70}{10} = 420$ distance

54. (C) $S_{avg.} = \frac{2ab}{a+b}=\frac{2\times 25\times 4}{25+4}$

$= \frac{200}{29}$ km/hr

$2D = \frac{200}{29}\times\left(5+\frac{4}{5}\right)=\frac{200}{29}\times\frac{29}{5}$

$= 40$ km

$\Rightarrow D = 20$ km

55. (A) (Q + R) 6 days work $= 7 \times 6 = 42$

$\Rightarrow$ P completes $= 60 - 42 = 18$

P' s eff. $\frac{18}{3} = 6$

Q's eff $= 10 - 6 = 4$

R's eff $= 7 - 4 = 3$

P completes whole work in $= \frac{60}{6} = 10$ days

R completes whole work in $= \frac{60}{3} = 20$ dyas

diff. $20 - 10 = 10$ days

56. (D) $\frac{90\,\text{m} \times 16\,\text{d} \times 12\,\text{h}}{1\,\text{w}}$

$= \frac{70\,\text{men} \times 24\text{ days} \times 8\text{ hours}}{\text{W work}}$

$= 90 \times 16 \times 12 = \frac{70 \times 24 \times 8}{W}$

$9W = 7, W = \frac{7}{9}$

57. (D) According to the question

$\frac{x^2-y^2}{x^2+xy+y}=\frac{5}{1}$

$\frac{(x-y)(x^2+xy+y^2)}{x^2+xy+y^2}=\frac{5}{1}$

$\frac{(x-y)(x^2+xy+y^2)}{x^2+xy+y^2}=\frac{5}{1}$

$x - y = 5$ ..... (i)

$\frac{x^2-y^2}{x-y}=\frac{7}{1}$

$\frac{(x+y)(x-y)}{x-y}=\frac{7}{1}$

$x + y = 7$ ..... (ii)

Solve equation (i) and (ii)

$x = 6$

$y = 1$

$\Rightarrow \frac{2x}{3y}=\frac{2\times 6}{3\times 1}=\frac{12}{3}=\frac{4}{1}$

58. (A) $\frac{\text{Story books}}{\text{other books}}=\frac{7}{2}$

Story books = 1512

7 units $\overset{23}{11}$ 1512

1 unit $\overset{23}{11}\ \frac{1512}{7} = 216$

2 units $\overset{23}{11}$ 216 × 2 = 432

New ratio of $\frac{\text{Story books}}{\text{other books}}=\frac{15}{4}$

As we know that only story books are added

$\Rightarrow$ 4 units $\overset{23}{11}$ 432

1 unit $\overset{23}{11}\ \frac{432}{4} = 108$

15 units $\overset{23}{11}$ 108 × 15 = 1620

New collection of story books = 1620

$\Rightarrow$ Number of story books added

$= 1620 - 1512 = 108$

59. (D) Total capital invested by A in 1 year

$= 36000 \times 12 =$ ₹ 432000

Total capital invested by B in 1 year

$= 45000 \times 4 + (45000 - 20000) \times 5 + (55000 + 25000) \times 3$

$= 180000 + 125000 + 240000 = 545000$

Ratio of capital 432000 : 545000

Ratio of profit 432 : 545

According to the question,

(432 + 545) units = ₹ 117240

977 units = ₹ 117240

1 unit $= \frac{117240}{977} =$ ₹ 120

Difference in profit $= (545 - 432) \times 120 = 13560$

It means B will get ₹ 13560 more

60. (C) Given, $\frac{\sec q+\tan q}{\sec q-\tan q}=2\,\frac{51}{79}$

$\Rightarrow \frac{\sec q + \tan q}{\sec q - \tan q} = \frac{209}{79}$

$\left[\text{by componendo-dividendo } \frac{a}{b} = \frac{c}{d}, \frac{a+b}{a-b} = \frac{c+d}{c-d}\right]$

$\frac{\sec q + \tan q + \sec q - \tan q}{\sec q + \tan q - \sec q + \tan q} = \frac{209 + 79}{209 - 79}$

