(GCF-2,3,4,5,6,7,8,10 VCF-1,2, VDCF-1,2 & SCF-1,2)

DATE: 29.11.2021 MAXIMUM MARKS: 100 TIMING: 2 Hours

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. Ans. b
Explanation:

$$CI = 60000\left(1+\frac{6}{100}\right)\left(1+\frac{8}{100}\right)\left(1+\frac{10}{100}\right) - 60,000 = Rs.15,556.80$$

2. Ans. c
Explanation:

$1\,Rs. : 50\,P : 25\,P$

$4x, 5x, 6x$

$$4x + \frac{250x}{100} + \frac{150x}{100} = 120$$

$$x = 15$$

The number of coins of 25 paisa = 6 x 15 = 90

3. Ans. c
Explanation:

$A : B = 4 : 5]\times 7$

$B : C = 7 : 8]\times 5$

$A : B : C = 28 : 35 : 40$

4. Ans. a
Explanation:

$$\frac{1}{1+\frac{a^x}{a^y}} + \frac{1}{1+\frac{a^y}{a^x}}$$

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

5. Ans. b
Explanation:

$$A = P\left(1+\frac{r}{100}\right)^n$$

$$2000 = P\left(1+\frac{8}{100}\right)^4$$

P = Rs. 1470.06

6. Ans. a
Explanation:

$$P = \frac{R}{r}[1-(1+r)^{-n}]$$

$5,00,000 = \frac{R}{.08}[1-(1+0.8)^{-3}]$

R = Rs. 1,94,016.75

7. Ans. b
Explanation:
The number of straight lines
$= {}^{n}c_2 - {}^{x}c_2 + 1$
$= {}^{15}c_2 - {}^{6}c_2 + 1 = 91$

8. Ans. c
Explanation:
The no. of arrangements = Total no. of arrangements – Two 'o's come together-
$= \frac{6!}{2!} - 5! = 240$

9. Ans. d
Explanation:
Number of ways $= {}^{6}c_3 \times {}^{5}c_2 = 200$

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

11. Ans. c
Explanation:
$\frac{n!}{(n-5)!} = 20 \times \frac{n!}{(n-3)!}$
(n-3) (n-4) (n-5) ! = 20 (n-5) !
Use option.

12. Ans. b
Explanation:
It is an AP with a=-111 and d=4
T_n = a + (n-1) d
= -111 + (n-1) 4
= - 111 + 4n – 4
= 4n-115
Tn > 0
4n – 115 > 0
$n > 28\frac{3}{4}$
$\because$ The smallest integer greater than $28\ \frac{3}{4}\ is\ 29$.

13. Ans. b
Explanation:

$$\log_{10} 80 = \log_{10} (8 \times 10)$$
$$= \log_{10} (2 \times 4 \times 10)$$
$$= \log_{10} 2 + \log_{10} 4 + \log_{10} 10$$
$$= x + y + 1$$

14. Ans. d
Explanation:
$\log_2 \log_3(x) = 3^1 = 3$

$$\log_3^x = 2^3 = 8$$

$x = 3^8 = 6561$

15. Ans. a
Explanation:

$$\frac{2^{n+3} - 10 \times 2^{n+1}}{2^{n+1} \times 6}$$

$$= \frac{2^n \times 2^3 - 10 \times 2^n \times 2}{2^{n+1} \times 2 \times 6}$$

$$= \frac{8 - 20}{12} = \frac{-12}{12} = -1$$

16. Ans. b
Explanation:

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

if $x = 1$ $f(x)$ *will be undefined*

$A = R - \{1\}$

17. Ans. c
Explanation:

$$f(x) = {}^xC_2$$
$$= \frac{x(x-1)}{2}$$
$$= \frac{x^2 - x}{2}$$
$$f'(x) = \frac{2x - 1}{2}$$
$$f'(3) = \frac{2 \times 3 - 1}{2} = \frac{5}{2}$$

18. Ans. b
Explanation:

$$\alpha - \beta = \sqrt{(\alpha + \beta)^2 - 4\alpha\beta}$$
$$= \sqrt{(7)^2 - 4(-9)} = \sqrt{85}$$

19. Ans. d
Explanation:

$$x^2 - (sum\ of\ roots)\,x + product\ of\ roots = 0$$
$$x^2 - (2 - \sqrt{3} + 2 + \sqrt{3})\,x + (2 - \sqrt{3})(2 + \sqrt{3}) = 0$$
$$x^2 - 4x + 1 = 0$$

