CBS / JET

Answers and Explanations

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

1. B The author talks about the ability of various mammals to adapt to modes of life in the second paragraph and in the last paragraph talks about extinction being a characteristic of the evolution of life.

2. C We can infer from the second paragraph, fourth line" that the bat had better flying abilities than the "pterosaur". Thus "pterosaur" was a flying reptile.

3. D The last line of the first paragraph states "It is in the Miocene time that the mammals reached their peak with reference to size." Hence, (D) it can be infered.

4. D The last line of the third paragraph states that "with reference to mammals, we see their extinction is a characteristic of the evolution of life, which can be seen in the geologic record of life-- "Geology is the study of the rocks the earth is composed of. Focil means the remains of the dead animals or plants turned into rocks.

5. A "Malevolent" means having, showing, or arising from intense often vicious ill will, spite, or hatred.

6. C "Benefactor" means one that confers a benefit; one that makes a gift or bequest. "Patron" means one that uses wealth or influence to help an individual.

7. C "Cogent" means appealing forcibly to the mind or reason, convincing.

8. B "Recession" means an act of moving away especially from something difficult, dangerous, or disagreeable. "Approach" means the means or procedure for doing something.

9. D "Inimical" means marked by opposition or ill will. "Amiable" means generally agreeable. [Note: In this question option A 'Affable' is also correct. However, DU has declared option D to be correct.]

10. C "Noxious" means harmful or destructive to living beings. "Healthy" means enjoying health and vigor of body, mind, or spirit.

11. C The correct sentence is "many physicists initially regarded quantum theory as unnatural, absurd and incompatible with common sense."

12. D There is no error in the sentence.

13. B The correct sentence is "the academy members waged a relentless war against my supervisor and me, because our research…" Here "me" is used because it is in the accusative case as it is precede by the preposition against:

14. A The first sentence describes the scene of fire. Thus (S) is the opening sentence as it takes that description forward. The "fire" needs to be mentioned before the introduction of sentence (Q). Hence, RQ is a mandetory pair. Only option A has RQ.

15. A RP is a mandatory pair as the reason that cost benefit yardstick should not be applied to universities is because universities cannot be equated with commercial enterprises. Moreover, S is clearly the concluding section.

16. C QSP is linked. Q and S both give examples of situations where patients have inadequate control over their language. As emphasized by "but" in (P) it gives an example of a situation where they can think inspite of lack of control over their language.

17. A "Pedant" is one who makes a show of knowledge.

18. C "Cynic" is one who believes that human conduct is motivated wholly by self-interest.

19. C "Pilferage" means to steal stealthily in small amounts and often again and again. "Defalcation" means the act or an instance of embezzling. Fraudulence means act of frauding. Forgery also means act of fraudulence.

20. B The correct spelling of the word is "treacherous". Which means betryal of trust or faith.

21. D The correct spelling of the word is "occasionally".

22. D The correct spelling of option (a) is "tomorrow". The correct spelling for option (b) is "ominous". The correct spelling for option (c) is "commissioner".

23. C Someone with green fingers has a talent for gardening.

24. D "To make a clean breast of" means to make a full disclosure; to confess.

25. A "A man of straw" is a person compared to an effigy stuffed with straw, a sham. A person or an idea that is weak and easy to defeat.

26. C	27. B	28. B
29. C	30. A	31. C
32. C	33. A	34. D
35. B	36. C	37. B
38. C	39. C	40. B

41. C For $\{k_1, k_2, k_3, ...k_n\} \in R$

$$A = \left\{\left(k_1, \frac{1}{k_1}\right)\left(k_2, \frac{1}{k_2}\right), \left(k_3, \frac{1}{k_3}\right), ..., \left(k_n, \frac{1}{k_n}\right), ...\right\}$$

and

$$B = \{(k_1, -k_1), (k_2, -k_2), (k_3, -k_3), ..., (k_n, -k_n), ...\}$$

There is no common ordered pair in A and B

$\therefore A \cap B = \phi$.

Alternate solution:

$(x,y) \in A$, x and y would have same sign. While $(x,y) \in B$, x, and y would have different sign.

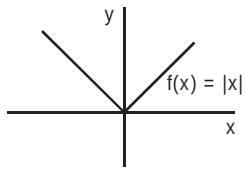
$\therefore A \cap B = \phi$.