$\frac{\sec q}{\tan q} = \frac{288}{130}$

$\Rightarrow \frac{\sec q}{\tan q} = \frac{288}{130}$

$\Rightarrow \frac{\frac{1}{\cos q}}{\frac{\sin q}{\cos q}} = \frac{288}{130}$

$\Rightarrow \frac{1}{\sin q} = \frac{288}{130}$

$\Rightarrow$ Therefore, $\sin\theta = \frac{130}{288}$

$\Rightarrow \sin\theta = \frac{65}{144}$

61. (C) tan A = ntan B and sin A = msin B

$n = \frac{\tan A}{\tan B}$ $m = \frac{\sin A}{\sin B}$

Put A = 30° and B = 60°

$n = \frac{\frac{1}{\sqrt{3}}}{\sqrt{3}}$ $m = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$

$n = \frac{1}{3}$ $m = \frac{1}{\sqrt{3}}$

$\Rightarrow \cos^2 A = \cos^2 30° = \frac{3}{4}$

Now check from option

Option (C) : $\frac{m^2 - 1}{n^2 - 1} = \frac{\left(\frac{1}{\sqrt{3}}\right)^2 - 1}{\left(\frac{1}{3}\right)^2 - 1}$

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

$= \frac{3}{4}$ (satisfy)

62. (B) $2\pi R_1 = 528$

$\Rightarrow 2 \times \frac{22}{7} \times R_1 = 528$

$\Rightarrow R_1 = 84$ cm

New Radius $R_2 = 84 - 14 = 70$

Area of road = $\pi (R_1^2 - R_2^2)$

$\Rightarrow \pi \times 14\ (154)$

$\Rightarrow$ Total expenditure

$= \frac{22}{7} \times 14 \times 154 \times 10 = ₹\ 67760$

63. (A) Ratio of parallel sides = 5 : 3

$\frac{1}{2}(5x + 3x) \times 24 = 1440$

$4x \times 24 = 1440$

$x = \frac{1440}{4 \times 24} = 15$ m

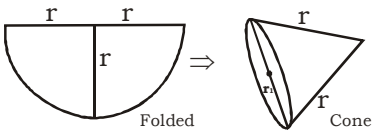
$\Rightarrow$ length of longer side = $5x$

$= 5x$

$= 5 \times 15$

$= 75$ m

64. (B)



radius of semi-circular sheet = r $\Rightarrow \frac{28}{2}$

Circumference of sheet = π r

$= 14\pi$ cm

Sheet is folded to form a cone

Let radius of cone = r_1

The circumference of base of cone

$\Rightarrow$ circumference of sheet

$\Rightarrow 2\pi r_1 = 14\pi$

$r_1 = 7$ cm

$\Rightarrow$ radius of cone = 7 cm

Slant height = radius of semicircular sheet

r = 14 cm

$\Rightarrow$ height = $\sqrt{(14)^2 - (7)^2}$

$= \sqrt{147} = 12$ cm (approximate)

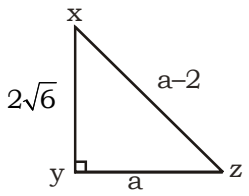
65. (A) $\frac{1}{\sqrt{2}}\sin\frac{p}{6}\cos\frac{p}{4}-\cot\frac{p}{3}\sec\frac{p}{6}+\frac{5\tan\frac{p}{4}}{12\sin\frac{p}{2}}$

$\Rightarrow \frac{1}{\sqrt{2}}\times\frac{1}{2}\times\frac{1}{\sqrt{2}}-\frac{1}{\sqrt{3}}\times\frac{2}{\sqrt{3}}+\frac{5\cdot1}{12\cdot1}$

$\Rightarrow \frac{1}{4}-\frac{2}{3}+\frac{5}{12}$

$\Rightarrow \frac{3-8+5}{12}=0$

66. (D)



$a^2+\left(2\sqrt{6}\right)^2=(a+2)^2$

$a^2+24=a^2+4+4a$

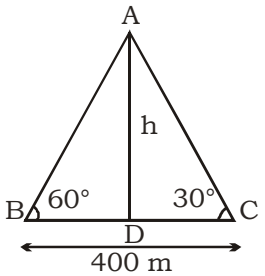
$a=5$

$\Rightarrow$ sec x + tan x

$=\frac{H}{B}+\frac{P}{B}=\frac{7}{2\sqrt{6}}+\frac{5}{2\sqrt{6}}$

$=\frac{12}{2\sqrt{6}}=\sqrt{6}$

67. (A)



