(GCF-1, 3, 4, 5, 6, 7+7A, 8+8A, 9, VCF-1,2, ACF-1,2, JCF-1)

DATE: 08.10.2023 **MAXIMUM MARKS: 100** **TIMING: 2 Hours**

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. Ans. a
Explanation:
The most appropriate diagram to represent 5 year plan outlay of India in different economic sectors is Pie diagram

2. Ans. d
Explanation:

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

3. Ans. a
Explanation:

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

Let Rs. P be the each payment.

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

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

4. Ans. c
Explanation:
37, 39, ... 119
l = a + (n–1)d
119 = 37 + (n–1)(2)
n = 42

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

5. Ans. d
Explanation:

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

$y \log x = x + y$

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

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

6. Ans. b
Explanation:
F = $\sqrt{L \times P}$
150^2 = 144 x P
P = 156.25

7. Ans. b
Explanation :
Suppose that I am x years old and my son is y years old. Then, according to question,
$x = 3y$ ...(i)
and $x + 5 = \frac{5}{2}(y + 5)$ ...(ii)
from (i) and (ii), $3y + 5 = \frac{5}{2}(y + 5)$
$\Rightarrow 6y + 10 = 5y + 25$
$\Rightarrow$ y = 15
Substituting in (i) gives, $x = 3 \times 15 = 45$
Hence, my age = 45 years.

8. Ans. a
Explanation:
A = $\frac{R}{r}[(1+r)^n - 1]$
= $\frac{6000}{0.09}[(1+0.09)^8 - 1]$
= Rs. 66170.84

9. Ans. a
Explanation:

First Time	Second Time
A = 3x	$A = 27x$
P = x	$P = x$
n = 6	n = ?
$\therefore 3x = x\left[1+\frac{r}{100}\right]^6$	$27x = x\left[1+\frac{r}{100}\right]^n$
$3 = \left[1+\frac{r}{100}\right]^6$	$(3)^3 = \left[1+\frac{r}{100}\right]^n$
	$\left\{\left[1+\frac{r}{100}\right]^6\right\}^3 = \left(1+\frac{r}{100}\right)^n$
	$\left(1+\frac{r}{100}\right)^{18} = \left(1+\frac{r}{100}\right)^n \Rightarrow n = 18$

10. Ans. b
Explanation:

f(x) = $\sqrt{x+\sqrt{x+...\infty}}$

$\Rightarrow$ f(x) = $\sqrt{x+f(x)}$

On squaring both sides, we get

$[f(x)]^2 = x + f(x)$

differentiation both sides

2f(x) f'(x) = 1+f'(x)

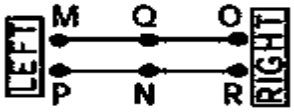
f'(x) [2f(x)–1]=1

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

11. Ans. a
Explanation:
Using declining balance depreciation
Declining Balance Depreciation Rate = 1 – (Salvage Value / Cost)^(1/Years)
Rearrange
Salvage value = Cost x (1 - Depreciation rate)^Years
Salvage value = 10000 x (1 - 10%)^10 = 3,486.78

12. Ans. b
Explanation:
16000[(1 + 5%)3 – 1] = 2522

13. Ans. b
Explanation:
According to question,
The sitting arrangement of M, N, O, P, Q and R would be as follows:
It is clear from the diagram that Q is facing N.



14. Ans. c
Explanation:
Common Solution for the set:
In this type of linear arrangement, we find the fixed position all are facing north
Here Y is Exactly in the Middle and it is third to the left of U

1	2	3	4	5	6	7
			Y			U

W, cannot sit at any extreme end so, T is in 1st place. W sits fifth to the right of T. W is in 6th place

1	2	3	4	5	6	7
T			Y		W	U

Z is not an immediate neighbor of Y. so, only one place left for Z that is 2.

1	2	3	4	5	6	7
T	Z		Y		W	U

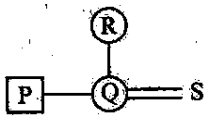
Two people sit between Z and X, X is at 5th place

1	2	3	4	5	6	7
T	Z		Y	X	W	U

The last place left for V.
From the given information we can make the following arrangement.

