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

SSC MAINS (MATHS) MOCK TEST-20 (SOLUTION)

1. (C) $80\% = \frac{4}{5}$

Let the number = $5x$

$4x + 80 = 5x$

$x = 80$

Required number = $5x = 80 \times 5 = 400$

2. (A) Student gets 190 marks and fails by 35 marks

Total marks need to pass = 190 + 35

$\because$ 36% marks are pass marks

$\Rightarrow$ 36% = 225

$\Rightarrow 100\% = \frac{225}{36} \times 100$

$\Rightarrow$ 100% = 625

$\Rightarrow$ Total marks 625

3. (A) Let the eight consecutive integer are x, $x+2$, $x+4$, $x+6$, $x+8$, $x+10$, $x+12$, $x+14$,

According to the question,

$$\frac{x + x + 2 + x + 4 + x + 6 + x + 8 + x + 10 + x + 12 + x + 14}{8} = 93$$

$8x + 56 = 744$

$8x = 688$

$x = 86$

Greatest number = $x + 14 = 86 + 14 = 100$

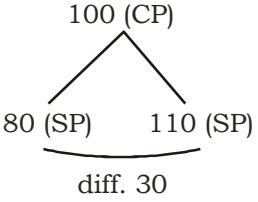
4. (C)

	Rice	Fish	Oil
Old	120	170	30
Expenses	$\frac{23}{11}$ $\frac{235}{92}$ 20%	$\frac{235}{92}$ 30%	$\frac{235}{92}$ 50%
	↑	↑	↑

Required percentage increase

$$= \frac{(24 + 51 + 15)}{(120 + 170 + 30)} \times 100 = \frac{90}{320} \times 100 = 28\frac{1}{8}\%$$

5. (B)



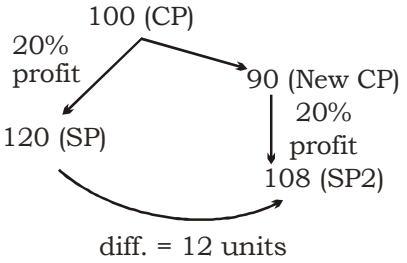
30 units $\frac{23}{11}$ 12

1 unit $\frac{23}{11}$ $\frac{12}{30}$

100 units $\frac{23}{11}$ $\frac{12}{30} = ₹ 40$

CP = ₹ 40

6. (B) Let CP of the watch = 100



diff. = 12 units

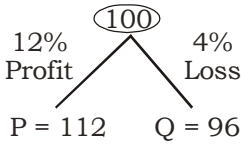
12 units $\frac{23}{11}$ 30

1 unit $\frac{23}{11}$ $\frac{30}{12}$

100 units $\frac{23}{11}$ $\frac{30}{12} \times 100 = 250$

CP of the watch = ₹ 250

7. (B) Let CP = 100



$$\frac{Q}{P} = \frac{96}{112} = \frac{6}{7}$$

8. (B) 1 dm = $\frac{1}{10}$ m

Let depth of the hole = d

$\Rightarrow 48 \text{ m} \times 31.5 \times \frac{6.5}{10}$ m

$= 27 \times 18.2 \times d$

$\Rightarrow$ d = 2 m

9. (B) Number of cubes = $\frac{8' 4' 2' 8}{2' 2' 2} = 64$

10. (B)

(A + C)	: B	(A + B)	: C
$3_{\times 3}$	: $1_{\times 3}$	$2_{\times 4}$	: $1_{\times 4}$
(A + C)	: B	(A + B)	: C
9	: 3	8	: 4

A : B : C = 5 : 3 : 4 $\Rightarrow$ Total work = 12 × 10

Completed by A = $\frac{12 \cdot 10}{5}$ = 24 days

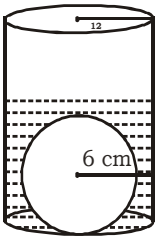
11. (C) Let the height be H

$\Rightarrow \frac{1}{3}\sqrt[4]{12}r_1^2 H + \frac{1}{3}\sqrt[4]{12}r_2^2 H + = \frac{4}{3}\sqrt[4]{12}R^2$

$\Rightarrow \frac{1}{3}\sqrt[4]{12}\, H(r_1^2 + r_2^2) = \frac{4}{3}\sqrt[4]{12}R^3$

$\square$ $H = \left(\frac{4R^3}{r_1^2 + r_2^2}\right)^{\frac{1}{2}}$

12. (B)



Let the increase in height = h cm

$\square$ $\pi(12)^2 R^2 h = \frac{4}{3}\pi(12)r^3$

$(12)^2 \times h = \frac{4}{3} \times 6^3$

$h = \frac{4}{3} \times \frac{216}{144} = 2$ cm

13. (A) According to the question numbers between 6 and 50 divisible by '5'
10, 15, 20, 25, 30, 35, 40, 45

$\text{Avg} = \frac{10+15+20+25+30+35+40+45}{8}$

$\text{avg} = \frac{220}{8} = 27.5$

14. (B) $x + \frac{1}{x} = \sqrt{3}$ (take cube on both sides)

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

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

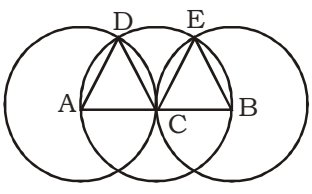
$\square$ $x^3 + \frac{1}{x^3} + 3\left(\sqrt{3}\right) = 3\sqrt{3}$

$x^3 + \frac{1}{x^3} = 0$

$\square$ $x^6 = -1$

$\square$ $x^{18} + x^{12} + x + 1$
$= (-1)^3 + (-1)^2 + 1$
$= -1 + 1 + 1 = 1$

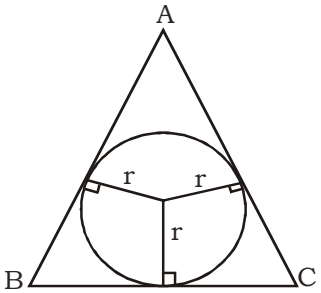
15. (B)