In $\triangle$ABD

$\tan60°=\frac{AD}{BD}$

$\frac{\sqrt{3}}{1}=\frac{AD}{BD}\Rightarrow$ AD : BD = $\sqrt{3}:1$ ..... (i)

In $\triangle$ADC

$\tan30°=\frac{AD}{DC}$

$\frac{1}{\sqrt{3}}=\frac{AD}{DC}=$ AD : DC = $1:\sqrt{3}$ ..... (ii)

Now,

BD	:	AD	:	DC
1	:	$\sqrt{3}$	:	
		1	:	$\sqrt{3}$
1	:	$\sqrt{3}$	:	3

BC = BD + DC

= 1 + 3 = 4 units.

4 units = 400 m

1 unit = 100 m

AD = $\sqrt{3}$ unit

= $100\sqrt{3}=100\times1.732=173.2$ m

68. (D) OQ = OB = OC = (r) say

$\angle$AOD = $\angle$BOC = 120°

$\because$ $\angle$BOQ = $\angle$COQ = 60°

$\because$ $\frac{SB}{OB}=\sin60°=\frac{\sqrt{3}}{2}$

SB = $\frac{r\sqrt{3}}{2}$

$\because$ BC = 2SB = $r\sqrt{3}$

$\because$ Area of quadrilateral BQCO = $\frac{1}{2}\times BC\times OQ$

$=\frac{1}{2}\times BC\times OQ$

$=\frac{1}{2}\times r\sqrt{3}$

$=r^2\frac{\sqrt{3}}{2}$ cm

Area of both the quadrilaterals = $2\times\left(r^2\frac{\sqrt{3}}{2}\right)$

$=r^2\sqrt{3}$ cm²

69. (D)

70. (A) The distance between them = $\left|\frac{C_1-C_2}{\sqrt{a^2+b^2}}\right|$

$\frac{9-(-14)}{\sqrt{(2)^2+(5)^2}}=\frac{23}{\sqrt{29}}$ unit

71. (C) Let AB = 5

$\angle$AOB = 90°

$\angle$BOC = $\angle$AOD = $\angle$DOC = 90°

$\because$ BC is also 5 m

Hence, ABCD is a rhombus

$\because$ Area of rhombus ABCD = $\frac{AC\cdot BD}{2}$

$=\frac{6\cdot8}{2}=24$ m²

72. (B) My salary = 100
Salary of my brother = 110
Salary of my sister = 120
[∵ 110 × 6.66% = 9.999 = 10%]

Salary of my wife = $\left(230 - 230 \times \frac{1300}{23 \times 100}\right)$

= 100%

$\left(\because 56\frac{12}{13} = \frac{1300}{23}\right)$

73. (C)

Total copy	Copy (price counted)
20	18
$\frac{235}{92} \times 45$	$\frac{235}{92} \times 45$
900	810

Now,
Let SP of a book = x

$$x \times 810 = 60 \times 1200 \times \frac{117}{100}$$

$$x = \frac{60 \times 12 \times 117}{810} = 104$$

74. (A)

A	B
2	9
1 ↕	↕ 3
3	6

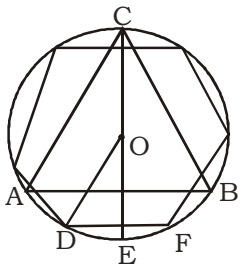
1 A = 3 B
A : B = 3 : 1
Total work = 3 × 2 + 9 × 1 = 15

