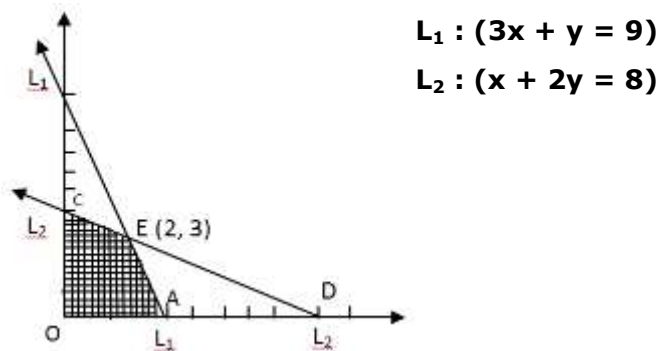


BUSINESS MATHEMATICS, REASONING & STATISTICS

1. A bag contains coins of Rs. 1, 50 paise and 25 paise in the ratio 4:5:6. If the total amount in the bag is Rs. 120, then the number of coins of 25 paise, is :-
 - (a) 60
 - (b) 75
 - (c) 90
 - (d) 96
2. If set $A = \{1, 2, 3\}$, then what is the power set of A ?
 - (a) $\{\{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$
 - (b) $\{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}\}$
 - (c) $\{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$
 - (d) None
3. The number of arrangements of the letters of the word "SALOON" if the two O's do not come together is :-
 - (a) 360
 - (b) 720
 - (c) 240
 - (d) 120
4. If $\log_{10} 2 = x$ and $\log_{10} 4 = y$, then $\log_{10} 80$ is equal to:
 - (a) $x - y + 1$
 - (b) $x + y + 1$
 - (c) $x - y - 1$
 - (d) $2x - y + 1$
5. Transpose of row matrix is
 - (a) zero matrix
 - (b) diagonal matrix
 - (c) Column Matrix
 - (d) Row matrix
6. Sum of a number and its reciprocal is $\frac{10}{3}$ then find out the square of the number.
 - (a) 9
 - (b) 1
 - (c) 4
 - (d) 16

7. The value of the expression $\frac{x+y+z}{x^{-1}y^{-1}+y^{-1}z^{-1}+z^{-1}x^{-1}}$ is
- (a) $\frac{1}{x+y+z}$
- (b) $\frac{xyz}{x+y+z}$
- (c) $\frac{1}{xyz}$
- (d) xyz
8. The third proportional to $(x^2 - y^2)$ and $(x - y)$ is
- (a) $\frac{x+y}{x-y}$
- (b) $\frac{x-y}{x+y}$
- (c) $x+y$
- (d) $x-y$
9. If $x + \frac{1}{x} = \sqrt{2}$ then $x^2 + \frac{1}{x^2}$ is equal to
- (a) 1
- (b) 2
- (c) 0
- (d) 4
10. The solution of the system of equations : $\frac{x}{a} + \frac{y}{b} = 2$; $ax - by = a^2 - b^2$ is :
- (a) a, b
- (b) $-a, b$
- (c) $-a, -b$
- (d) none of these
11. If $\log_8 m + \log_8 2 = \frac{2}{3}$, Then the value of m -
- (a) 1
- (b) $\frac{3}{2}$
- (c) 2
- (d) 0

12. The area of a rectangle whose length is five more than twice its width is 75 sq. units. The length is :-
 (a) 5 units
 (b) 10 units
 (c) 15 units
 (d) 20 units
13. Find out sum of the roots of equation $3x^2 + (5m-2)x + m = 0$ if one root is reciprocal to other.
 (a) $\frac{15}{2}$
 (b) $\frac{-13}{3}$
 (c) $\frac{5m-2}{3}$
 (d) $\frac{13}{2}$
14. $\frac{\log_9 11}{\log_5 13} - \frac{\log_3 11}{\log_{\sqrt{5}} 13} =$
 (a) 1
 (b) -1
 (c) 2
 (d) None of these
15. Graph of some constraints are given by the figure



The shaded region OAEC belongs to the constraint

- (a) $3x + y \leq 9$
 $x + 2y \geq 8$
 $x \geq 0; y \geq 0$
 (b) $3x + y \leq 9$
 $x + 2y \leq 8$
 $x \geq 0; y \geq 0$
 (c) $3x + y \geq 9$
 $x + 2y \leq 8$
 $x \geq 0; y \geq 0$
 (d) None of these

16. What is the sum of the squares of the roots of equation $x^2+2x-143=0$?
(a) 170
(b) 180
(c) 190
(d) 290
17. In a bag, there are coins of 25 p, 10 p and 5 p in the ratio of 1 : 2 : 3. If there are Rs. 30 in all, how many 5 p coins are there?
(a) 50
(b) 100
(c) 150
(d) 200
18. $\log(1+2+3)$ is equal to :-
(a) $\log 1 + \log 2 + \log 3$
(b) $\log(1 \times 2 \times 3)$
(c) Both the above
(d) None
19. If Rs. 510 be divided among A, B, C in such a way that A gets $\frac{2}{3}$ of what B gets and B gets $\frac{1}{4}$ of what C gets, then the share of A ?
(a) Rs. 60
(b) Rs. 50
(c) Rs. 150
(d) Rs. 200
20. A sum of money lent out at simple interest amounts to Rs. 720 after 2 years and Rs. 1020 after a further period of 5 years. Find the principal.
(a) Rs. 520
(b) Rs. 6000
(c) Rs. 600
(d) Rs. 1740
21. Using the digits 1, 2, 3, 4 and 5 only once, how many numbers greater than 41000 can be formed ?
(a) 41
(b) 48
(c) 50
(d) 60
22. The present value of Rs. 10000 due in 2 years at 5% p.a. compound interest when the interest is paid on half-yearly basis is:
(a) Rs. 9070.50
(b) Rs. 9069.50
(c) Rs. 9065.50
(d) Rs. 9059.50