20. Ans. a
Explanation:
a = 5,00,000 , d = 15,000

$$S_n = \frac{n}{2}[2a + (n-1)d]$$
$$= \frac{10}{2}[2 \times 5,00,000 + (10-1)\,15,000]$$
= Rs. 56,75,000

21. Ans. a
Explanation:

No. of ways that can be formed by using the word 'BANANA' = $\frac{6!}{3!2!} = 60$

No. of ways in which two N comes together = $\frac{5!}{3!} = 20$

$\because$ Required No. of ways = 60–20 = 40

22. Ans. b
Explanation:

Standard Deviation (σ) = $\sqrt{\text{Variance}}$
= $\sqrt{100} = 10$
$\because$ Mode = 3 Median – 2 Mean
$29 = (3 \times 23) - 2\,\text{Mean}$
Mean = $(69 - 29)/2 = 20$
$\because$ Coefficient of variation (CV) = $\frac{\sigma}{\bar{X}} \times 100$

$\therefore$ CV = $\frac{10}{20} \times 100 = 50\%$

23. Ans. c
Explanation:
Change in origin does not change S.D. Thus SD is k.

24. Ans. a
Explanation:
X^{-} —— Y
^{+}R —— S^{+} Uncle

25. Ans. a
Explanation:
Z A X C Y B

26. Ans. a
Explanation:
Given that,

$$6300 = P\left(1 + \frac{2R}{100}\right) \text{.....(i)}$$

$$7875 = P\left(1 + \frac{15R}{400}\right) \text{.....(ii)}$$

$$\because T = 3\frac{9}{12} = \frac{15}{4} \text{ years}$$

$$\frac{(ii)}{(i)} \implies \frac{(1 + \frac{15R}{400})}{(1 + \frac{2R}{100})} = \frac{7875}{6300}$$

$$\implies \frac{400 + 15R}{400 + 8R} = \frac{7875 \div 1575}{6300 \div 1575} = \frac{5}{4}$$

$$\implies 4(400 + 15R) = 5(400 + 8R)$$

$$\implies 1600 + 60R = 2000 + 40R$$

$$\implies 60R - 40R = 2000 - 1600$$

$$\implies 20R = 400$$

$$\therefore R = 20\ \%\text{(Ans)}$$

27. Ans. b
Explanation:

$$2{,}00{,}000 = A\left[\frac{(1+5\%)^{20} - 1}{5\%}\right]$$

A = 6048.5 = 6049

28. Ans. c
Explanation:
4 ! x 5 ! = 2880

29. Ans. c
Explanation:
11% = 825
P = 7500

30. Ans. c
Explanation:
P x $((1+5\%)^{20}-1)$ = 1640
P = 16,000

31. Ans. a

Explanation:
$B \cap C = \{5\}$
$A \times (B \cap C) = \{(2, 5), (3, 5)\}$

32. Ans. b
Explanation:
$5{,}000[(1 + 1.5\%)^{20} (1 + 4\%)^{16} - 1] = CI$
CI = 7613.17

33. Ans. a
Explanation:
np = 3 ; npq = 2
Now $3 \times q = 2 \rightarrow Q = 2/3$
And, P = 1-Q = 1-2/3 = 1/3
and, $n \times 1/3 = 3 \rightarrow n = 9$
Now, $\left(\frac{2}{3} + \frac{1}{3}\right)^9$

34. Ans. b
Explanation:
$1000\left[\frac{(1+14\%)^5 - 1}{14\%}\right]$ = Future Value
F.V. = 6610/-

35. Ans. b
Explanation:
$(2^6 - 1) \times (2^4 - 1) = 945$

36. Ans. c
Explanation:
$P_{2000, 2003} = \frac{P_{2003} \times 100}{P_{2000}}$
$= \frac{60 \times 100}{15} = 400\%$

37. Ans. c
Explanation:
$D = P\left(\frac{R}{100}\right)^2$
$768 = P\left(\frac{8}{100}\right)^2$
P = 1,20,000

38. Ans. d
Explanation:

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

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

39. Ans. a
Explanation:

$$CI = P\left(1+\frac{r}{100}\right)^{n} - P$$

$$= 5{,}000\left(1+\frac{4}{100}\right) - 5{,}000$$

$$= 200$$

$$CI = 5{,}000\left(1+\frac{2}{100}\right)^{2} - 5{,}000$$

$$= 202$$

D = 202-200 = Rs. 2

40. Ans. b
Let the sum borrowed be x. Then,

$$\left(\frac{X \times 6 \times 2}{100}\right) + \left(\frac{xX \times 9 \times 3}{100}\right) + \left(\frac{X \times 14 \times 4}{100}\right) = 11{,}400$$

