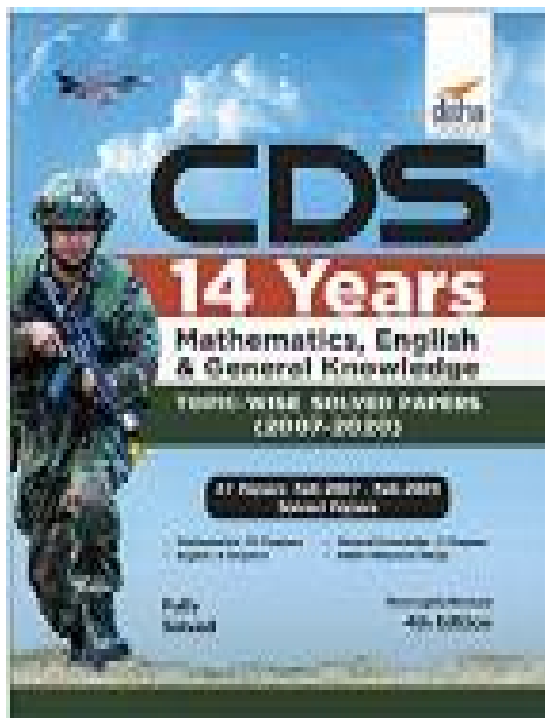


CDS Solved Paper 2020

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ISBN : 9789389986389

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COMBINED DEFENCE SERVICES (CDS) EXAMINATION SOLVED PAPER 2020-I

(Held on Feb. 2020)

MATHEMATICS

- The number $2 \times 3 \times 5 \times 7 \times 11 + 1$
 - a prime number
 - not a prime, but power of a prime
 - not a power of a prime, but a composite even number
 - not a power of a prime, but a composite odd number
- Two unequal pairs of numbers satisfy the following conditions :
 - The product of the two numbers in each pair is 2160.
 - The HCF of the two numbers in each pair is 12.
 If x is the mean of the numbers in the first pair and y is the mean of the numbers in the second pair, then what is the mean of x and y ?
 - 60
 - 72
 - 75
 - 78
- How many digits are there in $(54)^{10}$?
(Given that $\log_{10} 2 = 0.301$ and $\log_{10} 3 = 0.477$)
 - 16
 - 18
 - 19
 - 27
- Which one of the following is a set of solutions of the equation $x^{\sqrt{x}} = \sqrt[n]{x^x}$, if n is a positive integer?
 - $\{1, n^2\}$
 - $\{1, \sqrt{n}\}$
 - $\{1, n\}$
 - $\{n, n^2\}$
- In a competitive examination, 250 students have registered. Out of these, 50 students have registered for Physics, 75 students for Mathematics and 35 students for both Mathematics and Physics. What is the number of students who have registered neither for Physics nor for Mathematics?
 - 90
 - 100
 - 150
 - 160
- If the sum of the digits of a number $10^n - 1$, where n is a natural number, is equal to 3798, then what is the value of n ?
 - 421
 - 422
 - 423
 - 424
- Which one of the following is the largest number among 2222^2 , 222^{22} , 22^{222} , 2^{2222} ?
 - 2^{2222}
 - 22^{222}
 - 222^{22}
 - 2222^2
- If m is the number of prime numbers between 0 and 50; and n is the number of prime numbers between 50 and 100, then what is $(m - n)$ equal to ?
 - 4
 - 5
 - 6
 - 7
- If $\frac{a}{b} = \frac{1}{3}$, $\frac{b}{c} = 2$, $\frac{c}{d} = \frac{1}{2}$, $\frac{d}{e} = 3$ and $\frac{e}{f} = \frac{1}{4}$, then what is the value of $\frac{abc}{def}$?
 - $\frac{1}{4}$
 - $\frac{3}{4}$
 - $\frac{3}{8}$
 - $\frac{27}{4}$
- Which one of the following is the largest divisor of $3^x + 3^{x+1} + 3^{x+2}$, if x is any natural number?
 - 3
 - 13
 - 39
 - 117
- A two-digit number is 9 more than four times of the number obtained by interchanging its digits. If the product of digits in the two-digit number is 8, then what is the number?
 - 81
 - 42
 - 24
 - 18
- If α and β are the roots of the quadratic equation $x^2 + kx - 15 = 0$ such that $\alpha - \beta = 8$, then what is the positive value of k ?
 - 2
 - 3
 - 4
 - 5
- What are the values of p and q respectively, if $(x - 1)$ and $(x + 2)$ divide the polynomial $x^3 + 4x^2 + px + q$?
 - 1, -6
 - 2, -6
 - 1, 6
 - 2, 6
- If $(x + k)$ is the HCF of $x^2 + 5x + 6$ and $x^2 + 8x + 15$, then what is the value of k ?
 - 5
 - 3
 - 2
 - 1
- If $5^{x+1} - 5^{x-1} = 600$, then what is the value of 10^{2x} ?
 - 1
 - 1000
 - 100000
 - 1000000
- A number divides 12288, 28200 and 44333 so as to leave the same remainder in each case. What is that number ?
 - 272
 - 232
 - 221
 - 120
- If $x^2 + 9y^2 = 6xy$, then what is $y : x$ equal to ?
 - 1 : 3
 - 1 : 2
 - 2 : 1
 - 3 : 1
- If m and n are positive integers such that $m^n = 1331$, then what is the value of $(m - 1)^{n-1}$?
 - 1
 - 100
 - 121
 - 125
- What is $\frac{1}{a^{m-n} - 1} + \frac{1}{a^{n-m} - 1}$ equal to ?
 - 1
 - 1
 - 0
 - $2a^{m-n}$

20. If $x = \sqrt{2}$, $y = \sqrt[3]{3}$ and $z = \sqrt[6]{6}$, then which one of the following is correct ?
 (a) $y < x < z$ (b) $z < x < y$
 (c) $z < y < x$ (d) $x < y < z$
21. If $\log x = 1.2500$ and $y = x^{\log x}$, then what is $\log y$ equal to ?
 (a) 4.2500 (b) 2.5625
 (c) 1.5625 (d) 1.2500
22. If $f(x)$ is divided by $(x - \alpha)(x - \beta)$ where $\alpha \neq \beta$, then what is the remainder ?
 (a) $\frac{(x - \alpha)f(\alpha) - (x - \beta)f(\beta)}{\alpha - \beta}$
 (b) $\frac{(x - \alpha)f(\beta) - (x - \beta)f(\alpha)}{\alpha - \beta}$
 (c) $\frac{(x - \beta)f(\alpha) - (x - \alpha)f(\beta)}{\alpha - \beta}$
 (d) $\frac{(x - \beta)f(\beta) - (x - \alpha)f(\alpha)}{\alpha - \beta}$
23. If the area of a square is $2401x^4 + 196x^2 + 4$, then what is its side length ?
 (a) $49x^2 + 3x + 2$ (b) $49x^2 - 3x + 2$
 (c) $49x^2 + 2$ (d) $59x^2 + 2$
24. If x varies as yz , then y varies inversely as
 (a) xz (b) $\frac{x}{z}$ (c) $\frac{z}{x}$ (d) $\frac{1}{(xz)}$
25. If the points P and Q represent real numbers $0.\overline{73}$ and $0.5\overline{6}$ on the number line, then what is the distance between P and Q ?
 (a) $\frac{1}{6}$ (b) $\frac{1}{5}$ (c) $\frac{16}{45}$ (d) $\frac{11}{90}$
26. What is the point on the xy -plane satisfying $5x + 2y = 7xy$ and $10x + 3y = 8xy$?
 (a) $\left(-1, \frac{1}{6}\right)$ (b) $\left(\frac{1}{6}, -1\right)$
 (c) $\left(1, \frac{1}{6}\right)$ (d) $\left(-\frac{1}{6}, -1\right)$
27. The price of an article X increases by 20% every year and price of article Y increases by 10% every year. In the year 2010, the price of article X was ₹5000 and price of article Y was ₹2000. In which year the difference in their prices exceeded ₹5000 for the first time ?
 (a) 2012 (b) 2013 (c) 2014 (d) 2015
28. The ratio of speeds of X and Y is 5 : 6. If Y allows X a start of 70 m in a 1.2 km race, then who will win the race and by what distance ?
 (a) X wins the race by 30 m
 (b) Y wins the race by 90 m
 (c) Y wins the race by 130 m
 (d) The race finishes in a dead heat
29. A train takes two hours less for a journey of 300 km if its speed is increased by 5 km/hr from its usual speed. What is its usual speed ?
 (a) 50 km/hr (b) 40 km/hr
 (c) 35 km/hr (d) 25 km/hr
30. If 6 men and 8 women can do a piece of work in 10 days; and 13 men and 24 women can do the same work in 4 days, then what is the ratio of daily work done by a man to that of a woman ?
 (a) 2 : 1 (b) 1 : 2
 (c) 4 : 3 (d) 3 : 4
31. Students of a class are made to sit in rows of equal number of chairs. If number of students is increased by 2 in each row, then the number of rows decreases by 3. If number of students is increased by 4 in each row, then the number of rows decreases by 5. What is the number of students in the class ?
 (a) 100 (b) 105
 (c) 110 (d) 120
32. A sum was put at simple interest at certain rate for 2 years. Had it been put at 1% higher rate of interest, it would have fetched ₹24 more. What is the sum ?
 (a) ₹500 (b) ₹600
 (c) ₹800 (d) ₹1200
33. The population of two villages is 1525 and 2600 respectively. If the ratio of male to female population in the first village is 27 : 34 and the ratio of male to female population in the second village is 6 : 7, then what is the ratio of male to female population of these two villages taken together?
 (a) $\frac{33}{41}$ (b) $\frac{85}{82}$ (c) $\frac{71}{90}$ (d) $\frac{5}{6}$
34. In a class room the ratio of number of girls to that of boys is 3 : 4. The average height of students in the class is 4.6 feet. If the average height of the boys in the class is 4.8 feet, then what is the average height of the girls in the class ?
 (a) Less than 4.2 feet
 (b) More than 4.2 feet but less than 4.3 feet
 (c) More than 4.3 feet but less than 4.4 feet
 (d) More than 4.4 feet but less than 4.5 feet
35. What is the median of the data 3, 5, 9, 4, 6, 11, 18 ?
 (a) 6 (b) 6.5
 (c) 7 (d) 7.5
36. In a pi-diagram there are three sectors. If the ratio of the angles of the sectors is 1 : 2 : 3, then what is the angle of the largest sector?
 (a) 200° (b) 180°
 (c) 150° (d) 120°
37. The maximum marks in a Test are converted from 250 to 50 for the purpose of an Internal Assessment. The highest marks scored were 170 and lowest marks were 70. What is the difference between the maximum and minimum marks scored in the Internal Assessment ?
 (a) 15 (b) 17
 (c) 20 (d) 24

DIRECTIONS: for the following three (03) items:

Read the following information and answer the *three* items that follow :

The following data presents count of released convicts who have served prison terms (X), those who have received some educational or technical training during their term (Y) and those who were offered Company placement (Z) respectively, from six different jails A, B, C, D, E and F, in the year 2010.

	X	Y	Z
A	86	45	25
B	1305	903	461
C	2019	940	474
D	1166	869	416
E	954	544	254
F	1198	464	174

38. Jails with highest and smallest percentage of trained convicts are respectively.

- (a) F and D (b) D and F
(c) C and A (d) D and A

39. Jail with highest placement rate of trained convicts is

- (a) F (b) D (c) B (d) A

40. Jails from which more than half of the trained convicts are offered jobs, are

- (a) A, B and C (b) A, B and D
(c) A, D and E (d) A, E and F

41. The number of three digit numbers (all digits are different) which are divisible by 7 and also divisible by 7 on reversing the order of the digits, is

- (a) Six (b) Five (c) Four (d) Three

42. How many integral values of x and y satisfy the equation $5x + 9y = 7$, where $-500 < x < 500$ and $-500 < y < 500$?

- (a) 110 (b) 111
(c) 112 (d) None of the above

43. Let XYZ be a 3-digit number. Let $S = XYZ + YZX + ZXY$. Which of the following statements is/are correct?

1. S is always divisible by 3 and $(X + Y + Z)$
2. S is always divisible by 9
3. S is always divisible by 37

Select the correct answer using the code given below:

- (a) 1 only (b) 2 only
(c) 1 and 2 (d) 1 and 3

44. In covering certain distance, the average speeds of X and Y are in the ratio 4 : 5. If X takes 45 minutes more than Y to reach the destination, then what is the time taken by Y to each the destination?

- (a) 135 mmminutes (b) 150 minutes
(c) 180 minutes (d) 225 minutes

45. For two observations, the sum is S and product is P . What is the harmonic mean of these two observations?

- (a) $\frac{2S}{P}$ (b) $\frac{S}{(2P)}$ (c) $\frac{2P}{S}$ (d) $\frac{P}{(2S)}$

46. If the annual income of X is 20% more than that of Y , then the income of Y is less than that of X by $p\%$. What is the value of p ?

- (a) 10 (b) $16\frac{2}{3}$ (c) $17\frac{1}{3}$ (d) 20

47. What is the least perfect square which is divisible by 3, 4, 5, 6 and 7?

- (a) 1764 (b) 17640 (c) 44100 (d) 176400

48. In a water tank there are two outlets. It takes 20 minutes to empty the tank if both the outlets are opened. If the first outlet is opened, the tank is emptied in 30 minutes. What is the time taken to empty the tank by second outlet?

- (a) 30 minutes (b) 40 minutes
(c) 50 minutes (d) 60 minutes

49. If $(x^2 - 1)$ is a factor of $ax^4 + bx^3 + cx^2 + dx + e$, then which one of the following is correct?

- (a) $a + b + c = d + e$ (b) $a + b + e = c + d$
(c) $b + c + d = a + e$ (d) $a + c + e = b + d$

50. If $\left(x^8 + \frac{1}{x^8}\right) = 47$, what is the value of $\left(x^6 + \frac{1}{x^6}\right)$?

- (a) 36 (b) 27 (c) 18 (d) 9

51. A wheel makes 360 revolutions in one minute. What is the number of radians it turns in one second?

- (a) 4π (b) 6π (c) 12π (d) 16π

52. What is the least value of $(25 \operatorname{cosec}^2 x + \sec^2 x)$?

- (a) 40 (b) 36 (c) 26 (d) 24

53. Let $0 < \theta < 90^\circ$ and $100\theta = 90^\circ$. If $\alpha = \prod_{n=1}^{99} \cot n\theta$, then which one of the following is correct?

- (a) $\alpha = 1$ (b) $\alpha = 0$ (c) $\alpha > 1$ (d) $0 < \alpha < 1$

54. If $\tan 6\theta = \cot 2\theta$, where $0 < 6\theta < \frac{\pi}{2}$, then what is the value of $\sec 4\theta$?

- (a) $\sqrt{2}$ (b) 2 (c) $\frac{2}{\sqrt{3}}$ (d) $\frac{4}{3}$

55. A tree of height 15 m is broken by wind in such a way that its top touches the ground and makes an angle 30° with the ground. What is the height from the ground to the point where tree is broken?

- (a) 10m (b) 7m (c) 5m (d) 3m

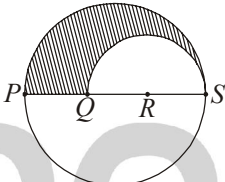
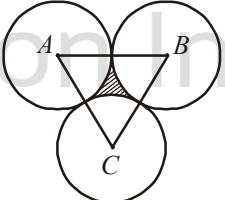
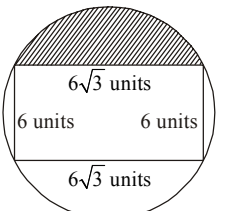
56. On a plane area there are two vertical towers separated by 100 feet apart. The shorter tower is 40 feet tall. A pole of length 6 feet stands on the line joining the base of two towers so that the tip of the towers and tip of the pole are also on the same line. If the distance of the pole from the shorter tower is 75 feet, then what is the height of the taller tower (approximately)?

- (a) 85 feet (b) 110 feet
(c) 125 feet (d) 140 feet

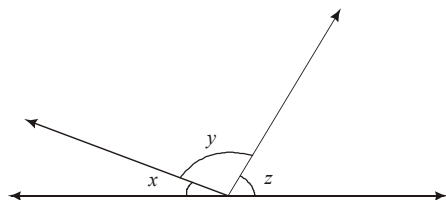
57. The angles of elevation of the top of a tower from two points at distances p and q from the base and on the same straight line are 27° and 63° respectively. What is the height of the tower?

- (a) pq (b) $\sqrt{pq}$ (c) $\frac{pq}{2}$ (d) $\frac{\sqrt{pq}}{2}$

58. What is the value of $\sin^2 6^\circ + \sin^2 12^\circ + \sin^2 18^\circ + \dots + \sin^2 84^\circ + \sin^2 90^\circ$?
 (a) 1 (b) 2 (c) 4 (d) 8
59. What is $\frac{\cos \theta}{1 + \sin \theta} + \frac{1}{\cot \theta}$ equal to?
 (a) cosec θ (b) sec θ
 (c) sec $\theta + \text{cosec } \theta$ (d) cosec $\theta - \cot \theta$
60. What is $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} - \frac{\sin \theta + 1}{\cos \theta}$ equal to?
 (a) 0 (b) 1 (c) $2 \sin \theta$ (d) $2 \cos \theta$
61. What is $(\tan x + \tan y)(1 - \cot x \cot y) + (\cot x + \cot y)(1 - \tan x \tan y)$ equal to?
 (a) 0 (b) 1 (c) 2 (d) 4
62. What is $\sqrt{\frac{\sec x - \tan x}{\sec x + \tan x}}$ equal to ?
 (a) $\frac{1}{\sin x + \cos x}$ (b) $\frac{1}{\tan x + \cot x}$
 (c) $\frac{1}{\sec x + \tan x}$ (d) $\frac{1}{\text{cosec } x + \cot x}$
63. If θ lies in the first quadrant and $\cot \theta = \frac{63}{16}$, then what is the value of $(\sin \theta + \cos \theta)$?
 (a) 1 (b) $\frac{69}{65}$ (c) $\frac{79}{65}$ (d) 2
64. What is the value of $\frac{1 - 2 \sin^2 \theta \cos^2 \theta}{\sin^4 \theta + \cos^4 \theta} + 4$ equal to?
 (a) 0 (b) 1 (c) 2 (d) 5
65. A rectangle is 48 cm long and 14 cm wide. If the diagonal makes an angle θ with the longer side, then what is $(\sec \theta + \text{cosec } \theta)$ equal to?
 (a) $\frac{775}{168}$ (b) $\frac{725}{168}$ (c) $\frac{375}{84}$ (d) $\frac{325}{84}$
66. What is the area of the triangle having side lengths $\frac{y}{z} + \frac{z}{x}, \frac{z}{x} + \frac{x}{y}, \frac{x}{y} + \frac{y}{z}$?
 (a) $\frac{(x + y + z)^2}{xyz}$ (b) $\frac{\sqrt{xyz}}{x + y + z}$
 (c) $\sqrt{\frac{x}{y} + \frac{y}{z} + \frac{z}{x}}$ (d) $\sqrt{\frac{xy + yz + zx}{xyz}}$
67. If the angles of a triangle are 30° and 45° and the included side is $(\sqrt{3} + 1)$ cm, then what is the area of the triangle ?
 (a) $(\sqrt{3} + 1) \text{ cm}^2$ (b) $(\sqrt{3} + 3) \text{ cm}^2$
 (c) $\frac{1}{2}(\sqrt{3} + 1) \text{ cm}^2$ (d) $2(\sqrt{3} + 1) \text{ cm}^2$
68. $ABCD$ is a plate in the shape of a parallelogram. EF is the line parallel to DA and passing through the point of intersection O of the diagonals AC and BD . Further, E lies on DC and F lies on AB . The triangular portion DOE is cut out from the plate $ABCD$. What is the ratio of area of remaining portion of the plate to the whole?
 (a) $\frac{5}{8}$ (b) $\frac{5}{7}$
 (c) $\frac{3}{4}$ (d) $\frac{7}{8}$
69. Two circles of radii 20 cm and 16 cm intersect and the length of common chord is 24 cm. If d is the distance between their centres, then which one of the following is correct ?
 (a) $d < 26$ cm (b) $26 \text{ cm} < d < 27$ cm
 (c) $27 \text{ cm} < d < 28$ cm (d) $d > 28$ cm
70. In a circle of radius 5 cm, AB and AC are two chords such that $AB = AC = 8$ cm. What is the length of chord BC ?
 (a) 9 cm (b) 9.2 cm
 (c) 9.6 cm (d) 9.8 cm
71. Two circles touch internally. The sum of their areas is $136\pi \text{ cm}^2$ and distance between their centres is 4 cm. What are the radii of the circles ?
 (a) 11 cm, 7 cm (b) 10 cm, 6 cm
 (c) 9 cm, 5 cm (d) 8 cm, 4 cm
72. If area of a circle and a square are same, then what is the ratio of their perimeters ?
 (a) $2\sqrt{\pi}$ (b) $\sqrt{\pi}$
 (c) $\frac{\sqrt{\pi}}{2}$ (d) $\frac{\sqrt{\pi}}{4}$
73. A circle of diameter 8 cm is placed in such a manner that it touches two perpendicular lines. Then another smaller circle is placed in the gap such that it touches the lines and the circle. What is the diameter of the smaller circle ?
 (a) $4(3 - \sqrt{2})$ cm (b) $4(3 - 2\sqrt{2})$ cm
 (c) $8(3 - \sqrt{2})$ cm (d) $8(3 - 2\sqrt{2})$ cm
74. The thickness of a cylinder is 1 foot, the inner radius of the cylinder is 3 feet and height is 7 feet. To paint the inner surface it requires one litre of a particular colour. How much quantity of the same colour is required to paint all the surfaces of the cylinder ?
 (a) $\frac{7}{3}$ litre (b) $\frac{3}{2}$ litre
 (c) $\frac{8}{3}$ litre (d) $\frac{10}{3}$ litre
75. A square and a rectangle have equal areas. If one side of the rectangle is of length numerically equal to the square of the length of the side of the square then the other side of the rectangle is
 (a) square root of the side of the square
 (b) half the side of the square
 (c) of unit length
 (d) double the side of the square