42. C We know that possible number of reflexive relations on a set of 'n' elements $= 2^{n^2-n}$

For n = 4, possible number of reflexive relations

$= 2^{4^2-4} = 2^{12}$.

43. A



f(x) = |x| is continous at every point on its domain R. But it is not differentiable at x = 0.

44. C Let $\frac{1}{x} = h$

If $x \to 0$, then $h \to \infty$

$$\therefore \lim_{x\to 0} \frac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1} = \lim_{h\to\infty} \frac{e^h - 1}{e^h + 1}$$

$$= \lim_{h\to\infty} \frac{e^h\left(1 - \frac{1}{e^h}\right)}{e^h\left(1 + \frac{1}{e^h}\right)}$$

$$= \lim_{h\to\infty} \frac{1 - \frac{1}{e^h}}{1 + \frac{1}{e^h}} = \frac{1-0}{1+0} = 1 \quad \left(\because \lim_{h\to\infty} \frac{1}{e^h} = 0\right).$$

45. A $f(x) = x^3 - 3x$

$f'(x) = 3x^2 - 3$

For increasing

$f'(x) > 0$

$\Rightarrow 3x^2 - 3 > 0$

$\Rightarrow x^2 - 1 > 0$

$\therefore x > 1$ or $x < -1$

$x = (-\infty, -1) \cup (1, \infty)$

For decreasing

$f'(x) < 0$

$\Rightarrow 3x^2 - 3 < 0$

$\Rightarrow x^2 - 1 < 0$

$x < 1$ or $x > -1$

$x = (-1, 1)$

Hence, f(x) is increasing on $(-\infty,-1)\cup(1,\infty)$ and decreasing on (–1, 1).

46. B $\log_{0.1}x^2 > \log_{0.1}25$

$\therefore x^2 < 25$

$\Rightarrow x^2 - 25 < 0$

$x < 5$ and $x > -5$

$\therefore x = (-5, 5)$.

47. D $S = 1^2 - 2^2 + 3^2 - 4^2 .... + 199^2 - 200^2$

$= 1^2 + 2^2 + 3^2 ..... + 200^2 - 2[2^2 + 4^2 + 6^2 ....200^2)$

$$= \frac{200(200+1)(400+1)}{6} - 2\times 4\left(1^2 + 2^2 + 3^2 + ...100^2\right)$$

$$= \frac{200\times 201\times 401}{6} - \frac{8\times 100\times 101\times 201}{6}$$

$$= 200\times 201\left(\frac{401}{6} - \frac{404}{6}\right)$$

$$= 40200\times -\frac{1}{2} = -20100 .$$

48. B Let $\cot^{-1}x = \theta$

$\therefore \cot\theta = x$

$\therefore \operatorname{cosec}\theta = \sqrt{1+\cot^2\theta} = \sqrt{1+x^2}$

$$\sin\theta = \frac{1}{\operatorname{cosec}\theta} = \frac{1}{\sqrt{1+x^2}}$$

$$\therefore \sin(\cot^{-1}x) = \sin\theta = \frac{1}{\sqrt{1+x^2}} .$$

49. A For being divisible by 4, last two digit number of the number must be divisible by 4.

$\therefore$ Last 2 digits must be 12, 24, 32, 44

Hundred digit of the number can be filled in 4 ways.

$\therefore$ Total number divisible by 4 = 4 × 4 = 16

$$\therefore \text{Probability} = \frac{16}{4\times 4\times 4} = \frac{1}{4} .$$

50. D $\because \vec{a} = i + j + k, \vec{b} = 4i + 3j + 4k$ and $\vec{c} = i + \alpha j + \beta k$ are linearly dependent.

$$\therefore \begin{vmatrix} 1 & 1 & 1 \\ 4 & 3 & 4 \\ 1 & \alpha & \beta \end{vmatrix} = 0$$

$\Rightarrow 1(3\beta - 4\alpha) - 1(4\beta - 4) + 1(4\alpha - 3) = 0$

$\Rightarrow 3\beta - 4\alpha - 4\beta + 4 + 4\alpha - 3 = 0$

$\Rightarrow -\beta + 1 = 0$

$\therefore \beta = 1$

Now,

$|\vec{c}| = \sqrt{3}$

$\therefore 1^2 + \alpha^2 + \beta^2 = \left(\sqrt{3}\right)^2$

$\Rightarrow 1 + \alpha^2 + 1^2 = 3$

$\Rightarrow \alpha^2 = 1 \Rightarrow \alpha = \pm 1$

$\therefore \alpha = \pm 1, \beta = 1$.

