CAT 2001 Actual Paper

Answers and Explanations

1	c	**2**	b	**3**	a	**4**	d	**5**	a	**6**	c	**7**	b	**8**	a	**9**	d	**10**	a
11	a	**12**	d	**13**	a	**14**	c	**15**	d	**16**	d	**17**	d	**18**	d	**19**	a	**20**	d
21	c	**22**	b	**23**	d	**24**	c	**25**	b	**26**	a	**27**	c	**28**	c	**29**	a	**30**	c
31	c	**32**	a	**33**	a	**34**	c	**35**	a	**36**	b	**37**	c	**38**	d	**39**	b	**40**	b
41	c	**42**	d	**43**	d	**44**	b	**45**	a	**46**	b	**47**	b	**48**	c	**49**	b	**50**	b
51	a	**52**	d	**53**	c	**54**	b	**55**	d	**56**	c	**57**	a	**58**	c	**59**	d	**60**	a
61	d	**62**	c	**63**	b	**64**	c	**65**	d	**66**	c	**67**	d	**68**	a	**69**	d	**70**	a
71	a	**72**	c	**73**	a	**74**	b	**75**	b	**76**	a	**77**	d	**78**	d	**79**	b	**80**	b
81	a	**82**	c	**83**	d	**84**	b	**85**	c	**86**	a	**87**	d	**88**	c	**89**	d	**90**	c
91	c	**92**	a	**93**	a	**94**	a	**95**	d	**96**	c	**97**	b	**98**	b	**99**	a	**100**	b
101	d	**102**	b	**103**	d	**104**	b	**105**	b	**106**	a	**107**	c	**108**	b	**109**	a	**110**	c
111	c	**112**	a	**113**	b	**114**	a	**115**	d	**116**	d	**117**	d	**118**	b	**119**	a	**120**	d
121	c	**122**	d	**123**	a	**124**	a	**125**	c	**126**	b	**127**	d	**128**	b	**129**	a	**130**	c
131	c	**132**	c	**133**	c	**134**	b	**135**	b	**136**	c	**137**	b	**138**	c	**139**	d	**140**	b
141	c	**142**	b	**143**	b	**144**	b	**145**	b	**146**	d	**147**	a	**148**	c	**149**	a	**150**	c

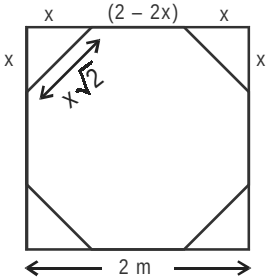
	Question number	Total questions	Total attempted	Total correct	Total wrong	Net Score	Time Taken
QA	1 to 50	50					
EU + RC	51 to 100	50					
DI + DS + AR	101 to 150	50					
Total		150					

1. c Let the marks scored in five subjects be 6x, 7x, 8x, 9x and 10x (on a scale of 1).
Average score = 60%

$$\Rightarrow \frac{6x + 7x + 8x + 9x + 10x}{5} = \frac{60}{100} \Rightarrow 8x = 0.6$$

$\Rightarrow x = 0.075$
So the marks are 0.45, 0.525, 0.6, 0.675 and 0.75.
Number of times the marks exceed 50% is 4.

2. b



Let the length of the edge cut at each corner be x m. Since the resulting figure is a regular octagon,

$$\therefore \sqrt{x^2 + x^2} = 2 - 2x \Rightarrow x\sqrt{2} = 2 - 2x$$

$$\Rightarrow \sqrt{2}\,x\ (1 + \sqrt{2}) = 2 \Rightarrow x = \frac{\sqrt{2}}{\sqrt{2}+1}$$

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

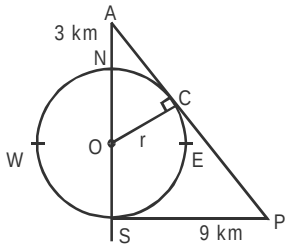
3. a Check the answer choices basis the fact that:
Odd × Odd = Odd
Odd × Even = Even
Even × Even = Even

4. d $x > 5, y < -1$
Use answer choices.
Take x = 6, y = –6.
We see none of the statements (a), (b) and (c) is true.
Hence the correct option is (d).

5. a First light blinks after 20 s.
Second light blinks after 24 s.
They blink together after LCM (20 and 24) = 120 s = 2 min. Hence, the number of times they blink together in an hour = 30.

6. c We can put a minimum of 120 oranges and a maximum of 144 oranges, i.e., 25 oranges need to be filled in 128 boxes.
There are 25 different possibilities if there are 26 boxes. In such a case, at least 2 boxes contain the same number of oranges. (i.e., even if each of the 25 boxes contain a different number of oranges, the 26th must contain one of these numbers).
Similarly, if there are 51 boxes, at least 3 boxes contain the same number of oranges.
Hence, at least 6 boxes have the same number of oranges in case of 128 boxes.

7. b



ΔAPS and ΔAOC are similar triangles.
Where OC = r

$$\therefore \frac{r}{r+3} = \frac{9}{\sqrt{81 + (2r + 3)^2}}$$

Now use the options. Hence, the diameter is 9 km.

8. a Let BC = y and AB = x.
Then area of ΔCEF = Area(ΔCEB) – Area(ΔCFB)

$$= \frac{1}{2}.\frac{2x}{3}.y - \frac{1}{2}.\frac{x}{3}.y = \frac{xy}{6}$$

Area of ABCD = xy
∴ Ratio of area of ΔCEF and area of ABCD is

$$\frac{xy}{6} : xy = \frac{1}{6}$$

Alternate method:

Join AC, therefore Area of $\Delta ABC = \frac{1}{2}$ Area of ABCD

Also,
Area of ΔCAE = Area of ΔCEF = Area of ΔCFB

$\therefore$ Area of $\Delta CEF = \frac{1}{6}$ Area of ABCD

9. d Work done in one day by A, B, C and D are

$\frac{1}{4}, \frac{1}{8}, \frac{1}{16}$ and $\frac{1}{32}$ respectively.

Using answer choices, we note that the pair of B and C does $\frac{3}{16}$ of work in one day; the pair of A and D does $\frac{1}{4} + \frac{1}{32} = \frac{9}{32}$ of the work in one day.

Hence, A and D take $\frac{32}{9}$ days.

B and C take $\frac{16}{3} = \frac{32}{6}$ days.

Hence, the first pair must comprise of A and D.

10. a Let the four-digit number be abcd.
a + b = c + d ... (i)
b + d = 2(a + c) ... (ii)
a + d = c ... (iii)
From (i) and (iii), b = 2d

From (i) and (ii), $3b = 4c + d$

$\Rightarrow 3(2d) = 4c + d$

$\Rightarrow 5d = 4c$

$\Rightarrow c = \frac{5}{4}d$

Now d can be 4 or 8.
But if d = 8, then c = 10 not possible.
So d = 4 which gives c = 5.