Area $\square$ABDE $= 3 \times$ ar $\triangle$ADC
(ADC is equilateral triangle)

$3 \times \frac{\sqrt{3}}{4} \times 2^2 = 3\sqrt{3}$ unit^2

16. (D)



Inradius of triangle $= \frac{\text{Aera of triangle}}{\text{Semiperimeter}}$

$\square$ ar ($\triangle$ABC) = inradius semiperimeter

$= 4 \times \frac{28}{2} = 4 \times 14 = 56$ cm

Volume of the prism = 366 cm^3
(area of base) × height = 366 cm^3
$56 \times$ height = 366 cm

$\text{height} = \frac{366}{56} = 6.535$ cm

17. (B) $3x + \frac{1}{2x} = 5$

$\square$ Multiply both sides by $\frac{2}{3}$

$\square$ $3x \times \frac{2}{3} + \frac{1}{2}x \times \frac{2}{3} = 5 \times \frac{2}{3}$

$2x + \frac{1}{3x} = \frac{10}{3}$

$\square$ Taking cube on both side

$8x^3 + \frac{1}{27x^3} + 3 \times 2x \times \frac{1}{3x}\left(2x + \frac{1}{3x}\right) = \left(\frac{10}{3}\right)^3$

$8x^3 + \frac{1}{27x^3} = \frac{1000}{27} - \frac{20}{3}$

$= \frac{1000 - 180}{27} = \frac{820}{27} = 30\frac{10}{27}$

18. (B) Given $x^2 + y^2 + z^2 = 2(x + z - 1)$
Find $x^3 + y^3 + z^3$ = ?

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

$\Rightarrow (z-1)^2 = 0$

$\Rightarrow z = 1$

Value substituted in question,

$\Rightarrow x^3 + y^3 + z^3$

$\Rightarrow 1^3 + 0 + 1^3$

$\Rightarrow 2$

19. (D) $\dfrac{2p}{p^2-2p+1} = \dfrac{1}{4}$

$$\frac{2}{p-2+\frac{1}{p}} = \frac{1}{4}$$

$$p + \frac{1}{p} - 2 = 8$$

$$p + \frac{1}{p} = 10$$

20. (A) Let the time taken by A to cover 1 km $= x$ sec.

Time taken by B and C to cover the same distance $= x + 25$ and $x + 55$ sec.

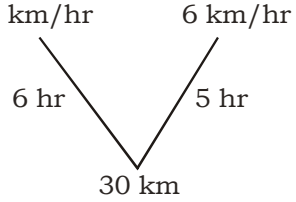
	A	C
Distance	1000	725
Time	29	40

$$\frac{A}{C} = \frac{29}{40} = \frac{x}{x+55} \Rightarrow 29x + 1595 = 40x$$

$$x = \frac{1595}{11} = 145$$

time taken by A = 145 sec.
= 2 minutes 25 sec.

21. (A)

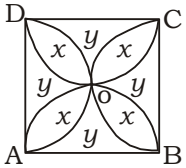


$= 6 - 5 = 1$ units $\overset{23}{11}$ $\dfrac{7+5}{60} = \dfrac{1}{5}$

30 units $\overset{23}{11}$ $\dfrac{1}{5} \times 30 = 6$ km

= Required distance = 6 km

22. (A)



Let area of each shaded portion $= x$ and area of each unshaded portion $= y$

Total area of square $= (8)^2 = 64$ cm^2

$\therefore \quad 4(x + y) = 64$

$x + y = 16 \quad \ldots(i)$

Again in a semicircle,

AOB $= x + y + x$

$= \dfrac{1}{2}\pi \times (4)^2$

$2x + y = 8\pi \quad \ldots(ii)$

from (ii) and (ii) we get

$x = 8\pi - 16$

$= 8(\pi - 2)$

Total area of shaded region

$= 32(\pi - 2)$ cm^2

23. (B) Let the length of both of trains $= l$ meter (equal)

speed of first train $= s_1$ m/s

$\Rightarrow \dfrac{1}{s_1} = 3 \Rightarrow s_1 s_1 = \dfrac{1}{3}$ ..... (i)

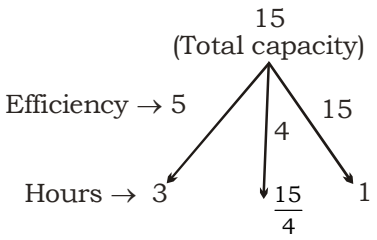
Again $\Rightarrow \dfrac{1}{s_2} = 4 \Rightarrow s_2 = \dfrac{l}{4}$ ..... (ii)

$\Rightarrow$ Time to cross earn other from opp direction

$= \dfrac{\text{total distance}}{\text{total speed}} = \dfrac{l+l}{\frac{l}{3}+\frac{l}{4}} = \dfrac{2l}{7l} \times 12$

$= \dfrac{24}{7}$ sec. $= 3\dfrac{3}{7}$ sec.

24. (C)



Ist pipe fills till 3 pm $= 5 \times 2 = 10$ units

IInd pipe fills till 3 pm $= 4 \times 1 = 4$ units

Total filled $= 10 + 4 = 14$ units

Pipe (III) efficiency $= 15 - 9 = 6$ unit/hrs

Tank will be empty in $= \dfrac{14}{6} = 2$ hr 20 min.

3 pm + 2 hr 20 min = 5 : 20 pm

25. (A) $R_x = \dfrac{80}{20}$ pages/hr

$= 4$ p/h

$R_{(x+y)} = \dfrac{135}{27}$ p/h

$= 5$ p/h

$Ry = R_{(x+y)} - R_x = (5 - 4)$

$= 1$ p/h

y can copy 20 pages $= \dfrac{20p}{1p/h} = 20$ h

26. (B) $T = \frac{D}{S} = \frac{l_1 + l_2}{S_1 + S_2} = \frac{300}{100 \times \frac{5}{18}}$

$= \frac{300 \times 18}{500} = T = \frac{54}{5} = 10.8$ sec.