76. The length and breadth of a rectangle are in the ratio 4:3. Then what is the ratio of the area of the triangle formed by the parts of the diagonals with a long side to the area of the triangle formed by the parts of diagonals with a short side?
(a) 3:4 (b) 4:3 (c) 16:9 (d) 1:1
77. Suppose a region is formed by removing a sector of 20° from a circular region of radius 30 feet. What is the area of this new region?
(a) 150π square feet (b) 550π square feet
(c) 650π square feet (d) 850π square feet
78. $ABCD$ is a parallelogram where AC and BD are the diagonals. If $\angle BAD = 60^\circ$, $\angle ADB = 90^\circ$, then what is BD^2 equal to?
(a) $\frac{3}{5} AB^2$ (b) $\frac{3}{4} AB^2$ (c) $\frac{1}{2} AB^2$ (d) $\frac{2}{3} AB^2$
79. A line through the vertex A of a parallelogram $ABCD$ meets DC in P and BC produced in Q . If P is the mid-point of DC , then which of the following is/are correct?
1. Area of $\triangle PDA$ is equal to that of $\triangle PCQ$
2. Area of $\triangle QAB$ is equal to twice that of $\triangle PCQ$ Select the correct answer using the code given below:
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2
80. How many cubic metre of earth is to be dug out to dig a well of radius 1.4 m and depth 5m?
(a) 30.2 cubic metre (b) 30.4 cubic metre
(c) 30.6 cubic metre (d) 30.8 cubic metre
81. If the diagonals of a rhombus are x and y , then what is its area?
(a) $\frac{xy}{2}$ (b) $\frac{xy}{4}$
(c) xy (d) $x^2 - y^2$
82. The lengths of sides of a triangle are $3x$, $4\sqrt{y}$, $5\sqrt{z}$, where $3x < 4\sqrt{y} < 5\sqrt{z}$. If one of the angles is 90° , then what are the minimum integral values of x , y , z respectively?
(a) 1, 2, 3 (b) 2, 3, 4
(c) 1, 1, 1 (d) 3, 4, 5
83. What is the maximum number of circum-circles that a triangle can have?
(a) 1 (b) 2 (c) 3 (d) Infinite
84. If an arc of a circle of radius 6 cm subtends a central angle measuring 30° , then which one of the following is an approximate length of the arc?
(a) 3.14 cm (b) 2.15 cm
(c) 2.14 cm (d) 2 cm
85. A ladder 5 m long is placed in a room so as to reach a point 4.8 m high on a wall and on turning the ladder over to the opposite side of the wall without moving the base, it reaches a point 1.4 m high. What is the breadth of the room?
(a) 5.8m (b) 6m (c) 6.2m (d) 7.5m
86. What is the area of the largest square plate cut from a circular disk of radius one unit?
(a) 4 square units (b) $2\sqrt{2}$ square units
(c) π square units (d) 2 square units
87. Out of 4 identical balls of radius r , 3 balls are placed on a plane such that each ball touches the other two balls. The 4th ball is placed on them such that this ball touches all the three balls. What is the distance of centre of 4th ball from the plane?
(a) $2\frac{\sqrt{2}}{3}r$ unit (b) $\frac{\sqrt{3}+2\sqrt{2}}{\sqrt{2}}r$ unit
(c) $\frac{r}{3-2\sqrt{2}}$ unit (d) $\frac{\sqrt{3}+2\sqrt{2}}{\sqrt{3}}r$ unit
88. A right circular cylinder just encloses a sphere. If p is the surface area of the sphere and q is the curved surface area of the cylinder, then which one of the following is correct?
(a) $P = q$ (b) $p = 2q$
(c) $2p = q$ (d) $2p = 3q$
89. $ABCD$ is a quadrilateral such that $AD = DC = CA = 20$ units, $BC = 12$ units and $\angle ABC = 90^\circ$. What is the approximate area of the quadrilateral $ABCD$?
(a) 269 sq. units (b) 300 sq. units
(c) 325 sq. units (d) 349 sq. units
90. 
Let $PQRS$ be the diameter of a circle of radius 9 cm. The length PQ , QR and RS are equal. Semi-circle is drawn with QS as diameter (as shown in the given figure). What is the ratio of the shaded region to that of the unshaded region?
(a) 25:121 (b) 5:13
(c) 5:18 (d) 1:2
91. 
What is the area of the shaded region in the given figure, if the radius of each of the circles is 2 cm?
(a) $4\sqrt{3} - 2\pi$ cm² (b) $\sqrt{3} - \pi$ cm²
(c) $\sqrt{3} - \frac{\pi}{2}$ cm² (d) $2\pi - 2\sqrt{3}$ cm²
92. 
In the given figure, what is the area of the shaded region?
(a) $9(\pi - \sqrt{3})$ sq. units (b) $3(4\pi - 3\sqrt{3})$ sq. units
(c) $3(3\pi - 4\sqrt{3})$ sq. units (d) $9(\sqrt{3} - \pi)$ sq. units

93.



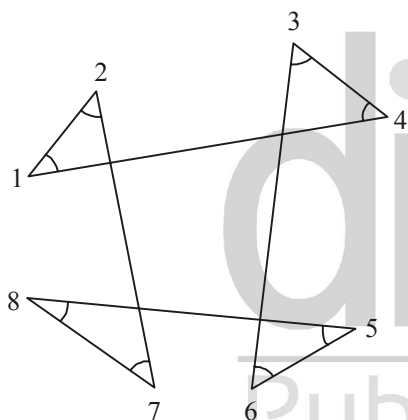
In the given figure, if $\frac{y}{x} = 6$ and $\frac{z}{x} = 5$, then what is the value of x ?

- (a) 45° (b) 30°
(c) 15° (d) 10°

94. $ABCD$ is a trapezium, where AB is parallel to DC . If $AB = 4$ cm, $BC = 3$ cm, $CD = 7$ cm and $DA = 2$ cm, then what is the area of the trapezium?

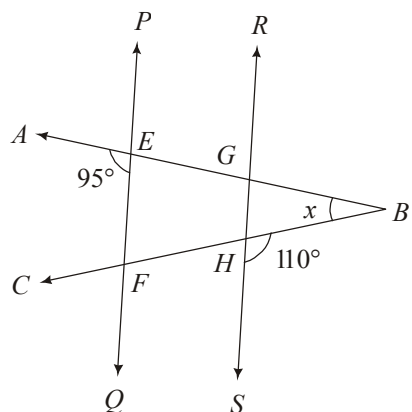
- (a) $22\sqrt{\frac{2}{3}} \text{ cm}^2$ (b) $22\sqrt{\frac{3}{2}} \text{ cm}^2$
(c) $22\sqrt{3} \text{ cm}^2$ (d) $\frac{22\sqrt{2}}{3} \text{ cm}^2$

95.



Angles are shown in the given figure. What is value of $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8$?

- (a) 240° (b) 360°
(c) 540° (d) 720°

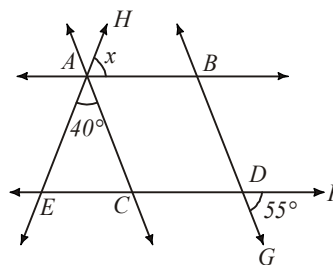


96.

In the given figure PQ is parallel to RS , $\angle AEF = 95^\circ$, $\angle BHS = 110^\circ$ and $\angle ABC = x^\circ$. Then what is the value of x ?

- (a) 15 (b) 25
(c) 30 (d) 35

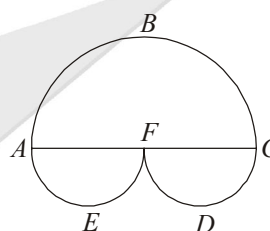
97.



In the given figure AB is parallel to CD and AC is parallel to BD . If $\angle EAC = 40^\circ$, $\angle FDG = 55^\circ$, $\angle HAB = x^\circ$, then what is the value of x ?

- (a) 85 (b) 80
(c) 75 (d) 65

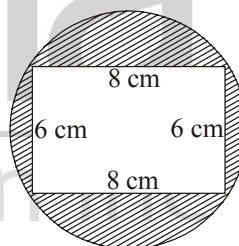
98.



In the given figure, there are three semi circles ABC , AEF and CDF . The distance between A and C is 28 units and F is the mid-point of AC . What is the total area of the three semi circles?

- (a) 924 square units (b) 824 square units
(c) 624 square units (d) 462 square units

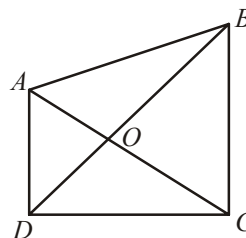
99.



What is the approximate area of the shaded region in the figure given?

- (a) 15.3 cm^2 (b) 25.5 cm^2
(c) 28.4 cm^2 (d) 30.5 cm^2

100.



Consider the following statements with reference to the given figure :

- The sum of the areas of $\triangle AOD$ and $\triangle BOC$ is equal to the sum of the areas of $\triangle AOB$ and $\triangle DOC$.
- $\angle AOD = \angle BOC$
- $AB + BC + CD + DA > AC + BD$

Which of the above statements are correct?

- (a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

DIRECTIONS: In this section you have a few short passages. After each passage, you will find some items based on the passage. First, read a passage and answer the items based on it. You are required to select your answers based on the contents of the passage and opinion of the author only.

Passage – I

Not all agricultural societies become civilizations, but no civilization can become one without passing through the stage of agriculture. This is because at some stage in the development of agriculture, as productivity improves, not all people would need to be engaged in producing or procuring food. A significant number of people could be freed up to pursue other activities such as building walls or monuments for new cities; making new tools, weapons and jewellery; organizing long-distance trade; creating new artistic masterpieces; coming up with new inventions; keeping accounts; and perhaps constructing new public infrastructure such as irrigation canals that further improve the productivity of agriculture, thus realizing even more people to do new things.

This can happen, of course, only if a society that has transitioned to high-productivity agriculture has also, at some stage in its evolution, found a way to channel the bonanza of free time into other work fruitfully. In the ancient world, this often involved creating new ideologies and new hierarchies or power structures to coerce or otherwise convince large groups of people to devote their time to the new tasks for very little reward.

1. Which one of the following statements is true according to the author?
 - (a) Agriculture has always been part of all civilizations.
 - (b) Not all civilizations have undergone the processes of agriculture.
 - (c) Agriculture gave birth to new civilizations.
 - (d) Communities discontinued agriculture to become civilizations.
2. A significant number of people were sent to carry out other work from agriculture because
 - (a) there were insufficient agricultural products.
 - (b) people were needed to build monuments, weapons, jewellery, etc.
 - (c) there were sufficient agricultural products.
 - (d) this enabled the development of civilizations.
3. What kind of agriculture based societies would emerge as civilizations?
 - (a) Societies which achieved high productivity in agriculture had the opportunity to find time for other work.
 - (b) Societies which depended on agriculture completely moved to other fruitful work so as to move to many places.
 - (c) Societies which transitioned from one stage of agriculture to another.
 - (d) Societies which could not do agriculture for lack of resources moved to other work.

4. People as groups were convinced to do new work through
 - (a) reward, force and community persuasions.
 - (b) ideologies, hierarchies and power structures.
 - (c) excessive agricultural products.
 - (d) very high rewards.
5. Which word in the passage means 'changeover'?
 - (a) Transitioned
 - (b) Channel
 - (c) Coerce
 - (d) Hierarchies

Passage – II

When we pick up a newspaper, a book or an article, we come to our task with certain preconceptions and predispositions. We expect to find a specific piece of information or be presented with an argument or an analysis of something, say, the likelihood of recession in the next six months or the reasons why children can't read. We probably know a little about the book or article we are reading even before we start. There was, after all, some reason why we chose to read one piece of writing rather than another.

Our expectations and predispositions may, however, blind us to what the article and its author is actually saying. If, for example, we are used to disagreeing with the author, we may see only what we expect to see and not what is actually there. Day after day in our routine pattern of life we expose ourselves to the same newspaper, the same magazine, even books by authors with the same perspectives. In order to reflect on our reading habits and improve our skills we need to break out of this routine, step back and look at what we are doing when we read.

6. According to the author, which one of the following statements is **not** true?
 - (a) Readers preconceptions influence their reading.
 - (b) Readers have expectations when they read an article or a book.
 - (c) Readers look for specific information in any of their readings.
 - (d) Readers assume that everything they read will have new information.
7. Our expectations and predispositions may, however, blind us because
 - (a) we may not get the actual ideas of the author.
 - (b) we will get the actual ideas of the author.
 - (c) we may disagree with the author.
 - (d) we will agree with all the ideas of the author.
8. One of the ways to improve our reading habits is to
 - (a) break the routine by changing the time of reading.
 - (b) change the types of topics we read.
 - (c) break the routine of reading the same newspaper.
 - (d) stop reading for some time and then restart reading.
9. Which quality does the author here advocate, to be a good reader?
 - (a) Being objective to the ideas of the author
 - (b) Having preconceptions and predispositions
 - (c) Having continuous routines
 - (d) Disagreeing with the author
10. Which word in the passage means 'Viewpoints'?
 - (a) Preconceptions
 - (b) Predispositions
 - (c) Pattern
 - (d) Perspectives

SPOTTING ERRORS

DIRECTIONS: Each item in this section has a sentence with three underlined parts labelled as (a), (b) and (c). Read each sentence to find out whether there is any error in any underlined part and indicate your response on the Answer Sheet against the corresponding letter i.e., (a) or (b) or (c). If you find no error, your response should be indicated as (d).

11. After mysteriously expanding for decades, Antarctica's sea ice cover starting melting. No error
(a) (b) (c) (d)
12. The auction, conducted by the bank, will be price based using multiple priced method. No error
(a) (b) (c) (d)
13. If the scheme would have been implemented effectively all affected would have benefitted. No error
(a) (b) (c) (d)
14. Government Stock offers safety, liquidity and attractive returned for long duration. No error
(a) (b) (c) (d)
15. Scrolling thorough my social media timeline, I hovered over a video of a minor road traffic accident. No error
(a) (b) (c) (d)
16. The fascination with gold at least seems to be a case were traditional belief and
(a) (b)
modern finance would point the same way. No error
(c) (d)
17. Evolutionary biology leave us distinctly pessimistic about the possibility
(a) (b)
that altruism can arise naturally among humans. No error
(c) (d)
18. When everything starts working for you, you will find things are achieve and delivered. No error
(a) (b) (c) (d)
19. If I were you I would not go for change of job. No error
(a) (b) (c) (d)
20. At the beginning of the nineteenth century, female literacy was extremely lowed
(a) (b)
in comparison to male literacy. No error
(c) (d)

ORDERING OF WORDS IN A SENTENCE

DIRECTIONS: Each of the following items in this section consists of a sentence, parts of which have been jumbled. These parts have been labelled as P, Q, R and S. there are four sequences, namely (a), (b), (c) and (d). You are required to re-arrange the jumbled parts of the sentence and mark your response accordingly.

21. for long and the backbone of India will continue to be the same agriculture has been
P Q R S
(a) SPQR (b) SQPR (c) QRSP (d) QSRP
22. the cry of general public agenda in any country public policy making is generally driven by
P Q R S
(a) RQSP (b) RPSQ (c) PSRQ (d) QRSP
23. before it starts of the government is the essential power the power to manage conflict
P Q R S
(a) RSPQ (b) SQRP (c) RQSP (d) QRSP

24. a majority of the vote the party that received of the government must take control
P Q R S
(a) QPSR (b) PSRQ (c) RSPQ (d) SQPR
25. can express a view on in which the electorate a particular issue of public policy a referendum is a vote
P Q R S
(a) SQPR (b) RPQS (c) QRSP (d) PQRS
26. in modern societies or merely suppressed has class conflict been resolved
P Q R S
(a) RPSQ (b) RSPQ (c) PRSQ (d) QRSP
27. several of our food are being extensively cultivated and vegetable crops hybrid varieties of
P Q R S
(a) QRSP (b) SPQR (c) QPRS (d) SPRQ
28. against the officer reason for the accusation there should have been who was in-charge at that time
P Q R S
(a) RPSQ (b) RQPS (c) PQRS (d) SPRQ
29. poetry is and ideas powerful feelings the spontaneous overflow of
P Q R S
(a) SRQP (b) PQRS (c) RSQP (d) PSRQ
30. historical identity and a common descent a group of people is called an. ethnic group
P Q R
who share a common culture. S
(a) QSPR (b) QRPS (c) PSQR (d) RQPS

IDIOMS AND PHRASES

DIRECTIONS: Given below are some idioms/phrases followed by four alternative meanings to each. Choose the response (a), (b), (c) or (d) which is the most appropriate expression and mark your response in the Answer Sheet accordingly.

31. *A paper tiger*
(a) Person or organisation that appears powerful, but actually is not
(b) Person or organisation that acts like a tiger
(c) People who campaign for the protection of tigers
(d) A daredevil
32. *Lily-livered*
(a) Brave and courageous
(b) Not brave
(c) Comical
(d) Outrageous
33. *Eat like a bird*
(a) Eat fast
(b) Eat very little
(c) Eat a lot
(d) Pretending to be eating
34. *The dog days*
(a) Days celebrating dogs
(b) The bitter days
(c) The hottest days
(d) The coldest days
35. *A banana republic*
(a) A small or poor country with a weak government
(b) A small or poor country which produces banana
(c) A country which has been occupied by a big country
(d) A country without any government
36. *The pros and cons*
(a) The good and bad parts of a situation
(b) Like and dislike of a situation
(c) A bad experience in an event
(d) A good moment of an event
37. *Prime the pump*
(a) To do something in order to make something succeed
(b) To do good things to succeed in life
(c) To do something in order to get bad things done
(d) Asking people to do things to make something succeed

38. *The green-eyed monster*
- Feeling of being joyous
 - Feeling of being jealous
 - Feeling bad about happenings
 - Feeling lucky about something
39. *Rise to the occasion*
- To celebrate a success in a difficult situation
 - To regret a situation which ended in failure
 - To succeed in dealing with a difficult situation
 - To motivate people to succeed in a difficult situation
40. *Call it a day*
- End of the day
 - Completion of work
 - Stop doing something
 - A beautiful day

ORDERING OF SENTENCES

DIRECTIONS: In this section each item consists of six sentences of a passage. The first and the sixth sentences are given in the beginning as S1 and S6. The middle four sentences in each have been jumbled up and labelled as P, Q, R and S. You are required to find out the proper sequence of the four sentences and mark your response accordingly on Answer Sheet.

41. S1: Chinua Achebe was born in 1930 and educated at the Government College in Umuahia, Nigeria.
- S6: Chinua Achebe has written over twenty books, including novels, stories, essays and collections of poetry, and won the Nobel Prize for literature.
- P: During the Civil War in Nigeria, he worked for the Biafran government service.
- Q: After the War, he was appointed Senior Research Fellow at the University of Nigeria, Nsukka.
- R: He joined the Nigerian Broadcasting Company in Lagos in 1954, later becoming its Director of External Broadcasting.
- S: He received a BA from London University in 1953 and in 1956 he studied broadcasting in London at the BBC.
- The correct sequence should be
- SRPQ
 - RPQS
 - PQRS
 - QRSP
42. S1: "Every person carries in his head a mental model of the world—a subjective representation of external reality," writes Alvin Toffler in *Future Shock*.
- S6: When we begin to think we can do so only because our mind is already filled with all sorts of ideas with which to think.
- P: It organizes our knowledge and gives us a place from which to argue.
- Q: This mental model is, he says, like a giant filing cabinet.
- R: It contains a slot for every item of information coming to us.

S: As E.F. Schumacher says, "When we think, we do not just think; we think ideas."

The correct sequence should be

- PSRQ
 - SPRQ
 - QRPS
 - RQPS
43. S1: Biology is the study of life in its entirety.
- S6: Classical descriptive and clueless biology found a theoretical framework in the evolutionary theory of Darwin.
- P: In later years, the focus was physiology and internal morphology or anatomy.
- Q: Darwinian ideas of evolution by natural selection changed the perception completely.
- R: The growth of biology as a natural science during the last 1000 years is interesting from many points of view.
- S: One feature of this growth is changing emphasis from mere description of life forms to identification and classification of all recorded living forms.
- The correct sequence should be
- QPRS
 - SPRQ
 - QRPS
 - PQRS
44. S1: Biology is the youngest of the formalized disciplines of natural science.
- S6: Life expectancy of human beings has dramatically changed over the years.
- P: However, the twentieth century and certainly the twenty-first century has demonstrated the utility of biological knowledge in furthering human welfare, be it in health sector or agriculture.
- Q: The discovery of antibiotics and synthetic plant-derived drugs, anaesthetics have changed medical practice on one hand and human health on the other hand.
- R: Applications of physics and chemistry in our daily life also have a higher visibility than those of biology.
- S: Progress in physics and chemistry proceeded much faster than in biology.
- The correct sequence should be
- QPRS
 - PRQS
 - RPQS
 - SRPQ
45. S1: People in society need many goods and services in their everyday life including food, clothing, shelter, transport, etc.
- S6: The teacher in the local school has the skills required to impart education to the students.
- P: A weaver may have some yarn, some cotton and other instruments required for weaving cloth.
- Q: A family farm may own a plot of land, some grains, farming implements, may be a pair of bullocks and also the labour services of the family members.
- R: Every individual has some amount of the goods and services that one would like to use.

S: In fact, the list of goods and services that any individual needs is so large that no individual in society, to begin with, has all the things one needs.

The correct sequence should be

- (a) PQRS (b) RSPQ
(c) QPSR (d) SRQP

46. S1: Farming is the main production activity in the village.
S6: The new ways of farming need less land, but much more capital.

P: These have allowed the farmers to produce more crops from the same amount of land.

Q: Over the years there have been many important changes in the way farming is practised.

R: But in raising production, a great deal of pressure has been put on land and other natural resources.

S: This is an important achievement, since land is fixed and scarce.

The correct sequence should be

- (a) QPSR (b) RSPQ
(c) SRPQ (d) PRSQ

47. S1: Britain was the first country to experience modern industrialization.

S6: This gave people a wider choice for ways to spend their earnings and expanded the market for the sale of goods.

P: This meant that the kingdom had common laws, a single currency and a market that was not fragmented by local authorities and uneven taxation.