23. Which Statement is correct in the following?
Linear system of equation
 $2x + 3y = 4$ and $4x + 6y = 7$ has
(a) no solution
(b) Unique solution
(c) exactly 2 solution
(d) Infinite solution
24. $f(x) = \left(x + \frac{1}{x}\right)^2$ find derivative $\frac{dy}{dx}$
(a) $2x - \frac{2}{x^3}$
(b) $2x$
(c) $2x - 2$
(d) None of these
25. An annuity consisting of equal payments at the end of each month for 2 years is to be purchased for Rs. 2000. If the interest rate is 6% compounded monthly, how much is each payment?
(a) 78.61
(b) 76.80
(c) 68.70
(d) 68.50
26. A Polygon has 27 diagonals. Number of sides of this polygon is:
(a) 12
(b) 15
(c) 16
(d) 9
27. The sum of all odd natural numbers between 36 and 120 is:
(a) 2000
(b) 2040
(c) 3276
(d) 3726
28. In an organization Employer required maximum ten employees. X and Y are numbers of male and female respectively then which inequality shows right relation.
(a) $x + y = 10$
(b) $x + y \leq 10$
(c) $x + y \geq 10$
(d) $x \geq 10$
29. An examination paper consists of 12 questions divided into two parts A and B. Part A contains 7 questions and part B contains 5 questions. A candidate is required to attempt 8 questions selecting at least 3 from each part. In how many maximum ways can the candidate select the questions ?
(a) 350
(b) 210
(c) 520
(d) None

30. $x^y = e^{x+y}$ then $\frac{dy}{dx} =$
- (a) $\frac{2 \log x}{(\log x - 1)^2}$
- (b) $\frac{-\log x - 2}{(\log x - 1)}$
- (c) $\frac{\log x}{(\log x - 1)}$
- (d) $\frac{\log x - 2}{(\log x - 1)^2}$
31. On a certain sum, the simple interest at the end of $6\frac{1}{4}$ year becomes $\frac{3}{8}$ of the sum. The rate of Percentage is:
- (a) 7%
- (b) 6%
- (c) 5%
- (d) $5\frac{1}{2}\%$
32. What is the number of ways that 4 boys and 3 girls can be seated so that boys and girls alternate ?
- (a) 12
- (b) 72
- (c) 120
- (d) 144
33. What is the number of digits in the numeral form of 8^{17} ? (Given that $\log 2 = 0.3010$)
- (a) 51
- (b) 16
- (c) 15
- (d) 14
34. If $f(x) = 2x+7$ and $g(x) = x^2+7$, $x \in \mathbb{R}$, then which value of x will satisfy $\text{fog}(x) = 25$?
- (a) -1, 1
- (b) -2, 2
- (c) $-\sqrt{2}, \sqrt{2}$
- (d) None
35. If $f(x) = 2x^2+3x-5$, then what is $f'(0)+3f'(-1)$ equal to :
- (a) -1
- (b) 0
- (c) 1
- (d) 2
36. If 20% of $(P + Q) = 50\%$ of $(P - Q)$ Then, $P:Q =$
- (a) 5 : 7
- (b) 3 : 7
- (c) 7 : 3
- (d) 7 : 8

37. The age of a man is three times the sum of the ages of his two sons and 5 years hence his age will be double the sum of their ages. Find the present age of the man?
- (a) 35
(b) 40
(c) 45
(d) 50
38. The number of straight lines can be formed out of 10 point of which 7 are collinear
- (a) 24
(b) 21
(c) 25
(d) 26
39. If a matrix has 16 elements; what are the possible orders it can have
- (a) 2×8 ; 8×1 ; 4×4 ; 1×16 ; 16×1
(b) 2×8 ; 8×2 ; 4×4 ; 1×16 ; 16×1
(c) 2×8 ; 8×2 ; 4×1 ; 1×16 ; 16×1
(d) 2×4 ; 8×2 ; 4×4 ; 1×16 ; 16×1
40. $\begin{pmatrix} x & y \\ 2 & 3 \end{pmatrix} \times \begin{pmatrix} 1 & 2 & 3 \\ x & y & z \end{pmatrix}$
- (a) $\begin{bmatrix} x+2xy & 3x+y^2 & 3xyz \\ 2+3x & 4+3y & 6+3z \end{bmatrix}$
(b) $\begin{bmatrix} x+xy & 2x+y^2 & 3x+yz \\ 2+3x & 4+3y & 6+3z \end{bmatrix}$
(c) $\begin{bmatrix} x+2xy & 2xy+y^2 & 12yz \\ 2+3x & 4+3y & 6+3z \end{bmatrix}$
(d) $\begin{bmatrix} x-xy & 2x-y^2 & 3x-yz \\ 2+3x & 4+3y & 6+3z \end{bmatrix}$
41. If the number of observations of the groups G1 and G2 are in the ratio 1 : 2 and their arithmetic means are 16 and 10 respectively, then Arithmetic Mean of the combined group is
- (a) 13
(b) 12
(c) 14
(d) none of these
42. The mean marks of 300 students were 40. Later on it was discovered that 66 marks of A were read as 60, 14 marks of B were read as 41 and 60 marks of C were not included. Find the corrected mean on the basis of this information.
- (a) 40.13 Marks
(b) 47 Marks
(c) 38.15 Marks
(d) None of the above