1	2	3	4	5	6	7
T	Z	V	Y	X	W	U

15. Ans. d
Explanation:
Mother in Law



16. Ans. d
Explanation:
Since X and Y both are the young-ones of Z. Hence either X and Y will be either sons or daughters of Z. Since Y is not the son of Z. Hence Y will be the daughter of Z.

17. Ans. c
Explanation:

Commodity	R	W	RW
I	110	3	330
II	120	3	360
III	70	1	70
Total		7	760

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

18. 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

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

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

19. Ans. a
Explanation:

Largest angle = $\frac{32}{90} \times 360 = 128^0$

Smallest angle = $\frac{17}{90} \times 360 = 68^0$

Difference = 60^0

20. Ans. a
Explanation:
Purchasing power of money is inversely proportional to price index number.

21. Ans. a
Explanation:
Age of applicants for life insurance and the premium of insurance-correlation positive

22. Ans. c
Explanation:
The area of a normal Curve is Unity.

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

24. Ans. b
Explanation:
The algebric sum of deviations taken from mean is zero.
Example:

X_i	$\left(X_i - \overline{X}\right)$
10	−10
20	0
30	10
	0

$\overline{X} = \frac{\Sigma X_i}{n}$

$= \frac{10+20+30}{3}$

$= 20$

Therefore $\Sigma\left(X_i - \overline{X}\right) = 0$

25. Ans. a
Explanation:
Laspeyre's Price Index is based on base year Quantity.
Since Formula is $L = \frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \times 100$
Hence Q_0 is constant.

26. Ans. b
Explanation:
Box-head is the entire upper part of the table which includes columns and sub-column and unit of measurement.

27. Ans. a
Explanation:
Q.D<M.D.<S.D

28. Ans. b
Explanation:
If two variable are uncorrelated then regression lines are Perpendicular.

29. Ans. c
Explanation:
To check the consistency of two data which measure of dispersion will be used CV.

30. Ans. d
Explanation:

$$E = \left[\left(1+\frac{r}{100}\right)^{n} - 1\right] \times 100$$

$$= \left[\left(1+\frac{6}{200}\right)^{2} - 1\right] \times 100 = 6.09\%$$

31. Ans. d
Explanation:
No. of ways = $7C_4$ X $3C_2$ + $7C_3$ X $3C_3$
= 105 + 35 = 140

32. Ans. d
Explanation:
$(a,a),(b,b),(c,c) \in R$
So R is a reflexive relation
But $(a,b) \in R$ and $(b,a) \notin R$
Thus, R is not a symmetric relation.
Also, $(a,b),(b,c) \in R \Rightarrow (a,c) \notin R$
Hence R is not a transitive relation

33. Ans. b
Explanation:
Mean Proportion

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

$$= \frac{ab}{a+b}$$

34. 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

35. Ans. a
Explanation:
Which one of the following mean cannot be determined by graphic method.

36. Ans. c
Explanation:
$x^2 + x + 2 = 0$
$\propto + \beta = -1, \propto \beta = 2$
$(\propto + \beta)^2 = \propto^2 + \beta^2 + 2 \propto \beta$
$1 = \propto^2 + \beta^2 + 4$
$\propto^2 + \beta^2 = -3$

$$\frac{\propto}{\beta}+\frac{\beta}{\propto}=\frac{\propto^2+\beta^2}{\propto\beta}=\frac{-3}{2}$$