51. A

X	0	1	2
P(X)	K	2K	3K

$\because$ X is random variable taking values 0, 1, 2

$\therefore P(0) + P(1) + P(2) = 1$

$\Rightarrow K + 2K + 3K = 1$

$$\Rightarrow K = \frac{1}{6} .$$

52. C Number of triangles formed by joining 12 points in which 7 are collinear

$= {}^{12}C_3 - {}^{7}C_3$

$= 220 - 35 = 185$.

53. B Let the two positive numbers be x and y

$\therefore x + y = 20$ ...(i)

$$\text{Arithmetic mean} = \frac{x+y}{2} = 10$$

Geometric mean $= \sqrt{xy}$

According the question,

$\sqrt{xy}$ = 10 – 20% of 10

Now,

$\Rightarrow (x-y)^2 = (x+y)^2 - 4xy$

$= (20)^2 - 4\times 64$

$= 400 - 256 = 144$

$\therefore x - y = 12$.

54. D $t_n = \frac{1}{n}(1 + 2 + 3... + n)$

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

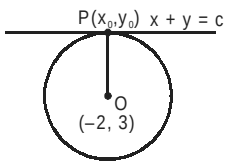
$$\therefore S_n = \Sigma\frac{1}{2}(n+1)$$

$$= \frac{1}{2}(\Sigma n + \Sigma_1)$$

$$= \frac{1}{2}\left[\frac{n(n+1)}{2} + n\right]$$

$$S_{40} = \frac{1}{2}\left[\frac{40\times 41}{2} + 40\right] = 430 .$$

55. A Let number of question answered correctly = x
and number of question answered incorrectly = y
$\therefore$ x + y = 90 ...(i)
and
6x – 2y = 356
$\Rightarrow$ 3x – y = 178 ...(ii)
Solving (i) and (ii), we get
x = 67, y = 23
$\therefore$ Number of questions answered correctly = 67.

56. B 

Equation of circle = $x^2 + y^2 + 4x - 6y + 9 = 0$
$\Rightarrow (x + 2)^2 + (y - 3)^2 = 4$
$\therefore$ Centre of the circle is (–2, 3) and radius is 2.
Now let x + y = c, touches the circle at the point $P(x_0,y_0)$.
Slope of tangent x + y = c is –1.
$\therefore$ Slope of radius OP = 1

$$\Rightarrow \frac{y_0 - 3}{x_0 + 2} = 1$$

$\Rightarrow y_0 - x_0 = 5$
$\Rightarrow y_0 = x_0 + 5$ ... (1)
Now,
$(x + 2)^2 + (y - 3)^2 = 4$
$\Rightarrow (x_0 + 2)^2 + (x_0 + 5 - 3)^2 = 4$
$\Rightarrow 2(x_0 + 2)^2 = 4$
$\Rightarrow (x_0 + 2)^2 = 2$
$\Rightarrow x_0 + 2 = \pm\sqrt{2}$
$\therefore x_0 = -2 \pm \sqrt{2}$
Hence x + y = c is touching the circle at two points
$(-2+\sqrt{2}, 3+\sqrt{2})$ and $(-2-\sqrt{2}, 3-\sqrt{2})$
$\therefore c = x_0 + y_0$
$= -2+\sqrt{2}+3+\sqrt{2}$ or $-2-\sqrt{2}+3-\sqrt{2}$
$= 1+2\sqrt{2}$ or $1-2\sqrt{2}$
$= 1 \pm 2\sqrt{2}$.