27. (A) $(2\text{ m} + 1\text{ w}) \times 14_{\text{days}} = (2\text{ m} + 4\text{ w}) \times 8_{\text{days}}$

$14\text{ m} + 7\text{ w} = 8\text{m} + 16\text{ w}$

$6\text{ m} = 9\text{ w} = 2\text{ m} = 3\text{ w}$

1 m get = ₹ 600/days

2 m get = ₹ 1200/days

(wages always divided in the ratio of efficiency)

So,

3 women will get = ₹ 1200/days

[(2 m = 3w)]

1 woman will get = 400/days

28. (C) Let,

- Sonali's age = $5x$
- Monali's age = $3x$

According to the question,

- $\frac{5x+5}{3x+5} = \frac{10}{7}$
- $\frac{x+1}{3x+5} = \frac{2}{7}$
- $7x + 7 = 6x + 10$
- $x = 3$
- so, Monali's present age = $3x$
  $= 3 \times 3 = 9$ years

29. (A) Zinc : Copper

5 : 3

Let $5x$: $3x$

Given, $5x + 3x = 400$ g

$8x = 400$ g

$x = 50$ g

- Zinc : Copper

250 g : 150 g

Let a gram of copper is added

- $\frac{250}{150+a} = \frac{5}{4}$
- $1000 = 750 + 5a$
- $250 = 5a$

$a = 50$ g

30. (B)

₹ 1	:	50P	: 25P
		2P	: 1
		$\frac{2}{8}$	
1	:	4	
2	:	8	: 4

No. of coins $\overset{23}{11}$ $2x : 8x : 4x$

Values of coins $\overset{23}{11}$ $2x \times 1 : 8x \times \frac{1}{2} : 4x \times \frac{1}{4}$

Total value $\overset{23}{11}$ $2x + 4x + x$ $\overset{23}{11}$ $7x$

$7x$ = ₹ 56 (Given)

x = ₹ 8

- Value of 50 paise 50 paise are
  $= 32 \times 2 = 64$

31. (C)

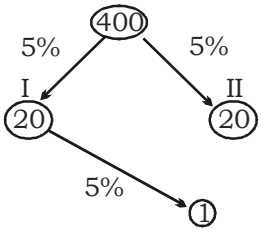
	Big	: Medium	: Small
Rate	15	: 10	: 5
Quantity (kg)	3	: 2	: 5
Total cost (₹)	45	: 20	: 25

Total cost = 3 + 2 + 5 = 10

- Average cost = $\frac{90}{10}$ = ₹ 9

32. (C) Rate of interest 5% = $\frac{1}{20}$

Let principal = $(20)^2$ = 400 units

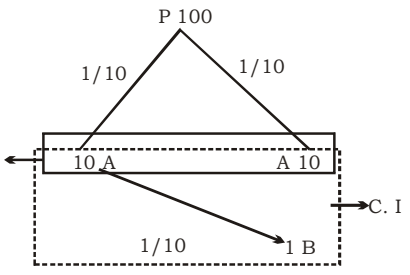


- Total interest = 41 units $\overset{23}{11}$ ₹ 328
  1 unit $\overset{23}{11}$ ₹ 8
  400 units $\overset{23}{11}$ ₹ 3200
- Principal = ₹ 3200

33. (D) Given Amt. = ₹ 12100

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

Time = 2 years



Total amount for 2 year

= 10 + 10 + 1 + 100 = 121

- 121 units $\overset{23}{11}$ ₹ 12100
- 1 unit $\overset{23}{11}$ 100
- Principal = 100 unit = 100 × 100 = 10000

34. (C) 4 year 4 years

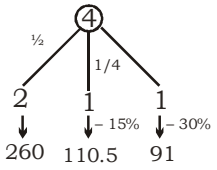
P $\overset{23}{11}$ 2 P $\overset{23}{11}$ 4P

= 2 × 4 = 8 years

35. (A) Let CP of article = ₹ 100

= MP of each article = $\frac{130}{100} \times 100 = ₹130$

Let number of article to be sold = 4
at the rate of ₹130



= Total SP = 260 + 110.5 + 91 = ₹ 461.5
Total CP = 4 × 100 = 400

= % profit = $\frac{461.5 - 400}{400} \times 100 = 15\frac{3}{8}\%$

36. (A) cost price for the retailer

$= 800 \times \frac{90}{100} \times \frac{85}{100} + 13 = 612 + 13 = ₹625$

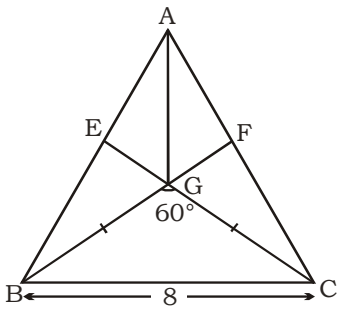
SP = 875

Profit = $\frac{875 - 625}{625} \times 100$

$= \frac{250}{625} \times 100 = 40\%$

37. (B)

- According to the question
- ∵ ∠BGC = 60° (Given)
- ∠GBC = ∠GCB = $x°$
- $x° + x° + 60° = 180°$
- $x = 60°$



- So, ΔABC is an equilateral triangle with side 8 cm each

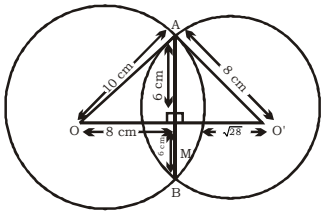
Then, Area of triangle Δ BOC = $\frac{\sqrt{3}}{4}8^2$

$= 16\sqrt{3}$ cm²

- Area of ΔABC
= Area (ΔBGC + ΔAGC + ΔAGB)
- Area of ΔABC = $3 \times 16\sqrt{3} = 48\sqrt{3}$ cm²

$\{\because \Delta BGC = \Delta ABC = \Delta AGB\}$

38. (A)