B alone done $\frac{15}{1}$ = 15 days

75. (D) We know altitude of equilateral

△ABC is $\frac{\sqrt{3}}{2}$ a

Length of OC = $\frac{\sqrt{3}}{2}$ a × $\frac{2}{\sqrt{3}} = \frac{a}{\sqrt{3}}$ r



also DF = b

$$DE = \frac{b}{2}$$

In △ODE $\cos 60° = \frac{DE}{OD} = \frac{\frac{b}{2}}{\frac{a}{\sqrt{3}}}$

$$= \frac{1}{2} = \frac{\sqrt{3}b}{2a}$$

$= a = \sqrt{3}b$
$a^2 = 3b^2$

76. (A) ∵ $\cos\theta = \frac{a^2 + b^2 - c^2}{2ab}$

By cosine rule = $\frac{(6)^2 + (2)^2 - C^2}{2 \times 6 \times 2}$

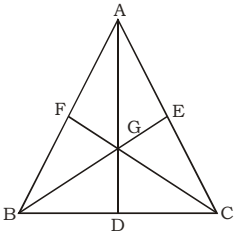
$$= \frac{40 - C^2}{24}$$

For acute angle $\cos\theta > 0$

$\frac{40 - C^2}{24} > 0 \Rightarrow C^2 = 40$

$0 < C < 2\sqrt{10}$ ∵ (can not be negative)
Also b + C > a
C > 6 – 2
C > 4
Then 4, $2\sqrt{10}$

77. (C) G is the centroid of △ABC



$$AB^2 + AC^2 = 2AD^2 + 2\left(\frac{1}{2}BC\right)^2$$

$$AB^2 + AC^2 = 2AD^2 + \frac{1}{2}BC^2$$

$$BC^2 + AB^2 = 2BE^2 + \frac{1}{2}AC^2$$

$$BC^2 + AC^2 = 2CF^2 + \frac{1}{2}AB^2$$

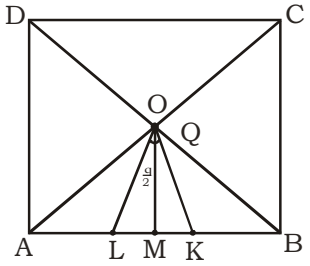
$$BC^2 + AC^2 = \frac{4CF^2 + AB^2}{2}$$

$2BC^2 + 2AC^2 - AB^2 = (2CF)^2$

78. (B) Let side of a square = a

$AC = a\sqrt{2}$

$$AO = OC = \frac{a}{\sqrt{2}}$$



$= AM = \frac{a}{2}$

$LM = \left(\frac{a}{\sqrt{2}} - \frac{a}{2}\right)$

$OM = \frac{a}{2}$

$\because \tan 6\overline{39} = \frac{2\tan\frac{q}{2}}{1-\tan^2\frac{q}{2}}$

Then in $\triangle OML = \tan\frac{q}{2} = \frac{\frac{a}{\sqrt{2}} - \frac{a}{2}}{\frac{a}{2}}$

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

$\text{Tan } 6\overline{39} = \frac{2\left(\sqrt{2}-1\right)}{1-3+2\sqrt{2}} = \frac{2\left(\sqrt{2}-1\right)}{2\left(\sqrt{2}-1\right)}$

$\tan 6\overline{39} = 1$

79. (A) $4\overline{12}r^2 = 770\ cm^2$

$\frac{22}{7} \times r^2 = 770$

$r = 7\sqrt{5}\ cm$

Area of curved surface $= 4\overline{12}rl$

$= \frac{22}{7} \times 7\sqrt{5} \times l = 814$

$l = \frac{37}{\sqrt{5}}$

$\because h^2 = l^2 - r^2 = \left(\frac{37}{\sqrt{5}}\right)^2 - \left(7\sqrt{5}\right)^2$