Shortcut
Equation of circle = $x^2 + y^2 + 4x - 6y + 9 = 0$
$\Rightarrow (x + 2)^2 + (y - 3)^2 = 4$
$\therefore$ Centre of the circle is (–2, 3) and radius is 2.
$\therefore$ It x + y = c is tangent to circle distance of centre (–2, 3) from x + y = c will be 2 units.

$$\therefore \left|\frac{-2+3-c}{\sqrt{1^2+1^2}}\right| = 2$$

$$\Rightarrow \left|\frac{1-c}{\sqrt{2}}\right| = 2$$

$$\therefore \frac{1-c}{\sqrt{2}} = \pm 2$$

$\Rightarrow c = 1 \pm 2\sqrt{2}$.

$$\left[\because \text{Distance of a point } (x,y) \text{ from the line } ax + by + c = 0 \text{ is given by } d = \left|\frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^5}}\right|\right]$$

57. C Let $y = \frac{x}{1+x^2}$
$y + x^2y = x$
$\Rightarrow x^2y - x + y = 0$
$\because$ x is real
$\therefore (-1)^2 - 4y^2 \geq 0$

$$\Rightarrow 1 - 4y^2 \geq 0 \Rightarrow (1-2y)(1+2y) \geq 0$$

$$\Rightarrow -\frac{1}{2} \leq y \leq \frac{1}{2}$$

$$\therefore y = \left[-\frac{1}{2}, \frac{1}{2}\right].$$

58. B Let the roots are α and 3α

$$\therefore \alpha \times 3\alpha = 27$$

$$\Rightarrow 3\alpha^2 = 27$$

$\therefore \alpha = \pm 3$
Now,
$\alpha + 3\alpha = -4(m - 2)$

$$\Rightarrow 4\alpha = -4(m - 2)$$

For $\alpha = +3$	For $\alpha = -3$
$-4(m - 2) = +12$	$-4(m - 2) = -12$
$\Rightarrow m - 2 = -3$	$\therefore m - 2 = 3$
$m = -1$	$m = 5$.

59. A f(x) = f(x –1) + f(x –2)
f(0) = 1 f(1) = 1
f(2) = f(1) + f(0) = 1 + 1 = 2
f(3) = f(2) + f(1) = 2 + 1 = 3
f(4) = f(3) + f(2) = 3 + 2 = 5
f(5) = f(4) + f(3) = 5 + 3 = 8
f(6) = f(5) + f(4) = 8 + 5 = 13
f(7) = f(6) + f(5) = 13 + 8 = 21
(fof)5 = f(8) = f(7) + f(6) = 21 + 13 = 34.

60. B For one-one
If $f(x_1) = f(x_2)$ then $x_1 = x_2$
Let $\sin \pi x_1 = \sin \pi x_2$
It does not imply that $x_1 = x_2$
(Because $\sin \pi = \sin 2\pi = 0$)
$\therefore$ f is not one-one.
For onto
For every value of $\sin \pi x \in [-1, 1]$ there will exist a pre image in it's domain.
$\therefore$ f is onto function.

61. D $f(x) = |x - 3|$

$$\therefore f(x) = \begin{cases} 3-x; & x \le 3 \\ x-3; & x > 3 \end{cases}$$

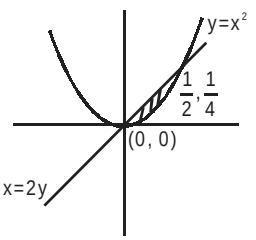
$$\therefore \int_1^4 |x-3|dx = \int_1^3 (3-x)dx + \int_3^4 (x-3)dx$$

$$= \left[3x - \frac{x^2}{2}\right]_1^3 + \left[\frac{x^2}{2} - 3x\right]_3^4$$

$$= \left[\left(9 - \frac{9}{2}\right) - \left(3 - \frac{1}{2}\right)\right] + \left[\left(\frac{4^2}{2} - 12\right) - \left(\frac{9}{2} - 9\right)\right]$$

$$= 2 + \frac{1}{2} = \frac{5}{2}.$$

62. A



The points of intersection of the curves $y = x^2$ and $2y = x$ are $(0,0)$ and $\left(\frac{1}{2}, \frac{1}{4}\right)$

$$\left[\because y = x^2 \Rightarrow y = (2y)^2 \Rightarrow 4y^2 - y = 0 \Rightarrow y = 0, \frac{1}{4}\right]$$

Area enclosed is shown by shaded region.