O O' = $8 + \sqrt{28}$

= 13.3 (approx)
= 8 + 5.29

Note :

∵ ΔAMO = Right angled triangle
= ΔAMO'

In , ΔAMO'

∴ AM = 6, AO' = 8

then, O'M' = $\sqrt{28}$

- O O' = OM + O'M = $8 + \sqrt{28}$
- 13.3 cm

39. (D) Let two numbers are x and y

x y = 45
x – y = 4

- $(x - y)^2 = x^2 + y^2 - 2xy$
- $x^2 + y^2 = (x - y)^2 + 2xy$
- $x^2 + y^2 = 16 + 90$
- $x^2 + y^2 = 106$

40. (A)

- $2\sqrt{54} - 6\sqrt{\frac{2}{3}} - \sqrt{96}$
- $6\sqrt{6} - 2\sqrt{\frac{2}{3} \times 9} - 4\sqrt{6}$
- $6\sqrt{6} - 2\sqrt{6} - 4\sqrt{6} = 0$

41. (C) 203, 213, 233, 243, 253, 263, 273, 283, 293

- Total 10

300 to 399

- Total number of integers = 100

total number of integers = 10 + 100 = 110

42. (B) $a^3 + b^3 = 9$

$a + b = 3$

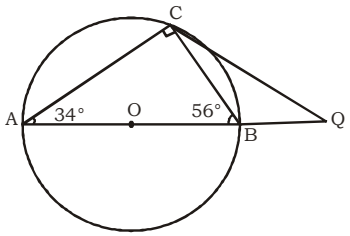
Assume values, a = 2, b = 1

- $(2)^3 + 1 = 9$

$8 + 1 = 9$

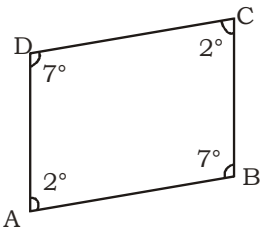
$\Rightarrow \frac{1}{a}+\frac{1}{b}=\frac{1}{2}+1=\frac{3}{2}$

43. (A) In $\triangle CBA$



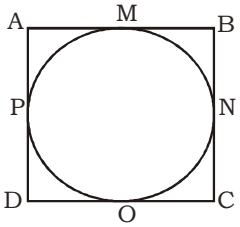
$\angle ACB = 90°$
(Angle formed by semicircle is 90°)
$\angle ACB + \angle CAB + \angle CBA = 180°$
$90° + 34° + \angle CBA = 180°$
$\angle CBA = 56°$

44. (C) ATQ,



As we know that in a parallelogram opposite angles are same.
$\Rightarrow \angle A = \angle C$
$\angle B = \angle D$
Note : Parallelogram is rhombus but rhombus is not a parallelogram.

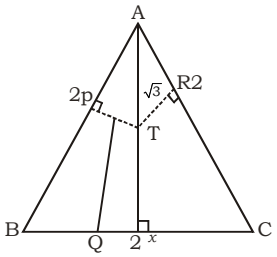
45. (B)



According to figure
PA = AM
(equal tangent drawn from a external point)
PD = OD
MB = BN OC = CN

$\Rightarrow \frac{(AB+CD)}{(CB+AD)}=\frac{(AB+BM)+(OD+OC)}{(CN+NB)+(AP+DP)}=1$

46. (D)



Let side = 2 units

$\text{side} = \frac{2}{\sqrt{3}}(PT + QT + TR)$

$2 = \frac{2}{\sqrt{3}}(PT + QT + TR)$

and A X $= \frac{\sqrt{3}}{2} \times 2 = \sqrt{3}$

So, it is equal to AX

47. (C) Let total profit = 24 units

Profit of A $= \frac{1}{8} \times 24 = 3$ units

Profit of B $= \frac{1}{3} \times 24 = 8$ units

	A	:	B	:	C
Capital ®	x	:	y	:	1560
Time ®	4	:	6	:	8
Profit ®	3	:	8	:	$13[24-(8+3)]$

We know ,
Capital × Time = profit

$\frac{\text{Profit}}{\text{Time}}$ = capital

$\Rightarrow \frac{13}{8}$ units = 1560
1 unit = ₹ 1560
1 unit = ₹ 960

$y = \frac{960 \times 8}{6}$

y = ₹ 1280

$x = \frac{3}{4} \times 960 = ₹\ 720$

Capital of A = ₹ 720
Capital of B = ₹ 1280

48. (C) $\left\{\frac{\cos^2 A \times \sin^2(\sin A + \cos A)}{(\sin A - \cos A)} +\right.$

$$\frac{\sin^2 A \times \cos^2 A(\sin A - \cos A)}{(\sin A + \cos A)}$$

$$\frac{(\sin A + \cos A)^2 + (\sin A - \cos A)^2}{(\sin A - \cos A)(\sin A + \cos A)}$$

[sin²A – cos²A]

2 (sin² + cos²A) 2

49. (D) $\tan^2\theta = 1 - e^2$

$\sec^2\theta + \tan^2\theta \cdot \operatorname{cosec}^2\theta$

$\sec^2\theta + \tan^2\theta \cdot \tan^2\theta \cdot \cos^2\theta$

$\sec^2\theta + \tan^2\theta \cdot \frac{\sin q}{\cos q} \cdot \frac{1}{\sin q}$

$\sec^2\theta + \tan^2\theta \cdot \sec^2\theta$

$\sec^2\theta (1 + \tan^2\theta) = \sqrt{1 + \tan^2 q}\,(1 + \tan^2\theta)$

$(1 + \tan^2\theta)^{3/2} = (1 + 1 - e^2)^{3/2}$

$(2 - e^2)^{3/2}$

50. (D) A + B = 90°

B = 90 – A

sec² A + sec²B – sec² A. sec² B

sec²A + sec² (90 – A) – sec² A. sec² (90 –A)

sec²A + cosec² A – sec²A. cosec² A

$$\frac{1}{\cos^2 A} + \frac{1}{\sin^2 A} - \frac{1}{\cos^2 A} \times \frac{1}{\sin^2 A}$$

$$\frac{\sin^2 A + \cos^2 A}{\cos^2 A \sin^2 A} - \frac{1}{\cos^2 A . \sin^2 A}$$

$$\frac{1}{\cos^2 A \sin^2 A} - \frac{1}{\cos^2 A . \sin^2 A} = 0$$

51. (A) Put r = 2

$$\tan\theta = \frac{r\sin q}{r\cos q} = \frac{1}{\sqrt{3}}$$

$\theta = 30°$

$$= \frac{2\tan 30° + \sec 30°}{2\sec 30° + \tan 30°}$$

$$= \frac{2 \times \frac{1}{\sqrt{3}} + \frac{2}{\sqrt{3}}}{2 \times \frac{2}{\sqrt{3}} + \frac{1}{\sqrt{3}}} = \frac{4}{5}$$