Q: It had been politically stable since the seventeenth century, with England, Wales and Scotland unified under a monarchy.

R: By then a large section of the people received their income in the form of wages and salaries than in goods.

S: By the end of the seventeenth century, money was widely used as the medium of exchange.

The correct sequence should be

- (a) QPSR (b) PSQR
(c) RSQP (d) SRQP

48. S1: For several million years, humans lived by hunting wild animals and gathering wild plants.

S6: As a result, conditions were favourable for the growth of grasses such as wild barley and wheat.

P: This led to the development of farming and pastoralism as a way of life.

Q: This change took place because the last ice age came to an end about 13,000 years ago and with that warmer, wetter conditions prevailed.

R: Then, between 10,000 and 4,500 years ago, people in different parts of the world learnt to domesticate certain plants and animals.

S: The shift from foraging to farming was a major turning point in the human history.

The correct sequence should be

- (a) QSPR (b) SPQR
(c) PSQR (d) RPSQ

49. S1: All governments claim eternal consistency and success.

S6: Diplomacy offers choices and those choices must be negotiated with other sovereign actors.

P: Choices involved uncertainty, risk and immediacy; those who must take the choices operate in the contemporary political milieu.

Q: And yet the essence of governance is choice.

R: Nowhere is this more true than in foreign policy decision-making.

S: Some even claim omniscience.

The correct sequence should be

- (a) SQPR (b) QSRP
(c) SRPQ (d) RSPQ

50. S1: Buddhism continued to spread into many lands of Asia during the period of 5th and 6th century.

S6: He translated several scriptural commentaries into Pali and wrote a work called the *Visuddhimagga*, which soon attained the status of a classic work on Theravada doctrine and meditation.

P: While this can be understood as a part of larger processes of cultural interaction, especially trade, a key role was played by monks.

Q: We know a little bit about some of them, but there must have been countless men whose commitment to the Buddhist path gave them the courage and determination to persevere in the face of the long, hard journey to India and back.

R: Buddhism had made its way to Sri Lanka many centuries earlier, during the time of Ashoka, and a thriving Buddhist community soon took root.

S: In the 5th century, the monk Buddhaghosha travelled to Sri Lanka.

The correct sequence should be

- (a) RQPS (b) QRPS
(c) PQRS (d) PSRQ

FILL IN THE BLANKS

DIRECTIONS : Each of the following sentences in this section has a blank space and four words or group of words are given after the sentence. Select the most appropriate word or group of words for the blank space and indicate your response on the Answer Sheet accordingly.

51. On his way to the capital, the minister _____ the eminent social worker at his residence.

- (a) called on (b) called
(c) calling for (d) call off

52. The fire brigade fought for four hours to _____ the fire in the building.
(a) put in (b) put out
(c) put on (d) put off
53. Ravi has proved that he can _____ on his promise by winning the match.
(a) carry through (b) carry out
(c) carry (d) carry off
54. It is best to _____ politics when in the classroom.
(a) keep out (b) keep on
(c) keep off (d) keeping
55. It shows that she has _____ many years of service.
(a) put in (b) put out
(c) put (d) put on
56. The chairperson said that the group was _____ of time.
(a) running out (b) running
(c) running with (d) run out
57. If I _____ an angel, I would solve the problems of people.
(a) am (b) were
(c) was (d) have
58. Where there is a _____, there is a way.
(a) way (b) road
(c) wing (d) will
59. The police could not establish how the accident _____.
(a) came off
(b) came about
(c) came on
(d) came out
60. I _____ my old friend after twenty years.
(a) ran into (b) ran in
(c) run in (d) run on
66. A new show is trying to change the clipped depictions of women in animation.
(a) original (b) hackneyed
(c) crony (d) artificial
67. Not everyone finds a vocation which suits one's aptitude.
(a) attitude (b) approach
(c) liking (d) occupation
68. Uninterrupted rain had fatigued the commuters from the outskirts to the city and work suffered.
(a) excited (b) refreshed
(c) slowed (d) exhausted
69. The leader said, "I am aghast with the developments so far. I will take time to understand this."
(a) satisfied (b) sad
(c) amused (d) horrified
70. The cause of the accident is yet to be ascertained, but police officials suspect the driver of the vehicle allegedly fell asleep.
(a) determined (b) curtailed
(c) thought of (d) being known

ANTONYMS

DIRECTIONS : Each item in this section consists of sentences with an underlined word followed by four words or group of words. Select the option that is **opposite in meaning** to the underlined word and mark your response on the Answer Sheet accordingly.

71. Early medieval period was not a combination of urban and rural civilization. It was not a period of urban decay as claimed by some.
(a) survival (b) waste away
(c) decomposition (d) spoil
72. He speaks eloquently and can pull crowds.
(a) confusingly (b) expressively
(c) powerfully (d) fluently
73. Everyone has to fight the inertia in the system.
(a) sluggishness (b) indolence
(c) activity (d) torpor
74. There is a need to promote philanthropy in education.
(a) charity (b) benevolence
(c) nastiness (d) likeliness
75. What we lack in the current times is compassion.
(a) empathy (b) carefulness
(c) indifference (d) hardship
76. Tempestuous behaviour would not yield much in any place.
(a) relaxed (b) passionate
(c) intense (d) windy
77. Wooing everyone over an issue for support will not serve much purpose.
(a) discouraging (b) encouraging
(c) pursuing (d) persuading
78. The highest award was bestowed upon her for her yeoman service.
(a) conferred (b) withdrawn
(c) imparted (d) imbibed
79. One feels elated when someone praises one's work.
(a) feels good (b) excited
(c) depressed (d) sober

SYNONYMS

DIRECTIONS : Each item in this section consists of a sentence with an underlined word followed by four words/group of words. Select the option that is **nearest in meaning** to the underlined word and mark your response on the Answer Sheet accordingly.

61. All the developments that took place in the 20th century have had implications for the next century.
(a) consequences (b) interferences
(c) feedback (d) planning
62. He is such a leader that his actions are contagious.
(a) complicated (b) transmittable
(c) effective (d) unthinkable
63. The budget incorporated a number of tax reforms which included higher taxes for the very rich.
(a) excluded (b) integrated
(c) laid down (d) removed
64. His thesis makes all generic statements which have already been proved.
(a) specific (b) crude
(c) broad (d) non-standard
65. The captain produced yet another stellar show to make her team enter the semi-finals.
(a) extraordinary (b) eclipse
(c) poor (d) not a great

80. All business activities need not result in profit-making. There is a need to be charitable.
 (a) lenient (b) malevolent
 (c) unforeseen (d) gracious

PARTS OF SPEECH

DIRECTIONS : Each of the following sentences has a word or phrase underlined. Read the sentences carefully and find which part of speech the underlined word belongs to. Indicate your response on the Answer Sheet accordingly.

81. He has been working in the Department of Foreign Affairs since 2002.
 (a) Adverb (b) Adjective
 (c) Intensifier (d) Noun
82. The man in dark blue is the one who made us win the match.
 (a) Relative clause (b) Interrogative pronoun
 (c) Relative pronoun (d) Affirmative
83. The most beautiful actor of the industry was awarded today.
 (a) Adjective (b) Numeral
 (c) Adverb (d) Noun
84. "What is the latest news?" asked the Captain.
 (a) Relative pronoun (b) Adjective
 (c) Adverb (d) Adjectival clause
85. Noticing the change in the behaviour of the officer, the cadets returned to their position.
 (a) Participle (b) Present continuous
 (c) Noun phrase (d) Noun
86. When he reached the department, the officials had left for the meeting.
 (a) Past perfect verb (b) Past tense
 (c) Dependent clause (d) Independent clause
87. He has offered her another chance.
 (a) Intransitive verb (b) Past tense
 (c) Perfect tense (d) Transitive verb
88. The building is very ancient.
 (a) Transitive verb (b) Intransitive verb
 (c) Main verb (d) Auxiliary verb
89. Hurrah! What a scintillating beauty the landscape is !
 (a) Conjunction (b) Adjective
 (c) Adverb (d) Interjection
90. Ravi was declared as the winner in the tie because he had hit the most number of fours and sixes.
 (a) Conjunction (b) Interjection
 (c) Adverb (d) Cause

SPELLING MISTAKES

DIRECTIONS : In this section a word is spelt in four different ways. Identify the one which is correct. Choose the correct response (a), (b), (c) or (d) and indicate on the Answer Sheet accordingly.

91. Which one of the following alternatives has the correct spelling ?
 (a) Continuum (b) Continuem
 (c) Contuneim (d) Continueiam
92. Which one of the following alternatives has the correct spelling ?

- (a) Stretegy (b) Stretagy
 (c) Stratagy (d) Strategy
93. Which one of the following alternatives has the correct spelling ?
 (a) Commisionor (b) Commisioner
 (c) Commissioner (d) Comissioner
94. Which one of the following alternatives has the correct spelling ?
 (a) Vacum (b) Vacuum
 (c) Vacuem (d) Vacam
95. Which one of the following alternatives has the correct spelling ?
 (a) Psephology (b) Psefoloagy
 (c) Sephology (d) Psyphology
96. Which one of the following alternatives has the correct spelling ?
 (a) Neuphrology (b) Nephrology
 (c) Neprology (d) Neaprology
97. Which one of the following alternatives has the correct spelling ?
 (a) Psudonym (b) Pseudonym
 (c) Pseudanym (d) Seseudonym
98. Which one of the following alternatives has the correct spelling ?
 (a) Pnumonia (b) Neumonia
 (c) Pneumonia (d) Numania
99. Which one of the following alternatives has the correct spelling ?
 (a) Resilient (b) Resilint
 (c) Risilient (d) Realisent
100. Which one of the following alternatives has the correct spelling ?
 (a) Supplemtary (b) Supplementary
 (c) Supplemtary (d) Supplemantory

TRANSFORMATION OF SENTENCES

DIRECTIONS : In this section two sentences are given and you are required to find the correct sentence which combines both the sentences. Choose the correct response (a), (b), (c) or (d) and indicate on the Answer Sheet accordingly.

101. Which is the correct combination of the given two sentences ?
 The officer will return from China on Monday. You can meet him.
 (a) You can meet the officer when he returned from China on Monday.
 (b) You can meet the officer when he will return from China on Monday.
 (c) You can meet the officer when he returns from China on Monday.
 (d) The officer will meet you when you return from China on Monday.
102. Which is the correct combination of the given two sentences?
 He is hard-working. He is honest too.
 (a) He is not only hard-working, but also honest.
 (b) He is only hard-working and honest.
 (c) He is hard-working but honest too.
 (d) He is not hard-working but also honest.

103. Which is the correct combination of the given two sentences?
Parents have been waiting since morning.
They want to meet the counsellor.
- The counsellor has been waiting to meet the parents since morning.
 - Parents had been waiting to meet the counsellor since the morning.
 - Parents are waiting to meet the counsellor in the morning.
 - Parents have been waiting since morning to meet the counsellor.
104. Which is the correct combination of the given two simple sentences using 'If' clause ?
Minchi should have worked hard. She would have cleared the test.
- If Minchi had worked hard, she would have cleared the test.
 - Had not Minchi worked hard, she could not have cleared the test.
 - If Minchi has worked hard, she would have cleared the test.
 - If Minchi had worked hard, she will have cleared the test.
105. Which one of the following is the correct statement combining the two statements using 'though' ?
He has been trying his level best to win. He could not succeed.
- Though he is trying his level best to win, he could not succeed.
 - He is trying his level best to win, though he could not succeed.
 - Though he has been trying his level best to win, he could not succeed.
 - Though he had been trying his level best to win, he could not succeed.
106. Which is the correct combination of the given two sentences using 'relative clause' ?
Gandhiji preached peace. He is an apostle of peace.
- Gandhiji who preached peace is an apostle of peace.
 - Gandhiji preached peace because he is an apostle of peace.
 - Gandhiji who preached peace is called an apostle of peace.
 - Gandhiji is an apostle of peace because he preached peace.
107. Which is the correct combination of the given two sentences?
Priya reached the station. The bus left before her.
- When Priya reached the station, the bus had already left.
 - When Priya had reached the station, the bus already left.
 - Priya reached the station, when the bus already left.
 - When Priya had reached the station, the bus had already left.
108. Which is the correct combination of the given two sentences?
He is too tired. He could not stand.
- He is so tired that he could scarcely stand.
 - He is too tired and cannot stand.
 - He will not stand and he is very tired.
 - He is so tired that he could not be standing.
109. Which is the correct combination of the given two sentences?
The teacher entered the classroom. All students stopped talking.
- No sooner did the teacher enter the classroom than the students stopped talking.
 - As soon as the teacher entered the classroom all students were asked to stop talking.
 - All students stopped talking as the teacher enters the classroom.
 - No sooner did the students stop talking than the teacher entered the classroom.
110. Which one of the following is the correct statement of the combination of the two sentences given below using 'whereas' ?
Kavya is interested in reading books. Her sister shows interest in outdoor games.
- Kavya is interested in reading books whereas her sister's interest is outdoor games.
 - Kavya is interested in reading books whereas her sister is not interested in it.
 - Kavya is interested in reading whereas her sister's interest is outdoor games.
 - Kavya is interested in reading books whereas her sister's interest is to play outside.

REPORTED SPEECH

DIRECTIONS: In this section direct speech sentences are given and you are required to find the correct indirect speech sentence of the same. Choose the correct response (a), (b), (c) or (d) and indicate on the Answer Sheet accordingly.

111. Rahul said to his teacher, "Madam, what is the way to solve the question ?"
- Rahul asked his teacher what the way to solve the question was.
 - Rahul told his teacher what was the way to solve the question.
 - Rahul asked to his teacher what the way was to solve the question.
 - Rahul told his teacher what the way was to solve the question.
112. He said to his friend, "Could you please close the door?"
- He requested his friend to close the door.
 - He requested his friend to please close the door.
 - He ordered his friend to close the door.
 - He wanted his friend to close the door for him.
113. Raj said to Sheela, "The Sun rises in the east."
- Raj told Sheela that the Sun rose in the east.
 - Raj told Sheela that the Sun rises in the east.
 - Raj asked Sheela that the Sun rises in the east.
 - Raj said to Sheela that the Sun has arisen in the east.
114. Navanitha said to her friends, "What a scintillating beauty it is !"
- Navanitha told to her friends that it was a scintillating beauty.
 - Navanitha exclaimed to her friends what a scintillating beauty it was.

- (c) Navanitha asked her friends whether it was a scintillating beauty.
(d) Navanitha exclaimed to her friends that it was a scintillating beauty.
115. The Captain said to the soldiers, "March forward and aim at the peak of the hill today."
(a) The Captain requested the soldiers to march forward and aim at the peak of the hill that day.
(b) The Captain ordered the soldiers to march forward and aim at the peak of the hill today.
(c) The Captain ordered the soldiers to march forward and aim at the peak of the hill that day.
(d) The Captain told the soldiers that they should march forward and aim at the peak of the hill that day.
116. "Where were you last evening?" said the lady to her maid.
(a) The lady asked her maid where she had been the previous evening.
(b) The lady asked her maid where she had been in the last evening.
(c) The lady asked her maid where had she been the evening before.
(d) The lady told her maid where she had been to the last evening.
117. "Those who sowed the seeds last season will reap the harvest this season," said the leader to her followers.
(a) The leader said to her followers that those who sowed the seeds the previous season would reap the harvest that season.
(b) The leader addressed her followers that those who have sown the seeds the previous season would reap the harvest this season.
(c) The leader addressed her followers that those who had sown the seeds the previous season would reap the harvest that season.
(d) The leader advised her followers that those who sow the seeds the previous season would reap the harvest this season.
118. He said to his manager, "Could you please pass the bill this week?"
(a) He told his manager that bill to be passed.
(b) He requested his manager to pass the bill that week.
(c) He ordered his manager to pass the bill that week.
(d) He requested his manager to pass the bill this week.
119. The village chief said to the villagers, "All of us need to adopt new regulations. We will protect our Earth forever."
(a) The village chief ordered the villagers that all of them needed to adopt new regulations and they would protect their Earth forever.
(b) The village chief told the villagers that all of them need to adopt new regulations and they will protect their Earth forever.
(c) The village chief wanted the villagers needed to adopt new regulations and they would protect their Earth forever.
(d) The village chief told the villagers that all of them needed to adopt new regulations and they would protect their Earth forever.
120. The grandfather said to the baby, "May you live long with all good things of life."
(a) The grandfather blessed to the baby with long life and all good things of life.
(b) The grandfather asked the baby that she would live long with all good things of life.
(c) The grandfather wanted the baby to live long with all good things of life.
(d) The grandfather blessed the baby that she would live long with all good things of life.

GENERAL KNOWLEDGE

- Scattering of α -particles by a thin gold foil suggests the presence of
 - electron in an atom
 - proton in an atom
 - positively charged nucleus at the centre of an atom
 - isotopes of gold
- The elements of which of the following pairs are isobars?
 - ${}^1_1\text{H}$ and ${}^3_1\text{H}$
 - ${}^1_1\text{H}$ and ${}^2_1\text{H}$
 - ${}^{12}_6\text{C}$ and ${}^{14}_6\text{C}$
 - ${}^{40}_{18}\text{Ar}$ and ${}^{40}_{20}\text{Ca}$
- Which one of the following chemical reactions is **not** feasible?
 - $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$
 - $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
 - $\text{Cu} + \text{PbCl}_2 \rightarrow \text{CuCl}_2 + \text{Pb}$
 - $\text{Mg} + \text{CuSO}_4 \rightarrow \text{MgSO}_4 + \text{Cu}$
- A solution having pH equal to zero is known as
 - highly alkaline solution
 - highly acidic solution
 - weakly acidic solution
 - neutral solution
- Which one of the following acids is produced in human stomach?
 - Formic acid
 - Sulphuric acid
 - Nitric acid
 - Hydrochloric acid
- Match List-I with List-II and select the correct answer using the code given below the Lists :

List-I (Compound)	List-II (Use)
A. Boric acid	1. Antiseptic
B. Citric acid	2. Food preservative
C. Magnesium hydroxide	3. Antacid
D. Acetic acid	4. Pickle

Code :

	A	B	C	D
(a)	1	2	3	4
(b)	1	3	2	4
(c)	4	3	2	1
(d)	4	2	3	1

7. The property of the sound waves that determines the pitch of the sound is its
(a) frequency (b) amplitude
(c) wavelength (d) intensity
8. Which one of the following is **not** a property of the X-rays?
(a) They are deflected by electric fields.
(b) They are not deflected by magnetic fields.
(c) They have high penetration length in matter.
(d) Their wavelength is much smaller than that of visible light.
9. Which one of the following is **not** true about the image formed by a plane mirror?
(a) It is of the same size as the subject.
(b) It is laterally inverted.
(c) It is real image.
(d) It is formed as far behind the mirror as the object is in front.
10. In a periscope, the two plane mirrors are kept
(a) parallel to each other
(b) perpendicular to each other
(c) at an angle of 60° with each other
(d) at an angle of 45° with each other
11. If the speed of light in air is 3×10^8 m/s, then the speed of light in a medium of refractive index $\frac{3}{2}$ is
(a) 2×10^8 m/s (b) $\frac{9}{4} \times 10^8$ m/s
(c) $\frac{3}{2} \times 10^8$ m/s (d) 3×10^8 m/s
12. Which one of the following types of radiation has the shortest wavelength?
(a) Radio waves (b) Visible light
(c) Infrared (IR) (d) Ultraviolet (UV)
13. The unit of the force constant k of a spring is
(a) N·m (b) N/m
(c) N·m² (d) N/m²
14. Which one of the following is **not** an epidemic disease?
(a) Cholera (b) Malaria
(c) Smallpox (d) Elephantiasis
15. Which one of the following animals has a three-chambered heart?
(a) Scoliodon (b) Salamander
(c) Pigeon (d) Human being
16. Which one of the following is the correct sequence of events during sexual reproduction in plants?
(a) Seedling, formation of embryo, pollination, fertilization, division of zygote
(b) Formation of embryo, seedling, pollination, fertilization, division of zygote
(c) Pollination, fertilization, division of zygote, formation of embryo, seedling
(d) Seedling, formation of embryo, division of zygote, pollination, fertilization
17. When air is blown from mouth into a test tube containing limewater, the limewater turns milky. This is due to the presence of
(a) water vapour (b) oxygen
(c) carbon dioxide (d) carbon monoxide
18. Which one of the following is the 'energy currency' for cellular processes?
(a) Glucose (b) ATP
(c) ADP (d) Pyruvic acid
19. Which one of the following is the first enzyme to mix with food in the digestive tract?
(a) Trypsin (b) Cellulose
(c) Pepsin (d) Amylase
20. Mahatma Gandhi's Dandi March, a great event in Indian freedom struggle, was associated with
(a) iron (b) sodium chloride
(c) sulphur (d) aluminium
21. Match List-I with List-II and select the correct answer using the code given below the Lists :
- | List-I
(Name) | List-II
(Formula) |
|---------------------|--|
| A. Bleaching powder | 1. NaHCO_3 |
| B. Baking soda | 2. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ |
| C. Washing soda | 3. Ca(OH)_2 |
| D. Slaked lime | 4. CaOCl_2 |
- Code :**
- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 4 | 1 | 2 | 3 |
| (b) | 4 | 2 | 1 | 3 |
| (c) | 3 | 2 | 1 | 4 |
| (d) | 3 | 1 | 2 | 4 |
22. The number of water molecules associated with copper sulphate molecule to form crystals is
(a) 2 (b) 4
(c) 5 (d) 6
23. Silver articles become black after some time when exposed to air because
(a) silver gets oxidized to silver oxide
(b) silver reacts with moist carbon dioxide in the air to form silver carbonate
(c) silver reacts with sulphur in the air to form a coating of silver sulphide
(d) silver reacts with nitrogen oxides in the air to form silver nitrate
24. If x is the temperature of a system in Kelvin and y is the temperature of the system in $^\circ\text{C}$, then the correct relation between them is
(a) $x = 273 - y$ (b) $x = 273 + y$
(c) $x = 173 + y$ (d) $x = 173 - y$
25. The resistivity ρ of a material may be expressed in units of
(a) ohm (b) ohm/cm
(c) ohm-cm (d) ohm-cm²