37. Ans. c
Explanation:

$$S\infty=\frac{a}{1-r}$$

$$a=2, b=\frac{6}{5}$$

$$ab=\frac{12}{5}$$

38. Ans. c
Explanation:

$$\sum x^2 = n(\sigma^2 + \bar{x}^2)$$

39. Ans. d
Explanation:
Mean < Variance

40. Ans. b
Explanation:
$(AUB')'$
$= A' \cap B$
$= B - A$

41. Ans. c
Explanation:

$$D= P\left(\frac{R}{100}\right)^2$$

$$768 = P\left(\frac{8}{100}\right)^2$$

P = 1,20,000

42. Ans. d
Explanation:

$$E = \left[\left(1+\frac{r}{100}\right)^n - 1\right]\times 100$$

$$= \left[\left(1+\frac{6}{200}\right)^2 - 1\right]\times 100 = 6.09\%$$

43. Ans. b
Explanation:

Let the sum be Rs. x. Then, $\left(\frac{X\times10\times7}{100\times2}\right)-\left(\frac{X\times12\times5}{100\times2}\right)=40$

$\Leftrightarrow \quad \frac{7x}{20}-\frac{3x}{10}=40 \Leftrightarrow x=(40x20)=800.$

Hence, the sum is Rs. 800.

44. Ans. b
Explanation:
T_5= a+4d =14 ..... (i)
T_{12} = a+11d =35 ..... (ii)
On solving equation (i) and (ii)
a=2

45. Ans. c
Explanation:

The no. of ways = $^4P_3$ × 4!
= 24 × 24 = 576

46. Ans. b
Explanation:
$-2x+3y\geq6$ Cuts on X axis (−3, 0)
Y axis (0, 2)
and y is more than x so option (B) is Correct.

47. Ans. d
Explanation:
A = P $\left(1+\frac{r}{100}\right)^n$

1 = P $\left(1+\frac{10}{100}\right)^2$

P = 0.83

48. Ans. d
Explanation:
SI for 2 years = 5,680 – 5,200 = 480
SI for 5 years = $\frac{480}{2}\times5$ $=1,200$
P = 5,200 – 1,200 = Rs. 4,000
Rate = $\frac{100\times1,200}{4,000\times5}=6\%$

49. Ans. b
Explanation:
= $\log_{60}3 + \log_{60}4 + \log_{60}5$
= $\log_{60}60=1$

50. Ans. c
Explanation:
$1Rs. : 50P : 25P$
$4x, 5x, 6x$
$4x + \frac{250\,x}{100} + \frac{150\,x}{100} = 120$
$x = 15$
The number of coins of 25 paisa = 6 x 15 = 90

51. Ans. d
Explanation:
Different words can be formed $= \frac{11!}{4!\,4!\,2!}$
S = 4, P = 2, I = 4

52. Ans. c
Explanation:
A = $P\left(1 + \frac{r}{100}\right)^n$
$\frac{25}{16}P = P(1 + \frac{r}{100})^2$
$\left(\frac{5}{4}\right)^2 = (1 + \frac{r}{100})^2$
$\frac{5}{4} = 1 + \frac{r}{100}$
r = 25%

53. Ans. a
Explanation :
Black Red + White Ball
3 6
$3c_1$ x $6c_2$ + $3c_2$ x $6c_1$ + $3c_3$ = 64

54. Ans. c
Explanation :
(A-B) $\cup$ c
{2, 6, 9} $\cup$ {2, 6, 8}
= {2, 6, 8, 9}

55. Ans. b
Explanation:
Revised salary = $\frac{200}{110} \times 325 = 590.90$
It means worker is in loss.

56. Ans. a
Explanation :

Let cost of one chair and one table are x and y respectively, then
5x + 3y = 350……..(i)
3x + 5y = 370……..(ii)
on solving eq^n (i) and eq^n (ii)
x = 40, y = 50
Cost of one table and two chairs is Rs. 130

57. Ans. a
Explanation :
No. of diagonals = $n_{c_2} - n$

58. Ans. a
Explanation :
n(AxB) = n(A) x n(B)
= 5 x 3 = 15

59. Ans. a
Explanation:
$5x+7y-22=0$
$6x+2y-22=0$
$r=\sqrt{\frac{10}{42}}$
$byx=\frac{-5}{7}$
$bxy=-\frac{2}{6}$ $-\frac{5}{7}=-\frac{\sqrt{\frac{10}{42}}\times\sqrt{15}}{\sigma x}$ $\sigma x=2.64\ \ 6$

60. Ans. b
Explanation:
Coefficient of range = $\frac{L-S}{L+S}$
Where $L\rightarrow$ for largest value
$S\rightarrow$ for smallest value
Coefficient of range = $\frac{40-10}{40+10}=\frac{30}{50}=\frac{3}{5}$

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

62. Ans. b
Explanation:
Revised salary = $\frac{200}{110}\times 325=590.90$

It means worker is in loss.