11. a Amount of money given to X
$= 12 \times 300 + 12 \times 330 + ... + 12 \times 570$
$= 12[300 + 330 + ... + 540 + 570]$

$= 12 \times \frac{10}{2}[600 + 9 \times 30] = 52200$

Amount of money given to Y is
$6 \times 200 + 6 \times 215 + 6 \times 230 + 6 \times 245 + ...$ to 20 terms
$= 6[200 + 215 + 280 + ... 485]$

$= 6 \times \frac{20}{2}[400 + 19 \times 15]$

$= 6 \times 10[400 + 285]$
$= 60 \times 685 = 41100$
$\therefore$ Total amount paid = 52200 + 41100 = Rs. 93,300.

12. d Let the number be x.
Increase in product = 53x – 35x = 18x
$\Rightarrow 18x = 540 \Rightarrow x = 30$
Hence new product = 53 × 30 = 1590.

13. a Let x be the total number of people the college will ask for donations.
$\therefore$ People already solicited = 0.6x
Amount raised from the people solicited
= 600 × 0.6x = 360x
Now 360x constitutes 75% of the amount.
Hence, remaining 25% = 120x
Hence, average donation from remaining people
$= \frac{120x}{0.4x}$ = Rs. 300.

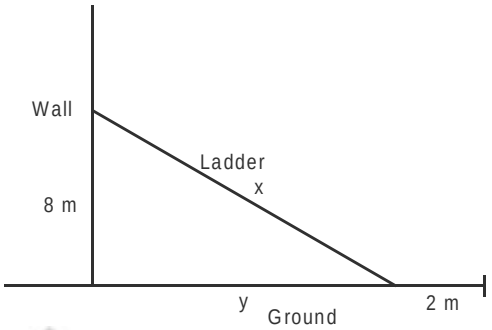
14. c The value of y would be negative and the value of x would be positive from the inequalities given in the question.
Therefore, from (b) and (d), y becomes positive. The value of xy^2 would be positive and will not be the minimum.
From (a) and (c), x^2y and 5xy would give negative values but we do not know which would be the minimum.
On comparing (a) and (c), we find that
$x^2 < 5x$ in $2 < x < 3$.

$\therefore x^2y > 5xy$ [Since y is negative.]

$\therefore$ 5xy would give the minimum value.

15. d Let $y = n^3 - 7n^2 + 11n - 5$
At n = 1, y = 0
$\therefore (n - 1)(n^2 - 6n + 5)$
$= (n - 1)^2 (n - 5)$
Now $(n - 1)^2$ is always positive.
For n < 5, the expression gives a negative quantity.
Therefore, the least value of n will be 6.
Hence, m = 6.

16. d



Let the length of the ladder be x meter. We have
$8^2 + y^2 = x^2$ and $(y + 2) = x$
Hence, $64 + (x - 2)^2 = x^2$
$\Rightarrow 64 + x^2 - 4x + 4 = x^2$
$\Rightarrow 68 = 4x \Rightarrow x = 17$

17. d Let there be x mints originally in the bowl. Sita took $\frac{1}{3}$, but returned 4. So now the bowl has $\frac{2}{3}x + 4$ mints.

Fatima took $\frac{1}{4}$ of the remainder, but returned 3. So the bowl now has $\frac{3}{4}\left(\frac{2}{3}x + 4\right) + 3$ mints.

Eshwari took half of remainder that is

$\frac{1}{2}\left[\frac{3}{4}\left(\frac{2}{3}x + 4\right) + 3\right]$

She returns 2, so the bowl now has

$\frac{1}{2}\left[\frac{3}{4}\left(\frac{2}{3}x + 4\right) + 3\right] + 2 = 17 \Rightarrow x = 48$

Short cut:
Since Sita was the first person to pick and she picks up $\frac{1}{3}$ of the mint, but if you see the options, none of the option is a multiple of 3.

18. d In 30 years from 1971 to 2001, number of odd days = 30 + (8 from leap years) = 38 and $38 \equiv 3 \bmod 7$
So December 9, 1971 is Sunday – 3 days = Thursday

19. a The product of 44 and 11 is 484.
If base is x, then,

$3414 = 3x^3 + 4x^2 + 1x^1 + 4 \times x^0 = 484$

$\Rightarrow 3x^3 + 4x^2 + x = 480$
This equation is satisfied only when x = 5.
So base is 5.
In decimal system, the number 3111 can be written as 406.

20. d Let x be the speed of Rahul, and y be the speed of current in mph.

$$\frac{12}{x-y}-\frac{12}{x+y}=6 \Rightarrow \frac{y}{x^2-y^2}=\frac{1}{4}$$

$$\Rightarrow y=\frac{x^2-y^2}{4} \quad \text{... (i)}$$

When Rahul doubles his rowing speed, then we have

$$\frac{12}{2x-y}-\frac{12}{2x+y}=1 \Rightarrow \frac{2y}{4x^2-y^2}=\frac{1}{12}$$

$$\Rightarrow y=\frac{4x^2-y^2}{24} \quad \text{... (ii)}$$

$\therefore$ From (i) and (ii), we have $2x^2 = 5y^2$

Putting $x^2 = \frac{5}{2}y^2$ in (i), we get $y=\frac{\frac{3}{2}y^2}{4} \Rightarrow y=\frac{8}{3}$.

21. c Let 'x' be the number of males in Mota Hazri.

	Chota Hazri	Mota Hazri
Males	x – 4522	x
Females	2(x – 4522)	x + 4020

$x + 4020 - 2(x - 4522) = 2910 \Rightarrow x = 10154$

$\therefore$ Number of males in Chota Hazri = 10154 – 4522 = 5632

22. b Let the number of students in classes X, Y and Z be a, b and c respectively. Then,
total of X = 83a
total of Y = 76b
total of Z = 85c

Also $\frac{83a+76b}{a+b}=79 \Rightarrow 4a = 3b$;

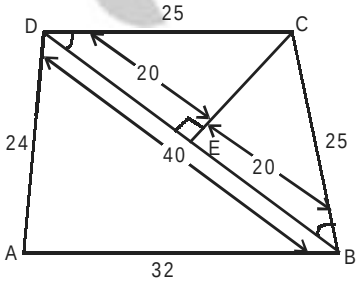
and $\frac{76b+85c}{b+c}=81 \Rightarrow 4c = 5b$

Hence, $b = \frac{4}{3}a$, $c = \frac{5}{4}b=\frac{5}{4}\times\frac{4}{3}a=\frac{5}{3}a$

Average of X, Y and Z = $\frac{83a+76b+85c}{a+b+c}$

$$= \frac{83a + 76\times\frac{4}{3}a + 85\times\frac{5}{3}a}{a + \frac{4}{3}a + \frac{5}{3}a} = \frac{978}{12}=81.5.$$

23. d



CE = $\sqrt{25^2-20^2}=15$

(Since DBC is isosceles triangle.)
ABCD is a quadrilateral
where AB = 32 m, AD = 24 m, DC = 25 m, CB = 25 m
and $\angle$DAB is right angle.
By Pythagoras Theorem: DB = 40 m

So area of $\Delta ADB = \frac{1}{2}\times 32\times 24 = 384$ sq. m

Now in isosceles Δ BCD, perpendicular CE from C to BD bisects BD.