$$\therefore \text{Area} = \int_0^{\frac{1}{2}} (y_1 - y_2)dx$$

$$= \int_0^{\frac{1}{2}} \left(\frac{x}{2} - x^2\right)dx$$

$$= \left[\frac{x^2}{4} - \frac{x^3}{3}\right]_0^{\frac{1}{2}}$$

$$= \frac{1}{16} - \frac{1}{24} = \frac{1}{48} \text{ square units.}$$

63. C $\begin{bmatrix}1 & k\end{bmatrix}\begin{bmatrix}3k & +4 \\ -2 & 1\end{bmatrix}\begin{bmatrix}1 \\ k\end{bmatrix} = 11$

$$\Rightarrow \begin{bmatrix}3k - 2k & 4 + k\end{bmatrix}\begin{bmatrix}1 \\ k\end{bmatrix} = 11$$

$$\Rightarrow 3k - 2k + 4k + k^2 = 11$$

$$\Rightarrow k^2 + 5k - 11 = 0$$

It is a quadratic equation with positive discriminant. Hence, there are two real value of k will exist.

64. B Let T_{r+1} contain x^4 is the expansion of $\left(\frac{x}{2} - \frac{3}{x}\right)^{10}$

$$T_{r+1} = {}^{10}C_r \left(\frac{x}{2}\right)^{10-r} \left(\frac{-3}{x}\right)^r$$

$$= {}^{10}C_r \left(\frac{1}{2}\right)^{10-r} \times (-3)^r . x^{10-r} . x^{-r}$$

Putting $10 - 2r = 4$, we get $r = 3$

$$\therefore T_{3+1} = {}^{10}C_3 \left(\frac{1}{2}\right)^7 . (-3) \times x^4$$

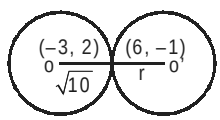
$$= 120 \times \frac{1}{128} \times -27x^4$$

$$= -\frac{405}{16}x^4$$

$$\therefore \text{Co-efficient of } x^4 = \frac{-405}{16}.$$

65. C The centre and the radius of the circle $(x + 3)^2 + (4 - 2)^2 = 10$ are $(-3, 2)$ and $\sqrt{10}$ respectively.

The centre and the radius of the circle $(x - 6)^2 + (4 + 1)^2 = r^2$ are $(6, -1)$ and r respectively.



Now

$$OO' = \sqrt{10} + r$$

$$\Rightarrow \sqrt{(6+3)^2 + (2+1)^2} = \sqrt{10} + r$$

$$\Rightarrow 3\sqrt{10} = \sqrt{10} + r$$

$$\therefore r = 2\sqrt{10} \quad \therefore r^2 = 40.$$

66. D A = Event that 2 has appeared at least once

$$\therefore A = \{(2,1)(2,2)(2,3)(2,4)(2,5)(2,6)(1,2)(3,2)(4,2)(5,2)(6,2)\}$$

$$\therefore P(A) = \frac{11}{36}$$

B = Event that sum is 7.

B = {(1, 6)(2, 5)(3, 4)(4, 3)(5, 2)(6, 1)}

$$\therefore P(B) = \frac{6}{36}$$

$(A \cap B) = \{(2,5),(5,2)\}$

$P(A \cap B) = \frac{2}{36}$

$\therefore P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{2}{36}}{\frac{6}{36}} = \frac{1}{3}$.

67. A $f(x) = 2x + 1$

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

$\therefore f^{-1}(x) = \frac{x-1}{2}$

Similarly $g^{-1}(x) = 3x$

$\therefore (f^{-1}og^{-1})(x) = \frac{g^{-1}(x)-1}{2} = \frac{3x-1}{2}$.

68. B All possibles rational numbers are

$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{2}{3}, \frac{2}{4}, \frac{2}{5}, \frac{2}{6}, \frac{3}{4}, \frac{3}{5}, \frac{3}{6}, \frac{4}{5}, \frac{4}{6}, \frac{5}{6}$.

However $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$, $\frac{1}{3} = \frac{2}{6}$ and $\frac{2}{3} = \frac{4}{6}$.