52. (A) We know that

$\tan(90° - \theta) = \cot\theta$

and $\cot(90° - \theta) = \tan\theta$

$\tan(4\theta - 50°) = \cot(50° - \theta)$

$\cot[90° - (4\theta - 50°)] = \cot(50° - \theta)$

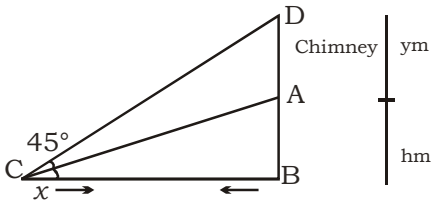
$90° - (4\theta - 50°) = 50° - \theta$

$90° - 4\theta + 50° = 50° - \theta$

$90° = 3\theta$

then $\theta = 30°$

53. (B) AB = Building = h meter



AD = chimney = 'y' meter

In ⊿DCB

$$\tan 45° = \frac{DB}{BC} \Rightarrow 1 = \frac{h + y}{BC}$$

BC = h + y ..... (i)

In ⊿ACB

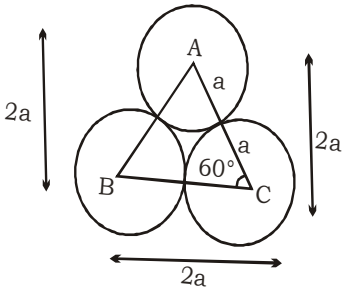
$$\tan x° = \frac{AB}{BC} \Rightarrow \tan x = \frac{h}{BC} \Rightarrow BC$$

= h cot x ..... (ii)

From equation (i) and (ii)

y = (h cot x – h) meter

54. (D)



hence

⊿ABC is the equilateral triangle

AB = BC = AC = '2a' cm

area of ⊿ABC = $\frac{\sqrt{3}}{4}(2a)^2 = \frac{\sqrt{3}}{4} \times 4a^2$

area of sectors of $\theta = 60° = 3 \times \frac{60°}{360°} \times \pi a^2$

$$= \frac{p a^2}{2}$$

area of shaded region = area of ⊿ABC –

area of 3 sector = $\sqrt{3}\,a^2 - \frac{p a^2}{2}$

$$= \left(\frac{2\sqrt{3} - p}{2}\right) a^2 \text{ cm}^2$$

55. (B) Perimeter of square = 44 cm

Area of square = $\left(\frac{44}{4}\right)^2$ = 121 cm²

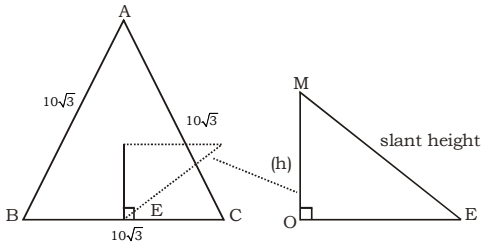
Circumference of circle = $2\pi r = 44$

$$r = \frac{22 \times 7}{22} = 7 \text{ cm}$$

 are of circle = $\frac{4}{12}\pi r^2 = \frac{22}{7} \times (7)^2 = 154$ cm²

Required difference = 154 – 121 = 33 cm²

56. (C)



$= OE = \frac{\text{side of equilatera D}}{2\sqrt{3}}$

$= \frac{10\sqrt{3}}{2\sqrt{3}} = 5$ cm

$\frac{1}{2}$ perimeter × H + area of base = $270\sqrt{3}$

$\frac{1}{2} \times 30\sqrt{3} \times H \ (10\sqrt{3})^2 \times \frac{\sqrt{3}}{4} = 270\sqrt{3}$

$15\sqrt{3} + 75\sqrt{3} = 270\sqrt{3}$

$15\sqrt{3}H = 195\sqrt{3}$

H = 13

$\sqrt{H^2 + 25} = 13$

H = 12 cm

57. (D) $\frac{1000 \times 5 \times 10}{100} = 500$

Now, Amount = 1500

$500 = \frac{1500 \times 5 \times T}{100}$

$T = \frac{20}{3} = 6\frac{2}{3}$ year

Total time = $16\frac{2}{3}$ years

58. (D) Volume of prism = (area of base × height)

Area of base (i.e area of triangle)

 Area of base = $\sqrt{s(s-a)(s-b)(s-c)}$

= (By Hero's formula)

$S = \frac{13+20+21}{2} = \frac{54}{2} = 27$

 $\sqrt{27(27-13)(27-20)(27-21)}$

 $\sqrt{27 \times 14 \times 7 \times 6}$

 $\sqrt{9 \times 3 \times 2 \times 7 \times 7 \times 2 \times 3}$

 $\sqrt{79 \times 9 \times 7 \times 7 \times 2 \times 2}$

 $\sqrt{9 \times 9 \times 7 \times 7 \times 2 \times 2}$

 $9 \times 7 \times 2$

Volume of prism = $(9 \times 7 \times 2) \times 9 = 1134$ cm³

59. (A) Simple interest for one year

$= \frac{240}{2} = ₹ 80$

Simple interest for two year = 80 × 2 = ₹ 160

Difference = 170 – 160 = ₹ 10

Rate % = $\frac{10}{80} \times 100 = 12\frac{1}{2}\%$

60. (A) Marks scored in Hindi and Maths

$= \frac{160°}{360°} \times 540 = 240$

Marks scored in English and Social Science = $\frac{120°}{360°} \times 540 = 180$