$= \frac{1369-1235}{5} = \frac{144}{5}$

$h = \frac{12}{\sqrt{5}}\ cm$

$\because$ volume of cone $= \frac{1}{3} \times 4\overline{12}r^2 \times h$

$= \frac{1}{3} \times 770 \times \frac{12}{\sqrt{5}}$

$= 616\sqrt{5}\ cm^3$

80. (B) $(S + m)\ 20 = \left(\frac{S}{2} + 5m\right) \times 10$

$25 + 2m = \frac{S}{2} + 5m$

$S : m = 2 : 1$

Total work $= 3 \times 20 = 60$ days

Completed by Suraj in $= \frac{60}{2} = 30$ days

81. (B) Let = CP = 100

CP	SP	MP
100	135	180

$^{3\times}1200$ gm ———— CP 1000 gm $_{\times 3} = 3000$

$_{4\times}900$ gm ———— SP 1350 gm $_{\times 4} = 5400$

$P\% = \left(\frac{2400}{3000}, 100\right) = 80\%$

82. (A) $\because (a^3 + 3a^2b + 3b^2a + b^2)$

$(x+1)^3 - 1$

$(105 + 1)^3 - 1 = (106)^3 - (1)^3$

$= 1191015$

83. (B) Let a = 0.75

b = 0.25

$a \times a - 2 \times a \times b + b \times b$

$= (a - b)^2$

$= (0.75 - 0.25)^2$

$(0.50)^2$

$= .2500$

84. (A) $5.\overline{6} + 7.\overline{3} + 8.\overline{7} + 6.\overline{1}$

$= 5 + \frac{6}{9} + 7 + \frac{3}{9} + 8 + \frac{7}{9} + 6 + \frac{1}{9}$

$= 26 + \frac{17}{9}$

$= 26 + 1 + \frac{8}{9}$

$= 27\frac{8}{9} \approx 27.\overline{8}$

85. (C) A + B + C = 84 × 3 = 252 kg

A + B + C + D = 80 × 40 = 320 kg

D's weight = 320 – 252 = 68 kg

E's weight = 68 + 3 = 71 kg

(E + B + C + D) = 79 × 4 = 316 kg

Then,

A – E = 320 – 316 = 4 kg

A = 4 + E ≈ 4 + 71 = 75 kg

86. (D)

$= \left(1+\cos\frac{p}{8}\right)\left(1+\cos\frac{3p}{8}\right)\left(1+\cos\left(p - \frac{3p}{8}\right)\right)$

$\left(1+\cos\left(p - \frac{p}{8}\right)\right)$

$$= \left(1+\cos\frac{p}{8}\right)\left(1+\cos\frac{3p}{8}\right)\left(1-\cos\frac{3p}{8}\right)$$

$$\left(1-\cos\frac{p}{8}\right)$$

$$= \left(1-\cos^2\frac{p}{8}\right)\left(1-\cos^2\frac{3p}{8}\right)$$

$$= \sin^2\frac{p}{8}\sin^2\frac{3p}{8}$$

$$= \sin^2\frac{p}{8}\sin^2\left(\frac{p}{2}-\frac{p}{8}\right)$$

$$= \sin^2\frac{p}{8}\cos^2\frac{p}{8}$$

$$= \frac{1}{4}\left(\frac{1}{4}\sin^2\frac{p}{8}\cos^2\frac{p}{8}\right)$$

$$= \frac{1}{4}\left(\sin\frac{p}{4}\right)^2 = \frac{1}{4}\left(\frac{1}{\sqrt{2}}\right)^2 = \frac{1}{8}$$

87. (C) $\frac{x \times 8 \times 1}{100} + \frac{(20000-x)\frac{7}{3} \times 1}{100} = 800$