These three numbers are counted more than once.
Hence, number of distinct rational numbers = 15 – 4 = 11

69. B Let $3^{\frac{1}{3}} = x$

$\therefore \frac{4}{9^{1/3} - 3^{1/3} + 1} = \frac{4}{x^2 - x + 1}$

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

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

$= \frac{4\left(3^{1/3} + 1\right)}{\left(3^{1/3}\right)^3 + 1}$

$= \frac{4\left(3^{1/3} + 1\right)}{4}$

$= 3^{1/3} + 1$

70. C Let $\cos^{-1}\frac{1}{8} = \theta$

$\therefore \cos\theta = \frac{1}{8}$

$\therefore \sin\left(\frac{1}{2}\cos^{-1}\frac{1}{8}\right) = \sin\frac{\theta}{2}$

Now

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

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

$= 1 - \frac{1}{8} = \frac{7}{8}$

$\therefore \sin^2\frac{\theta}{2} = \frac{7}{16}$

$\therefore \sin\frac{\theta}{2} = \frac{\sqrt{7}}{4}$.

71. D Decrease in excise duty = 30%

$\therefore$ Percentage increase in consumption so that revenue of government is unchanged

$= \frac{30}{100 - 30} \times 100$

$= 42\frac{6}{7}\%$.

72. B Let number of housed boys = x
Let number of housed girls = 55 – x
$\therefore$ Number of adopted children

$= \frac{x}{4} + \frac{55 - x}{5}$

$= \frac{x + 220}{20} = \frac{x}{20} + 11$

Now there are two possible value of x, which are 20 and 40, for which number of adopted children will be integer.
For x = 40, the number of adopted children will be maximum which is $\frac{40}{20} + 11 = 13$.

73. B The first stake does not need any space. Hence, what ever be the number of stakes, number of spaces between the first and the last stake will be one less than total number of stakes.
$\therefore$ In first 20 stakes there will be 19 spaces.

$\therefore$ Length of each space = $\frac{57}{19} = 3$ m

and in another 20 stakes there will be 20 spaces.
$\therefore$ Length of row of stakes = 57 + 20 × 3 = 117 m.

For questions 74 to 76: The given information can be tabulated as

Position of house from left to right	Ist	IInd	IIIrd	IVth
Houses	-	Blue	Red	White
Nationalities	Norwegian	Italian	Englishmen	Spaniard
Drinks		Tea	Milk	Fruit Juice

74. B 75. B 76. D

77. C Step 1 : X = 6, Y = 3
Step 2 : X = 18, Y = 4
Step 3 : X = 72, Y = 5
Step 4 : X = 360, Y = 6
After 4th steps X = 360 > 100, so machine will stop.

78. D

79. C

80. D If N = 500, the machine will perform one more step.
Taking X = 360, Y = 6
$\therefore$ Final value of X = 360 × 6 = 2160.

81. A The given relation is $a \Rightarrow a^3 - a^2$

$13 \Rightarrow 13^3 - 13^2 = 2028$

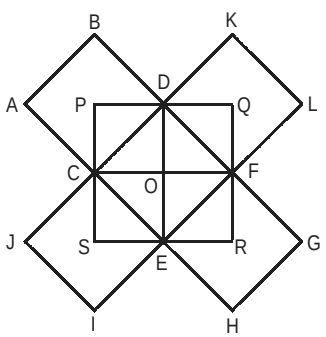
$\therefore 8 \Rightarrow 8^3 - 8^2 = 448$.

Note: This question was found to have some problem units answer choice. DU decided to remove this question during evaluation.

82. D $7 \Rightarrow 7 \times (7+4) = 77$

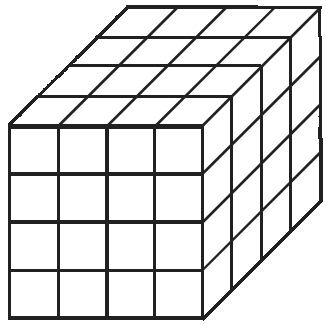
$\therefore 11 \Rightarrow 11 \times (11+4) = 165$.

83. A



(I) ABCD, CDFE, EFGH, CEIJ, DFLK, OCPD, ODQF, OFRE, OESC = 9
(II) ABGH, IJKL, PQRS = 3
(III) ABFE, CDGH, JIFD, CEKL, PDSE, PCQF, DERQ, CFRS = 8
$\therefore$ Total no. of rectangles = 9 + 3 + 8 = 20.

For question 84 to 86:



84. C If a colored cube is a divided into n^3 parts, then cubes from the innner most core of the original cubes will not have any color on any of it faces and numbers of such small cubes is $(n-2)^3$.
Number of cubes which have no face painted
$= (4-2) \times (4-2) \times (4-2) = 8$.