$BE = DE = \frac{40}{2} = 20$ m.

Now by Pythagoras Theorem:

$CE = \sqrt{25^2-20^2} = 15$ m.

So area of $\Delta BCD = 2\times\frac{1}{2}\times 15\times 20 = 300$ sq. m

Hence, area of ABCD = 384 + 300 = 684 sq. m

24. c Let the total number of pages in the book be n.
Let page number x be repeated.

Then $\sum_{i=1}^{n} i + x = 1000$

$$\frac{n(n+1)}{2}+x=1000$$

Thus, $\frac{n(n+1)}{2} \le 1000$ gives n = 44

Since $\frac{n(n+1)}{2}=990$ (for n = 44), hence, x = 10.

25. b If Shyam takes 1 min for every 3 steps, then he takes $\frac{1}{3}$ min for every step.

For 25 steps, he takes $\frac{25}{3}$ min, i.e. 8.33 min.

So Vyom takes $\frac{1}{2}$ min for every step.

For 20 steps, he takes $\frac{20}{2}$ min, i.e. 10 min.

Difference between their time = 1.66 min.
Escalator takes 5 steps in 1.66 min and difference in number of steps covered = 5
Speed of escalator is 1 step for 0.33 min,
i.e. 3 steps per minute.
If escalator is moving, then Shyam takes 25 steps and escalator also takes 25 steps.
Hence, total number of steps = 50.

26. a Let the cost of 1 burger, 1 shake and 1 fries be x, y and z.
Then,

$3x + 7y + z = 120$ ...(i)
$4x + 10y + z = 164.50$ ...(ii)
On performing: (i) × 3 – (ii) × 2, we get,
$x + y + z = 31$.

27. c Taking a = b = c = d = 1, we get the minimum value as $(1 + 1)(1 + 1)(1 + 1)(1 + 1) = 2 \times 2 \times 2 \times 2 = 16$.

28. c Let 't' be the time taken for all three together, then

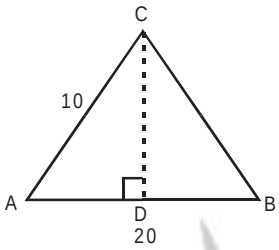
$$\frac{1}{t+6}+\frac{1}{t+1}+\frac{1}{2t}=\frac{1}{t}$$

Solving the above equation, we get

$3t^2 + 7t – 6 = 0$ or $t = \frac{2}{3}$ hr

= 40 min

29. a



Let's assume AB be the longest side of 20 units and another side AC is 10 units. Here CD $\perp$ AB.

Since area of $\Delta ABC = 80 = \frac{1}{2} AB \times CD$

So $CD = \frac{80 \times 2}{20} = 8$.

In ΔACD; $AD = \sqrt{10^2 - 8^2} = 6$

Hence, DB = 20 – 6 = 14.

So $CB = \sqrt{14^2 + 8^2} = \sqrt{196 + 64} = \sqrt{260}$ units.

30. c Let the 6th and the 7th terms be x and y.
Then 8th term = x + y
Also $y^2 – x^2 = 517$
$\Rightarrow (y + x)(y – x) = 517 = 47 \times 11$
So y + x = 47
y – x = 11
Taking y = 29 and x = 18, we have 8th term = 47,
9th term = 47 + 29 = 76 and 10th term = 76 + 47 = 123.

31. c Fresh grapes contain 10% pulp.
$\therefore$ 20 kg fresh grapes contain 2 kg pulp.
Dry grapes contain 80% pulp.

$\therefore$ 2 kg pulp will contain $\frac{2}{0.8} = \frac{20}{8} = 2.5$ kg dry grapes.

32. a Total time taken by B to cover 60 km

$= \frac{60}{50}\text{hr} = \frac{6}{5}\text{hr}$

It stops at station C for $\frac{1}{4}$ hr.

Now, in $\left(\frac{6}{5}+\frac{1}{4}\right)$hr train X travels

$70 \times \frac{29}{20} = 101.5$ km

This implies that they do not cross each other by the time train Y finishes its stoppage at station C.
Let they meet after t hr.

Then $70t + 50(t – \frac{1}{4}) = 180 \Rightarrow t = \frac{192.5}{120}$ hr

Distance from A will be $(70 \times \frac{192.5}{120})$ km = 112 km approximately

33. a Let the highest number be n and x be the number erased.

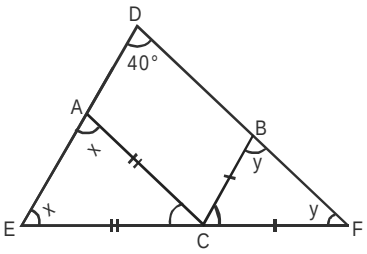
Then, $\frac{\frac{n(n+1)}{2} - x}{(n-1)} = 35\frac{7}{17} = \frac{602}{17}$.

Here, the denominator (n – 1) must be a multiple of 17.

For $n – 1 = 68 \Rightarrow n = 69$, we have $\frac{\frac{69(70)}{2} - x}{68} = \frac{602}{17}$

$\Rightarrow x = 602 \times 68 – 69 \times 35 = 2415 – 2408 = 7$.
Hence, n = 69 and x = 7 satisfy the above conditions.

34. c Let $\angle AEC = x$ and $\angle BFC = y$



Here $\angle ACE = 180° – 2x$, $\angle BCF = 180° – 2y$
and $x + y + 40° = 180°$ (In ΔDEF)
So $x + y = 140°$
So $\angle ACB = 180° – \angle ACE – \angle BCF$
$= 180° – (180° – 2x) – (180° – 2y)$
$= 2(x + y) – 180°$
$= 2 \times 140° – 180° = 100°$.

35. a In first updown cycle, the reduction price is Rs. 441. According to this, (b) and (d) are removed. Now we have to analyse (c), if the original price is Rs. 2,500, then after first operation, the price will be 2500 – 441= Rs. 2,059.
In second operation, it will come down to around Rs.

$1688\left[\text{here decrease\%} = \frac{441}{2500}\times 100 \approx 18\%\right]$.

So the value is not equivalent to Rs. 1,944.81.
Hence, option (a) is the answer.

36. b Let L be length in metres of the race which A finishes in t seconds.

Speed of A = $\frac{L}{t}$ m/s

Speed of B = $\frac{L-12}{t}$ m/s

Speed of C = $\frac{L-18}{t}$ m/s

Time taken by B to finish the race = $\frac{L}{(L-12)/t}$ s

$= \left(\frac{L}{L-12}\right)t$ s

In this time, C covers (L – 8) m

$\left(\frac{L-18}{t}\right)\left(\frac{L}{L-12}\right)t = L-8$

$\Rightarrow L = 48$ m

37. c $\left(x+\frac{1}{x}\right)^2+\left(y+\frac{1}{y}\right)^2$

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

$= (x+y)^2-2xy+\frac{(x+y)^2-2xy}{x^2y^2}+4$

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

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

In order to maximize the value of above expression, the value of xy must be maximum.