Difference = 240 – 180 = 60

61. (B) 100% = 360°

 22.2% = $\frac{360° \times 22.2}{100} = 79.92° \approx 80°$

62. (B) 540 = 360°

 105 = $\frac{360°}{540} \times 105 = 70°$

63. (B) $\frac{540}{5} = 108$

64. (D) 360° = 540

$90° = \frac{540}{360°} \times 100 = 25\%$

65. (A) 5 × 10 × 15 × 20 × 25 × .... × 50

5 × 1× 5× 2× 5 × 3 × 5 × 4 .... 5× 10

5^{10} (1 × 2 × 3 × 4 ..... 10)

From 1 to 10 digit 2

$2 \mid 10$
$2 \mid 5 \rightarrow$
$2 \mid 2 \rightarrow \Big] 8$
$2 \mid 1 \rightarrow$
$\mid 0$

Number of 2 = 5 + 2 + 1 = 8

Number of zeros = 8

66. (C) Total mark obtained by 5 student

= 50 × 5 = 250

Correct total mark = 250 – 84 + 48

= 214

Average = $\frac{214}{5} = 42.8$

67. (C) Let the upstream speed be x km/hr and the downstream speed by y km/hr.

Then, $\frac{24}{x} + \frac{36}{y} = 6$

and $\frac{36}{x} + \frac{24}{y} = \frac{13}{2}$

After solving above equation.
Then, $x = 8$ km/hr, $y = 12$ km/hr

Speed of current = $\frac{1}{2}(12 - 8)$

= 2 km/hr

68. (C) $\because$ Exterior angle = $\frac{1}{3} \times 180^\circ = 60^\circ$

$\therefore n \times 60^\circ = 360^\circ \Rightarrow n = 6$

69. (A) 20 pieces $\rightarrow$ $(3 + x)$ min.
60 pieces $\rightarrow$ $(8 - 3 - x)$ min.

$\frac{20}{3+x} + \frac{60}{5-x} = 20$

$5 - x + 9 + 3x = 15 - 3x + 5x - x^2$

$\Rightarrow \quad 14 + 2x = 15 + 2x - x^2$

$\Rightarrow \quad x^2 = 1$

$\Rightarrow \quad x = 1$

20 pieces $\rightarrow$ 4 min
160 pieces $\rightarrow$ 32 min

70. (A) Let the required time be T years.
Efficiency of m : w : c = 4 : 3 : 1

$\frac{M \times 22}{W} = \frac{T(50M + 45F + 17C)}{W}$

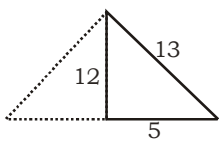
$4 \times 22 = T(50 \times 4 + 45 \times 3 + 17 \times 1)$

$T = \frac{88}{200 + 135 + 17}$

$= \frac{88}{352}$

$= \frac{1}{4}$ Years or 3 months

71. (C)



Volume = $\frac{1}{3} \times \frac{22}{7} \times 5 \times 5 \times 12$

= 314.28 » 314 cm³

72. (B) $(17)^{1999} + (11)^{1999} - (7)^{1999}$

unit digit = $(7)^{1999} + (1)^{1999} + (7)^{1999}$

$\because$ $(7)^{1999} - (7)^{1999} = 0$

unit digit = 1

73. (C) Unit digit expression will be equal to the digit of $2^{888} + 8^{222}$.

$\because$ Unit digit of 2^{888} is 6 and the unit digit of 8^{222} is 4.

$\square$ 6 + 4 = 10

$\square$ required unit digit = 0

74. (C) Volume of the cone = $\frac{1}{3}\pi r^2 \times 3^2 \times 9 = 27\pi r^2$

Volume of frustum = 44 cm³

$\frac{h}{9} = \frac{r_2}{r_1}$

$\frac{h}{9} = \frac{r^2}{3}$

h = 3r2

$\frac{1}{3}\pi r_2^2 h = 27\pi r^2 - 44$

$\left[\because 44 = \frac{22}{7} \times 14 = 14p\right]$

$\frac{1}{3}\pi \times 3r_2^3 = 27\pi r^2 - 14\pi r^2$

$r_2 = \sqrt[3]{\frac{27p - 14p}{p}} = \sqrt[3]{13}$ cm

75. (C) $\frac{2\pi r(h + r)}{2\pi rh} = \frac{462}{154}$

$\left(1 + \frac{r}{h}\right) = 3$

$\frac{r}{h} = \frac{2}{1}$

$h = \frac{r}{2}$

$2\pi rh = 154$

$2 \times \frac{22}{7} \times 2h^2 = 154$

$h^2 = \frac{154 \times 7}{2 \times 2 \times 2}$

$h = \frac{7}{2}$

$v = \pi r^2 h$

$\frac{22}{7} \times 7 \times 7 \times \frac{7}{2} = 539$

76. (C) Let slant height = l and radius = r

$\therefore v = \frac{1}{3}\pi r^2 h \Rightarrow 3v = \pi r^2 h$

$\Rightarrow 9v^2 = \pi^2 r^4 h^2$

and $c = \pi rl$

$\Rightarrow c^2 = \pi^2 r^2 l^2 = \pi^2 r^2 (h^2 + r^2)$

$[\because l^2 = h^2 + r^2]$

$\Rightarrow c^2 = \pi^2 r^2 h^2 + \pi^2 r^4$

$\therefore 3\pi v h^3 - c^2 h^2 + 9v^2$

$= (\pi^2 r^2 h)\pi h^3 - (\pi^2 r^2 h^2 + \pi^2 r^4) h^2 + \pi^2 r^4 h^2$

$= \pi^2 r^2 h^4 - \pi^2 r^2 h^4 - \pi^2 r^4 h^2 + \pi^2 r^4 h^2$

$= 0$

77. (D) Let $x = \sqrt{4 + \sqrt{4 - x}}$ $\Rightarrow x^2 = 4 + \sqrt{4 - x}$

$\Rightarrow (x^2 - 4) = \sqrt{4 - x}$

Now put the values from option only option (D) satisfies the condition.