43. A variable x have 10 values $x_1, x_2, \dots, x_5, -x_1, -x_2, \dots, -x_5$. -and $\sum_{i=1}^5 x_i^2 = 80$, find the standard deviation of x
- (a) 2
 - (b) 4
 - (c) $2\sqrt{2}$
 - (d) 16
44. For a variable the mean is 10 and the coefficient of variation is 50. Then the variance is
- (a) 5
 - (b) 20
 - (c) 400
 - (d) 25
45. If the maximum and minimum values of 10 observations are 40 and 10 then coefficient of range is
- (a) $\frac{5}{3}$
 - (b) $\frac{3}{5}$
 - (c) 30
 - (d) none of these
46. The median of $X, \frac{x}{2}, \frac{x}{3}, \frac{x}{5}$ is 10. Find x where $X > 0$
- (a) 24
 - (b) 32
 - (c) 8
 - (d) 16
47. The average salary of 50 men was Rs. 80 but if was found the salary of two of them were Rs. 82 and 96 which was wrongly taken as Rs. 28 and 69. The revised average salary is -
- (a) 78.56
 - (b) 82.92
 - (c) 85.26
 - (d) 81.62
48. What is the G.M. for the numbers 2,4,8,16,32,64?
- (a) $2^{5/2}$
 - (b) $2^{7/2}$
 - (c) 33
 - (d) None

49. Find the harmonic mean of the following numbers : $1, \frac{1}{3}, \frac{1}{5}, \dots, \frac{1}{2n-1}$
- (a) $\frac{1}{n+1}$
- (b) $\frac{1}{n-1}$
- (c) $\frac{2}{n}$
- (d) $\frac{1}{n}$
50. In the line $y=19-\frac{5x}{2}$, b_{yx} is equal to
- (a) $19/2$
- (b) $5/2$
- (c) $-5/2$
- (d) None
51. If the rank coefficient between debenture price and share price is found to be 0.143 and the sum of squares of the difference in the rank is 48, what is the number of share selected for study?
- (a) 5
- (b) 7
- (c) 12
- (d) 6
52. If Fisher's index = 150 and Paasche's index = 144, then Laspeyre's index is
- (a) 147
- (b) 156.25
- (c) 160.17
- (d) 138
53. During a certain period the cost of living Index number goes up from 110 to 200 and the salary of the worker is also raised from Rs. 325 to Rs. 500. Does the worker :
- (a) gain
- (b) loses
- (c) fully compensated
- (d) gain lay 10%
54. For Finding correlation between two attributes, we consider
- (a) Pearson's correlation coefficient
- (b) Scatter diagram
- (c) Spearman's rank correlation coefficient
- (d) Coefficient of document deviations.

55. Regression coefficient are
- (a) dependent of change of origin and of scale.
 - (b) independent of both change of origin and of scale.
 - (c) dependent of change of origin but not of scale.
 - (d) independent of change of origin but not of scale
56. The regression equation of y on x is $y = -3 + 0.5x$ and that of x on y is $x = -7 + By$. If the correlation co-efficient between x and y is 0.1, then B=
- (a) 0.5
 - (b) -0.5
 - (c) 0.02
 - (d) -0.02
57. Five competitors in a contest are ranked by two judges in the order 1, 2, 3, 4, 5 and 5,4,3,2,1 respectively. Calculate the Spearman's rank correlation coefficient.
- (a) -0.5
 - (b) -1
 - (c) 0.5
 - (d) 1
58. Purchasing power of money is
- (a) Inversely proportional to price index number
 - (b) Directly proportional to price index number
 - (c) Both (a) and (b)
 - (d) None of these
59. Given the prices of 2 commodities are increased by 10% and 20% respectively and the price of another commodity is decreased by 30%. The relative importance of 3 commodities are in the ratio 3:3:1. Find weighted price index number.
- (a) 80
 - (b) 109
 - (c) 108.5
 - (d) 110
60. When b_{yx} and b_{xy} are given, $r = ?$
- (a) $r = -\sqrt{b_{yx} \times b_{xy}}$
 - (b) $r = \frac{b_{yx} + b_{xy}}{2}$
 - (c) $r = \pm\sqrt{b_{yx} \times b_{xy}}$
 - (d) All of the above
61. Which of the following statements are true?
- I. Correlation coefficient is the arithmetic mean between regression coefficients.
 - II. Regression coefficients are independent of the change of origin but not of scale.
 - III. If one of the regression coefficient is > 1 , then the other must be less than unity.
- (a) I and II
 - (b) III and I
 - (c) II and III
 - (d) I, II and III

62. If $4y - 5x = 15$ is the regression line of y on x and the coefficient of correlation between x and y is 0.75, what is the value of the regression coefficient of x on y ?
- (a) 0.45
(b) 0.9375
(c) 0.6
(d) none of these

63. Given the following data :

Commodity	P_0	q_0	p_1	q_1
A	1	10	2	5
B	1	5	X	2

where p and q represent price and quantity respectively and subscript for the time period. The value of X if the ratio between Laspeyres (L) and Paasche's (P) index numbers is 28 : 27 i.e., $L : P = 28 : 27$ is :

- (a) 3
(b) 4
(c) 5
(d) 6
64. When two or more related time series are expressed in different units, we use
- (a) logarithmic or ratio
(b) multiple line chart
(c) multiple axis chart
(d) none
65. A pie chart is drawn to show the areas in millions of square kms. of several continents. The area 11.7 sq. km. of Africa is shown by a sector subtending an angle of 82° . If the subtended angle corresponding to North America be 66° , find its area
- (a) 9.8 km^2
(b) 9.4 km^2
(c) 88 km^2
(d) 5.6 km^2
66. Hidden trend, if any, in the data can be noticed in
- (a) Textual presentation
(b) Tabulation
(c) Diagrammatic representation
(d) All of these
67. Mean and S.D. of a given set of observations is 1,500 and 400 respectively. If there is hiked by 20% in the first year and each observation is an increment of 100 in 2nd year, then find new mean and S.D.
- (a) 1920, 480
(b) 1900, 480
(c) 1600, 480
(d) 1600, 400
68. If two regression lines are $3x + 4y - 18 = 0$ and $5x + 2y = 10$. Then $\sigma_x : \sigma_y = ?$
- (a) 0.53
(b) 0.73
(c) 0.60
(d) None