26. The electromagnetic waves, which are used for satellite communication, are
 - (a) infrared radiations (b) ultraviolet radiations
 - (c) radio waves (d) visible lights
27. Which one of the following is the correct sequence of organs that occur in the path of urine flow in human body?
 - (a) Kidney, ureter, urinary bladder, urethra
 - (b) Kidney, urinary bladder, ureter, urethra
 - (c) Kidney, ureter, urethra, urinary bladder
 - (d) Urinary bladder, kidney, urethra, ureter
28. Which of the following endocrine glands is **not** found in pair in humans?
 - (a) Adrenal (b) Pituitary
 - (c) Testis (d) Ovary
29. Which one of the following cell organelles contains DNA?
 - (a) Golgi apparatus (b) Mitochondrion
 - (c) Lysosome (d) Endoplasmic reticulum
30. Who among the following scientists introduced the concept of immunization to the medical world?
 - (a) Edward Jenner (b) Robert Koch
 - (c) Robert Hooke (d) Carl Linnaeus
31. On 31st December, 1929, in which one of the following Congress Sessions was proclamation of Purna Swaraj made?
 - (a) Ahmedabad (b) Calcutta
 - (c) Lahore (d) Lucknow
32. Which one of the following Acts reserved seats for women in Legislatures in accordance with the allocation of seats for different communities?
 - (a) The Government of India Act, 1858
 - (b) The Indian Councils Act, 1909
 - (c) The Government of India Act, 1919
 - (d) The Government of India Act, 1935
33. Which one among the following was demanded by the All India Depressed Classes Leaders' Conference at Bombay in 1931?
 - (a) Universal adult suffrage
 - (b) Separate electorates for untouchables
 - (c) Reserved seats for the minorities
 - (d) A unitary State in India
34. Who among the following was one of the founders of the Indian Society of Oriental Art?
 - (a) Rabindranath Tagore
 - (b) Abanindranath Tagore
 - (c) Dwarkanath Tagore
 - (d) Bankim Chandra Chattopadhyaya
35. Who among the following Sultans succeeded in finally breaking and destroying the power of Turkan-i- Chihalgani?
 - (a) Iltutmish
 - (b) Balban
 - (c) Alauddin Khalji
 - (d) Muhammad bin Tughluq
36. Who among the following Mongol leaders/commanders **did not** cross Indus to attack India?
 - (a) Chenghiz Khan (b) Tair Bahadur
 - (c) Abdullah (d) Qutlugh Khwaja
37. In the region of eastern shore of Adriatic Sea, a cold and dry wind blowing down from the mountain is known as
 - (a) Mistral (b) Bora
 - (c) Bise (d) Blizzard
38. Nyishi tribe is found mainly in
 - (a) Andaman and Nicobar (b) Arunachal Pradesh
 - (c) Nilgiri-Kerala (d) Kashmir Valley
39. In the field of tourism, which one of the following Indian States is described as 'One State Many Worlds'?
 - (a) Assam (b) West Bengal
 - (c) Karnataka (d) Rajasthan
40. The number of people per unit area of arable land is termed as
 - (a) agricultural density (b) arithmetic density
 - (c) physiological density (d) economic density
41. Which one of the following rivers joins Ganga directly?
 - (a) Chambal (b) Son
 - (c) Betwa (d) Ken
42. Which one of the following is **not** a type of commercial agriculture?
 - (a) Dairy farming
 - (b) Grain farming
 - (c) Livestock ranching
 - (d) Intensive subsistence agriculture
43. Which one of the following is **not** a land use category?
 - (a) Forestland (b) Pasture land
 - (c) Marginal land (d) Barren and wasteland
44. Which one of the following is **not** an objective of the MGNREGA?
 - (a) Providing up to 100 days of skilled labour in a financial year
 - (b) Creation of productive assets
 - (c) Enhancing livelihood security
 - (d) Ensuring empowerment to women
45. Which one of the following statements with regard to the functioning of the Panchayats is **not** correct?
 - (a) Panchayats may levy, collect and appropriate taxes, duties, tolls, etc.
 - (b) A person who has attained the age of 25 years will be eligible to be a member of a Panchayat.
 - (c) Every Panchayat shall ordinarily continue for five years from the date of its first meeting.
 - (d) A Panchayat reconstituted after premature dissolution shall continue only for the remainder of the full period.
46. Which one of the following is the earliest launched scheme of the Government of India?
 - (a) Deendayal Antyodaya Yojana
 - (b) Pradhan Mantri Gram Sadak Yojana
 - (c) Saansad Adarsh Gram Yojana
 - (d) Deendayal Upadhyaya Grameen Kaushalya Yojana
47. Which of the following statements is **not** correct regarding the Members of Parliament Local Area Development Scheme (MPLADS)?
 - (a) Members of the Parliament (MPs) sanction, execute and complete works under the scheme.
 - (b) Nominated Members of the Parliament can recommend works for implementation anywhere in the country.
 - (c) The scheme is fully funded by the Government of India.
 - (d) The annual entitlement per MP is ₹5 crore.

48. Saubhagya, a Government of India Scheme, relates to which of the following areas?
 (a) Achieving universal household electrification
 (b) Providing clean cooking fuel to poor households
 (c) Rationalizing subsidies on LPG
 (d) Stopping female foeticide
49. The "Basel Convention" is aimed at protecting human health and environment against adverse effects of which of the following?
 (a) Hazardous wastes
 (b) Persistent Organic Pollutants (POPs)
 (c) Mercury
 (d) Chemicals and pesticides
50. Which one of the following is the biggest cause of incidence of migration of female persons in India?
 (a) Employment (b) Education
 (c) Marriage (d) Business
51. Which one of the following is **not** correct about Repo rate?
 (a) It is the interest rate charged by the Central Bank on overnight loan.
 (b) It is the interest rate paid by the commercial banks on overnight borrowing.
 (c) It is the interest rate agreed upon in the loan contract between a commercial bank and the Central Bank.
 (d) It is the cost of collateral security.
52. The Cash Reserve Ratio refers to
 (a) the share of Net Demand and Time Liabilities that banks have to hold as liquid assets
 (b) the share of Net Demand and Time Liabilities that banks have to hold as balances with the RBI
 (c) the share of Net Demand and Time Liabilities that banks have to hold as part of their cash reserves
 (d) the ratio of cash holding to reserves of banks
53. In economics, if a diagram has a line passing through the origin and has 45° angle with either axis and it is asserted that along the line $X = Y$, what is tacitly assumed?
 (a) Both variables are pure numbers.
 (b) Both variables are in the same unit.
 (c) Both variables are in different units.
 (d) At least one variable is a pure number.
54. Who among the following won the Best Men's Player Award of FIFA Football Awards, 2019?
 (a) Cristiano Ronaldo (b) Virgil van Dijk
 (c) Lionel Messi (d) Xavi
55. In September 2019, which one of the following travel giants declared itself bankrupt?
 (a) Expedia (b) Cox & Kings
 (c) SOTC (d) Thomas Cook
56. Greta Thunberg, a teenaged environment activist who was in news recently, hails from
 (a) Sweden (b) Germany
 (c) USA (d) Canada
57. Recently the Reserve Bank of India has imposed limitations, initially for a period of six months, on the withdrawal of amount by account holders of which one of the following banks?
 (a) Indus Lnd Bank
 (b) Dhanlaxmi Bank
 (c) Punjab and Maharashtra Cooperative Bank
 (d) South Indian Bank
58. Amitabh Bachchan was recently conferred with the prestigious Dada Saheb Phalke Award. Who among the following was the first recipient of the award?
 (a) Prithviraj Kapoor (b) Devika Rani
 (c) Sohrab Modi (d) Naushad
59. The famous Mughal painting, depicting Jahangir embracing the Safavid king Shah Abbas, was painted by which one of the following Mughal painters?
 (a) Abd al-Samad (b) Abul Hasan
 (c) Dasavant (d) Bishandas
60. Which of the following statements about 'Mughal Mansab' system are correct?
 1. 'Zat' rank was an indicator of a Mansabdar's position in the imperial hierarchy and the salary of the Mansabdar.
 2. 'Sawar' rank indicated the number of horsemen the Mansabdar was required to maintain.
 3. In the seventeenth century, Mansabdars holding 1000 or above 'Sawar' rank were designated as nobles (Umara).
 Select the correct answer using the code given below.
 (a) 1 and 2 only (b) 1 and 3 only
 (c) 2 and 3 only (d) 1, 2 and 3
61. Which one of the following pairs is not correctly matched?
 (a) Kuddapah-kar : Rocky wastelands
 (b) Nancai : Wet fields
 (c) Puncai : Dry fields
 (d) Tottakal : Garden lands
62. Which of the following rulers were identified through matronyms (names derived from that of the mother)?
 (a) Mallas of Pava (b) Videhas of Mithila
 (c) Yaudheyas (d) Satavahanas
63. Which one of the following statements about the famous text of *Panchatantra* is correct?
 (a) It is a philosophical text reflecting the debates of the time and refuting rival positions.
 (b) It is a text ushering in linguistics as a formal science.
 (c) It is a text discussing developments in various spheres of natural sciences.
 (d) It is a text showing through illustration what should and should not be done.
64. Geomorphic factors influencing plant and animal distributions are
 (a) slope angle and relief only
 (b) slope aspect and relative relief
 (c) slope angle, slope aspect and relief
 (d) slope angle, slope aspect and relative relief
65. Which one of the following groups of cities **does not** have Sclerophyll as its natural vegetation cover?
 (a) Valparaiso and Cape Town
 (b) Lisbon and Perth
 (c) Los Angeles and Adelaide
 (d) Las Vegas and Queensland

66. Which of the following are warm ocean currents?
 - (a) Kuroshio and California Current
 - (b) North Atlantic Drift and Brazil Current
 - (c) Canaries and Benguela Current
 - (d) West Wind Drift and Falkland Current
 67. In India, how many States/Union Territories have more than two international boundaries?
 - (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 68. In the Hadley cell thermal circulation, air rises up and finally descends at
 - (a) intertropical convergence zone
 - (b) doldrums
 - (c) subtropical high-pressure cells
 - (d) equatorial troughs
 69. Which one of the following soils is characterized by very high content of organic matter?
 - (a) Vertisol
 - (b) Histosol
 - (c) Gelisol
 - (d) Spodosol
 70. Overseas Indians can exercise franchise in an election to the Lok Sabha under which of the following conditions?
 1. They must be citizens of India.
 2. Their names must figure in the electoral roll.
 3. They must be present in India to vote.
 Select the correct answer using the code given below.
 - (a) 1, 2 and 3
 - (b) 2 and 3 only
 - (c) 1 and 2 only
 - (d) 1 only
 71. Which one of the following is **not** a feature of the Ayushman Bharat Scheme?
 - (a) There is no cap on family size and age.
 - (b) The scheme includes pre- and post-hospitalization expenses.
 - (c) A defined transport allowance per hospitalization will also be paid to the beneficiary.
 - (d) The scheme provides a benefit cover of ₹10 lakh per family.
 72. Which of the following are considered to be the four pillars of human development?
 - (a) Equity, inclusion, productivity and empowerment
 - (b) Equity, productivity, empowerment and sustainability
 - (c) Productivity, gender, inclusion and equity
 - (d) Labour, productivity, inclusion and equity
 73. Which one of the following was added as a fundamental duty through the Constitution (86th Amendment) Act, 2002?
 - (a) To strive towards excellence in individual and collective activity
 - (b) To provide opportunities for education to one's child between the age of 6 and 14 years
 - (c) To work for the welfare of women and children
 - (d) To promote peace and harmony
 74. Which one of the following Articles of the Constitution of India protects a person against double jeopardy?
 - (a) Article 20
 - (b) Article 21
 - (c) Article 22
 - (d) Article 23
 75. Consider the following statements about Stone Age in India:
 1. Different periods are identified on the basis of the type and technology of stone tools.
 2. There are no regional variations in the type and technology of tools in different periods.
 3. Stone Age cultures of different periods evolved uniformly in a neat unilinear fashion all over the subcontinent.
- Which of the statements given above is/are correct?
- (a) 1 only
 - (b) 1 and 2 only
 - (c) 3 only
 - (d) 1, 2 and 3
76. From which one of the following factory sites were limestone and chert blades mass produced and sent to various Harappan settlements in Sindh?
 - (a) Sukkur and Rohri Hills
 - (b) Khetri in Rajasthan
 - (c) Chagai Hills
 - (d) Hills of Baluchistan
 77. The work *Siyar-ul-Mutakherin*, which describes the Battle of Plassey, 1757, was written by
 - (a) Salabat Jung
 - (b) Qasim Khan
 - (c) Ghulam Husain
 - (d) Ram Mohan Roy
 78. Who believed that the Russian designs were 'an imminent peril to the security and tranquility' of the Indian Empire in 1836?
 - (a) Lord Auckland
 - (b) Lord Palmerston
 - (c) Lord Canning
 - (d) Alexander Burnes
 79. The 'Tattvabodhini Sabha' was established by
 - (a) Devendranath Tagore in 1839
 - (b) Keshab Chandra Sen in 1857
 - (c) Akshay Kumar Datta in 1850
 - (d) Dwarkanath Tagore in 1840
 80. What was the code name given to the first ever tri-service military exercise between India and USA?
 - (a) Lion Triumph
 - (b) Elephant Triumph
 - (c) Tiger Triumph
 - (d) Bison Triumph
 81. 'Naropa' is an annual festival of
 - (a) Sikkim
 - (b) Ladakh
 - (c) Arunachal Pradesh
 - (d) Nagaland
 82. Which one of the following is India's official entry for the Best International Feature Film category in the 92nd Academy Awards?
 - (a) *Bulbul Can Sing*
 - (b) *Super Deluxe*
 - (c) *Gully Boy*
 - (d) *And The Oscar Goes To*
 83. The Global Goalkeeper Award is given by
 - (a) the Bill and Melinda Gates Foundation
 - (b) the United Nations Environment Programme
 - (c) the Kellogg School of Management
 - (d) the World Meteorological Organization
 84. 'Gandhi Solar Park' is located at
 - (a) New York
 - (b) Vladivostok
 - (c) Thimphu
 - (d) Houston
 85. Who among the following was the first to arrive in Africa as traders that eventually led to European colonization of Africa?
 - (a) French
 - (b) Spanish
 - (c) Portuguese
 - (d) Dutch
 86. The College of Military Engineering affiliated to Jawaharlal Nehru University is situated at
 - (a) New Delhi
 - (b) Dehradun
 - (c) Nainital
 - (d) Pune

87. Which of the following statements with regard to Coal India Limited (CIL) is/are true?
- CIL has its headquarters at Kolkata.
 - CIL operates through 82 mining areas spread over twenty provincial States of India.
 - CIL is the single largest coal-producing company in the world.
- Select the correct answer using the code given below.
- 1 only
 - 1 and 3 only
 - 2 and 3 only
 - 1, 2 and 3
88. Which one of the following climatic types is found in Central Spain?
- Subarctic
 - Mediterranean dry hot summer
 - Subtropical Steppe
 - Humid continental warm summer
89. Which one of the following is **not** among the principal languages of Jammu and Kashmir?
- Urdu
 - Gujari
 - Koshur
 - Monpa
90. The major part of Central Asia is dominated by which one of the following language families?
- Indo-European
 - Sino-Tibetan
 - Austrian
 - Altaic
91. Which one of the following Articles was defended by Dr. B. R. Ambedkar on the plea that it would be used as 'a matter of last resort'?
- Article 352
 - Article 359
 - Article 356
 - Article 368
92. What is the ground on which the Supreme Court can refuse relief under Article 32?
- The aggrieved person can get remedy from another court
 - That disputed facts have to be investigated
 - That no fundamental right has been infringed
 - That the petitioner has not asked for the proper writ applicable to his/her case
93. The Ministry of Heavy Industries and Public Enterprises consists of
- the Department of Heavy Industry and the Department for Promotion of Industry and Internal Trade
 - the Department of Public Enterprises and the Department for Promotion of Industry and Internal Trade
 - the Department of Scientific and Industrial Research and the Department of Heavy Industry
 - the Department of Heavy Industry and the Department of Public Enterprises
94. The First Delimitation Commission in India was constituted in
- 1949
 - 1950
 - 1951
 - 1952
95. Who among the following stated in the Constituent Assembly that on 26th January, 1950, India was going to enter a life of contradictions?
- Dr. B. R. Ambedkar
 - Jawaharlal Nehru
 - Mahatma Gandhi
 - S. P. Mukherjee
96. The power of the Supreme Court to decide in the case of a dispute between two or more States is called
- original jurisdiction
 - inherent jurisdiction
 - plenary jurisdiction
 - advisory jurisdiction
97. Who among the following is the Chairman of the Economic Advisory Council to the Prime Minister (EAC-PM)?
- Ratan P. Watal
 - Bibek Debroy
 - Ashima Goyal
 - Sajjid Chinoy
98. Hilsa is the national fish of
- Pakistan
 - India
 - Bangladesh
 - Nepal
99. The Vijaynagar Advanced Landing Ground of the Indian Air Force, which was reopened recently, is located in
- Jammu and Kashmir
 - Arunachal Pradesh
 - Karnataka
 - Himachal Pradesh
100. Rustom-2, which crashed in Karnataka recently, was a/an
- fighter aircraft
 - helicopter
 - transport aircraft
 - unmanned aerial vehicle
101. The maiden trilateral naval exercise involving India, Singapore and Thailand was held at
- Port Blair
 - Chennai
 - Panaji
 - Kochi
102. The creation of a Federal Court in India was advocated by which of the following Acts/Commissions?
- The Government of India Act, 1919
 - The Lee Commission, 1923
 - The Government of India Act, 1935
 - The Indian Councils Act, 1909
103. Who founded the 'Seva Samiti' at Allahabad in 1914?
- Hridayanath Kunzru
 - G. K. Gokhale
 - Shri Ram Bajpai
 - T. B. Saprui
104. The State of Hyderabad in the Deccan officially acceded to the Indian Union in the year
- 1948
 - 1950
 - 1949
 - 1947
105. The Hunter Commission (1882) appointed to survey the state of education in India
- deprecated University education
 - overruled the Despatch of 1854
 - endorsed the Despatch of 1854 with greater emphasis on primary education
 - criticized the grants-in-aid system of schooling
106. The power to legislate on all matters relating to elections to Panchayats lies with
- the Parliament of India
 - the State Legislatures
 - the State Election Commission
 - the Election Commission of India
107. The 11th Schedule of the Constitution of India distributes powers between
- the Union and the State Legislatures
 - the State Legislatures and the Panchayat
 - the Municipal Corporation and the Panchayat
 - the Gram Sabha and the Panchayat

108. The provisions of the Constitution of India pertaining to the institution of Panchayat **do not** apply to which one of the following States?
 (a) Meghalaya (b) Tripura
 (c) Assam (d) Goa
109. Which one of the following rivers **does not** drain into Black Sea?
 (a) Volga (b) Dnieper
 (c) Don (d) Danube
110. The National Water Academy (NWA) is located at
 (a) Dehradun
 (b) Hyderabad
 (c) Bhopal
 (d) Khadakwasla
111. Which one of the following is the correct sequence of formation of the Commissions starting from the earliest?
 (a) Finance Commission, Planning Commission, Investment Commission, Election Commission
 (b) Election Commission, Planning Commission, Finance Commission, Investment Commission
 (c) Planning Commission, Election Commission, Finance Commission, Investment Commission
 (d) Investment Commission, Finance Commission, Planning Commission, Election Commission
112. The formulation of policy in respect to Intellectual Property Rights (IPRs) is the responsibility of
 (a) the Ministry of Law and Justice
 (b) the Department of Science and Technology
 (c) the Department for Promotion of Industry and Internal Trade
 (d) the Ministry of Human Resource Development
113. Which one of the following is the latest addition to the AYUSH group of health care system?
 (a) Unani
 (b) Siddha
 (c) Sowa-Rigpa
 (d) Reiki
114. Which one of the following is the nodal agency in India for the United Nations Environment Programme?
 (a) The Ministry of Environment, Forest and Climate Change
 (b) The Ministry of Science and Technology
 (c) The Ministry of Earth Sciences
 (d) The Ministry of Home Affairs
115. According to the Census 2011, in India, what is the percentage of people (approximately) considered to be migrants (internal), i.e., now settled in a place different from their previous residence?
 (a) 25% (b) 35% (c) 45% (d) 55%
116. Suppose an agricultural labourer earns ₹ 400 per day in her village. She gets a job to work as babysitter in a nearby town @ ₹700 per day. She chose to work as agricultural labourer. Which one of the following is the opportunity cost of the agricultural labourer?
 (a) ₹1,100 (b) ₹700 (c) ₹400 (d) ₹300
117. Match List-I with List-II and select the correct answer using the code given below the Lists :
- | List-I
(Market structure) | List-II
(Characteristic) |
|------------------------------|---|
| A. Perfect competition | 1. Only one producer selling one commodity |
| B. Monopoly | 2. Few producers selling similar or almost similar products |
| C. Monopolistic competition | 3. Many producers selling differentiated products |
| D. Oligopoly | 4. Many producers selling similar products |
- Code:**
- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 4 | 3 | 1 | 2 |
| (b) | 4 | 1 | 3 | 2 |
| (c) | 2 | 1 | 3 | 4 |
| (d) | 2 | 3 | 1 | 4 |
118. Which one of the following was the host country for World Tourism Day, 2019?
 (a) USA (b) India (c) Russia (d) Canada
119. BRICS Summit, 2020 will be hosted by
 (a) India (b) China (c) Russia (d) Brazil
120. The Government of India has recently constituted a civilian award in the name of Sardar Vallabhbhai Patel in the field of contribution to
 (a) unity and integrity of India
 (b) art and culture
 (c) social work
 (d) entrepreneurship