78. (B) Expression $= \frac{1}{2^{\frac{2}{3}} + 2^{\frac{1}{3}} + 1}$

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

$= 2^{\frac{1}{3}} - 1 = \sqrt[3]{2} - 1$

$[\because (a - b)(a^2 + ab + b^2) = a^3 - b^3]$

79. (D) $x = \frac{2\sqrt{3} \cdot \sqrt{2}}{\sqrt{3} + \sqrt{2}}$

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

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

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

(By componendo and dividendo)

Similarly,

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

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

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

$\because$ Expression

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

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

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

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

80. (B) Let $x = \sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}}$

$\Rightarrow x^3 = (20 + 14\sqrt{2}) + (20 - 14\sqrt{2}) +$

$3\left(\sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}}\right)\sqrt[3]{20^2 - (14\sqrt{2})^2}$

$\Rightarrow x^3 = 40 + 3(400 - 392)^{1/3} x$

$\Rightarrow x^3 = 40 + 3(8)^{1/3} x$

$\Rightarrow x^3 = 40 + 3 \times 2 \times x$

$\Rightarrow x^3 = 40 + 6x$

$\Rightarrow x^3 - 6x = 40$

which is satisfied by $x = 4$

81. (C) $\sin 2x = \frac{1}{5}$ $\Rightarrow 1 + \sin 2x = 1 + \frac{1}{5} = \frac{6}{5}$

$\Rightarrow \sin^2 x + \cos^2 x + 2 \sin x . \cos x = \frac{6}{5}$

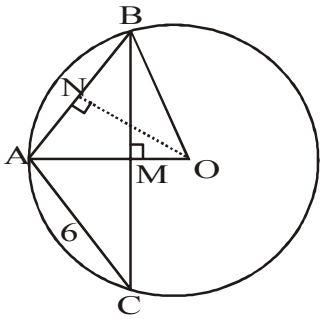
$[\because \sin^2 x + \cos^2 x = 1$ and $\sin 2x = 2 \sin x . \cos x]$

$\Rightarrow (\sin x + \cos x)^2 = \frac{6}{5}$

$\Rightarrow \sin x + \cos x = \sqrt{\frac{6}{5}}$

82. (C) 0

83. (B) Let BM = x cm



$\therefore$ Area of $\Delta AOB = \frac{1}{2} \times OA \times BM$

$= \frac{1}{2} \times 5 \times x = \frac{5x}{2}$ cm²

ON $\perp$ AB

$\therefore$ AN = BN = $\frac{6}{2} = 3cm$

In Δ ANO

ON = $\sqrt{(5)^2 - (3)^2} = 4cm$

$\therefore$ Again area of the Δ AOB

= $\frac{1}{2} \times AB \times ON = \frac{1}{2} \times 6 \times 4 = 12cm$

$\therefore$ $\frac{5x}{2} = 12 \Rightarrow x = \frac{24}{5} = 4.8cm$

$\therefore$ BC = $2x$ = 9.6 cm

84.(B) BC = 2(OB) = $\sqrt{a^2 + 4^2}$

$= \sqrt{a^2 + 16}$

$(\because \angle A = 90°)$

$\because \Delta ABD \sim \Delta CBA$

$\therefore \frac{BD}{AB} = \frac{AB}{BC} \Rightarrow BD.BC = a^2$

$\Rightarrow BD = \frac{a^2}{BC} = \frac{a^2}{\sqrt{a^2 + 16}}$

$\therefore OD = OB - BD = \frac{\sqrt{a^2 + 16}}{2} -$

$\frac{a^2}{\sqrt{a^2 + 16}} = \frac{16 - a^2}{2\sqrt{a^2 + 16}}$

85. (B) $(30)^{26} \times (22)^{11} \times (15)^{24}$

- $(2 \times 3 \times 5)^{15} \times (2 \times 11)^{11} \times (3 \times 5)^{24}$
- $2^{15} \times 3^{15} \times 5^{15} \times 2^{11} \times 11^{11} \times (3 \times 5)^{24}$
- $2^{15+11} \times 3^{15+24} \times 5^{15+24} \times 11^{11}$
- $2^{26} \times 3^{39} \times 5^{39} \times 11^{11}$

Number of factors

26 + 39 + 39 + 11 = 115

86. (C) = $\frac{3^1}{5}$ = R = 3

$\frac{3^2}{5} = \frac{9}{5}$ = R = 4

$\frac{3^3}{5} = \frac{27}{5}$ = R = 2

$\frac{3^4}{5} = \frac{81}{5}$ = R = 1

$\frac{3^5}{5} = \frac{243}{5}$ = R = 3

$\frac{3^6}{5} = \frac{729}{7}$ = R = 4

$\frac{3^{321}}{5} = \frac{(3)^{4 \cdot 80} \cdot 3}{5}$

+1 +3

- -

$\frac{(3^4)^{80} \cdot 3}{5}$

Remainder = 3

87. (D) $\frac{1}{3} + \frac{1}{9} + \frac{1}{27}$ ..... ∞

It is a GP

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

r = $\frac{\frac{1}{9}}{\frac{1}{3}} = \frac{1}{3}$

$\because$ r < 1

$S_\infty = \frac{a}{1-r} = \frac{\frac{1}{3}}{1 - \frac{1}{3}} = \frac{\frac{1}{3}}{\frac{2}{3}} = \frac{1}{2}$

then on substituting

$\left(\frac{1}{3} + \frac{1}{4} + \frac{1}{27} \ldots\ldots\right)^\infty = \frac{1}{2}$