$\frac{x+y}{2} \ge \sqrt{x}y \Rightarrow \frac{1}{2} \ge \sqrt{xy} \Rightarrow xy \le \frac{1}{4} \Rightarrow (xy)_{max} = \frac{1}{4}$

$\therefore$ The required value

$= 5-2\times\frac{1}{4}+\frac{1-2\times\frac{1}{4}}{\frac{1}{16}} = 5-\frac{1}{2}+8 = 12.5.$

Alternative solution:

x + y = 1 and x > 0, y > 0

Taking x = y = $\frac{1}{2}$, value of

$\left(x+\frac{1}{x}\right)^2+\left(y+\frac{1}{y}\right)^2=\left(2+\frac{1}{2}\right)^2+\left(2+\frac{1}{2}\right)^2=\frac{25}{4}+\frac{25}{4}=\frac{25}{2}$

It can be easily verified as it is the least value among options.

For questions 38 and 39:

$BA = \frac{r_1+r_2}{n_1}$, $MBA_2 = \frac{r_1+r_2}{n_1+n_2}$ and

$MBA_1 = \frac{r_1}{n_1}+\frac{n_2}{n_1}\ \max\left\{0, \frac{r_2}{n_2}-\frac{r_1}{n_1}\right\}$

From BA and MBA_2, we get $BA \ge MBA_2$ because $n_1+n_2 \ge n_1$.

From BA and MBA_1, we get $BA \ge MBA_1$ because

$\frac{r_1}{n_1}+\frac{r_2}{n_1} \ge \frac{r_1}{n_1}+\frac{r_2}{n_1}\times\frac{n_2}{r_2}\max\left\{0, \frac{r_2}{n_2}-\frac{r_1}{n_1}\right\}$.

Now from MBA_1 and MBA_2, we get

$\frac{r_1}{n_1}+\frac{r_2}{n_1}\times\frac{n_2}{r_2}\max\left\{0, \frac{r_2}{n_2}-\frac{r_1}{n_1}\right\} \ge \frac{r_1}{n_1+n_2}+\frac{r_2}{n_1+n_2}$.

38. d From the above information, $BA \ge MBA_1 \ge MBA_2$
None of these is the right answer.

39. b BA = 50 where there is no incomplete innings means

$r_2 = n_2 = 0 \Rightarrow \frac{r_1}{n_1} = 50$

$MBA_1 = \frac{r_1}{n_1}+\frac{n_2}{n_1}\max\left[0, \left(\frac{r_2}{n_2}-\frac{r_1}{n_1}\right)\right]$

$= 50+\frac{1}{n_1}\max\left[0, \left(\frac{45}{1}-50\right)\right]$

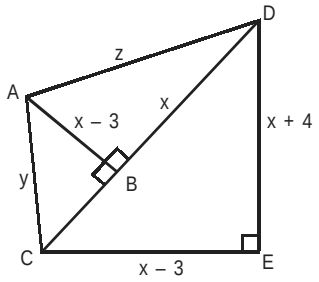
$= 50 + 0 = 50$

$BA = \frac{r_1+r_2}{n_1} = \frac{50n_1+45}{n_1} = 50+\frac{45}{n_1} > 50$

$MBA_2 = \frac{r_1+r_2}{n_1+n_2} = \frac{50n_1+45}{n_1+1} = 50-\frac{5}{n+1}$

Hence, BA will increase, MBA_2 will decrease.

40. b



By Pythagoras Theorem,

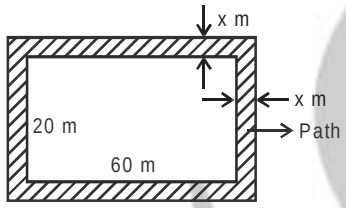
$DC = \sqrt{(x+4)^2 + (x-3)^2}$

Again by Pythagoras Theorem,
$BC^2 + AB^2 = AC^2$

$$\Rightarrow \left(\sqrt{(x+4)^2 + (x-3)^2} - x\right)^2 + (x-3)^2 = 100$$

We can find the value of x, using the answer choices given in the question. Hence, x = 11.

41. c



Let width of the path be x metres.
$\therefore (60 + 2x)(20 + 2x) - 60 \times 20 = 516$
$\Rightarrow 1200 + 120x + 40x + 4x^2 - 1200 = 516$
$\Rightarrow 4x^2 + 160x - 516 = 0 \Rightarrow x^2 + 40x - 129 = 0$
$\Rightarrow x = 3$ or -43 (not acceptable)

42. d $a = b^2 - b, b \geq 4$
$a^2 - 2a = (b^2 - b)^2 - 2(b^2 - b) = (b - 2)(b - 1)\, b\, (b + 1)$
Using different values of $b \geq 4$, we will find that $a^2 - 2a$ is divisible by 15, 20 and 24.
Hence, all of these is the right answer.

43. d Number of one-rupee coins = 158.
Possible arrangements of coins are listed as 1, 2, 4, 8, 16, 32, 64 and 31.
$\therefore$ Number of arrangements = 8.
So the least number of bags required = 8.

44. b From II, b = 2d
Hence, b = 10, d = 5 or b = 4, d = 2
From III, e + a = 10 or e + a = 4
From I, a + c = e or e – a = c
From III and I, we get 2e = 10 + c or 2e = 4 + c

$$\Rightarrow e = 5 + \frac{c}{2} \quad \text{... (i)}$$

$$\text{or } e = 2 + \frac{c}{2} \quad \text{... (ii)}$$

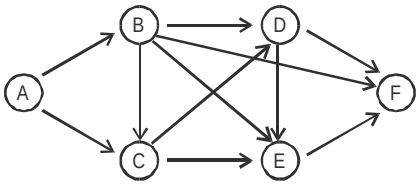
From (i), we can take c = 2, 4, 6, 10.
For c = 2, e = 6
c = 4, e = 7 (Not possible)
c = 6, c = 8 (Not possible)
c = 10, e = 10 (Not possible since both c and e cannot be 10)
From (ii), we have c = 2, 4, 6, 10.
For c = 2, e = 3 (Not possible)
c = 4, e = 4 (Not possible)
c = 6, e = 5 (Possible)
c = 10, e = 7 (Not possible)
Considering the possibility from B that c = 6 and e = 5 means e + a = 4
$\Rightarrow$ a = –1 (Not possible)
Hence, only possibility is b = 10, d = 5, c = 2, e = 6.
e + a = 10 $\Rightarrow$ a = 4

45. a Quadratic equation having roots (4, 3) is
(x – 4) (x – 3) = 0
$\Rightarrow x^2 - 7x + 12 = 0$ ... (i)
Quadratic equation having roots (3, 2) is
(x – 3) (x – 2) = 0
$\Rightarrow x^2 - 5x + 6 = 0$ ... (ii)
Picking the coefficient of x from (i) and the constant term from (ii), we get the required equation
$x^2 - 7x + 6 = 0$
$\Rightarrow (x - 6)(x - 1) = 0$
$\therefore x = 1, 6$
Hence, actual roots are (6,1).