HINTS & EXPLANATIONS

MATHEMATICS

1. (a) $2 \times 3 \times 5 \times 7 \times 11$ gives a number that are, divisible by 2, 3, 5, 7 and 11.
So, $(2 \times 3 \times 5 \times 7 \times 11 + 1)$ gives a number that are not divisible by 2, 3, 5, 7 and 11.
Then, that number is not divisible by 4, 6, 8, 9, and 10 as well.
Hence, number ' $(2 \times 3 \times 5 \times 7 \times 11 + 1)$ ' is a prime number.
2. (b) As, HCF of two numbers are 12.
Let two numbers are $12a$ and $12b$
then, $12a \times 12b = 2160 \Rightarrow ab = 15$
 $\therefore$ sets of numbers are (1, 15) and (3, 5)
means of set of numbers are 8 and 4
means of means = 6
 $\therefore$ Req. number = $6 \times 12 = 72$
3. (b) $\log(54)^{10} = 10 \log 54 = 10[3 \log 3 + \log 2]$
 $= 10[1.431 + 0.301] = 17.32$
 $\therefore$ Number of digits = $17 + 1 = 18$
4. (a) From question we have $x^{\sqrt{x}} = x^{x/n}$
 $\Rightarrow$ On equating the powers on both end
 $= \sqrt{x} = \frac{x}{n} \Rightarrow n = \sqrt{x} \Rightarrow x = n^2$
So possible solution are $x = \{1, n^2\}$
5. (d) Number of students registered for
Physics $n(P) = 50$
Mathematics $n(M) = 75$
Number of students registered for both subjects
 $n(P \cap M) = 35$.
Number of students, registered for either physics or mathematics
 $n(P \cup M) = n(P) + n(M) - n(P \cap M)$
 $= 50 + 75 - 35 = 90$
 $\therefore$ Number of students registered neither for physics nor for mathematics
 $n(\overline{P \cup M}) = 250 - 90 = 160$.
6. (b)

Value of n	Number	Sum of its digit
1	$10^1 - 1 = 9$	9
2	$10^2 - 1 = 99$	$9 + 9 = 2 \times 9$
3	$10^3 - 1 = 999$	$9 + 9 + 9 = 3 \times 9$
n	$10^n - 1 = 999 \dots n \text{ times}$	$\frac{9 + 9}{n \text{ time}} = n \times 9$

According to the question, Sum of its digits
 $n \times 9 = 3798 \Rightarrow n = 422$.
7. (a) Number in ascending orders are
 $2222^2 < 222^{22} < 22^{222} < 2^{2222}$
8. (b) Number of prime number between 0 to 50.
 $m = 15$; Number of prime number between 50 to 100
 $n = 10$; $\therefore m - n = 5$
9. (c) We have
 $a : b = 1 : 3$
 $b : c = 2 : 1$
 $c : d = 1 : 2$
 $d : e = 3 : 1$
 $e : f = 1 : 4$
 $a : b : c : d : e : f = 2 : 6 : 3 : 6 : 2 : 8$
 $\frac{abc}{def} = \frac{2 \times 6 \times 3}{6 \times 2 \times 8} = \frac{3}{8}$
10. (c) $3^x + 3^{x+1} + 3^{x+2} = 3^x(1 + 3 + 9) = 3^x \times 13$
Min value of $x = 1$
 $\therefore$ Min divisor = $3 \times 13 = 39$
11. (a) Let two digits of the number are x and y , then
 $xy = 8 \Rightarrow y = 8/x \dots(i)$
 $(10x + y) = 4(10y + x) + 9$
 $10x + y = 40y + 4x + 9$
 $6x = 39y + 9$
 $2x = 13y + 3$
 $2x = \frac{104}{x} + 3 \quad \left(\because y = \frac{8}{x} \right)$
 $2x^2 - 3x - 104 = 0$
 $\Rightarrow x = 8, \frac{13}{2}$
 $\therefore x = 8, y = 1$
Required number = 81
12. (a) As α and β are roots of the equation $x^2 + kx - 15 = 0$
Then, sum of roots $(\alpha + \beta) = -k$,
product of roots $\alpha\beta = -15$ and $(\alpha - \beta) = 8$ {given}
 $(\alpha - \beta)^2 + 4\alpha\beta = (\alpha + \beta)^2$
 $64 + (4 \times -15) = k^2$
 $\Rightarrow k^2 = 4 \Rightarrow k = 2$
13. (a) $f(x) = x^3 + 4x^2 + px + q$
Now, $(x - 1)$ and $(x + 2)$ divide
 $f(x)$. so, $f(1) = f(-2) = 0$
 $f(1) = 1^3 + 4 \times 1^2 + p \times 1 + q = 0 \Rightarrow p + q = -5$
 $f(-2) = -8 + 16 - 2p + q = 0 \Rightarrow q - 2p = -8$
on solving $p = 1, q = -6$
14. (b) As $(x + k)$ is HCF
 $\therefore F(-k) = k^2 - 5k + 6 = k^2 - 8k + 15$
 $\Rightarrow 3k = 9 \Rightarrow k = 3$
15. (d) $5^{x+1} - 5^{x-1} = 600$
 $5^{x-1}(25 - 1) = 600 \Rightarrow 5^{x-1} = 25 \Rightarrow x = 3$
 $10^{2x} = 10^6 = 1000000$
16. (c) The greatest number that divide 28200, 44333 and 12288
is the H.C.F. of $(28200 - 12288, 44333 - 28200, 44333 - 12288) = \text{H.C.F of } (15912, 16133, 32045)$
 $= 121$.

17. (a) We have, $x^2 + 9y^2 = 6xy$

$$9\left(\frac{y}{x}\right)^2 - 6\left(\frac{y}{x}\right) + 1 = 0$$

$$\Rightarrow \left(3\frac{y}{x} - 1\right)^2 = 0 \Rightarrow \frac{y}{x} = \frac{1}{3}$$

18. (b) $1331 = 11^3 = m^n$
 $\Rightarrow m = 11, n = 3$
 $(m-1)^{n-1} = 10^2 = 100$

19. (b) $\frac{1}{a^{m-n}-1} + \frac{1}{a^{n-m}-1} = \frac{1}{\frac{a^m}{a^n}-1} + \frac{1}{\frac{a^n}{a^m}-1}$
 $= \frac{a^n}{a^m-a^n} + \frac{a^m}{a^n-a^m} = \frac{a^n}{a^m-a^n} - \frac{a^m}{a^m-a^n}$
 $= -\frac{a^m-a^n}{a^m-a^n} = -1$

20. (b) $x = 2^{1/2} = 8^{1/6}$
 $y = 3^{1/3} = 9^{1/6}$
and $z = 6\sqrt{6} = 6^{1/6}$

21. (c) We have, $y = x^{\log x}$
Taking log on both sides
 $\log y = \log(x^{\log x})$
 $= \log x \cdot \log x = (1.25)^2 = 1.5625$

22. (c) $f(x) = c(x-\alpha)(x-\beta) + ax + b$
Required Remainder is $ax + b$
 $f(\alpha) = c\alpha + b; f(\beta) = c\beta + b$

$$a = \frac{f(\alpha) - f(\beta)}{(\alpha - \beta)}$$

$$b = f(\alpha) - a\alpha = f(\alpha) - \frac{f(\alpha) - f(\beta)}{(\alpha - \beta)}\alpha$$

Solving the question

$$ax + b = \frac{(x-\beta)f(\alpha) - (x-\alpha)f(\beta)}{\alpha - \beta}$$

23. (c) Area of the square
 $2401x^4 + 196x^2 + 4$
 $= (7x)^4 + 2 \times 2(7x)^2 + 2^2$
 $= ((7x)^2 + 2)^2 = (\text{side})^2$
 $\Rightarrow \therefore \text{Side} = (7x)^2 + 2 = 49x^2 + 2$

24. (c) As, $x \propto yz \Rightarrow \frac{1}{y} \propto z/x$

25. (a) From equation we have

$$P = 0.7\bar{3} = \frac{73-7}{90} = \frac{66}{90} = \frac{11}{15}$$

$$Q = 0.5\bar{6} = \frac{56-5}{90} = \frac{51}{90} = \frac{17}{30}$$

$\therefore$ Distance between P and Q

$$= \frac{11}{15} - \frac{17}{30} = \frac{22-17}{30} = \frac{5}{30} = \frac{1}{6}$$

26. (b) $10x + 4y = 14xy$
 $\frac{-10x-3y}{-10x-3y} = \frac{-8xy}{-8xy}$
On solving two equation
 $y = 6xy \Rightarrow 6x = 1, x = 1/6$
 $y = -5/6/5/6 = -1$

27. (b)

	X	Y
2010	5000	2000
2011	6000	2200
2012	7200	2420
2013	8640	2662

Difference in price in 2013 = $8640 - 2662 = 5978 > 5000$

28. (c) Let us assume that speed of X = 5m/s
 $\therefore$ speed of Y = 6m/s
Time taken by Y to cover 1.2 km race

$$t_Y = \frac{1200}{6} = 200 \text{ sec}$$

Time taken by X to cover 1.2 km race

$$t_X = \frac{1200-70}{5} = \frac{1130}{5} = 226 \text{ sec}$$

So Y wins the race by 26 sec.

Distance travelled by X in

$$26 \text{ sec} = 26 \times 5 = 130 \text{ m}$$

29. (d) Let usual speed = v
increased speed = v + 5

$$\text{Now, } \frac{300}{v} - \frac{300}{v+5} = 2$$

$$\frac{300(v+5) - 300v}{v(v+5)} = 2$$

$$\Rightarrow 2v^2 + 10v - 1500 = 0$$

$$\Rightarrow (v+30)(2v-50) = 0$$

$$\therefore v = -30, 25$$

$\therefore v = 25 \text{ km/hr}$ {since V is always + ve value}

30. (a) $(6M + 8W) 10 = (13M + 24W) 4$
 $60M + 80W = 52M + 96W$
 $8M = 16W$

$$\therefore M : W = 2 : 1$$

31. (d) Let number of student = R and number of Row = C
 $RC = (R+2)(C-3) = (R+4)(C-5)$
Now, $RC = (R+2)(C-3)$
 $RC = RC + 2C - 3R - 6$
 $2C - 3R = 6$... (i)

$$\text{Also, } RC = (R+4)(C-5)$$

$$RC = RC + 4C - 5R - 20$$

$$4C - 5R = 20$$
 ... (ii)

Now On applying (i) $\times 2$ - (ii) solving equation

$$R = 8, C = 15$$

$$\therefore \text{Number of student} = R \times C$$

$$= 15 \times 8 = 120$$

32. (d) $1\% = \frac{24}{2} = ₹ 12$

$$\therefore \text{Principle} = ₹ 1200$$

$$33. (d) \frac{\text{Male}}{\text{Total}} = \frac{\frac{1525 \times 27}{61} + \frac{2600 \times 6}{13}}{1525 + 2600} = \frac{1875}{4125} = \frac{5}{11}$$

$$\therefore \frac{\text{Male}}{\text{Female}} = \frac{5}{11-5} = \frac{5}{6}$$

34. (c) Let number of boys and girls in the class is $4x$ and $3x$ also Average height of girl is h

Now,

$$\Rightarrow 7x \times 4.6 = 4x \times 4.8 + 3x \times h$$

$$\Rightarrow 32.2x = 19.2x + 3x \times h$$

$$\therefore h = \frac{13}{3} = 4.\bar{3}$$

35. (a) Arrange the number assending order
3, 4, 5, 6, 9, 11, 18
Therefore 4^{th} term out of 7 is Median.

$$\therefore \text{Median} = 6$$

36. (c) Sum of angles of a pie diagram = 360°

$$\therefore \theta + 2\theta + 3\theta = 360^\circ$$

$$6\theta = 360^\circ$$

$$\theta = 60^\circ$$

Hence, angle of Largest sector

$$6\theta = 3 \times 60^\circ$$

$$= 180^\circ$$

$$37. (c) \frac{170-70}{250/50} = \frac{100}{5} = 20$$

$$38. (b) \text{Jail A} = \frac{45}{86} = 52.3\%$$

$$\text{Jail B} = \frac{903}{1305} = 69.19\%$$

$$\text{Jail C} = \frac{940}{2019} = 46.55\%$$

$$\text{Jail D} = \frac{869}{1166} = 74.45\%$$

$$\text{Jail E} = \frac{544}{954} = 57.02\%$$

$$\text{Jail F} = \frac{464}{1198} = 38.73\%$$

Hence, Jail with highest and lowest percentage of frained convicts are from jail D and jail F respectively.

39. (d) Highest placement rate of trained convicts are from jail A

$$= \frac{25}{45} = 55.56\%$$

$$40. (a) \text{Jail A} = \frac{25}{45} \times 100 = 55.56\%$$

$$\text{Jail B} = \frac{461}{903} = 51.50\%$$

$$\text{Jail C} = \frac{474}{940} = 50.44\%$$

$$\text{Jail D} = \frac{416}{869} = 47.87\%$$

$$\text{Jail E} = \frac{254}{544} = 46.69\%$$

$$\text{Jail F} = \frac{174}{464} = 37.5\%$$

Hence, Jail A, B and C are the required answer.

41. (c) $100x + 10y + z$ is divisible by 7.
 $100z + 10y + x$ is divisible by 7.
on solving above two equation
 $(99x - 99z)$ is divisible by 7.
 $x - z$ is divisible by 7.
four possible numbers. are
 $8y1$ or $1y8$ and $9y2$ or $2y9$

$$42. (b) 5x + 9y = 7 \Rightarrow y = \frac{7-5x}{9}$$

$$\therefore 7-5x \text{ is divisible by } 9$$

$$\text{So } x = 5, 14, \dots, 491$$

$$\text{or } x = 5, -4, -11, \dots, -499$$

So total possible values of x

$$= \frac{491+499}{9} + 1 = 111$$

43. (d) $S = XYZ + YZX + ZXY$

$$S = 100X + 10Y + Z + 100Y + 10Z + X + 100Z + 10X + Y = 111(X + Y + Z) = 3 \times 37(X + Y + Z)$$

$\therefore$ 3 digit number s is always divisible by 3, $(x + y + Z)$ and 37, but not always divided by 9

44. (c) Time taken by X and Y to covered distance is $5x$ and $4x$ respectively

$$\therefore 5x - 4x = 45 \text{ min}$$

$$x = 45 \text{ min}$$

$$\therefore \text{Time} = 4x = 45 \times 4 = 180 \text{ min}$$

$$45. (c) HM = \frac{2ab}{a+b} = \frac{2P}{S}$$

46. (b) Let income $y = 100\%$ and difference = 20%

$$\therefore x = 120$$

$$\text{Different} = (120 - 100) = 20$$

$$\text{Diff. percent} = 100 \times \frac{20}{120} = \frac{100}{6} = 16\frac{2}{3}\%$$

47. (c) Reqd. Square = $(3 \times 2 \times 2 \times 5 \times 7) \times (3 \times 5 \times 7) = 9 \times 49 \times 100 = 44100$

48. (d) Time taken to empty the tank by second outlet

$$= \frac{1}{\left(\frac{1}{20} - \frac{1}{30}\right)} = \frac{1}{\frac{1}{60}} = 60 \text{ minutes.}$$

49. (d) $x^2 - 1 = 0 \quad \therefore x = \pm 1$

$$\text{take } x = -1$$

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

$$\therefore a + c + e = b + d$$

$$50. (c) x^8 + \frac{1}{x^8} = 47$$

$$\left(x^4 + \frac{1}{x^4}\right)^2 = x^8 + \frac{1}{x^8} + 2$$

$$\Rightarrow x^4 + \frac{1}{x^4} = \sqrt{47+2} = 7$$

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

$$\Rightarrow x^2 + \frac{1}{x^2} = \sqrt{7+2} = 3$$

$$\left(x^2 + \frac{1}{x^2}\right)^3 = x^6 + \frac{1}{x^6} + 3\left(x^2 + \frac{1}{x^2}\right)$$

$$\Rightarrow x^6 + \frac{1}{x^6} = (3)^3 - 3(3) = 18$$

51. (c) Revolution in one minutes = 360

$$\therefore \text{revolution in one sec} = \frac{360}{60} = 6$$

$$\text{Number of radian it turns in one second} = 6 \times 2\pi = 12\pi \text{ rad/s}$$

52. (b) Min Vaule = $(\sqrt{25} + 1)^2 = 36$

53. (a) $100\theta = 90^\circ \therefore \theta = \frac{90}{100} = \frac{\pi}{2} \times \frac{1}{100}$

$$\alpha = \cot\left(\frac{1}{100} \cdot \frac{\pi}{2}\right) \cot\left(\frac{2}{100} \cdot \frac{\pi}{2}\right) \dots \cot\left(\frac{99}{100} \cdot \frac{\pi}{2}\right) = 1$$

54. (a) $\tan 6\theta = \cot 2\theta$

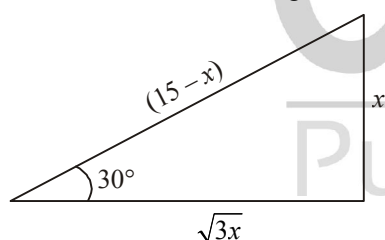
$$\Rightarrow \cot(90^\circ - 6\theta) = \cot 2\theta$$

$$\Rightarrow 90^\circ - 6\theta = 2\theta$$

$$\Rightarrow 8\theta = 90^\circ \therefore 4\theta = 45^\circ$$

$$\sec 4\theta = \sec 45^\circ = \sqrt{2}$$

55. Let the tree is broken at height x from ground



then, length of tree broken = $(15 - x)$

$$\text{From above triangle, } \sin 30^\circ = \frac{x}{15 - x}$$

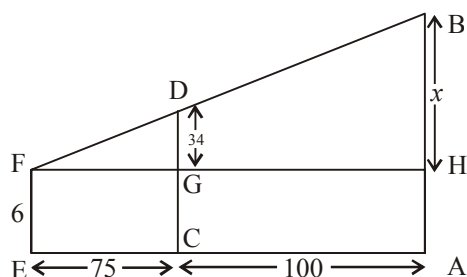
$$\Rightarrow \frac{1}{2} = \frac{x}{15 - x}$$

$$\Rightarrow 2x = 15 - x$$

$$3x = 15$$

$$x = 5 \text{ m}$$

56. (a)



Let AB, CD and EF are Length of longer, shorter towers and a pole respectively then, from question, we have

$$AC = 100 \text{ feet}$$

$$CD = 40 \text{ feet}$$

$$EF = 6 \text{ feet}$$

$$CE = 75 \text{ feet}$$

Then, from similar $\triangle DFG$ and $\triangle BFH$

$$\frac{DG}{BH} = \frac{FG}{GH} \Rightarrow \frac{34}{BH} = \frac{75}{175}$$

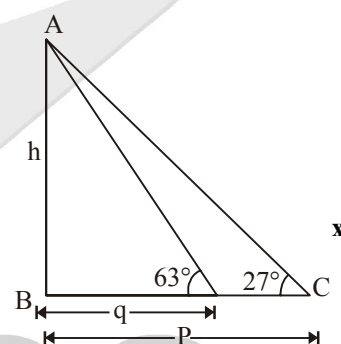
$$BH = \frac{175 \times 34}{75}$$

$$= 79.3 \text{ feet}$$

$$AB = 79.3 + 6$$

$$\approx 85 \text{ feet.}$$

57. (b)



$$\tan 63^\circ = \frac{h}{q}$$

...(i)

$$\tan 27^\circ = \frac{h}{p}$$

$$\tan (90 - 63^\circ) = \frac{h}{p}$$

$$\cot 63^\circ = \frac{h}{p}$$

$$\tan 63^\circ = \frac{p}{h}$$

...(ii)

Fromm equation (i) and (ii) we get :-

$$\frac{h}{q} = \frac{p}{h}$$

$$h^2 = pq$$

$$\therefore h = \sqrt{pq}$$

58. (d) $\sin^2 6^\circ + \sin^2 12^\circ + \sin^2 18^\circ + \dots \sin^2 84^\circ + \sin^2 90^\circ$

$$\text{Now, } \sin^2 84^\circ = \sin^2 (90^\circ - 6^\circ) = \cos^2 6^\circ$$

$$\therefore \sin^2 6^\circ + \sin^2 12^\circ + \sin^2 18^\circ + \dots \cos^2 12^\circ + \cos^2 6^\circ + \sin^2 90^\circ$$

$$\sin^2 6^\circ + \cos^2 6^\circ + \dots + \sin^2 42^\circ + \cos^2 42^\circ + \sin^2 90^\circ$$

$$= 7 + 1 = 8$$

59. (b) $\frac{\cos \theta}{1 + \sin \theta} + \frac{\sin \theta}{\cos \theta} = \frac{\cos^2 + \sin^2 + \sin \theta}{(1 + \sin \theta) \cos \theta}$

$$= \frac{1}{\cos \theta} = \sec \theta$$

$$\begin{aligned}
 60. \quad (a) \quad & \frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} - \frac{\sin\theta + 1}{\cos\theta} \\
 &= \frac{(\sin\theta - \cos\theta + 1)(\cos\theta) - (\sin\theta + 1)(\sin\theta + \cos\theta - 1)}{(\sin\theta + \cos\theta - 1)(\cos\theta)} \\
 &= \frac{\sin\theta \cdot \cos\theta - \cos^2\theta + \cos\theta - \sin^2\theta}{(\sin\theta + \cos\theta - 1)(\cos\theta)} \\
 &= \frac{-\sin\theta - \sin\theta \cdot \cos\theta - \cos\theta + \sin\theta + 1}{(\sin\theta + \cos\theta - 1)(\cos\theta)} = 0 \\
 &= \frac{0}{(\sin\theta + \cos\theta - 1)(\cos\theta)} = 0
 \end{aligned}$$

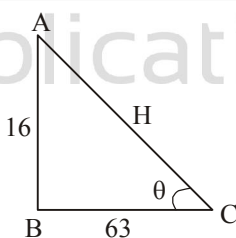
$$\begin{aligned}
 61. \quad (a) \quad & \tan x = a; \tan y = b \\
 & (a+b)\left(1 - \frac{1}{ab}\right) + \left(\frac{1}{a} + \frac{1}{b}\right)(1-ab) \\
 &= \frac{(a+b)(ab-1)}{ab} + \frac{(a+b)(1-ab)}{ab} \\
 &= \frac{(ab-1+1-ab)(a+b)}{ab} = 0
 \end{aligned}$$

$$\begin{aligned}
 62. \quad (c) \quad & \sqrt{\frac{\sec x - \tan x}{\sec x + \tan x}} = \sqrt{\frac{\sec^2 x - \tan^2 x}{(\sec x + \tan x)^2}} \\
 & \sqrt{\frac{1}{(\sec x + \tan x)^2}} = \frac{1}{\sec x + \tan x} \\
 & \therefore \sec^2 x - \tan^2 x = 1
 \end{aligned}$$

$$\begin{aligned}
 63. \quad (c) \quad & \text{As } \cot\theta = \frac{63}{16} \\
 & \text{From } \triangle ABC \\
 & B=63, P=16 \\
 & \therefore H = \sqrt{63^2 + 16^2} = 65
 \end{aligned}$$