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

64. Ans. d
Explanation:

$$m = 150 \times \frac{2}{100} = 3 \quad p(more\,than\,2) = 1 - \frac{e^{-3}3^0}{0!} - \frac{e^{-3}3^1}{1!} - \frac{e^{-3}3^2}{2!}$$

$$= 1 - \frac{e^{-3}3^0}{0!} - \frac{e^{-3}3^1}{1!} - \frac{e^{-3}3^2}{2!} = 0.58$$

65. Ans. b
Explanation:

$$\propto - \beta = \sqrt{(\propto + \beta)^2 - 4 \propto \beta}$$

$$= \sqrt{(7)^2 - 4(-9)} \quad = \quad \sqrt{85}$$

66. Ans. a
Explanation:

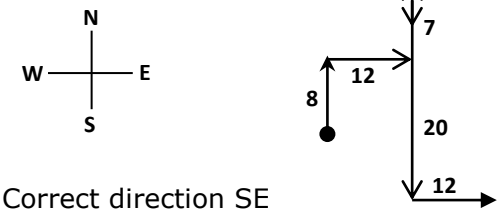
Z — A — X — C — Y — B

67. Ans. c
Explanation:
H + 2 = J
O + 2 = Q
N + 2 = P
E + 2 = G
Y + 2 = A
Now,
V - 2 = T
C - 2 = A
T - 2 = R
I - 2 = G
G - 2 = E
V - 2 = T
U - 2 = S

68. Ans. c
Explanation:
MINK - M = INK

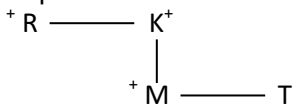
69. Ans. d
Explanation:
C + 2 = E + 2 = G + 2 = I
Then, J180P is wrong.

70. Ans. b
Explanation:

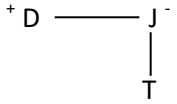


Correct direction SE
But best option South

71. Ans. b
Explanation:



72. Ans. a
Explanation:

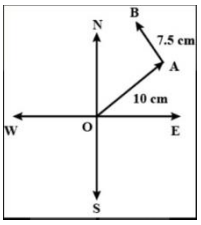


73. Ans. c
Explanation:
B is the son of C but C is not the mother of B means C is the father of B.
A is married to C means A is the mother of B.
F is the brother of B means F is the son of A and C.
D is daughter of A means D is daughter A and C. A is the mother and hence female. B is the son and hence male. C is the husband and hence male. D is the daughter and hence female. E is the brother and hence male. F is the son and hence male.
So, there are four males.

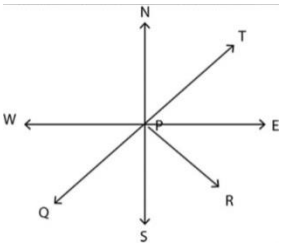
74. Ans. b
Explanation:
1, 10, 37, 118
1 x 3 + 7 = 10
10 x 3 + 7 = 37
37 x 3 + 7 = 118
118 x 3 + 7 = 361

75. Ans. a
Explanation:
H + 1 = I Now, N + 1 = O
E + 1 = F O + 1 = P
A + 1 = B R + 1 = S
L + 1 = M T + 1 = U
T + 1 = U
H + 1 = I

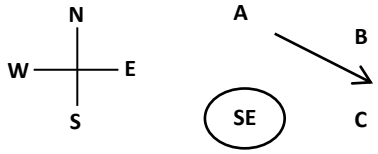
76. Ans. d
Explanation:



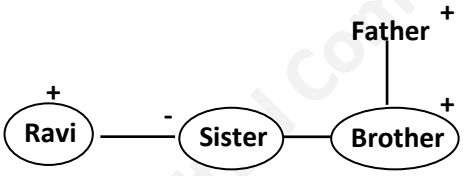
77. Ans. b
Explanation:



78. Ans. b
Explanation:



79. Ans. c
Explanation:



Answer- Sister

80. Ans. c
Explanation:
2nd = (1st + 1) : 3rd = (2nd + 2); 4th = (3rd + 3); 5th = (4th +4).
But 18 = 6th term not equal ? 5th + 5 = 14 + 5 = 19.

81. Ans. a
Explanation:

82. Ans. d
Explanation: Let the sides of a triangle are in $6x, 4x$ and $3x$

Then $6x + 4x + 3x = 52$

$x = 4$

The length of the smallest side = $3 \times 4 = 12\ \text{cm}$

83. Ans. b
Explanation:

$$\sqrt{\frac{n^2 - 1}{12}} = 2$$

$$\frac{n^2 - 1}{12} = 4$$

n = 7

84. Ans. a
Explanation:
Standard Deviation is independent of change of Origin.

85. Ans. c
Explanation:

$$r = \frac{25}{6 \times 5} = \frac{25}{30} = 0.833$$

86. Ans. c
Explanation:
Z = 3m - 2$\bar{x}$
18 = 3m - 48
66 = 3m
m = 22

87. Ans. d
Explanation:
50 x 2850 - 8000 + 7800
= 2846

88. Ans. c
Explanation:
Intersecting point of less than ogive and more than ogive curve Median.

89. Ans. d
Explanation:
Random Variable can be All of these.

90. Ans. c
Explanation:
Skewness of normal distribution is Zero.

91. Ans. c
Explanation:
Standard Normal Variate.

92. Ans. c
Explanation:
$A : B = 4 : 5] \times 7$
$B : C = 7 : 8] \times 5$
$A : B : C = 28 : 35 : 40$

93. Ans. b
Explanation:
$9, G, G_2, G_3, G_4, 288$
$l = a r^{n-1}$
$288 = 9\, r^5$
$r^5 = 2^5$
$r = 2$
$G_1 = ar = 9 \times 2 = 18$
$G_2 = ar^2 = 9 \times 4 = 36$
$G_3 = ar^3 = 9 \times 8 = 72$
$G_4 = ar^4 = 9 \times 16 = 144$

94. Ans. c
Explanation:
$\frac{d}{dx}(x^2 \log x)$
$= x^2 . \frac{1}{x} + 2x \log x$
$= x\,(1 + 2 \log x)$

95. Ans. a
Explanation:
Chronological classification is classification of units on the basis of time.

96. Ans. c
Explanation:

$New Mean = \frac{\bar{\times}}{\alpha}$ $\quad$ $New Mean = \frac{\bar{\times}}{\alpha} + 10$

97. Ans. d
Explanation:
$P_{01} = \sqrt{\frac{\sum P_1 q_0}{\sum P_0 q_0} x \frac{\sum P_1 q_1}{\sum P_0 q_1}} x100 = 94.88$

98. Ans. b
Explanation:
$\frac{1}{2} x \frac{1}{x} = \frac{1}{3} x \frac{1}{5}$

$$x = \frac{15}{2}$$

99. Ans. c
Explanation:
Sum of deviation from mean for any set of observation is Zero.

Example:

X_i	$\left(X_i - \overline{X}\right)$
10	−10
20	0
30	10
	0

$$\overline{X} = \frac{\Sigma X_i}{n}$$

$$= \frac{10+20+30}{3}$$

$$= 20$$

Therefore $\Sigma\left(X_i - \overline{X}\right) = 0$

100. Ans. b
Explanation:

X	P	PX
5	1/3	5/3
6	1/4	6/4
7	5/12	35/12

$$\frac{5}{3} + \frac{6}{4} + \frac{35}{12}$$

$$\frac{20+18+35}{12} = 6.08$$

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