$S_\infty = (25)^{1/2} = 5$

88. (D) $5.\overline{76}$ and $2.\overline{3}$

= $\left(5 + \frac{76}{99}\right) - \left(2 + \frac{3}{9}\right)$

= $5 + \frac{76}{99} - 2 - \frac{3}{9}$

= $3 + \left(\frac{76}{99} - \frac{3}{9}\right)$

= $3.\overline{43}$

89. (D)

Amount		Time
1380	+120	3
1500		5

+ 2 years

Interest paid in 2 years = ₹ 120

Interest paid in 1 year = ₹ 60

Interest paid in 3 years = 60 × 3 = ₹ 180

Principal = ₹ (1380 – 180) = ₹ 1200

Required rate % = $\frac{60}{1200} \times 100 = 5\%$

90. (A) Rate% = 10%

Let time = t years

Principal = ₹ 3200

Amount = ₹ 3362

Note : When interest is calculated quarterly.

New Rate% = $\frac{10}{4} = 2.5\%$

Time = 4t years

By using formula,

$3362 = 3200 \left(1 + \frac{2.5}{100}\right)^{4t}$

$\frac{3362}{3200} = \left(\frac{41}{40}\right)^{4t}$

$\Rightarrow \frac{1681}{1600} = \left(\frac{41}{40}\right)^{4t}$

$\Rightarrow \left(\frac{41}{40}\right)^{2} = \left(\frac{41}{40}\right)^{4t}$

On comparing both sides

$4t = 2 \Rightarrow t = \frac{1}{2}$ year

91. (C) C.P. of motor car = ₹ 17,000

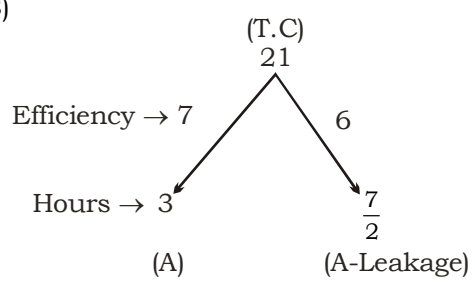
M.P. of motor car = ₹ $17{,}000 \times \frac{100}{85}$

= ₹ 20000

After successive discount, C.P.

= ₹ $20000 \times \frac{95}{100} \times \frac{90}{100}$ = ₹ 17100

92. (B)



A's efficiency is 7 units/hr

A's efficiency after leakage 6 units/hr

Leakage efficiency = 7 – 6 = 1 units/hr

Leakage will empty the fully filled tank

$\frac{\text{T.C}}{\text{Efficiency}} = \frac{21}{1} = 21$ hrs

93. (D) Average speed for whole Journey = $\frac{2s_1s_2}{s_1 + s_2}$

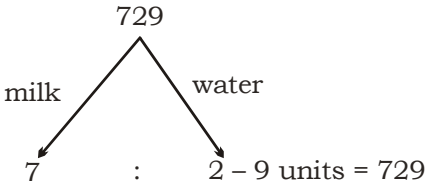
$= \frac{2 \times 20 \times 30}{20 + 30} = \frac{2 \times 20 \times 30}{50}$

Average speed = 24 km/hr

94. (D) Required population = $4410 \times \frac{100}{105} \times \frac{100}{105}$

= 4000

95. (D)



M : W

Initial → 7 : 2

After adding water 7 : 3) 1 unit

always milk will be same

i.e. 1 unit of water will be added = 1 unit ⇒ 81 m*l*.

96. (D) According to the question

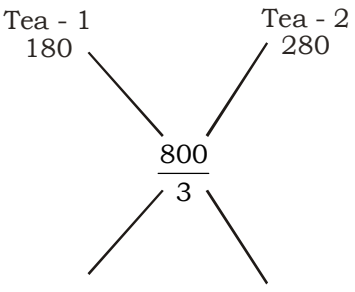
SP of the mixture = ₹ 320

Gain = 20%

⇒ C.P of the mixture = $320 \times \frac{100}{120}$

= ₹ $\frac{800}{3}$

Now using allegation method.



$280 - \frac{800}{3} = \frac{40}{3}$ $\quad \frac{800}{3} - 180 = \frac{260}{3}$

Ratio $\overset{23}{11}$ 40 : 260

Quantity $\overset{23}{11}$ 2 : 13

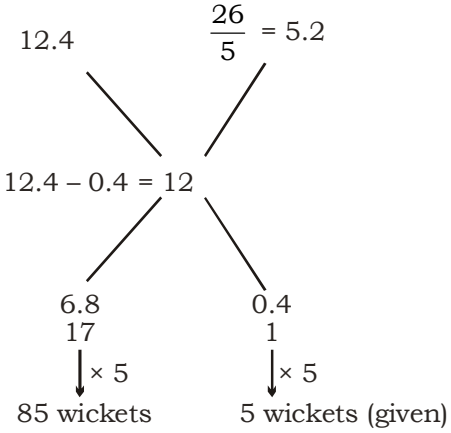
97. (A)

A	:	B	:	C
3	:	4	:	4
6	:	6	:	5
18	:	24	:	20
9	:	12	:	10

C : A

10 : 9

98. (C)



The number of wickets taken by him till the last match was = 85 + 5 = 90

99. (B) $66\frac{2}{3}\% = \frac{2}{3}$

Let the income of the person = 3 units

Expenditure = 2 units

Savings = (3 – 2) = 1 unit

1 unit = ₹ 1200

2 units = 2 × 1200 = ₹ 2400

100. (B) Let the initial expenditure = 100 units

$\overset{235}{92}$ 100 – 20% 80

Increase in consumption = $\frac{20}{80} = \frac{1}{4}$

$= \frac{1}{4}$ ® New

Original

Original Price = $\frac{36 \times 1000}{4 \times 500}$

$\left[500\,\text{gm} = \frac{500}{1000}\,\text{kg}\right]$

Original Price = ₹ 18/kg

SSC MAINS (MATHS) MOCK TEST-20 (ANSWER KEY)

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