69. Chronological classification is :
(a) classification of units on the basis of time
(b) classification of units on the basis of geographical area
(c) classification of units according to the characteristic of attributes
(d) classification of units according to the characteristic of variables
70. For Normal distribution the relation between quartile deviation (Q.D) and standard deviation (S.D) is:
(a) $Q.D > S.D$
(b) $Q.D < S.D$
(c) $Q.D = S.D$
(d) None of the above
71. The average age of a group of 10 students was 20 years. The average age increased by 4 years when two new students joined the group. What is the average age of two new students who joined the group?
(a) 22 years
(b) 30 years
(c) 44 years
(d) 32 years
72. If the difference between mean and Mode is 63, then the difference between mean and Median will be _____.
(a) 63
(b) 31.5
(c) 21
(d) None of the above
73. Age of applicants for life insurance and the premium of insurance-correlation are :
(a) positive
(b) negative
(c) zero
(d) None
74. If $u = 2x + 5$, $v = -3y + 1$, and the regression coefficient of y on x is -1.2 , the regression coefficient of v on u is :
(a) 1.8
(b) -1.8
(c) 3.26
(d) 0.8
75. The odds are 9:5 against a person who is 50 years living till he is 70 and 8:6 against a person who is 60 living till he is 80. Find the probability that at least one of them will be alive after 20 years:
(a) $\frac{11}{14}$
(b) $\frac{22}{49}$
(c) $\frac{31}{49}$
(d) $\frac{35}{49}$

76. The area of a normal Curve is
(a) 90%
(b) 95%
(c) Unity
(d) Infinity
77. If the difference between the mean and the variance of binomial distribution for 5 trials is $\frac{5}{9}$, the distribution is of the form
(a) $\left(\frac{1}{4} + \frac{3}{4}\right)^5$
(b) $\left(\frac{1}{9} + \frac{8}{9}\right)^5$
(c) $\left(\frac{2}{3} + \frac{1}{3}\right)^5$
(d) None of these
78. If the 1970 index with base 1965 is 200 and 1965 index with base 1960 is 150, the index 1970 on base 1960 will be:
(a) 700
(b) 300
(c) 500
(d) 600
79. When the two curves of ogive intersect, the point of intersection provides:
(a) First Quartile
(b) Second Quartile
(c) Third Quartile
(d) Mode
80. Cost of paper for a week under the heads raw material, labour, direct production and others were Rs. 23, Rs. 18, Rs. 32, Rs. 17 respectively. What is the difference between the central angles for the largest and smallest components of cost of the paper?
(a) 60
(b) 68
(c) 72
(d) 56
81. 10, 18, 28, 40, 54, ?, 88
(a) 70
(b) 86
(c) 87
(d) 98
82. 10, 100, 200, 310, 430 ?
(a) 560
(b) 540
(c) 550
(d) 590

83. 165, 195, 255, 285, ?, 375
(a) 345
(b) 390
(c) 335
(d) 395
84. 7, 26, 63, 124, 215, ?, 511
(a) 342
(b) 343
(c) 441
(d) 421
85. 5, 2, 7, 9, 16, 25, 41, ?
(a) 65
(b) 66
(c) 67
(d) 68
86. If RAMAN is written as 12325 and DINESH as 675489 how HAMAM is written ?
(a) 92323
(b) 92233
(c) 93233
(d) 93292
87. If DELHI is coded as CCIDD, how would you encode BOMBAY ?
(a) AJMTVT
(b) AMJXVS
(c) MJXVSU
(d) WXYZAX
88. From her home Purna wishes to go to school. From home she goes towards North and then turns left and then turns right, and finally she turns left and reaches school. In which direction her school is situated with respect to her home?
(a) North-East
(b) North-West
(c) South-East
(d) South-West
89. A man started walking West. He turned right, then right again and finally turned left. Towards which direction was he walking now ?
(a) North
(b) South
(c) West
(d) East
90. Six person A, B, C, D, E and F are sitting in two row, three in each row. (MAT 2011)
(i) E is not at the end of any row
(ii) D is second to the left of F
(iii) C, the neighbour of E, is sitting diagonally opposite of D.
(iv) B is the neighbour of F.

Which of the following are in one of the two rows ?

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

91. P, T, V, R, M, D, K and W are sitting around a circular table facing the centre. V is second to the left of T. T is fourth to the right of M. D and P are not immediate neighbours of T. D is third to the right of P. W is not an immediate neighbor of P. P is to the immediate left of K.

What is R's position with respect to V ?

- (a) Third to the right
- (b) Fifth to the right
- (c) Third to the left
- (d) Second to the left

92. Based on the statements given below, find out who is the uncle of P ?

- (i) K is the brother of J
- (ii) M is the sister of K
- (iii) P is the brother of N
- (iv) N is the daughter of J

- (a) K
- (b) J
- (c) N
- (d) M

93. A and B are brothers. E is the daughter of F. F is the wife of B. What is the relation of E to A?

- (a) Sister
- (b) Daughter
- (c) Niece
- (d) Daughter-in-law

94. Seema is the daughter-in-law of Sudhir and sister-in-law of Ramesh. Mohan is the son of Sudhir and only brother of Ramesh. Find the relation between Seema and Mohan.