Now, $\sin\theta + \cos\theta$

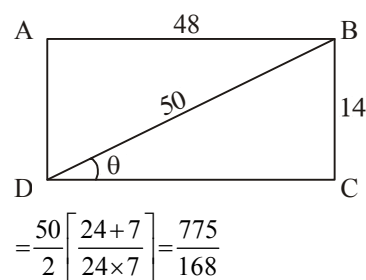
$$= \frac{P+B}{H} = \frac{63+16}{65} = \frac{79}{65}$$



$$\begin{aligned}
 64. \quad (d) \quad & \frac{1 - 2\sin^2\theta \cos^2\theta}{\sin^4\theta + \cos^4\theta} \\
 &= \frac{(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta \cos^2\theta}{\sin^4\theta + \cos^4\theta} \\
 &= \frac{\sin^4\theta + \cos^4\theta}{\sin^4\theta + \cos^4\theta} = 1 \\
 & \text{Hence, required sum} = 1 + 4 = 5
 \end{aligned}$$

$$\begin{aligned}
 65. \quad (a) \quad & \text{Diagonal } BD = \sqrt{(AB)^2 + (AD)^2} \\
 &= \sqrt{(48)^2 + (14)^2} \\
 &= \sqrt{2500} = 50
 \end{aligned}$$

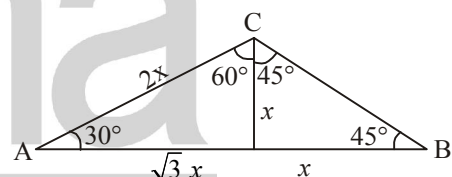
$$\text{Now } \sec\theta + \operatorname{cosec}\theta = \frac{50}{48} + \frac{50}{14}$$



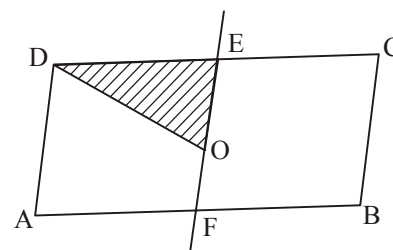
$$\begin{aligned}
 66. \quad (c) \quad & S = \frac{x}{y} + \frac{y}{z} + \frac{z}{x} \\
 & \text{Area} = \sqrt{S(S-a)(S-b)(S-c)} \\
 &= \sqrt{\left(\frac{x}{y} + \frac{y}{z} + \frac{z}{x}\right)\left(\frac{x}{y}\right)\left(\frac{y}{z}\right)\left(\frac{z}{x}\right)} \\
 &= \sqrt{\frac{x}{y} + \frac{y}{z} + \frac{z}{x}}
 \end{aligned}$$

$$\begin{aligned}
 67. \quad (c) \quad & \text{Let the triangle is as like it shown in the fig. then;} \\
 & \sqrt{3} + x = \sqrt{3} + 1 \Rightarrow x = 1
 \end{aligned}$$

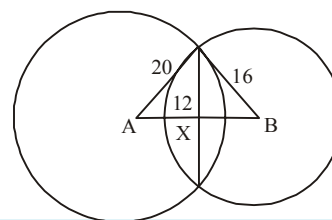
$$\begin{aligned}
 & \text{Area} = \frac{1}{2} \times x \times (\sqrt{3} + 1)x \\
 &= \frac{(\sqrt{3} + 1)}{2} \text{ cm}^2
 \end{aligned}$$



$$\begin{aligned}
 68. \quad (d) \quad & \text{Area}(DOE) = \frac{\text{Area}(ABCD)}{8} \\
 & \text{Reqd. Ratio} = \frac{7}{8}
 \end{aligned}$$



$$\begin{aligned}
 69. \quad (b) \quad & AX = \sqrt{400 - 144} = 16 \\
 & BX = \sqrt{256 - 144} = \sqrt{112} = 10.6 \\
 & AB = (16 + 10.6) \approx 26.6
 \end{aligned}$$



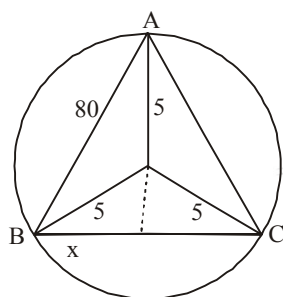
70. (c) $R = \frac{abc}{4\Delta}$

$$R = \frac{8 \times 8 \times c}{4 \times \frac{1}{2} \times c \sqrt{64 - \frac{c^2}{4}}}$$

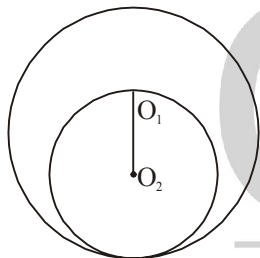
$$5 = \frac{32}{\sqrt{64 - \frac{c^2}{4}}}$$

$$\Rightarrow 64 - \frac{c^2}{4} = \frac{1024}{25} \Rightarrow \frac{c^2}{4} = \frac{576}{25}$$

$$\Rightarrow \frac{c}{2} = \frac{24}{5} \Rightarrow c = 9.6 \text{ cm.}$$



71. (b)



$$\pi r_1^2 + \pi r_2^2 = 136\pi$$

$$r_1^2 + r_2^2 = 136 \quad \dots(i)$$

$$r_1 - r_2 = 4 \quad \dots(ii)$$

from equation (i) and (ii)

$$(r_1 - r_2)^2 = r_1^2 + r_2^2 - 2r_1 \cdot r_2$$

$$\Rightarrow 16 = 136 - 2r_1 \cdot r_2$$

$$r_1 \cdot r_2 = 60$$

Again from equation (ii)

$$(r_1 + r_2)^2 = r_1^2 + r_2^2 + 2r_1 \cdot r_2$$

$$(r_1 + r_2)^2 = 136 + 120$$

$$(r_1 + r_2)^2 = 256$$

$$\therefore r_1 + r_2 = 16 \quad \dots(iii)$$

From equation (ii) and (iii) we get

$$r_1 + r_2 = 16$$

$$r_1 - r_2 = 4$$

$$r_1 = 10$$

$$r_2 = 6$$

72. (c) Let radius of circle is 'r' and side of the square is a then, from question

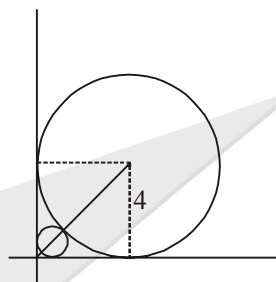
$$\pi r^2 = a^2 \Rightarrow \frac{r}{a} = \frac{1}{\sqrt{\pi}}$$

$$\text{Now } \frac{2\pi r}{4a} = \frac{2\pi}{4\sqrt{\pi}} = \frac{\sqrt{\pi}}{2}$$

73. (d) $(\sqrt{2}+1)d = (\sqrt{2}-1)8$

$$\Rightarrow d = (\sqrt{2}-1)^2 8$$

$$= (3-2\sqrt{2})8 \text{ cm}$$



74. (c) $2\pi rh = 1 \text{ litre}$

$$\text{Paint Reqd.} = \frac{2\pi rh + 2\pi(r+1)h + 2\pi[(r+1)+r]}{2\pi rh}$$

$$= \frac{rh + (r+1)h + 2r+1}{rh}$$

$$= \frac{21+28+7}{3 \times 7} = \frac{8}{3}$$

75. (c) Area of square of side length a = a²

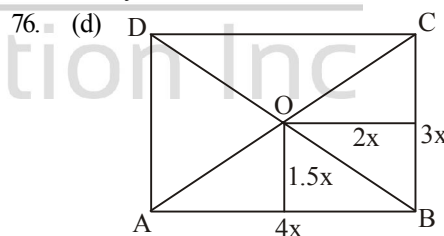
$$\text{Area of rectangle} = xy$$

by questions

$$x = a^2$$

$$\text{also } a^2 = xy$$

$$\therefore y = 1$$



Let length and breadth of a rectangle is 4x and 3x

$$\text{Area of triangle BOC} = \frac{1}{2} \times 3x \times 2x = 3x^2$$

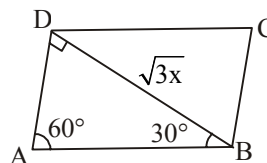
$$\text{Area of triangle AOB} = \frac{1}{2} \times 4x \times 1.5x = 3x^2$$

$$\therefore \text{ratio} = 1 : 1$$

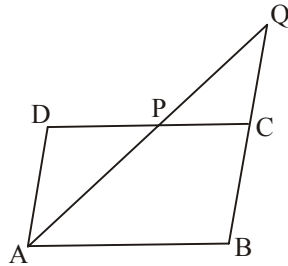
77. (d) $\text{Area} = \frac{340}{360} \times \pi \times (30)^2 = 850\pi$

78. (b) $\frac{BD}{AB} = \frac{\sqrt{3}x}{2x} = \frac{\sqrt{3}}{2}$

$$\Rightarrow BD^2 = \frac{3}{4} AB^2$$



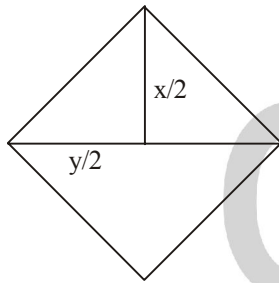
79. (d) $\triangle APD \cong \triangle QPC$
 $\triangle QPC \sim \triangle QAB$
 $\frac{PC}{AB} = \frac{1}{2}$



$$\therefore \frac{\text{Area}(\triangle QPC)}{\text{Area}(\triangle QAB)} = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

80. (d) $V = \pi r^2 h = \frac{22}{7} \times 1.4 \times 1.4 \times 5$
 $= 30.8 \text{ m}^3$

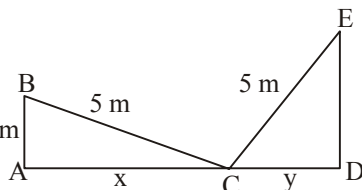
81. (a) $\text{Area} = 4 \times \frac{1}{2} \times \frac{x}{2} \times \frac{y}{2} = \frac{xy}{2}$



82. (c) $(3x)^2 + (4\sqrt{y})^2 = (5\sqrt{z})^2$
 $9x^2 + 16y = 25z^{2/3}$
 if putting value $x = 1, y = 1, z = 1$
 then, $9 + 16 = 25$ (satisfy the equation)
 $\therefore x = y = z = 1$

83. (a) Option (a) by definition

84. (a) $30^\circ = \frac{\pi}{6} \Rightarrow \text{Arc length} = r\theta = \frac{6 \times 3.14}{6} = 3.14 \text{ cm}$

85. (c) 

Let breadth of the room = $x + y$

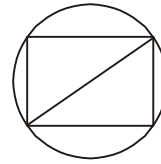
$$x = \sqrt{25 - 1.96} = \sqrt{23.04} = 4.8 \text{ m}$$

$$y = \sqrt{25 - 23.04} = \sqrt{1.96} = 1.4 \text{ m}$$

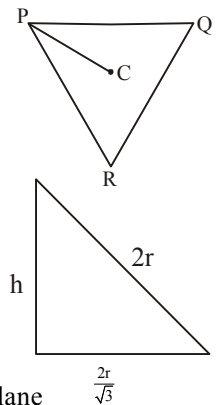
$$\therefore x + y = (4.8 + 1.4) \text{ m} = 6.2 \text{ m}$$

86. (d) $\text{Area of Largest square} = \frac{d^2}{2}$
 Where 'd' is the diameter of the circular disk
 and $d = 2r = 2$

$$\text{Hence, Area} = \frac{(2)^2}{2} = 2 \text{ sq. units.}$$



87. (d) The centre of three lower balls form an equilateral triangle. Let C be the centroid of this triangle. C is at the distance of $\frac{2r}{\sqrt{3}}$ from each vertex of lower ball.
 Let h = height of centre of 4th ball from C.



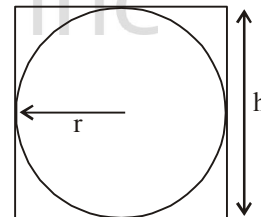
$$\text{then, } h = \sqrt{(2r)^2 - \left(\frac{2r}{\sqrt{3}}\right)^2} = 2r \sqrt{\frac{2}{3}}$$

$\therefore$ height of centre of 4th ball from plane

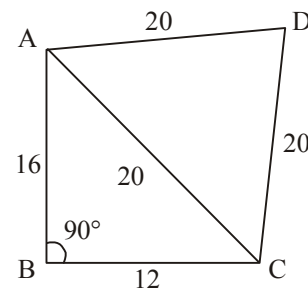
$$= h + r = 2r \sqrt{\frac{2}{3}} + r = r \left(\frac{2\sqrt{2} + \sqrt{3}}{\sqrt{3}} \right) \text{ units}$$

88. (a) $p = 4\pi r^2$
 $q = 2\pi r \cdot h = 2\pi r \cdot 2r = 4\pi r^2$

Hence, $P = q$.



89. (a) $\text{Area} = \frac{\sqrt{3}}{4} \times 20^2 + \frac{1}{2} \times 16 \times 12$
 $= 269.2$



90. (b) $\frac{\text{Shaded Area}}{\text{Total Area}} = \frac{\frac{1}{2}(\pi \times 9^2 - \pi \times 6^2)}{\pi \times 9^2} = \frac{5}{18}$

$\therefore \frac{\text{Shaded area}}{\text{Unshaded area}} = \frac{5}{18-5} = \frac{5}{13}$

91. (a) Area of all three sectors = $3 \times \frac{\pi}{3} \times \frac{(2)^2}{2} = 2\pi$

Area of equilateral triangle = $\frac{\sqrt{3}}{4} \times 4^2 = 4\sqrt{3}$

Area of shaded portion = $4\sqrt{3} - 2\pi$

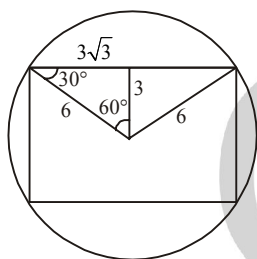
92. (b) Radius of circle = $\sqrt{(3)^2 + (3\sqrt{3})^2} = \sqrt{9+27}$

Area of circle = $\pi r^2 = 36\pi$

Reqd. Area = $\frac{\pi(6)^2}{3} - 3 \times 3\sqrt{3}$

= $12\pi - 9\sqrt{3}$

= $3(4\pi - 3\sqrt{3})$ Sq. units

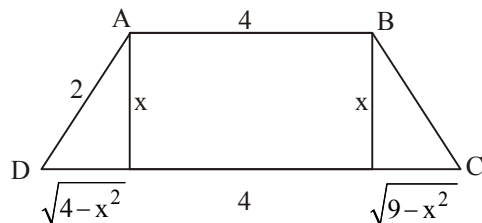


93. (c) From question $\frac{y}{x} = 6, y = 6x, \frac{z}{x} = 5, z = 5x$

Again $x + 6x + 5x = 12x = 180^\circ \Rightarrow x = 15^\circ$

94. (d) $\sqrt{4-x^2} + \sqrt{9-x^2} = 3 \Rightarrow \sqrt{9-x^2} = 3 - \sqrt{4-x^2}$
on squaring both sides, we have

$9 - x^2 = 9 + 4 - x^2 - 6\sqrt{4-x^2}$

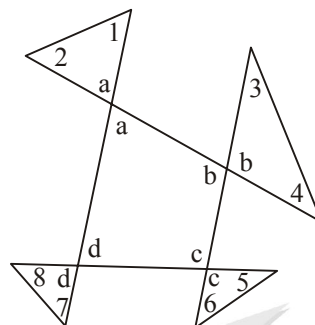


$\Rightarrow \sqrt{4-x^2} = \frac{2}{3}$

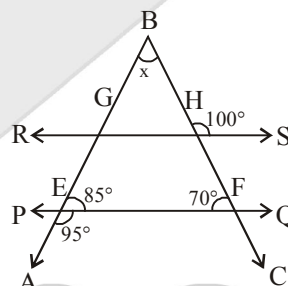
$\Rightarrow 4 - x^2 = \frac{4}{9} \Rightarrow x^2 = \frac{32}{9} \Rightarrow x = \frac{4\sqrt{2}}{3}$

$\Rightarrow \text{Area} = \frac{1}{2}(4+7) \frac{4\sqrt{2}}{3} = \frac{22\sqrt{2}}{3} \text{ cm}^2$

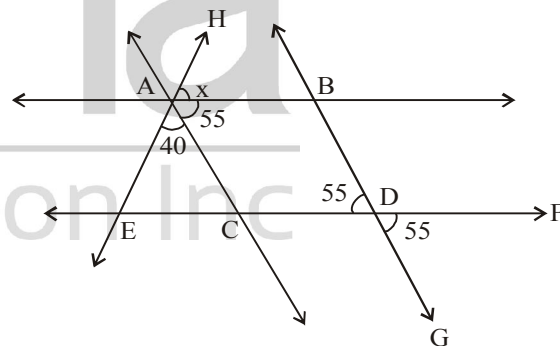
95. (b) $a + b + c + d = 360^\circ$
 $(1+2+a) + (3+4+b) + (5+6+c) + (7+8+d) = 180^\circ \times 4$
 $\therefore 1+2+3+4+5+6+7+8 = 360^\circ$



96. (b) $x = 180 - 85 - 70$
 $= 25^\circ$



97. (a) $x = 180 - 40 - 55$
 $x = 85^\circ$



98. (d) Area of three semicircles.
= Area of semicircle ABC + Area of Semicircle AEF + Area of semicircle CDF.
As AC = 28 unit

Then radius of semicircle ABC = $\frac{28}{2} = 14$ unit

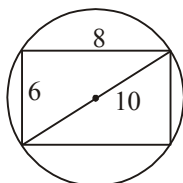
Radius of semicircle AEF = CDF = $\frac{14}{2} = 7$ unit.

Required Area = $\frac{\pi}{2}(14^2 + 7^2 + 7^2)$
 $= 462 \text{ sq. unit}$

99. (d) Area of circle = πr^2
 $= \pi(\sqrt{3^2 + 4^2})^2 = \pi(\sqrt{25})^2 = 25\pi$

Area of rectangle = $a \times b = 6 \times 8$

$$\therefore \text{Reqd. Area} = \pi \times 5^2 - 6 \times 8 \\ = 25\pi - 48 = 30.5 \text{ cm}^2$$



100. (b) Statement 2 & 3 are true by basic properties

ENGLISH

1. (a) The answer can be inferred from the first few lines of the first paragraph.
2. (b) The answer can be obtained from 7 to 10 lines of the first paragraph.
3. (a) Societies which achieved high productivity in agriculture had the opportunity to find time for other work.
4. (b) The answer can be obtained from the last few lines of the passage.
5. (a) Transition
6. (d)
7. (a) Answer can be obtained from the first few lines of second paragraph.
8. (c) Answer can be obtained from the last few lines of second paragraph.
9. (a) Being objective to the ideas of the author
10. (d)
11. (c) 'starting melting' should be replaced with 'has started melting'
12. (c) 'priced method' should be replaced with 'price method'
13. (a) 'would have been implemented' should be replaced with 'had been implemented'
14. (b) The word 'returned' should be replaced with 'returns'
15. (a) The word 'thorough' should be replaced with 'through'
16. (b) The word 'were' should be replaced with 'where'
17. (a) The word 'leaves' is correct contextually
18. (c) It should be 'achieved'
19. (c) It should be 'job change'
20. (b) It should be 'low'
21. (b) SQPR
In the given parts, the part (S) will be the first fragment as it is beginning with a noun 'agriculture' which is the subject of the sentence. The part (Q) will be the next fragment as it is the answer of 'what agriculture has been', (P) is the next fragment ending with 'and', (R) is the last fragment. Hence, the correct option is SQPR.
22. (a) RQSP
(R) is the subject of the sentence; (Q) is the second fragment as it is the extension of the subject. Next fragment is (S) having helping verb and main verb and (P) is the last fragment.
23. (c) RQSP
The correct sequence is "the essential power of the government is the power to manage conflict before it starts."
24. (a) QPSR
The correct sequence is "the party that received a majority of the vote must take control of the government."
25. (a) SQPR
The correct sequence is "A referendum is a vote in which the electorate can express a view on a particular issue of public policy."
26. (a) RPSQ
The correct sequence is "has class conflict in modern societies been resolved or merely suppressed?"
27. (d) SPRQ
Hybrid variety of several of our food and vegetable crops are being extensively cultivated.
28. (b) RQPS
There should have been reason for the accusation against the officer who was in-charge at that time.
29. (d) PSRQ
Poetry is the spontaneous overflow of powerful feelings and ideas.
30. (a) QSPR
A group of people who share a common culture historical identity and a common descent is called an ethnic group.
31. (a) 32. (b) 33. (b) 34. (c) 35. (a) 36. (a)
37. (a) 38. (b) 39. (c) 40. (c)
41. (a) The sentence (S) is the first fragment chronologically. The next linkage is the part (R) as it shows what Chinua Achebe did after his BA. The next fragment is sentence (P) as it is the happening before (Q). Hence, the correct sequence is SRPQ.
42. (c) QRPS
The sentence (Q) is direct link beginning with noun. Sentence (R) is the next linkage in order. The sentence (P) is the next fragment as it is the extension part of (R) and (S) is the last fragment. Hence, the correct sequence is QRPS.
43. (a) QPRS
This paragraph defines earlier definition of biology and Darwin's theory of evolution making (Q) as the opening sentence, option (P) should be the next sentence as it mentions focus of biology in later years, option (R) should be the next linkage mentioning the growth of biology in last 1000 years. The option (S) is the last sentence. Hence, the correct sequence is QPRS.
44. (d) SRPQ
The linkage we can find is S-R, both are mentioning physics and chemistry. In the order (S) is first sentence and (R) is the second sentence in order. The sentence (P) is beginning with conjunction 'however' should be the third sentence and (Q) is the last sentence in sequence.