Alternate method:
Since constant = [3 × 2] and coefficient of x = [–4x – 3x] = –7
Since quadratic equation is
x^2 – (Sum of roots)x + Product of roots = 0
or $x^2 - 7x + 6 = 0$
Solving the equation,
(x – 6)(x – 1) = 0 or x = (6, 1).

46. b Let the number of five-rupee, two-rupee and one-rupee coins be x, y and z respectively.
x + y + z = 300 ...(i)
5x + 2y + z = 960 ...(ii)
5x + y + 2z = 920 ...(iii)
(i) – (ii): y – z = 40 ...(iv)
5 × (i) – (ii): 3y + 4z = 540 ...(v)
Solving (iv) and (v), we get, y = 100 and z = 60.
Hence, the number of coins = 300 – (100 + 60) = 140.

47. b



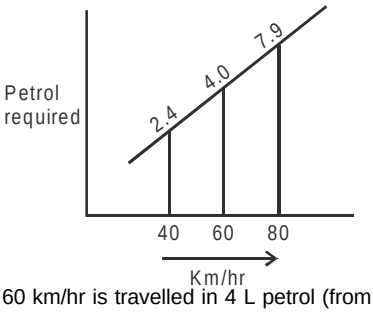
The number of distinct routes from A to F are listed below.
(1) ABDF (2) ACEF (3) ABF
(4) ABEF (5) ACDF (6) ABCDEF
(7) ACDEF (8) ABDEF (9) ABCDF
(10) ABCEF
Hence there are 10 way to reach F from A.

48. c The last two digits can be 12, 16, 24, 32, 36, 52, 56, and 64, i.e. 8 possibilities

Remaining digits can be chosen in ${}^4P_3 = 24$ ways.

Hence, total number of such five-digit numbers
$= 24 \times 8 = 192$.

49. b



60 km/hr is travelled in 4 L petrol (from the graph).
$\therefore$ 1 L is required for 15 km, i.e. for 15 km, 1 L petrol is required.

For 200 km, $\frac{200}{15}$ = 13.33 L is required.

50. b The fuel consumption at various speeds would be

$\frac{200}{40} \times 2.5 = 12.5$ L

$\frac{200}{80} \times 7.9 = 19.75$ L

$\frac{200}{60} \times 4 = 13.33$ L

If Manasa travels at 40 km/hr, the total consumption would be 12.5 L. Hence Manasa has to decrease the speed.

51. a A–H: Here 'exceed' would mean 'flowing beyond' the 'banks' (physical boundaries).
B–F: Here their accomplishments 'were superior to' the expectation.
C–E: It is difficult for us to 'comprehend' the infinite mercy of God.
D–G: He 'crossed limits' when he embezzled from the fund.

52. d A–E: We see smoke and 'deduce' that there must be a fire.
B–F: The listener makes all sorts of guesses about the 'utterance'.
C–G: 'You' can be sure from 'the long wait' that the person is definitely inclined to meet 'him'.
D–H: She had distanced herself from the debate but for a perfunctory question, thereby 'hinting' that she was not exactly excited by the debate.

53. c A–G: The wines have been preserved for a long time so as to 'age' it.
B–E: He has been "freed from the rashness of youth" in his old age.
C–H: The soil in the Gangetic plains are 'rich' with the flow of time.
D–F: The violin tunes were 'rich and pleasant'.

54. b A–F: The author felt "light after removing something distressing 'shoes'
B–H: The victims were given relief 'aid'.
C–G: The only 'diversion' I get is by playing cards.
D–E: The sentry was 'released from the performance of duty'.

55. d A–F: The committee heard his attempt to "remove the stigma" from his name.
B–H: Water had to be purified of "foreign/superfluous" ingredients by distillation.
C–E: The opposition was "gotten rid of" after the coup.
D-G: Drugs that empty the bowels have a bad effect on the brain.

56. c Out of the options for first sentence E/A, E seems better. Then, E–A forms a mandatory pair as it moves from the general "India" to specific "regional variations".
D–B' is the second mandatory pair with "office" being mentioned in D and then B starting with "office".
This makes choice (c) correct.

57. a Between D and F, you are more likely to choose D as the opening sentence as it is a question, but if D comes first, sentence F would be general and will take the sequence of information back. Therefore, choose F as the opening sentence. F–D seems better than F–C. Also B–A–C is a mandatory sequence as they are all comparing the scenario between different contexts. This makes choice (a) correct.

58. c Only E can start this paragraph. AC follows in (a) and (c). B with 'but' is the point of inflexion and D ends the paragraph on an optimistic note. Hence, option (c) is correct.

59. d Among the options, the best options for the opening sentence seem to be A and B. Again the option with B as the first sentence does not flow logically. A-B is a better sequence as it moves from general (universal) to specific (in areas..). This makes choice (d) correct. Hence, option (d) is correct.

60. a BC is a mandatory pair with 'calculable' and 'only uncontrolled applications' (exceptions to B). Hence, option (a) is correct.

61. d It's choice (d). You don't write reports or stories or books for tools, but 'obituaries' — yes, as tools do get obsolete. Also 'practices' do not wither or trade or die away, but they do fade away with time.

62. c You do not add or figure two attributes, but you do combine them into one. 'Appear' again is too abrupt when you are discerning a personality, 'emerges' would be more appropriate.

63. b The sentence is drawing a correlation between her face and her understanding. Scars and make-up are irrelevant in this context and can be removed as irrelevant options. "To diagnose if she appreciated" is incorrect, you diagnose on the basis of symptoms. This leaves us with option (b) which fits in well to make a coherent sentence.

64. c Choice (a) with “weird” as an option can be removed and similarly choice (d) with “gloomy”. They are both using words that are not first-priority as they are somewhat informal. Out of the other choices, “activity” is not qualified as “moving” (emotional). Choice (c) fits in the best and is the answer.

65. d Choice (a) can be easily eliminated since “being subordinate” and “boasting” of it do not go together. Choice (c) is incorrect because ‘intellectuals’ (individuals) being ancestors to societies (collectivity) is incorrect. Also present Indian intellectuals cannot possibly be ancestors either. Choice (b) is incorrect because “intellectual cliques” is odd especially since “cliques” is used in a somewhat negative sense. Choice (d) is correct.

66. c A specious argument sounds true but is actually false. ‘Credible’ has a positive note against the other three choices.

67. d To obviate is to make something unnecessary, this meaning is elucidated in (a), (b) and (c). ‘Bolster’ on the other hand strengthens the cause of driving personal cars.

68. a Easy. (b) (c) and (d) actually mean something that is no longer in use. (a) talks about prevailing practices.

69. d Parsimonious means being stingy. Choices (a), (b) and (c) are similar making choice (d) the answer.

70. a To say that war is a remedy for the burgeoning population problem is to speak flippantly. (b), (c) and (d) convey this light tone. Jovian relates to the planet Jupiter.