85. B Since two faces are painted by blue colour, therefore total number of one face painted cubes by blue colour will be $2\{(4-2) \times (4-2)\}$ i.e., 8.

86. C As shown in the figure, top and bottom faces are painted by green colour and cubes along edges (including corners) of these faces are painted by two or more colours, where one colour is green and remaining is/are either blue or black.
Therefore required number of cubes = 2 × 12 = 24.

87. B Using statement I alone average age of employee cannot be determined.
Using statement II alone, we get
Let number of executive employee be x, and number of non-executive employee be 20x

$\therefore$ Average age $= \dfrac{x \times 50 + 20x \times 30}{x + 20x}$

$= \dfrac{650x}{21x} = \dfrac{650}{21}$ years

Hence, statement II alone is sufficient.

88. C Using statement I alone, we get
D < A, C
So, it is not sufficient.
Using statement II alone, we get
E < B < D
It is not sufficient.
Combining both,
E < B < D < A, C
$\Rightarrow$ E is youngest.
Hence, both the statements taken together are sufficient.

89. D Let Peter's age be x years.
∴ Sanya's age = 2x years.
Using statement I alone, we get

$2x - 4 = 3(x - 4)$

$\Rightarrow x = 8$

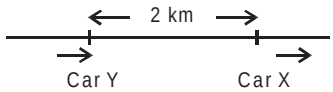
∴ Sanya's age = 16 years
Hence statement I alone is sufficient.
Using statement II alone, we get

$2x + 8 = 1.5(x + 8)$

$\Rightarrow 0.5x = 4$

x = 8 years
Sanya's age = 16 years
Hence, each statement alone is sufficient.

90. D



Using statement I alone, we get
Relative speed = (45 – 30) = 15 km/hr
Distance = 4 – 2 = 2 km

Time $= \frac{2}{15}$hr

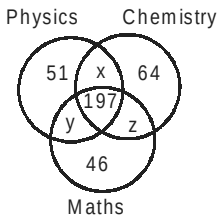
Statement I alone is sufficient.
Using statement II alone, we get

6 minutes ago car X was $\frac{1}{2}$ km ahead of car Y.

At present car X is 2 km ahead of car Y.

∴ $1\frac{1}{2}$ km difference of distance is created in 6 minutes.
∴ 4 km difference of distance will be created in 16 minutes.
Hence, each statement alone is sufficient.

For questions 91 to 93:



Failed in all subject = 70
∴ Passed in atleast one subject = 468 – 70 = 398

∴ $x + y + 2 + 51 + 64 + 46 + 197 = 398$

$\Rightarrow x + y + z = 40$

91. C Now failed in Chemistry = 51 + y + 46 + 70 = 170

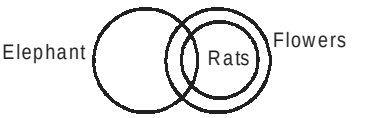
$\Rightarrow y = 3$

∴ Failed in Chemistry only = 3

92. A Failed in one subject only means passed in only two subjects = $x + y + z = 40$

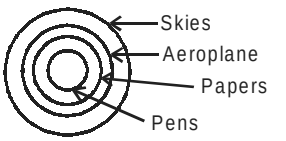
93. B Total number of studetns = 468
Number of students failed in all subject = 70
∴ Passed in atleast one subject = 468 – 70 = 398.

94. A



Only statement I follows.

95. C



Statement I and IV follows.

96. C The candidate satisfies criteria 1,2,and 3 but can pay only a little more than half of the applicable deposit amount. Thus according to the criteria 8, the candidate should be referred to the manager.

97. C The candidate satisfies criteria 1,2 and according to the criteria 9, his case may be referred to the manager.

98. D The candidate satisfies criteria 1 and 3 but not criteria 2 as his age is little more than twenty five years. Thus he is not selected.

99. C Maximum number of groups that can be formed is greatest common divisor of 36 and 45, which is 9. Hence, maximum number of groups that can be formed = 9.

100. A Only BEA is a logically correct option. All birds lay eggs talks about a property of the general category birds. Since ostrich belongs to that category according to the statement, BEA follows.