45. (d) SRQP
The two linkages are S-R and Q-P, the sentence (S) is the beginner as it mentions goods and services. The linkage is the sentence (R) which is the further extension of (S). The sentence (Q) is the third sequence as in S6 service is mentioned the same is mentioned in Q-P.
46. (a) QPSR
The linkages are QP and SR. Since S1 mentions farming as main production activity, the sentence (Q) is linked with S1 (Q) shows how farming has been changed now. (P) Should be the next sentence as it mentions how change in farming has allowed farmers to produce more crops.
And this is an important achievement in the field of agriculture; this is shown in (S) hence, it being the third sentence in order. Sentence (R) should be the last sentence. Hence, the correct sequence is QPSR.
47. (a) QPSR
The sentence (Q) is the first in sequence as this is beginning with pronoun 'it' which is used for Britain shown in S1. P is the next in sequence, mentions the laws and authorities of Britain. The next linkage is S-R where S precedes R. Hence the correct sequence is QPSR.
48. (d) RPSQ
The two linkages are RP and SQ. S1 shows earlier living activity of human hunting and gathering. R is the first in sequence as it mentions the time when the man learnt domestication. P is the second sentence in order as it shows the result of domestication. S is third sequence and Q is the last sentence in sequence. Hence, the correct sequence is RPSQ.
49. (a) SQPR
The two linkages are S-Q and P-R. S is the extension of S1 hence, it is the first sentence. Q is the second sentence. P is the third as it mentions choices of governance. R is the last fragment. Hence, the correct sequence is SQPR.
50. (c) PQRS
The two linkages are P-Q and R-S. P is the first sentence as it is linked with S1; Q is the next sequence as it shows the key roles of monks. R is the third sentence as it shows the origin time of Buddhism. S is the last sentence as it mentions Buddhagosha a person for him the pronoun 'he' is used in S6. Hence, the correct sequence is PQRS.
51. (a) Called on-means 'pay a visit or meet'
52. (d) Put off means to avoid
53. (c) 54. (a) 55. (a) 56. (a) 57. (b) 58. (d)
59. (b) Came about means to happen
60. (a) (Ran into someone or something) to hit someone or something by accident
61. (a) The word 'implication' means the effect that something will have on something else in the future. Hence, 'consequences' is the nearest in meaning.
62. (b) The word 'contagious' means 'something that you get when you come in contact with someone else. Hence, 'transmittable' is the nearest in meaning.
63. (b) The word 'incorporated' means to assimilate or join. Hence, 'integrated' is the nearest in meaning.
64. (c) The word 'broad' is correct contextually here.
65. (a) The word 'stellar' means something related to heavenly bodies. Hence, in this context 'extraordinary' is the right word.
66. (b) The word 'clichéd' means showing a lack of originality; based on frequently repeated phrases or opinions. Hence, the word 'hackneyed' is the nearest in meaning.
67. (d) The word 'vocation' means a type of work or way of life that is suitable for you.
68. (d) The word 'exhausted' is contextually correct here.
69. (d) The word 'aghast' means filled with horror or shock. Hence, option (d) is the right answer.
70. (a) The word 'ascertained' and 'determined' are nearly similar in meaning contextually.
71. (a) The word 'survival' is the only word opposite in meaning. Remaining options are nearly same in meaning to the given underlined word.
72. (a) The word 'eloquent' means one who is well at speaking. Hence, the word 'confusingly' is just opposite in meaning. Other options are nearly same in meaning.
73. (c) The word 'inertia' is used to show inactivity. Hence, the word 'activity' is just opposite in meaning. The words 'torpor', 'indolence' and sluggishness are nearly same in meaning to the given word.
74. (c) The words similar to 'philanthropy' are charity, benevolence and likeliness. The word 'nastiness' is opposite to the word 'philanthropy'.
75. (c) The word 'compassion' means showing kindness. Hence, the word 'indifference' is opposite in meaning.
76. (a) The words similar to 'tempestuous' are passionate, intense and windy. Hence, the word 'relaxed' is opposite to the word 'tempestuous'.
77. (a) The word 'wooing' means 'seeking favour or support'. Hence, the word 'discouraging' is just opposite in meaning to the given word.
78. (a) The word 'bestowed' is opposite to the word 'withdrawn'
79. (c) The word 'elated' means 'happy or excited'. Hence, the word 'depressed' is opposite to the given word.
80. (b) The word 'malevolent' is opposite to the given word.
81. (a) 82. (b)
83. (a) Adjective.
84. (b) The word 'latest' is used as an adjective as it is qualifying the noun 'news'.
85. (a)
86. (a) Past perfect structure is 'had+V3'.
87. (c) 'has offered' is a perfect tense.
88. (c) It is used as a main verb here.
89. (d)
90. (a) The word 'because' is linking word.
91. (a) Continuum is the correct spelling.

92. (d) Strategy
93. (c) Commissioner
94. (b) Vacuum
95. (a) Psephology-the statistical study of elections and trends in voting
96. (b) Nephrology- related to kidney
97. (b) Pseudonym
98. (c) Pneumonia
99. (a) Resilient-strong enough to deal with a situation
100. (b) Supplementary
101. (c) First, when using the zero conditional, the correct tense to use in both clauses is the simple present tense. A common mistake is to use the simple future tense.
102. (a) He is not only hard working, but also honest.
103. (d) Parents have been waiting since morning to meet the counsellor.
104. (a) The correct combination is 'if Minchi had worked hard, she would have cleared the test.
105. (c) Option (c) is the correct answer as it is having the configuration of the given sentences. In other options 'is trying', 'had been' are not correct.
106. (a) In option (a) the relative pronoun is used correctly. The use of 'called, because' is not correct in other options.
107. (a) The sentence "Priya reached the station" is in past simple tense, the next sentence should be in past perfect tense. Hence, option (a) is the correct answer. In option (b) and (d) past perfect is used in first sentence. Option (c) is also not correct as it is in past simple only.
108. (a) Option (a) is the correct option. Options (b) and (c) are not correct use of 'and'. In option (d) 'could not be' is also not correct here.
109. (a) Use of 'no sooner.....than' is correct here. Other options are not correct grammatically or contextually.
110. (a) Kavya is interested in reading books whereas her sister's interest is in outdoor games.
111. (a) This is a direct form of speech with interrogative sentence.
Changes are
Said to > asked
What is the way to solve the question > what the way to solve the question was
Hence, option (a) is the right answer.
112. (a) The sentence is ending with a question mark but this is polite a request.
Changes are;
Said to > requested
Conjunction > to
Could you please close the door? > close the door
Hence, option (a) is the right answer.
113. (b) This is an affirmative sentence with a universal truth. So, there is no change in indirect speech. Use only conjunction.
114. (d) The given direct speech is an exclamatory sentence.
Changes are;
Said to > exclaimed
Conjunction > that
What a scintillating beauty > it was a scintillating beauty.
115. (c) The given direct speech is an Imperative sentence.
Changes are;
Said to > ordered
Conjunction > to
Today > that day
Hence, option (c) is the right option.
116. (a) The given direct speech is an interrogative sentence.
Changes are;
Said > asked
Conjunction > where
Where were you last evening > where she had been the previous evening.
Hence, option (a) is the right option.
117. (c) The given direct speech is an assertive sentence.
Changes are;
Said > addressed
Conjunction > that
Those who sowed the seeds last season will reap the harvest this season > those who had sown the seeds the previous season would reap the harvest that season.
Hence, option (c) is the right option.
118. (b) This is a request in the form of question.
Changes are;
Said to > requested
Conjunction > to
Could you please pass the bill this week > pass the bill that week.
Hence, option (b) is the right answer.
119. (d) The given direct speech is an assertive sentence.
Changes are;
Said to > told
Conjunction > that
All of us need to adopt new regulations. We will protect our Earth forever > all of them needed to adopt new regulations and they would protect their Earth forever.
Hence, option (d) is the right option.
120. (d) The given direct speech is an Optative sentence.
Changes are;
Said to > blessed
Conjunction > that
Hence, option (d) is the right option.

GENERAL KNOWLEDGE

- (c) **Scattering of α - Particles** by a thin gold foil suggest the presence of Positively charged nucleus at the centre of an atom. Experiment was performed by Rutherford in which he allowed a beam of α - Particles to fall on a thin gold foil.
- (d) **Isobars** are the atoms of the elements which have the same atomic mass but different atomic number i.e. they possess same number of nucleons. Among the given

options, option (d) is the pair of isobar. $\frac{40}{18}$ Ar and

$\frac{40}{20}$ Ca, both have same atomic mass.

3. (c) All the given chemical reactions are the example of displacement reaction. In option (c), Copper is less reactive than lead therefore copper is not able to displace lead from its salt solution. Hence option (c) is not feasible.
4. (b) There's no solution having pH 0. But still it will be highly acidic solution. pH is the measure of acidity or alkalinity of a solution. The mathematical representation for pH is $-pH = -\log(H^+)$.
5. (d) The main constituent of gastric acid is hydrochloric acid produced by parietal cells in the gastric glands in the stomach. Its secretion is a complex and relatively energetically expensive process.
6. (a) Boric acid is often used as an antiseptic, insecticide, flame retardant, neutron absorber, or precursor to other chemical compounds. It has the chemical formula H_3BO_3 (sometimes written $B(OH)_3$), and exists in the form of colourless crystals or a white powder that dissolves in water. Citric acid is used in insecticides and disinfectants to help destroy bacteria and viruses. It is used to preserve and marinate meats, and flavour foods and beverages. Acetic acid is used in many industrial processes for the production of substrates and it is often used as a chemical reagent for the production of a number of chemical compounds like acetic anhydride, ester, vinyl acetate monomer, vinegar, and many other polymeric materials. Acetic acid also used in pickles.
7. (a) The frequency of a sound wave is what your ear understands as pitch. A higher frequency sound has a higher pitch, and a lower frequency sound has a lower pitch. They have a shorter wavelength of the electromagnetic spectrum. Requires high voltage to produce X-Rays. They are used to capture the human skeleton defects. They travel in a straight line and do not carry an electric charge with them. They are capable of travelling in a vacuum. They are powerful waves of electromagnetic energy.
8. (a) X-rays are not deflected by electric and magnetic field.
9. (c) Image formed by a plane mirror is always virtual and erect. The size of the image is equal to that of the object. The image formed is as far behind the mirror as the object is in front of it. The image is laterally inverted.
10. (a) A simple periscope is just a long tube with a mirror at each end. The mirrors are fitted into each end of the tube as shown in the figure. Hence, there are 2 plane mirrors used which are placed parallel to each other.
11. (a) Refractive index of a medium

$$= \frac{\text{Speed of light in air}}{\text{Speed of light in medium}}$$

$$\frac{3}{2} = \frac{3 \times 10^8}{\text{Speed of light in medium}}$$

$$\begin{aligned} \text{Speed of light in medium} &= \frac{3 \times 10^8}{3} \times 2 \\ &= 2 \times 10^8 \text{ m/s} \end{aligned}$$

12. (d) The higher energy, shorter wavelength far UV region spans wavelengths between 91 and 200 nm. Extreme UV radiation has the shortest wavelength range and highest energies of the regions of the ultraviolet spectrum and lies on the border between UV and X-ray radiation.
13. (b) In SI units, displacements are measured in meters (m), and forces in newtons (N or $\text{kg} \cdot \text{m/s}^2$). Therefore, the spring constant k, and each element of the tensor, is measured in newtons per meter (N/m), or kilograms per second squared (kg/s^2).
14. (d) Elephantiasis is also known as lymphatic filariasis. It's caused by parasitic worms, and can spread from person to person through mosquitoes. Elephantiasis causes swelling of the scrotum, legs, or breasts. Elephantiasis is considered a neglected tropical disease (NTD)
15. (b) Salamander belongs to group Amphibia, which shows 3 chambered heart (two auricles and one ventricle). In the 3 chambered heart, partial mixing of blood takes place. All amphibians have three chambered heart.
16. (c) Sequence of events of sexual reproduction in flowers are:
 - (1) Pollination- transfer of pollen to stigma.
 - (2) Fertilization- fusion of male gamete and egg cell produce zygote and fusion of polar nuclei with male gamete produce triploid endosperm.
 - (3) Embryo formation- zygote divides many time by mitosis and produces embryo.
 - (4) Seedling- embryo differentiate and becomes plumule, radicle and one or two cotyledons. Endosperm divides by mitosis to produce endosperm tissue which is food store. Integuments surrounding embryo sac forms testa (seed coat).
17. (c) Limewater turns milky when we blow CO_2 into it. As we all know that we inhale oxygen and exhale carbon dioxide. So when we blow CO_2 into Limewater it reacts with lime water and form calcium carbonate which turns it into milky.
18. (b) Energy is usually liberated from the ATP molecule to do work in the cell by a reaction that removes one of the phosphate-oxygen groups, leaving adenosine diphosphate (ADP). so the energy currency of the cell is ATP.
19. (d) Salivary amylase, present in saliva, is the first digestive enzyme that gets mixed with food in oral cavity during the process of mastication and bolus formation.
20. (b) It was the start of the civil disobedience movement which commenced as Mahatma Gandhi broke the salt law on the coastal town of Dandi on the Arabian Sea on April 5. Dandi March is also known as Namak Satyagrah or Salt Satyagrah. Sodium chloride is the chemical name for salt.

21. (a) Bleaching Powder CaOCl_2
Baking Soda NaHCO_3
Washing Soda $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
Slaked lime Ca(OH)_2
22. (c) The copper sulphate crystals contains 5 molecules of water of crystallization. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ which are blue in colour.
23. (c) The silver article becomes black after sometimes when exposed to air because silver reacts with sulphur which is present in the atmosphere and then forms silver sulphide. Thus the layer of this silver sulphide is formed on the surface of the silver article so they appear as dull or black.
24. (b) Temperature in Kelvin = $273 + \text{temperature in } ^\circ\text{C}$
Temperature in Kelvin = x (given)
Temperature in $^\circ\text{C}$ = y (given)
 $\therefore x = 273 + y$
25. (c) The electrical resistivity is the electrical resistance per unit length and per unit of cross-sectional area at a specified temperature. The SI unit of electrical resistivity is the ohm.metre. It is commonly represented by the Greek letter ρ rho.
26. (c) Radio waves are used to carry satellite signals. These waves travel at 300,000 km/s (the speed of light). Communications satellites are used to send and receive radio signals for television, phone or internet communications. Large concave reflectors called satellite dishes are normally used to send and receive these signals.
27. (a) Urine transport follows a path through the kidneys, ureters, urinary, bladder and urethra.
28. (b) Endocrine glands are a pair of testis in males and a pair of ovaries in females. Pituitary gland is the master gland that regulates the activity of other endocrine glands. Hence, pituitary gland does not exist in pairs.
29. (b) The three organelles that contain DNA are the nucleus, mitochondria and chloroplasts. Organelles are membrane-bound subunits within a cell analogous to organs in the body - that perform specific functions. The nucleus is the control center of the cell, and houses genetic information.
30. (a) In 1798 Edward Jenner introduced inoculation with cowpox (smallpox vaccine), a much safer procedure. This procedure, referred to as vaccination, gradually replaced smallpox inoculation, now called variolation to distinguish it from vaccination. Until the 1880s vaccine/vaccination referred only to smallpox, but Louis Pasteur developed immunization methods for chicken cholera and anthrax in animals and for human rabies, and suggested that the terms vaccine/vaccination should be extended to cover the new procedures. This can cause confusion if care is not taken to specify which vaccine is used e.g. measles vaccine or influenza vaccine.
31. (c) The flag of India was hoisted by Jawaharlal Nehru on 31 December 1929 on the banks of Ravi river, in Lahore, modern-day Pakistan. The Congress asked the people of India to observe 26th of January as Independence Day (see Legacy). The flag of India was hoisted publicly across India by Congress volunteers, nationalists and the public.
32. (d) Salient Features of the Government of India Act 1935 were as follows:
Abolition of provincial dyarchy and introduction of dyarchy at centre.
Abolition of Indian Council and introduction of an advisory body in its place.
Provision for an All India Federation with British India territories and princely states.
Elaborate safeguards and protective instruments for minorities.
Supremacy of British Parliament.
Increase in size of legislatures, extension of franchise, division of subjects into three lists and retention of communal electorate.
Separation of Burma from India.
33. (b) Gandhi claimed that the Congress alone represented political India; that the Untouchables were Hindus and should not be treated as a "minority"; and that there should be no separate electorates or special safeguards for Muslims or other minorities. These claims were rejected by the other Indian participants. According to this pact, Gandhi was asked to call off the Civil Disobedience Movement (CDM) and if he did so the prisoners of the British government would be freed except the criminal prisoners, i.e. those who had killed British officials. He returned to India, disappointed with the results and empty-handed.
34. (b) Gaganendranath Tagore, along with his brother Abanindranath, is known for founding the Indian Society of Oriental Art in 1907. This ISOA, sponsored by Europeans, much popularized Tagore's Bengal School, as well as art and crafts of other Asian nations.
35. (b) The Destruction of 'The Forty': Even when Balban worked as the Naib of Sultan Nasir-ud-din, he tried to break up the power of the group of 'the forty' (Turkani-Chihalgani) as he regarded it necessary to restore the powers of the Sultan. When he himself became the Sultan, he used every means to achieve this aim.
36. (a) Changez Khan did not cross Indus to attack India.
37. (b) Bora – a cold Adriatic wind
It rarely blows for more than three days. When Bora is of local origin, it will blow itself out in less than a day. Since it brings cold and heavy air, it finds its way towards the sea through mountain faults and between higher mountain ranges.
38. (b) Arunachal Pradesh
They also live in the Sonitpur and North Lakhimpur districts of Assam. Their population of around 300,000 makes them the most populous tribe of Arunachal Pradesh, closely followed by the tribes of the Adi according to 2001 census. The Nyishi language

belongs to the Sino-Tibetan family, however, the origin is disputed.

39. (c) The “One State Many Worlds” It is introduced by Department of Tourism - Government of Karnataka. It used to improve Karnataka Tourism. It is a one of best tagline used Tourism Department, This tagline is copyrighted under Department of Tourism - Government of Karnataka.
40. (c) Physiological Density-the number of people supported by a unit area of arable land. Physiological density is the number of people per unit area of arable land. Arable describes land that is suitable for growing crops.
41. (b) Son River, Son also spelled Sone, principal southern tributary of the Ganges (Ganga) River, rising in Madhya Pradesh state, central India. It flows north past Manpur and then turns northeast. The river cuts through the Kaimur Range and joins the Ganges above Patna, after a 487-mile (784-km) course.
42. (d) Commercial farming is a type of farming in which crops are grown for commercial use only. It is a modernized method of farming that is undertaken on a large scale. In this type of farming the large land, labour and machines are used.
The different types of commercial farming are:
Mixed crop and livestock.
Dairy farming.
Grain farming.
Livestock ranching.
Mediterranean farming.
Commercial gardening and fruit farming.
43. (d) Marginal land is land that has little or no agricultural or industrial value. Marginal land has little potential for profit and often has poor soil or other undesirable characteristics. This type of land is often located at the edge of deserts or other desolate areas.
44. (a) The MGNREGA was initiated with the objective of “enhancing livelihood security in rural areas by providing at least 100 days of guaranteed wage employment in a financial year, to every household whose adult members volunteer to do unskilled manual work”.
45. (b) Functioning of Panchayat:
Implementing various initiatives to create clean, beautiful and green villages.
Implementing Poverty Eradication initiatives through Maharashtra Rajya Gramin Jivanonnati Abhiyan.
Providing shelter and shelter related facilities under Pradhan Mantri Gramin Awaas Yojana
Empowering Panchayati Raj System by empowering public representatives under development program through training.
46. (b) Pradhan Mantri Gram Sadak Yajana) is a nationwide plan in India to provide good all-weather road connectivity to unconnected villages. This Centrally

Sponsored Scheme was introduced in 2000 by the then-prime minister of India Late Shri Atal Bihari Vajpayee.

Union Government on 25 September 2014 launched Deen Dayal Upadhyaya Antyodaya Yojana for urban and rural poor.

Sansad Adarsh Gram Yojana is a rural development programme broadly focusing upon the development in the villages which includes social development, cultural development and spread motivation among the people on social mobilization of the village community. The programme was launched by the Prime Minister of India, Narendra Modi on the birth anniversary of Jayaprakash Narayan, on 11 October 2014.

DDU-GKY was launched on 25 September 2014 by Union Ministers Nitin Gadkari and Venkaiah Naidu on the occasion of 98th birth anniversary of Pandit Deendayal Upadhyaya.[3] The Vision of DDU-GKY is to “Transform rural poor youth into an economically independent and globally relevant workforce”.

47. (a) Nominated Members of the Lok Sabha and Rajya Sabha may also select works for implementation in one or more districts, anywhere in the country. MPs can also recommend work of upto Rs. 25 lakhs per year outside their constituency or state of election to promote national unity, harmony and fraternity. MPs can recommend work of upto 25 lakh for Natural Calamity in the state and upto Rs. 1 crore in the country in case of Calamity of Severe Nature.
48. (a) Saubhagya. Pradhan Mantri Sahaj Bijli Har Ghar Yojana – ‘Saubhagya’ a new scheme was launched by the Hon’ble Prime Minister on 25th September 2017. Under Saubhagya free electricity connections to all households (both APL and poor families) in rural areas and poor families in urban areas will be provided.
49. (a) The Convention aims to protect human health and the environment against the adverse effects resulting from the generation, transboundary movements and management of hazardous wastes and other wastes. ... The Convention covers toxic, poisonous, explosive, corrosive, flammable, ecotoxic and infectious wastes.
50. (c) Most Common Reason For Migration Among Indian Women: Marriage. Data from 2011 Census says marriage was the reason behind 46 percent migrations in India, of which 97 percent are women. Marriage is the biggest reason why women migrate from one place to another.
51. (c) Repo rate refers to the rate at which commercial banks borrow money by selling their securities to the Central bank of our country. Reserve Bank of India (RBI) to maintain liquidity, in case of shortage of funds or due to some statutory measures. It is one of the main tools of RBI to keep inflation under control. Technically, repo stands for ‘Repurchasing

Option' or 'Repurchase Agreement'. It is an agreement in which banks provide eligible securities such as Treasury Bills to the RBI while availing overnight loans. An agreement to repurchase them at a predetermined price will also be in place. Thus, the bank gets the cash and the central bank the security.