71. a The reference is to an open discussion of the caste issue on a global platform.

72. c Referring to paragraph 1, lines (7-8) its obvious that choice (c) is correct. “Inverted representations .... such inversions”.

73. a Clearly, the UN conference is looking at discriminations based on caste, especially looking at paragraph 1. Choices (A) and (E) mention that choice (B) is a positive area and is not being addressed and choices (C) and (D) are too broad. This makes choice (a) correct.

74. b Paragraph 2, line 5 clearly indicates that choice (b) is correct.

75. b The author mentions in paragraph 2, line 3 – “race is a biological category” and in the last paragraph line 5 – “It would thus seem ... that dialectic”. This means all biological constructs are social constructs of which race is one. This makes choice (b) correct.

76. a A mono-syllabic word has only one syllable. So it can have only one onset. A phoneme, according to the passage, can be ‘initial’ and ‘final’.

77. d According to second last paragraph, line seven, it’s obvious that choice (d) is correct.

78. d The last part of the first paragraph makes it clear that (d) is correct.

79. b According to the last para, lines 7-10. The Treiman and Zudowski experiment showed that ‘4 and 5-year-old children found the onset-rime version ... significantly easier ... only the 6-year-old ... were able to perform both versions ... with an equal level of success’.

80. b Refer to the sentence in paragraph 2 — ‘rimes correspond to rhymes in single-syllabus words’.

81. a Choice (b) is false because the author says in paragraph one, line 4 “Few people ...”. Choice (c) is false because the author says “ ... Coarse-textured ....” in the fifth last line of the first para. Choice (d) is also incorrect as revealed in the last part of the passage. Choice (a) is correct as the author’s appreciation is for her singing though he does pay attention to other aspects of her life.

82. c The answer is presented in the fourth last line of the first para, “what middle age ..”. This makes choice (c) correct.

83. d The answer to this is also presented directly in the last line of the second paragraph — “suffering was her ....” . This makes choice (d) correct.

84. b Billie Holiday was fortunate to have ‘the best musicians of the 1930s to accompany her — notably Teddy Wilson, Frankie Newton and Lester Young ...’

85. c The author mentions in the first paragraph, lines 3-5, “Each of the ....”. This makes choice (c) correct.

86. a Refer to the part ‘The film itself ... opening by Dersu’s grave’. Besides (a) can be easily inferred from the second paragraph.

87. d The answer is presented directly in lines 2-4 of the third paragraph. “... nostalgic, melancholy...”.

88. c The answer is in lines 4-6 of the third paragraph. “First section of ....”. This makes choice (c) is correct.

89. d This aspect is highlighted in the last paragraph and choice (d) is the answer.

90. c Refer to the part ‘Kurosawa defines the world of the film initially upon a void, a missing presence’.

91. c Refer to the seventh paragraph lines 4-5 ‘... the greater the urge for change in a society, the stronger the appeal of a dynamic leadership ...’ This makes choice (c) correct.

92. a The answer to this question is present in the last paragraph in the second line “From the argument....” This makes choice (a) correct.

93. a Choice (A) is present in paragraph four, line one, choice (B) is mentioned in the last line of the fourth paragraph and choice (D) is mentioned in the 3rd last line of the seventh para. This makes choice (a) correct.

94. a The answer is presented in lines 1 to 4 of paragraph 2. This makes choice (a) correct.

95. d Refer to the first line of the fifth paragraph — 'But a system governed solely by impersonal rules can at best ensure order and stability; it cannot ... formal equality will be replaced by real equality ...' This makes choice (d) correct.

96. c A can be inferred, refer to the part — 'Democracy rests on two different principles ... the principle of equality before the law ... the leadership principle ... one principle cannot be promoted without some sacrifice of the other... ' D can be inferred, refer to the part — 'their continued preoccupation with plans and schemes ... to bridge the gap between the ideal of equality and the reality which is so contrary to it ... leadership with a measure of charisma ...' B and C venture too far by using the words 'disadvantages' and 'limitations' respectively which have no contextual relevance.

97. b The second and third lines of the second paragraph mention "Dark Age..." this makes choice (b) correct.

98. b Lines one to three of the fourth paragraph mention "The main problem..." making choice (b) the answer.

99. a Lines three-five of the fifth paragraph "Recently, some members ..." makes choice (a) correct.

100. b As revealed in the first line of the last paragraph, choice (b) is correct.

101. d Count only those lays for which any size of yellow coloured fabric is produced.
They are lay number
1, 3, 4, 6, 7, 8, 9, 11, 12, 15, 21, 24, 25, 27
Hence, 14 is the answer.

102. b Count those lays for which extra-extra large fabric is produced of any colours, i.e. count the lay numbers for which at least one of XXL from 3 colours is non-zero.
They are lay number 7, 8, 9, 10, 11, 12, 13, 14, 15, 21, 22, 23, 24, 25, 26, 27 .
Hence, 16 is the answer.

103. d Again count lay number for which at least one of the XXL from yellow and white are non-zero.
Lay number 7, 8, 9, 10, 11, 12, 13, 14, 15, 21, 23, 24, 25, 26, 27.
Hence, 15 is the answer.

104. b The varieties for which there is surplus gives the answer. There are 4 such varieties.

105. b Put a decimal after the first two digit in the passengers column and it will give the figure in millions.
In that case we have only 5 international airports of type A having more than 40 million passengers.
They are in serial number 1, 2, 3, 5, 9.
Rest all 'A' type airports are below 40 million.

106. a There are only six airports of USA among the top 10 busiest airports. They are in serial number 1, 2, 3, 5, 9, 10.

Hence, $\frac{6}{10} \times 100 = 60\%$.

107. c We have to calculate the percentage of passengers handled at Heathrow Airport.
Now total number of passengers in the 5 busiest airport is approximately
(77 + 72 + 63 + 62 + 60) million = 334 million
At Heathrow it is 62 million.

The approximate percentage is $\frac{60}{300} \times 100 \cong 20\%$

108. b All the international airports handle more than 30 million passengers. Among these only 6 airports are not located in USA. Hence, (b) is the correct option.

109. a Man-hours spent in coding is 420 + 100 = 520.
Now going by options, we see (a) is the only option.

110. c Total work is approximately
(100 + 80) + (420 + 100) + (280 + 140) = 1120
On-site work = 80 + 100 + 140 = 320
Percentage of total work carried out on-site is

$\frac{320}{1120} \times 100$ = 30% approximately.

111. c From figure the total effort in man-hours spent on-site is 320.
It is nearest to actual man-hours of offshore testing which is 280 (approximately.)

112. a Total man-hours
= (100 + 80) + (420 + 100) + (280 + 140) = 1120.
Total working hours = 100

Total man working = $\frac{1120}{100} = 11.2$ or 11.