$$\frac{2x}{25} + \frac{20000-x}{75} = 800$$

$$= 5x + 20000 = 800 \times 75$$

$$= x = \frac{40000}{5} = 8000$$

88. (C) Let total votes = x

$$\because x \times \frac{(60-40)}{100} = 298$$

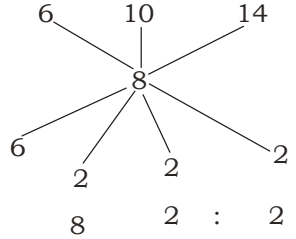
$$x \times \frac{1}{5} = 298$$

$x = 298 \times 5 = 1490$

89. (B) SP of mixture = 11.20 per kg

P% = 40

$$11.20 \times \frac{100}{140} = ₹\ 8 \text{ per kg}$$



4 : 1 : 1

90. (D) Q = P + 2

R = Q + 2 = P + 4

S = R + 2 = P + 6

T = S + 0 = P + 8

$\because$ Required average

$$= \frac{P+P+2+P+4+P+6+P+8}{5} = \frac{5P+20}{5}$$

= P + 4

91. (D) = (478 – 2) = 476

(719 – 5) = 714

HCP = 476 , 714

476)714(1
476)476(2
476
×

$\because$ Required number HCF of 476 and 714 = 238

92. (B) $\sqrt{x} = \sqrt{5-\sqrt{21}}$

$$= \sqrt{x} = \sqrt{\frac{10-2\sqrt{21}}{\sqrt{2}}}$$

$$= \sqrt{x} = \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}}$$

Now, $\sqrt{32-2x} = \sqrt{32-2\left(5-\sqrt{2}\right)}$

$$= \sqrt{32-10+2\sqrt{21}}$$

$$= \sqrt{22+2\sqrt{21}}$$

$$\left(\sqrt{21}+1\right)$$

$$\because \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}\left(\sqrt{2}+1-\sqrt{2}\right)} = \frac{1}{\sqrt{2}}\left(\sqrt{7}-\sqrt{3}\right)$$

93. (A) Total surface area = L.S.A + 2 × Area of base

$$= 360 = 30 \times h + \frac{1}{2} \times 5 \times 12$$

$360 - 30 = 30 \times h$

h = 10 cm

94. (B) 11 + 103 + 1005 + ...

10 + 1 + 100 + 3 + 1000 + 5 .....

$$\frac{\left(10^1+10^2+10^3+.....n\right)}{-} + \frac{(1+3+5+.....n)}{\text{odd series}}$$

G.P

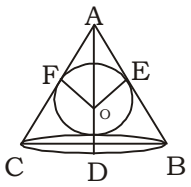
$$S_n = a\,\frac{\left(r^n-1\right)}{r-1}$$

$$\text{Total} = \frac{10\left(10^n-1\right)}{10-1} + n^2$$

$$= \frac{10}{9}(10^n-1) + n^2$$

95. (B) AB = 2a

BD = a



$AD = \sqrt{4a^2 - a^2}$

$= \sqrt{3}a$

Ð AFO = 90°

OD = r

AO = $\sqrt{3} - r$

$\because \sin BAD = \frac{a}{2a} = \frac{1}{2}$

$ÐBAD = 30^\circ = \frac{OF}{AO}$

$\frac{1}{2} = \frac{r}{AO} = \frac{r}{\sqrt{3a} - r}$

2a = $\sqrt{3}a - r$

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

96. (C)

5	379
5	75
5	15
	3

Then 75+15+3

= 93

97. (B) $360 = 2^3 \times 3^2 \times 5^1$
Sum of all odd factor = $2^o \times (3^o + 3^1 + 3^2) \times (5^0 + 5^1)$
= 1×13×6 = 78

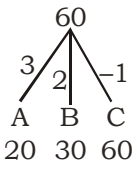
98. (D) $\frac{4^{19}}{33} = \frac{2^{38}}{33}$

$= \frac{2^{2'}3^{35}}{33} = \frac{8'\left(2^5\right)^7}{33}$

$= \frac{8'(-1)}{33}$

=33-8 = 25

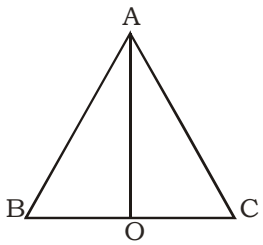
99. (C)



In first hour (A + C) ——— 3 – 1 = 2
second hours B + C = 2 – 1 = 1
Hence (2 + 1) unit will be filled in 2 hours
Then 3 ———— 2

60 ———— $\frac{2}{3} \times 60$ = 40 hours

100. (D)



x + y = 1

AD = $\left|\frac{20 + (-1) - (2)}{\sqrt{(1)^2 + (1)^2}}\right|$

AD = $\frac{17}{\sqrt{2}}$ equation .....(i)

let side of triangle = l

$\because$ BD = $\frac{l}{2}$

$\because$ $AD^2 = AB^2 - BD^2$

$= l^2 - \frac{l^2}{4} = \frac{3l^2}{4}$

$\because$ AD = $\frac{\sqrt{3}}{2} l = \frac{17}{\sqrt{2}}$

$l = \frac{17\sqrt{6}}{3}$

SSC MAINS (MATHS) MOCK TEST-19 (ANSWER KEY)

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