52. (b) Cash Reserve Ratio (CRR) is a specified minimum fraction of the total deposits of customers, which commercial banks have to hold as reserves either in cash or as deposits with the central bank. CRR is set according to the guidelines of the central bank of a country.
The CRR (4 per cent of NDTL) requires banks to maintain a current account with the RBI with liquid cash. ... While ensuring some liquid money against deposits is the primary purpose of CRR, its secondary purpose is to allow the RBI to control liquidity and rates in the economy.
53. (b) Because the function is increasing, the slope must be positive. An angle of 45 degrees means that the values of x equal the values of y. To find the slope of a straight line use this equation $M(\text{slope}) = \frac{Y_2 - Y_1}{X_2 - X_1}$, and as before $X_1 = Y_1$ and $X_2 = Y_2$. Depending on the previous information, the slope is 1.
54. (c) The 2019 FIFA FIFPro Men's and Women's Players of the Year were announced at a gala celebration held at the Teatro alla Scala in Milan on Monday evening. Lionel Messi beat off competition from Juventus' Cristiano Ronaldo and Liverpool's Virgil van Dijk to take the Men's award.
55. (d) British travel giant Thomas Cook collapsed after failing to secure rescue funding, the British Civil Aviation Authority said Sunday.
56. (a) Thunberg was born on January 3, 2003, in Stockholm, Sweden. Thunberg began her climate activism at age 15. She is known for her work against climate change, a popular example of youth activism. She started protesting on 20 August 2018, outside of the Swedish parliament in Stockholm.
57. (c) The Reserve Bank of India has ordered Punjab and Maharashtra Co-operative (PMC) Bank not to do any business for six months and capped depositor withdrawals at Rs 1,000, throwing the lives of thousands of traders, self-employed and daily wage earners into disarray.
58. (b) This award is given annually at the National Film Awards. The very first recipient of this award was Devika Rani who received it in 1969 on the occasion of the 17th National Film Awards. Dadasaheb Phalke is known as the 'Father of Indian Cinema'.
59. (b) Abul Hasan 1618 "Jahangir's Dream of embracing Shah 'Abbas" --Jahangir, on the right, hugs Shah Abbas, the Safavid ruler of the Persian empire.
60. (a) The was a military unit within the administrative system of the Mughal Empire introduced by Akbar. The word

mansab is of Arabic origin meaning rank or position. The system determined the rank and status of a government official and military generals. Every civil and military officer was given a mansab, which determined their salaries and allowances. The term manasabdar means a person having a mansab. Akbar introduced the ranks of zat and sawar in the system. Different views have been expressed regarding these terms. According to Blochmann, every mansabdar had to maintain as many soldiers as were indicated by his rank of zat while the rank of sawar indicated the number of horsemen among them.

61. (a) Kadapa is a city in the **Rayalseema** region of the south-central part of **Andhra Pradesh**, India. Kadapa district is endowed mainly with red and black soils ranging from poor to fertile soils. The soil of the district has been classified into red ferruginous soil and black spoil. These two classes can be sub divided into clay, loam sand with finer distinctions. Kudapa regions are not rocky. .
62. (d) The emperor called himself as Gauthamiputra Satakarni which meant Gauthami's son Satakarni. Gauthami referred to his mother, Gauthami Balashri. The Satavahanas, also known as the Andhras were an ancient Indian empire whose rule lasted from 1st century BCE to 2 century CE.
63. (d) Panchatantra is a text showing through illustration what should and should not be done. According to Indian tradition, it was written around 300 BCE by Pandit Vishnu Sarma, a sage. However, based as it is on older oral traditions, its antecedents among storytellers probably hark back to the origins of language. One of the most influential Sanskrit contributions to world literature, it is "certainly the most frequently translated literary product of India" and there are over 200 versions in more than 50 languages. In the Indian tradition, the Panchatantra is a nitisastra, a treatise on political science and human conduct, or niti. It is said that Vishnu Sarma's objective was to instruct three dull and ignorant princes in the principles of polity, by means of stories
64. (d) Geomorphic processes. Active and dominant geomorphic processes operating and hence influencing spatial distribution of plant and animals along the landscapes is mainly water movement. Running water has effected by speed, dissolution and rock weathering which is facilitated by dissolved oxygen.
65. (d) Sclerophyllous plants occur in many parts of the world, but are most typical in the chaparral biomes. They are prominent throughout western (Perth region), eastern (Sydney region) and southern (Adelaide region) parts of Australia, in the Mediterranean forests, woodlands, and scrub biomes that cover the Mediterranean Basin, Californian chaparral and woodlands, Chilean Matorral, and the Cape Province of South Africa.

66. (b) Warm ocean currents flow away from the equatorial region on the western side of ocean basins. The Gulf Stream in the North Atlantic and the Kuroshio Current in the North Pacific are examples of warm currents. There the current veers north-eastward across the Atlantic Ocean, where it is called the North Atlantic Drift and Brazil current.
67. (d) Indian states of Sikkim, Arunachal Pradesh, West Bengal and also Jammu and Kashmir share boundary with three neighbouring countries.
68. (c) The Hadley cell, named after George Hadley, is a global scale tropical atmospheric circulation that features air rising near the Equator, flowing poleward at a height of 10 to 15 kilometers above the earth's surface, descending in the subtropics, and then returning equatorward near the surface. This circulation creates the trade winds, tropical rain-belts and hurricanes, subtropical deserts and the jet streams. Hadley cells are the low-altitude overturning circulation that have air sinking at roughly zero to 30 degree latitude.
69. (b) Organic soils belong to the soil order Histosols and include the suborders Folists, Fibrists, Hemists and Saprists. Histosols often occur in transitional zones between dry upland areas and lacustrine or marine environments, but they are also present in grassland, permafrost regions, anthropogenic deposits, floodplains and alluvial fans.
70. (a) An overseas elector is a person who is a citizen of India and who has not acquired citizenship of any other country and is otherwise eligible to be registered as a voter and who is absenting from his place of ordinary residence in India owing to his employment, education or otherwise is eligible to be registered as a voter in the constituency in which his place of residence in India as mentioned in his passport is located. According to the provisions of Section 20A of the Representation of People Act, 1950, an NRI settled in foreign land can become an elector in electoral roll in India.
71. (d) Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PM-JAY) [1] is a flagship scheme of the Indian government's National Health Policy which aims to provide free health coverage at the secondary and tertiary level [2] to its bottom 40% poor and vulnerable population. It provides a cover of 5 lakh per family per year for medical treatment in empanelled hospitals, both public and private.
72. (b) Four basic pillars of human development: equity, sustainability, productivity, empowerment. Equity is the idea of fairness for every person, between men and women; we each have the right to education and health care.
73. (b) The 86th amendment to constitution of India in 2002, provided right to education as a fundamental right in part-III of the Constitution. A new article 21A was inserted which made right to education a fundamental right for children between 6-14 years.
74. (a) Article 20 of the Indian Constitution provides protection in respect of conviction for offences, and article 20(2) contains the rule against double jeopardy which says that "no person shall be prosecuted or punished for the same offence more than once." The protection under clause (2) of Article 20 of Constitution of India.
75. (a) The Stone Age is the period of time defined by the use of stone tools by human and our hominin ancestors. We can divide this further into the Paleolithic (Old Stone Age), Mesolithic (Middle Stone Age) and Neolithic (New Stone Age). In each of these periods, life in India grew and changed in different ways, setting the stages for advanced civilizations later to come.
76. (a) The largest archaeological site in the subcontinent goes back hundreds of thousands of years to some of the earliest uses of fire. Rohri Hills are located in the northeast corner of the province of Sindh. This limestone hilly sequence supplied variety of raw material like chert/flint, lime stone and fuller's earth to the ancient people, and is a paradise for modern day quarries and contractors, quarrying stone for construction of roads, canals etc.
77. (c) Siyar-ul-Mutakhkherin a voluminous historical work by Sayyid Ghulam Husain Tabatabai. He produced the work during the days of the fall of Muslim rule in Bengal (and also in India). Born in Delhi in 1140 AH/ 1727-28 AD in an aristocratic Muslim family, the author was well connected with the ruling elite of the time and completed his work in 1781 AD, almost a quarter of a century after the battle of Plassey (1757 AD).
78. (b) Viscount Palmerston, (20 October 1784 – 18 October 1865) was a British statesman who served twice as Prime Minister in the mid-19th century. Palmerston dominated British foreign policy during the period 1830 to 1865, when Britain was at the height of its imperial power. He held office almost continuously from 1807 until his death in 1865. He began his parliamentary career as a Tory, defected to the Whigs in 1830, and became the first Prime Minister of the newly formed Liberal Party in 1859. As Home Secretary, Palmerston enacted various social reforms, although he opposed electoral reform.
79. (a) The Tattwabodhini Sabha was a group started in Calcutta on 6 October 1839 as a splinter group of the Brahmo Samaj, reformers of Hinduism and Indian Society. On 6 October 1839 Devendranath Tagore established Tattvaranjini Sabha which was shortly thereafter renamed the Tattwabodhini (Truth-seekers) Sabha. Initially confined to immediate members of the Tagore family, in 2 years it mustered over 500 members.
80. (c) The United States and India hold their first-ever tri-service military exercise codenamed "Tiger Triumph" at Visakhapatnam and Kakinada later this month, the

- US State Department said on Monday. “This exercise will focus on humanitarian assistance and disaster relief.
81. (b) The Naropa festival is a grand Buddhist festival which occurs in every 12 years, has started at the 17th century Hemis Monastery in Ladakh, Jammu and Kashmir. The main event of the festival is the celebration of the 1,000th birth anniversary of spiritual Saint Naropa.
 82. (c) Gully Boy, featuring Ranveer Singh and Alia Bhatt in lead, was selected as India’s official entry in the International Feature Film category at the 92nd Academy Awards.
 83. (a) The global goalkeeper award is given by Bill and Melinda Gates Foundation.
Prime Minister Narendra Modi has been conferred the ‘Global Goalkeeper Award’ for the Swachh Bharat Abhiyan launched by the government.
 84. (a) Gandhi Solar Park: Prime Minister Narendra Modi along with other world leaders inaugurated the Gandhi Solar Park at the UN headquarters in New York on September 24, 2019.
 85. (c) It began with the Portuguese, who went to West Africa in search of gold. The first Europeans to come to Africa’s West Coast to trade were funded by Prince Henry, the famous Portuguese patron, who hoped to bring riches to Portugal.
 86. (d) College of Military Engineering (abbreviated as CME) was established in the year 1943. It is a premier technical training institution of the Indian Army Corps of Engineering, located in Dapodi, Pune, Maharashtra, India. The college is affiliated to JNU (Jawaharlal Nehru University).
 87. (b) Coal India Limited (CIL) is an Indian state-owned coal mining and refinery company headquartered in Kolkata, West Bengal, India.[2] It is the largest coal-producing company in the world and a Maharatna PSU. Coal India operates through 83 mining areas in 8 states in India.
 88. (b) In Central Spain, the climate is continental, with baking hot summers and quite cold winters. The warm-summer Mediterranean climate which predominates in parts of northwestern Spain and mostly inland in central-northern Spain at altitudes above 900-1000 masl.
 89. (d) The official language of Jammu and Kashmir is Urdu. However, Kashmiri is the local language of Jammu & Kashmir. Kashmiri (gujari), which is an Indo-Aryan language, is also known as Koshur. People living in Kashmir Valley speak Kashmiri.
Dakpakha, known in India as Tawang Monpa, is an East Bodish language spoken in the Tawang district of Arunachal Pradesh, claimed by Tibet as a part of Lho-kha Sa-khul, and in northern Trashigang District in eastern Bhutan, mainly in Challeng, Phongmed.
 90. (a) The major families in terms of numbers are Indo-European and Indo-Aryan languages and Dravidian languages in South Asia and Sino-Tibetan in East Asia. Several other families are regionally dominant.
 91. (c) Article 356 deals with imposition of President’s Rule over a State of India. When a state is under President’s Rule, the elected state government (led by the Chief Minister and the Council of Ministers) is dismissed and Council of ministers is suspended at legislature, and administration is conducted directly by the Governor of the state. The Governor is an appointee of the President and thus, effectively, a functionary of the Union Government. Bhimrao Ambedkar, chairman of the Drafting Committee of the Constitution of India, referred to Article 356 as a dead letter of the Constitution. In the constituent assembly debate it was suggested that Article 356 is liable to be abused for political gains. The Supreme Court said that Article 356 is an extreme power and is to be used as a last resort in cases where it is manifest that there is an impasse and the constitutional machinery in a State has collapsed.
 92. (c) The Supreme Court does not countenance the proposition that, on an application under Article 32 of the Constitution, the Court may decline to entertain the same on the simple ground that it involves the determination of disputed questions of fact or on any other ground. The Court would be failing in its duty as the custodian and protector of the fundamental rights, which may, prima facie, appear to have been infringed. It is possible very often to decide questions of fact on affidavits. If the petition and the affidavits in support thereof are not convincing and the Court is not satisfied that the petitioner has established his fundamental right or any breach thereof, the Court may dismiss the petition on the ground that the petitioner has not discharged the onus that lay on him.
 93. (d) The Ministry of Heavy Industries and Public Enterprises is an executive agency of the Government of India that administers 48 central public sector enterprises (PSEs) and assists them in their effort to improve capacity utilisation and increase profitability, generate resources and re-orient strategies to become more competitive. The ministry serves as an interface between PSEs and other agencies for long-term policy formulation. The ministry also encourages the restructuring of PSEs to make their operations competitive and viable on a long-term and sustainable basis.
 94. (d) In India, such Delimitation Commissions have been constituted 4 times – in 1952 under the Delimitation Commission Act, 1952, in 1963 under Delimitation Commission Act, 1962, in 1973 under Delimitation Act, 1972 and in 2002 under Delimitation Act, 2002. The main task of the commission is redrawing the boundaries of the various assembly and Lok Sabha constituencies based on a recent census. The representation from each State is not changed during

this exercise. However, the number of SC and ST seats in a state are changed in accordance with the census.

95. (a) While concluding the debate in the constituent assemble, as chairperson of drafting committee, Babasaheb had said that, "On the 26th of January 1950, we are going to enter into a life of contradictions. In politics we will have equality and in social and economic life we will have inequality. In politics we will be recognizing the principle of one man one vote and one vote one value. In our social and economic life, we shall, by reason of our social and economic structure, continue to deny the principle of one man one value.
96. (a) In India, the Supreme Court has original, appellate and advisory jurisdiction.[1] Its exclusive original jurisdiction extends to all cases between the Government of India and the States of India or between Government of India and states on one side and one or more states on other side or cases between different states. Original jurisdiction is related to cases which are directly brought to the Supreme Court Cases which require the interpretation of the constitution or cases relating to the denial of fundamental rights are heard In the supreme court. In case there is a dispute between two or more states or between the union and the states, the Supreme Court decides such cases. In addition, Article 131 of the Constitution of India grants original jurisdiction to the Supreme Court on all cases involving the enforcement of fundamental rights of citizens.
97. (b) Dr. Bibek Debroy is Chairman of Economic Advisory Council to the Prime Minister, Government of India. He is an economist and was educated in Ramakrishna Mission School, Narendrapur; Presidency College, Kolkata; Delhi School of Economics and Trinity College, Cambridge.
98. (c) Hilsa is the national fish of Bangladesh and it contributes 10% of the total fish production of the country, with a market value of \$1.74 billion. Hilsa also holds a very important place in the economics of West Bengal of India with 12.5% of the catch.
99. (b) VIJAY NAGAR advanced landing ground of Indian Air Force is located in ARUNACHAL PRADESH. The Indian Air Force (IAF) inaugurated the resurfaced runway at the Advance Landing Ground (ALG) here which will enable operations by military transport aircraft at the base near the China border.
100. (d) A Defence Research and Development Organisation (DRDO) aircraft Rustam-2(UAV)unmanned aerial vehicle crashed at an open field in the Chitradurga district of Karnataka.
101. (a) Singapore, India and Thailand have commenced a trilateral naval exercise at Port Blair in the Andaman and Nicobar Islands. The Singapore-India-Thailand Maritime Exercise (SITMEX) is the maiden trilateral exercise involving the Republic of Singapore Navy (RSN), Indian Navy and the Royal Thai Navy.
102. (c) The evolution of the Federal Court from Sir Hari Singh GOUT'S first resolution urging the creation of an all-India judicial tribunal in 1921 to the embodiment in the Government of India Act of 1935 of provisions for the establishment of the Federal Court.
103. (a) HridyaNathKunzru (1 October 1887 – 3 April 1978), a Kashmiri Pandit, was a freedom fighter and Indian public figure. He was a long-time Parliamentarian He was a member of the Constituent Assembly of India (1946–50) that drew up the Constitution of India.[1] He was also keenly interested in international affairs and co-founded the Indian Council of World Affairs and the Indian School of International Studies. SevaSamiti was founded by another prominent member of the Servants of India Society, Hridayanath Kunzru.
104. (a) On November 29, 1947 the Government of India signed a standstill agreement with the Nizam of Hyderabad, under which it was decided to give one year's time for both sides to arrive at an amicable solution. The Nizam privately hoped that he could continue as an independent ruler. September 17 marks seventy years of Hyderabad's union with India in 1948, thirteen months after India gained independence that the state of Hyderabad ruled by Mir Osman Ali Khan.
105. (c) Hunter Education Commission was a landmark commission appointed by Viceroy Lord Ripon with objectives to look into the complaints of the non-implementation of the Wood's Despatch of 1854; the contemporary status of elementary education.
106. (b) Article-243 A. Gram Sabha. - A Gram Sabha may exercise such powers and perform such functions at the village level as the Legislature of a State fixing tenure of 5 years forPanchayats and holding elections within a period of 6 months in theevent of supersession of any Panchayat, disqualifications for membership of Panchayats.
107. (d) The 11th Schedule distributes powers between the State Legislature and the Panchayat just as the 7th Schedule distributes powers between the Union and the State Legislature. Powers to impose taxes and financial resource.It can also assign to a Panchayat various taxes, duties.
108. (a) Part-IX of the Constitution of India deals with the Panchayati Raj system for the rural areas. It consists of definitions of various terms, composition, duration, reservation, powers, etc. of a Panchayat. It states that this part does not apply to the states of Nagaland, Meghalaya, and Mizoram.
109. (a) The Black Sea is a body of water and marginal sea of the Atlantic Ocean between Eastern Europe, the Caucasus, and Western Asia. It is supplied by a number of major rivers, such as the Danube, Dnieper, Southern Bug, Dniester, Don, and the Rioni. The

watersheds of many countries drain into the Black Sea beyond the six that immediately border it.

Volga River Basin Draining most of western Russian, the Volga is the largest river in Europe. From its source in the Valdai Hills north east of Moscow the river flows east and south east to the Caspian Sea.

110. (d) National Water Academy (formerly known as Central Training Unit) was set up in Central Water Commission by the Ministry of Water Resources, RD and GR, Govt. of India in the year 1988, to impart training to the in-service engineers of various Central/State organizations involved in the Development & Management of Water Resources. It was established under USAID assistance and strengthened with the subsequent assistance received from the World Bank. NWA is located at Khadakwasla, Pune, Maharashtra.
111. (b) Election commission was established on 25 January 1950. Planning commission was established on 15 March 1950. Finance commission was established on 22 November 1951 and Investment commission was established in December 2004. Thus option “b” is the correct sequence of formation of the commissions starting from the earliest.
112. (c) Patents, designs, trademarks and geographical indications are administered by the Controller General of Patents, Designs and Trademarks which is under the control of the Department of Industrial Policy and Promotion, Ministry of Commerce and Industry. Intellectual Property, Inventions and Innovations. The grant of a property right by the government, albeit generally for a limited period of time, over useful intangible intellectual output provides the owner of such legal property rights the right to exclude all others from commercially benefiting from it.
113. (c) The National Health Policy (NHP) 2017 has strongly advocated mainstreaming the potential of AYUSH within a pluralistic system of Integrative healthcare. The NHP 2017 uses a new language of ‘medical pluralism’ and re-emphasizes the need for integrating AYUSH in the National Health Mission, research and education. The Honorable Prime Minister’s vision for ‘New India’ endeavoring to empower youth, women and poor is indeed laudable. The ‘New India’ also needs to be a ‘Healthy India’ where its own traditional systems can play a significant role. Ayurveda, Yoga, Naturopathy, Unani, Siddha, Sowa Rigpa, Homoeopathy collectively covered under the Ministry of AYUSH, represent a pluralistic and integrative scheme of health services.
114. (a) The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation of India’s environmental and forestry policies and programmes.
115. (b) 35 per cent
45.36 crore Indians (35 per cent) in India are migrants — now settled in a place different from their previous residence, Census 2011 data.
116. (d) When an option is chosen from alternatives, the opportunity cost is the “cost” incurred by not enjoying the benefit associated with the best alternative choice, hence 300 is opportunity cost in this case.
117. (b) Perfect competition-the situation prevailing in a market in which buyers and sellers are so numerous and well informed that all elements of monopoly are absent and the market price of a commodity is beyond the control of individual buyers and sellers.
Monopolistic competition is a type of imperfect competition such that many producers sell products that are differentiated from one another and hence are not perfect substitutes.
A monopoly exists when a specific person or enterprise is the only supplier of a particular commodity. This contrasts with a monopsony which relates to a single entity’s control of a market to purchase a good or service
An oligopoly is a market form wherein a market or industry is dominated by a small group of large sellers. Oligopolies can result from various forms of collusion which reduce competition and lead to higher prices for consumers. Oligopolies have their own market structure.
118. (b) India hosted World Tourism Day 2019.
119. (c) Russia will host the BRICS summit in the summer of 2020, Russian President Vladimir Putin said on Friday at a meeting with his South African counterpart Cyril Ramaphosa on the sidelines of the G20 summit.
120. (a) Government of India has instituted ‘Sardar Patel National Unity Award’ - Highest Civilian Award for contribution to Unity and Integrity of India.