- (a) Sister-in-law
- (b) Aunt
- (c) Cousin
- (d) Wife

(Directions Q 95 to 97) Two or Three statements are followed by two conclusions I and II, you have to take the two given statements to be true, disregarding the commonly known facts and then decide which of the given conclusions logically follows from the two given statements?

95. **Statement:** Some Chairs are glasses.

All tree are Chairs

Conclusions:

- I. Some trees are glasses.
- II. Some glasses are trees.

- (a) Only I follows
- (b) Only II follows

- (c) Both I and II follows
- (d) Neither I nor II follows

96. **Statement:** All papers are pens.
All pens are erasers.
Conclusions: I. Some erases are papers.
II. Some pens are no papers.
- (a) Only I follows
 - (b) Only II follows
 - (c) Either I or II follows
 - (d) Neither I nor II follows

97. **Statement:** Only dogs are animals.
No historian is an animal.
Conclusions: I. Some dogs are not historians.
II. Some historians are not dogs.
- (a) Only conclusion I follows.
 - (b) Only conclusion II follows.
 - (c) Neither I nor II follows.
 - (d) Both conclusion I and II follows.

Directions (Q 98–100): Study the following carefully and answer the questions given below:

A, B, C, D, E, F, G, H and K are sitting around a circle facing the centre. B is fourth to the left of G, who is second to the right of C. F is fourth to the right of C and is second to the left of K. A is fourth to the right of K. D is not an immediate neighbour of either K or B. H is third to the right of E.

98. In which of the following combinations is the third person sitting between the first and the second persons?
- (a) EKB
 - (b) CHB
 - (c) AGC
 - (d) FGD
99. Who is fourth to the left of E ?
- (a) A
 - (b) C
 - (c) G
 - (d) Data inadequate
100. Who is the second to the right of K ?
- (a) C
 - (b) H
 - (c) F
 - (d) E

— ** —

(GCF-7+8, 9, 10, VDCF-3 & 4, VCF-3 & 4, SCF-3 & 4)

DATE: 12.10.2020

MAXIMUM MARKS: 100

TIMING: 3 Hours

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. Ans. c
Explanation:
1Rs. : 50P : 25P
4x, 5x, 6x
$$4x + \frac{250x}{100} + \frac{150x}{100} = 120$$
$$x = 15$$

The number of coins of 25 paisa = $6 \times 15 = 90$
2. Ans. c
Explanation:
 $A = 1, 2, 3$
Subsets of A = Power set of A
 $\phi, 1, 2, 3, 1, 2, 2, 3, 1, 3, 1, 2, 3$
3. Ans. c
Explanation:
The no. of arrangements = Total no. of arrangements – Two 'o's come together-
$$= \frac{6!}{2!} - 5! = 240$$
4. Ans. b
Explanation:
 $\log_{10} 80 = \log_{10} (8 \times 10)$
$$= \log_{10} (2 \times 4 \times 10)$$
$$= \log_{10} 2 + \log_{10} 4 + \log_{10} 10$$
$$= x + y + 1$$
5. Ans. c
Explanation:
Transpose of row matrix is Column Matrix.
6. Ans. a
Explanation:
Let number is x
Then $x + \frac{1}{x} = \frac{10}{3}$
$$3x^2 - 10x + 3 = 0$$

and roots are $3, \frac{1}{3}$

and square of the numbers are $9, \frac{1}{9}$

7. Ans. d

Explanation:

$$\frac{\frac{x+y+z}{\frac{1}{xy} + \frac{1}{yz} + \frac{1}{zx}}}{\left(\frac{z+x+y}{xyz}\right)} = \frac{x+y+z}{1} \times \frac{xyz}{(x+y+z)} = xyz$$

8. Ans. b

Explanation:

Let third proportional be T

$$x^2 - y^2, x - y, T$$

$$x^2 - y^2 : x - y :: x - y : T$$

$$(x - y)^2 = (x^2 - y^2) \times T$$

$$\frac{(x - y)^2}{x^2 - y^2} = T$$

$$\frac{x - y}{x + y} = T$$

9. Ans. c

Explanation:

$$x + \frac{1}{x} = \sqrt{2} \quad (\text{squaring both sides})$$

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

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

$$x^2 + \frac{1}{x^2} = \boxed{0}$$

10. Ans. a

Explanation:

From (i) equation, $bx + ay = 2ab$

From (ii) equation, $ax - by = a^2 - b^2$

Multiply eqⁿ (i) by a and eqⁿ (ii) by b, we get

$$abx + a^2y = 2a^2b \quad \dots(\text{iii})$$

$$\text{and } abx - b^2y = a^2b - b^3 \quad \dots(\text{iv})$$

Subtracting (iii) and (iv), $b^2y + a^2y = b^3 + a^2b$

$$\Rightarrow y(b^2 + a^2) = b(b^2 + a^2)$$

$$\Rightarrow y = b$$

Putting $y = b$ in the equation (i)

$$bx + a(b) = 2ab$$

$$\Rightarrow bx = ab \Rightarrow x = a$$

11. Ans. c

Explanation:

$$\log_8 m + \log_8 2 = \frac{2}{3}$$

$$\log_8 (2m) = \frac{2}{3}$$

$$(8)^{\frac{2}{3}} = 2m$$

$$(2^3)^{\frac{2}{3}} = 2m$$

$$(2)^2 = 2m$$

$$4 = 2m$$

$$2 = m$$

12. Ans: c

Explanation:

Let width of the rectangle is x , then length = $5+2x$

Given that Area of rectangle = 75

$$\text{Length} \times \text{width} = 75$$

$$(5 + 2x) \times x = 75$$

$$2x^2 + 5x - 75 = 0$$

$$(2x + 15)(x - 5) = 0$$

$$x = 5, \frac{-15}{2} \left[x \neq \frac{-15}{2} \right]$$

$$\text{Length} = 2x + 5$$

$$= 2(5) + 5 = 15 \text{ units}$$

13. Ans. b

Explanation:

Given equation is $3x^2 + (5m-2)x + m = 0$

$$\text{Sum of the roots} = \frac{-(5m-2)}{3}$$

We know that if roots are reciprocal to each other then $\frac{c}{a} = 1$ of $ax^2 + bx + c = 0$

$$\text{So } \frac{m}{3} = 1 \Rightarrow m = 3$$

$$\text{So sum of the roots} = \frac{-(5 \times 3 - 2)}{3} = \boxed{\frac{-13}{3}}$$

14. Ans. d

Explanation:

$$\begin{aligned}
 & \frac{\log_9 11}{\log_5 13} - \frac{\log_3 11}{\log_{\sqrt{5}} 13} \\
 & \Rightarrow \frac{\log_{(3)^2} 11}{\log_{(\sqrt{5})^2} 13} - \frac{\log_3 11}{\log_{\sqrt{5}} 13} \\
 & \Rightarrow \frac{\frac{1}{2} \cdot \log_3 11}{\frac{1}{2} \cdot \log_{\sqrt{5}} 13} - \frac{\log_3 11}{\log_{\sqrt{5}} 13} \\
 & \Rightarrow \frac{\log_3 11}{\log_{\sqrt{5}} 13} - \frac{\log_3 11}{\log_{\sqrt{5}} 13} \\
 & \Rightarrow 0
 \end{aligned}$$

Note $\log_{a^n} m = \frac{1}{n} \log_a m$
--

15. Ans. b

16. Ans. d

Explanation:

Let α and β are roots of equation

$$\begin{aligned}
 \alpha^2 + \beta^2 &= (\alpha + \beta)^2 - 2\alpha\beta \\
 &= (-2)^2 - 2(-143) \\
 &= 290
 \end{aligned}$$

17. Ans. c

Explanation :

$$\frac{25x}{100} + \frac{10 \times 2x}{100} + \frac{5 \times 3x}{100} = 30$$

$$: x = 50$$

$$\text{then the number of 5 p coins} = 3 \times 50 = 150$$

18. Ans. c

Explanation:

$$\begin{aligned}
 &= \log(1+2+3) = \log 6 \\
 &= \log(1 \times 2 \times 3) \\
 &= \log 1 + \log 2 + \log 3
 \end{aligned}$$

19. Ans. a

Explanation:

$$\frac{A}{B} = \frac{2}{3}, \frac{B}{C} = \frac{1}{4}$$

$$A:B:C=2:3:12$$

$$A's \text{ share} = \text{Rs. } 510 \times \frac{2}{17} = \text{Rs. } 60$$

20. Ans. c

Explanation:

$$\begin{aligned} \text{SI for 5 years} &= 1020 - 720 \\ &= 300 \end{aligned}$$

$$\text{SI for years} = \frac{300}{5} \times 2$$

$$= \text{Rs. } 120$$

$$\begin{aligned} \text{Principal} &= \text{Rs. } 720 - \text{Rs. } 120 \\ &= \text{Rs. } 600 \end{aligned}$$

21. Ans. b

Explanation:

$$\text{Required no. of ways} = 2 \times 4 \times 3 \times 2 \times 1 = 48$$

22. Ans. d

Explanation:

$$\begin{aligned} \text{Present value} &= A(1+i)^{-n} = 10000 / (1+0.025)^4 \\ &= 10000 / (1.025)^4 \\ &= 10000 / (1.1038) \\ &= \text{Rs. } 9059.50 \end{aligned}$$

23. Ans. a

Explanation:

For the lines $2x + 3y = 4$ and $4x + 6y = 7$

$$\frac{2}{4} = \frac{3}{6} \neq \frac{4}{7}$$

So, the given system of equation have no solution because, both lines are parallel to each other.

24. Ans. b

Explanation:

$$\text{LHL} = 3$$

$$\text{RHL} = 5 - P$$

$$\text{LHL} = \text{RHL}$$

$$3 = 5 - P$$

$$P = 2$$

25. Ans. a

Explanation:

$$\text{Here } A = 2000, i = \frac{6}{100 \times 12} = 0.005, n = 24$$

Let Rs. P be the each payment.

$$\therefore \text{Amount : } A = P \left[\frac{(1+i)^n - 1}{i} \right] \Rightarrow 2000 = P \left[\frac{(1+0.005)^{24} - 1}{0.005} \right] = P \left[\frac{(1.005)^{24} - 1}{0.005} \right]$$

$$\Rightarrow P = \frac{2000 \times 0.005}{(1.005)^{24} - 1} \quad \text{or} \quad P = \frac{10}{1.1272 - 1} = \frac{10}{0.1272} = \text{Rs. } 78.61$$

26. Ans. d

Explanation:

By options putting the value $n = 9$

$$9c_2 - 9 = 27$$

27. Ans. c

Explanation:

37, 39, ... 119

$$l = a + (n-1)d$$

$$119 = 37 + (n-1)(2)$$

$$n = 42$$

$$S_n = \frac{n}{2}(a+l) = \frac{42}{2}(37+119) = 3276$$

28. Ans. b

Explanation:

Sum of male and female employees Can not be more than ten so option (b) shows right inequality.