For 50 hr the total man-hours is 50 × 11 = 550 which is near to coding (420 + 100)
Hence, (a) is the answer

113. b Initial offshore testing man-hours = 280.
Initial onshore testing man-hours = 140.
Final offshore testing man-hours = 280 - 50% of 280 = 140
Final onshore testing man-hours = 140 + 140 = 280.
Hence, the proportion of testing offshore

$= \frac{140}{(140+280)} = 30\%$ approximately.

114. a

	Design	Coding	Testing
Initially	80	100	140
Finally	$80+\frac{100}{2}=130$	$100+\frac{420}{2}=310$	$140+\frac{294}{2}=287$

115. d We can see that the flow from Vaishali to Jyotishmati is 300 whereas demand is 400, so the deficit 100 will be met by flow from Vidisha. Again, the demand of 700 in Panchal is to be met by flow from Jyotishmati which can get it from Vidisha.
Thus, the quantity moved from Avanti to Vidisha 200 + 100 + 700 = 1000

116. d Free capacity at Avanti-Vaishali pipeline is 300, since capacity of each pipeline is 1000 and demand at Vidisha is 400 and 300 flows to Jyotishmati.
Thus, free capacity = {1000 – (400 + 300)} = 300

117. d Free capacity in Avanti-Vidisha is zero. Explanation is similar as in previous answer.

118. b On interchanging the effort allocation between operations B and C, then C and D, and then D and E we find that B takes the E's position.
Looking at the effort in B and then ranking in ascending order we find that the company 3 ranks third.

119. a Total effort for operation B through F is 81.5%.
Even distribution will give effort allocation in each operation = $\frac{81.5}{5}=16.3\%$
$\therefore$ Change in E = 28.6 – 16.3 = 12.3%

120. d Since we are given about company 1, 4, 5 in options so we will look for changes in these companies only.

Allocation of effort in B, C, D in companies 1 = 43.1

Remaining operations gets $\frac{43.1}{3}=14.4\%$ each.

Allocation of effort in B, C, D operations of company 4 = 29.7
Remaining operation is allocated extra
$\frac{29.7}{3}=9.9\%$ each.
Allocation of effort in B, C, D operation of company 5 = 36.8

Remaining operation is allocated $\frac{36.8}{3}=12.3\%$ each.
We see that operation E in company 5 will then show the maximum.

121. c From statement II, m, n could be (2, 15) (5, 6), (3, 10) and (1, 30) but from statement I, we get m, n as (2, 15).
Hence, the question can be answered by using both the statements together.

122. d From statement I nothing can be said since exact figures are not given.
From statement II since X > Y (from B) we do not know how much X is greater than Y, because if it is slightly greater than it will be less than Y after 5 years whereas if the difference is very high, then X will be greater than Y even after 5 years.

123. a From statement I, unequal even integers less than 10 are 2, 4, 6 and 8.

$\frac{X}{Y}$ is an odd integer is possible only if X = 6 and Y = 2

From statement II, even integers less than 10 are 2, 4, 6 and 8.

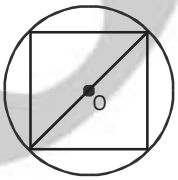
XY = 12 $\Rightarrow$ X = 6, Y = 2 or X = 2, Y = 6

Hence, question can be answered by using statement I alone but not by statement II.

124. a Statement I gives the capacity of boat and is of no help in finding out the number of round trips.
From statement II round trips can be calculated since we know the total time taken is 12 hr.

125. c Statement I gives the rate and statement II gives the size. It is like statement I gives the speed and statement II the distance and we are to find out time. So both statements are needed.

126. b



We know that the diameter of circle will be the diagonal of the square.
Thus, from any of the two statements, we can find out the areas of the circle and square.

127. d Statement I gives a general figure of Ram and Gopal. Statement II does not give any idea of how many apples Ram and Gopal purchased.
Both statements together also cannot give any result.

128. b Cost in rupees of oil moved by rail and road is 18% of 30 million = 5.4 million.
Volume of oil transported by rail and road
= 31% of 12 million tonnes = 3.72 million tonnes.

Cost in rupees per tonnes = $\frac{5.4}{3.72}=1.5$ approximately.

129. a From the chart, we can make out the least among road, rail, pipeline, ship by looking at the ratio of cost to volume.

$\text{Road} = \frac{6}{22}$

$\text{Rail} = \frac{12}{9}$

$\text{Pipeline} = \frac{65}{49}$

$\text{Ship} = \frac{10}{9}$

Since ratio of cost to volume for road is the lowest, it is the cheapest.

130. c Ship, air and road.
Like the previous answer again look at ratio of

$\frac{10}{9}, \frac{7}{11}, \frac{6}{22}$

So $\frac{10}{9} > \frac{7}{11} > \frac{6}{22}$

Hence, P > Q > R

131. c Sati-Savitri starts at the earliest.
So we view it first.
(1) *Sati-Savitri* — 9.00 a.m. to 10.00 a.m.
(2) *Veer Abhimanu* — 10.00 a.m. to 11.00 a.m.
(3) *Jhansi Ki Rani*/*Sundar Kand* — 11.00 a.m. to 11.30 a.m.
(4) *Joru Ka Ghulam* — 11.30 a.m. to 12.30 p.m.
Now lunch break from 12.30 p.m. to 1.30 p.m.
At 1.30 p.m. he can takes the show of only *Jhansi Ki Rani* so it cannot be viewed at 3rd.
(5) *Jhansi Ki Rani* — 1.30 p.m. to 2.00 p.m.
(6) *Reshma aur Shera* 2.00 p.m. to 3.00 p.m.
Hence, option (c) is best.

132. c Three children Vaibhav, Suprita and Anshuman.
Vaibhav > Suprita
↓
(Born in April)

One of children is born in September, but it is not Vaibhav, so it has to be Anshuman.
So Vaibhav is born in June and is 7-year-old. Vaibhav is 7-year-old and Anshuman is not 4-year-old.
So Suprita is 4-year-old.
Youngest child is 2-year-old and it has to be Anshuman.

Vaibhav	> Suprita	> Anshuman
(June, 7 years)	(April, 4 years)	(Sept., 2-year-old)

Hence, (c) is the answer.

133. c We can find out the time for lunch of respective families from the table below:

Family/Time	12:00	1:00	2:00
Sharma	✓		
Banerjee			✓
Pattabhiraman	✓		

Fried brinjal → Chinaware
Sambar → White Chinaware
Makkai-ki-roti → Red Chinaware
The family that eats at 1 o'clock serves fried brinjal, hence Pattabhiraman serves fried brinjal.
The family that eats last like makkai-ki-roti so Banaerjees like makkai-ki-roti. Sharmas are left with sambar.
Sharma - 12:00 - Sambar - White
Pattabhiraman - 1:00 - Fried brinjal - Blue
Bannerjees - 2:00 - Makkai-ki-roti - Red
Hence, (c) is the best option.

134. b We have two possible cases:
Case I:

	F	T
Shopkeeper 1:	Black hair	Long tail
	F	T
Shopkeeper 2:	Short tail	Wore a collar
	T	F
Shopkeeper 3:	White hair	No collar

Case II:

	T	F
Shop keeper 1:	Black hair	Long tail
	T	F
Shop keeper 2:	Short tail	Wore a collar
	F	T
Shop keeper 3:	White hair	No collar

Hence, we see only option (b) is correct.