29. Ans. d

Explanation :

The candidate can select 8 questions by selecting at last three from each part in the following ways:

(a) 3 questions from part A and 5 questions from part

$$B = {}^7C_3 \times {}^5C_5 = 35 \text{ ways}$$

(b) 4 questions from part A and part B each

$$B = {}^7C_4 \times {}^5C_4 = 175 \text{ ways}$$

(c) 5 questions from part A and questions from part

$$B = {}^7C_5 \times {}^5C_3 = 210 \text{ ways}$$

Hence, the total number of ways in which the candidate can select the question will be $= 35 + 175 + 210 = 420$ ways.

30. Ans. d

Explanation:

$$x^y = e^{x+y}$$

$$y \log x = x + y$$

$$y = \frac{x}{\log x - 1}$$

$$\frac{dy}{dx} = \frac{\log x - 2}{(\log x - 1)^2}$$

31. Ans. b

Explanation:

$$SI = \frac{prt}{100}$$

$$\frac{3}{8}P = \frac{p \times r \times 25}{400}$$

$$r = 6\%$$

32. Ans. d
Explanation:
The required no. of ways = $4! \times 3! = 144$
33. Ans. b
Explanation:
 $x = 8^{17}$
 $x = 2^{51}$
 $\log x = 51 \log 2$
 $\log x = 51 \times 0.3010 = 15.381$
Number of terms in $8^{17} = 15 + 1 = 16$
34. Ans. c
Explanation:
 $\text{fog}(x) = f[g(x)]$
 $= f(x^2 + 7)$
 $\text{fog}(x) = 2(x^2 + 7) + 7$
 $\text{fog}(x) = 2x^2 + 21$
 $\Rightarrow 2x^2 + 21 = 25$
 $x^2 = 2$
 $x = \pm\sqrt{2}$
35. Ans. b
Explanation:
 $f(x) = 2x^2 + 3x - 5$
 $f'(x) = 4x + 3$
 $f'(0) = 3$
 $f'(-1) = -1$
 $f'(0) + 3f'(-1) = 3 + 3(-1) = 3 - 3 = 0$
36. Ans. c
Explanation:
 $(P + Q) \times \frac{20}{100} = (P - Q) \times \frac{50}{100}$
 $2P + 2Q = 5P - 5Q$
 $7Q = 3P$
 $P:Q = 7:3$
37. Ans. c
Explanation:
Let x years be the present age of the man and sum of the present ages of the two sons be y years.
By the condition $x = 3y$ (i)
and $x + 5 = 2(y + 5 + 5)$ (ii)
From (i) & (ii) $3y + 5 = 2(y + 10)$
or $3y + 5 = 2y + 20$
or $3y - 2y = 20 - 5$
or $y = 15$

$$\therefore x = 3 \times y = 3 \times 15 = 45$$

Hence the present age of the main is 45 years.

38. Ans. c

Explanation:

Total line can be made by 10_{C_2}

and 7_{C_2} lines could not be drawn because points are collinear

So Remaining $\Rightarrow 10_{C_2} - 7_{C_2} + 1$

$$\Rightarrow 25$$

39. Ans. b

40. Ans. b

41. Ans. b

Explanation:

Given $n_1 = k$, $n_2 = k$

$$\bar{x}_1 = 16 \quad \bar{x}_2 = 10$$

Combined mean

$$\begin{aligned} \bar{x} &= \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2}{n_1 + n_2} \\ &= \frac{k \times 16 + k \times 10}{k + k} = \frac{16k + 20k}{3k} = \frac{36k}{3k} \\ &= 12 \end{aligned}$$

42. Ans. a

Explanation : Sum of marks of 300 students = $300 \times 40 = 12000$

after replacing wrong and missing observations sum of marks =

$$12000 - 60 + 66 + 14 - 41 + 60 = 12039$$

$$\text{Correct mean} = 12039/300 = 40.13$$

43. Ans. b

Explanation:

First 5 and last five observations are same in magnitude but opposite in sign. So

For given observation $\sum_{i=1}^{10} x_i = 0$ and

$$\sum_{i=1}^{10} x_i^2 = 2 \sum_{i=1}^5 x^2 = 2 \times 80 = 160$$

$$\begin{aligned} \sigma &= \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2} \\ &= \sqrt{\frac{160}{10} - \left(\frac{0}{10} \right)^2} \\ &= 4 \end{aligned}$$

44. Ans. d
Explanation:

$$\text{Coefficient of variation} = \frac{\text{S.D.}}{\bar{x}} \times 100$$

$$50 = \frac{\text{S.D.}}{10} \times 100$$

$$\text{S.D.} = \frac{50 \times 10}{100} = 5$$

$$\therefore \text{Variance} = (\text{S.D.})^2 = 5^2 = 25$$

45. Ans. b
Explanation:

$$\text{Coefficient of range} = \frac{L - S}{L + S}$$

Where $L \rightarrow$ for largest value

$S \rightarrow$ for smallest value

$$\text{Coefficient of range} = \frac{40 - 10}{40 + 10} = \frac{30}{50} = \frac{3}{5}$$

46. Ans. a
Explanation:
Arrange the data in ascending order:
 $x/5, x/3, x/2, x$
 $M =$ Simple Average of two middle terms

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

$$\frac{x}{2} + \frac{x}{3} = 20$$

$$\frac{5x}{6} = 20$$

$$x = 24$$

47. Ans. d
Explanation: $\sum x = 50 \times 80 = 4000$
After replacing correct observations $\sum x = 4000 - 28 - 69 + 82 + 96 = 4081$
Revised $\bar{x} = \frac{4081}{50} = 81.62$

48. Ans. b
Explanation:
 $\text{G.M.} = (2 \times 2^2 \times 2^3 \times 2^4 \times 2^5 \times 2^6)^{1/6}$
 $= 2^{7/2}$

49. Ans. d
Explanation:

$$H.M. = \frac{n}{1+3+5\ldots 2n-1} = \frac{1}{n}$$

50. Ans. c

51. Ans. b

Explanation:

$$r_R = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

$$0.143 = 1 - \frac{6 \times 48}{7(48)} = 0.143$$

52. Ans. b

Explanation:

$$F = \sqrt{L \times P}$$

$$150^2 = 144 \times P$$

$$P = 156.25$$

53. Ans. b

Explanation:

$$\text{Revised salary} = \frac{200}{110} \times 325 = 590.90$$

It means worker is in loss.

54. Ans. c

55. Ans. d

Explanation : Regression coefficient are independent of change of origin but not scale (As per Fundamental Principle)

56. Ans. c

Explanation :

$$b_{yx} = 0.5, b_{xy} = B, r = 0.1$$

$$r = \sqrt{b_{xy} \times b_{yx}}$$

$$0.1 = \sqrt{0.5 \times B}$$

$$0.5B = 0.01$$

$$B = \frac{0.01}{0.5} = 0.02$$

57. Ans. b

Explanation: if rank is in reverse order then spearman rank correlation coefficient is -1.

58. Ans. a

59. Ans. c

Explanation:

Commodity	R	W	RW
I	110	3	330

II	120	3	360
III	70	1	70
Total		7	760

$$\text{Weighted Price Index} = \frac{\sum RW}{\sum W} = \frac{760}{7} = 108.5$$

60. Ans. c

61. Ans. c

62. Ans. a

Explanation:

$$r = \sqrt{b_{xy} \times b_{yx}}$$

$$0.75 = \sqrt{\frac{5}{4} \times b_{xy}}$$

$$\frac{0.5625 \times 4}{5} = b_{xy}$$

$$b_{xy} = 0.45$$

63. Ans. b

Explanation :

$$\frac{L}{P} = \frac{\frac{\sum p_1 q_0}{\sum p_0 q_0}}{\frac{\sum p_1 q_1}{\sum p_0 q_1}} = \frac{\frac{20 + 5x}{15}}{\frac{10 + 2x}{7}} = \frac{28}{27}$$

$$= \frac{140 + 35x}{150 + 30x} = \frac{28}{27}$$

$$x = 4$$

64. Ans. c

65. Ans. b

Explanation :

Angle Corresponding to North America

$$= \frac{11.7}{82} \times 66$$

$$= 9.4 \text{ km}^2$$

66. Ans. c

67. Ans. b

Explanation : $\bar{x} = 1500$, $SD = 400$

After 1st year

Mean = $1500 + 20\% \text{ of } 1500 = 1800$

SD = $400 + 20\% \text{ of } 400 = 480$

After 2nd year

Mean = $1800 + 100 = 1900$

SD = 480 (no change)

68. Ans. b

Explanation:

$$\begin{aligned}\frac{\sigma_x}{\sigma_y} &= \sqrt{\frac{b_{xy}}{b_{yx}}} \\ &= \sqrt{\frac{8}{15}} \\ &= 0.73\end{aligned}$$

69. Ans. a

70. Ans. b

Explanation:

We Know Q.D = $\frac{2}{3} S.D$

Q.D. < S.D

71. Ans. c

Explanation :

Average age of 10 students = 20 yrs

The sum of age of 10 students = $20 \times 10 = 200$ yrs

If two boys are increased

The total no of students = $10 + 2 = 12$

And average increased by 4 yrs

Then new average = $20 + 4 = 24$

The sum of age of 12 student = $24 \times 12 = 288$

The sum of age of two boys = $288 - 200 = 88$

Average age of two boys = $\frac{88}{2} = 44$

72. Ans. c

Explanation:

Given: Mode - Mean = 63

We know the empirical relationship between mean, Median & Mode i.e.

(Mode - Mean) = 3 (Median - Mean)

Median - Mean = $\frac{63}{3} = 21$

73. Ans. a

74. Ans. a

Explanation:

$$b_{vu} = \frac{p}{q} \times b_{yx}$$

$$= \frac{-3}{2} \times -1.2 = 1.8$$

75. Ans. c

Explanation :

Event A: Person aged 50 years will remain alive after 20 years

Event B: Person aged 60 years will remain alive after 20 years

$$\therefore P(A) = \frac{5}{9+5} = \frac{5}{14} \text{ and } P(B) = \frac{6}{8+6} = \frac{6}{14}$$

$$\therefore P(A \cup B) = \frac{5}{14} + \frac{6}{14} - \frac{5}{14} \times \frac{6}{14} = \frac{31}{49}$$

76. Ans. c

77. Ans. c

Explanation:

$$np - npq = \frac{5}{9}$$

$$p = \frac{1}{3}, q = \frac{2}{3}$$

Distribution is $\left(\frac{2}{3} + \frac{1}{3}\right)^5$

78. Ans. b

Explanation :

$$\text{The index 1970 on base 1960 will be} = \frac{150 \times 200}{100} = 300$$

79. Ans. b

Explanation: Less than ogive & more than Ogive intersect at a point called MEDIAN or we can say second quartile.

80. Ans. a

Explanation:

$$\text{Largest angle} = \frac{32}{90} \times 360 = 128^\circ$$

$$\text{Smallest angle} = \frac{17}{90} \times 360 = 68^\circ$$

$$\text{Difference} = 60^\circ$$

81. Ans. a

82. Ans. a

83. Ans. a

84. Ans. a

85. Ans. b

86. Ans. a

87. Ans. b

88. Ans. b

89. Ans. a

90. Ans. a

91. Ans. a
92. Ans. a
93. Ans. c
94. Ans. d
95. Ans. d
96. Ans. a
97. Ans. a
98. Ans. d
99. Ans. a
100. Ans. b

— ** —