135. b Elle is 3 times older than Yogesh and Zaheer is half the age of Wahida.
If Wahida is 2x-year-old, then Zaheer is x.
Now Yogesh > Zaheer
⇒ Yogesh > x
Elle is 3 times older than Yogesh.
Which means Elle is older than Wahida as 3x > 2x.

Alternative method:
E = 3y ...(i)

$z = \frac{w}{2}$, or $2z = w$ ...(ii)

y > z , implies 2y > 2z implies 2y > w from (ii)
Now, if 2y > w
3y > w, i.e. E > w from (i)
Hence, Elle is older than Wahida.

136. c From (a) Zaheer is 10-year-old means Wahida is 20-year-old. From (b) Yogesh and Wahida are older than Zaheer by same number of years.
This means Yogesh is 20-year-old. Now Elle is 3 times older than Yogesh.
Elle is 20 × 3 = 60-year-old.
Hence, we see that both (a) and (b) statements are needed so the answer is (c).

137. b Checking from options,
(a) David, Rama and Rahim
Ram would like to be in the group only if Peter is there, so it is not feasible.
(b) Peter, Shyam and Rahim want to be selected together and none of them have problem or any conditions, hence feasible.
(c) Since Shyam is there, Rahim has to be but he is not also Fiza is not there which David insists so not feasible.
(d) Since Peter is not there Ram would not prefer that group, hence not feasible.

138. c Looking at options, we see (c) is best as Shyam and Rahim is selected and Fiza is there when David is selected.
In (a) we see Shyam is not there with Rahim.
In (b) Fiza is not there with David.
In (d) Peter and David cannot go together as David would not like Peter in the group.

139. d In Ist option — Kavita is in the group means David is there and David would not like Peter in the group, whereas Ram would like to be in the group if Peter is there so the statement cannot be true.
2nd option — If David is there, then only the group will have both women Kavita and Fiza, but in that case we see none of the rest could be the fourth person as Shyam and Rahim has to be together and Ram would be if Peter is there and David would not like Peter in the group, hence statement is false.
3rd option — It is not possible as Ram cannot go with Shyam and David with Peter.
So none of the above statements are true.

140. b Let S = spotted, NS = Non-spotted
There are 50 coloured leaves and is given as red and non-red.
We make the following table. Let 2n be number of red oak leaves where n is any natural number.

Oak				Maple			
Red		Non-red		Red		Non-red	
S	NS	S	NS	S	NS	S	NS
2n	x	10n	0	6	x	0	22

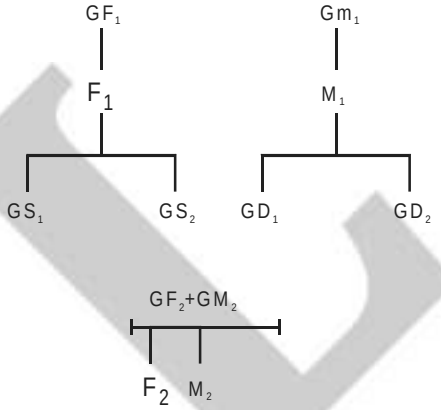
Now we have 2n + x + 10n + 6 + x + 22 = 50
$\Rightarrow$ 12n + 2x = 22
It is possible for only n = 1, x = 5
($\because$ n is not greater than 1)
Hence, number of oak leaves = 2 × 1 + 5 + 10 × 1 = 17

141. c O, P, Q and R carried on motorcycles M_1, M_2, M_3 and M_4 respectively. So

O	P	Q	R
M_1	M_2	M_3	M_4
F	E	A	C
B	D	G	H

Since B cannot be with R so it will go with O that is only left.
Hence, C and H will go together in M_4 with R.

142. b

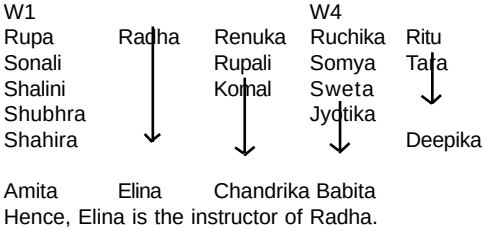


Thus, we have 2 grandfathers: GF_1, GF_2
4 fathers: GF_1, GF_2, F_1 and F_2
2 grandmothers: GM_1, GM_2
4 mothers: GM_1, GM_2, M_1 and M_2
Hence, minimum number will be 12.

143. b The condition that maximise the number of points is
D – 2 – 80 (40 × 2)
B – 4 – 360 (90 × 4)
C – 8 – 560 (70 × 8)
1000
$\therefore$ In total there are 14 items.

144. b Bashir < Chirag.
Now Chirag borrows Rs. 300 and Bashir Rs. 100 from Ashok. Ashok buys 3 shirt so he must have at least Rs. 1,000.
Bashir is left with no money after buying a sweater and he had to borrow Rs.100 from Ashok means he had Rs. 500 with him.
Ashok must have less than Rs. 1,500.
Ashok has three times the money with Deepak.
So Deepak cannot have Rs. 300 because Ashok must have Rs.1,000, again Deepak cannot have Rs. 500 because Ashok should have less than Rs.1,500.
So Deepak has Rs. 400 for which he can purchase the shawl which is costliest.

145. b



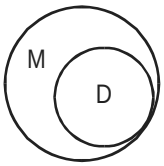
Hence, Elina is the instructor of Radha.

146. d

	Fishing	Smoking	Drinking	Gam-bling	Mount-aineer-ing
Likes	M_1 M_6	M_1 M_2 M_8	M_2 M_5	M_3 M_7 M_8	M_4 M_7
Dislikes	M_2 M_7	M_3 M_5 M_6	M_4	M_1	M_5 M_6 M_8

Going by options, we have:
(a) M does not hate at least one of the liking of any of the other 3 persons selected.
(b) None of person shares the liking of at least one of the other selected.
(c) None of the person shares a liking with at least one of the other three selected.
(d) M_1 shares liking with M_2 and vice versa.
M_4 shares liking with M_7 and vice versa.
M_1, M_2 dislikes M_7 liking.
M_4, M_7 dislikes M_2 liking.
Hence, the answer is option (d).

147. a $X = M.D = M \cap D$
$X = D$
$M \cap D = D$
$\Rightarrow D \subset M$
Thus, all dogs are mammals.



148. c $Y = F \cap (D \cap V)$ is not a null set means some F's are D's and sum D's are V's .
This implies some fish are dogs.

149. a $Z = (P \cap D) \cup M$
$P \cap D$ means Pluto, the dog.
$(P \cap D) \cup M$ means Pluto, the dog or any other mammal.

150. c $P.A = \phi$; $P \cup A = D$
$P \cap A = \phi$ means no alsatian is Pluto or Pluto is not an alsatian where dogs are composed of alsatian or Pluto or both.