$$\Leftrightarrow \left(\frac{3x}{25} + \frac{27x}{100} + \frac{14x}{25}\right) = 11{,}400 \quad \Leftrightarrow \frac{95x}{100} = 11{,}400 \quad \Leftrightarrow x = \left(\frac{11{,}400 \times 100}{95}\right) = 12{,}000$$

Hence, Sum borrowed Rs.12,000

41. Ans. d
Explanation:
P = 1/8 ; n = 10 ; q = 7/8
P(at least 2) = 1 - P(0) - P(1)

$$= 1 - 10_{c_0}\, p^{0} q^{9} - 10_{c_1}\, p^{1} q^{8}$$

$$= 0.3611$$

42. Ans. a
Explanation:
n = 4 ; p = 1/2 q = 1/2
P(at least 2 H) = P(2) + P(3) + P(4)

$${}^{4}c_{2}\, p^{2} q^{2} + {}^{4}c_{3}\, p^{3} q^{1} + {}^{4}c_{4}\, p^{4} q^{0}$$

43. Ans. d
Explanation:

$$P(7) = \frac{1}{8}$$

44. 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

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

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

47. Ans. b
Explanation:

$$S_\infty = \frac{a}{1-r} = \frac{\sqrt{3}}{1-\frac{1}{3}} = \frac{3\sqrt{3}}{2}$$

48. 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%

49. Ans. b
Explanation :

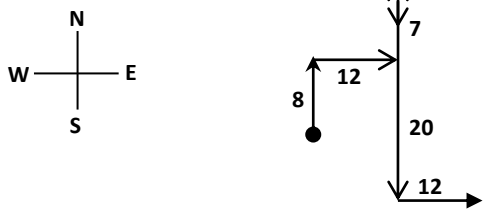
$$\frac{10000 \text{ x } 2 \text{ x } r}{100} + \frac{6000 \text{ x } 3 \text{ x } r}{100} = 1900$$

r= 5%

50. Ans. b
Explanation:
No. of observation = frequency

51. Ans. b
Explanation:
$\log\left(a+\sqrt{a^2+1}\right)+\log\left(a+\sqrt{a^2+1}\right)^{-1}$
$=\log\left(a+\sqrt{a^2+1}\right)-\log\left(a+\sqrt{a^2+1}\right)$
$=0$

52. Ans. b
Explanation:



Correct direction SE
But best option South

53. 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) $= \frac{5}{14}+\frac{6}{14}-\frac{5}{14}\times\frac{6}{14} = \frac{31}{49}$

54. Ans. b
Explanation :

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

$$0.8 = 1 - \frac{6\sum d^2}{990}$$

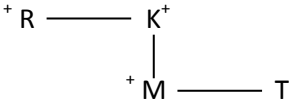
$$\sum d^2 = 33$$

Cor. $\sum d^2 = 33 - (7)^2 + (9)^2 = 65$

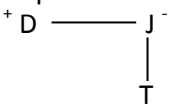
Cor. $r_R = 1 - \frac{6 \times 65}{990}$

=0.61

55. Ans. b
Explanation:



56. Ans. a
Explanation:



57. Ans. a
Explanation:

$$SD = \left|\frac{a}{c}\right| \times \sigma_x = \left|\frac{a}{c}\right| \times \sigma$$

58. 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.

59. Ans. a
Explanation:

$$\int (x^3 + 3^x)\,dx \qquad [e^{\log x} = x]$$

$$\frac{1}{4}x^4 + \frac{3^x}{\log 3} + c$$

60. Ans. b
Explanation:

$$x^{2a-3}y^{2a} = x^{6-a}y^{5a}$$

$$x^{3a-9} = y^{3a}$$

Taking logarithm
(3a-9)log x = 3a logy
3a logx – 3a logy = 9 logx

$$a \log \frac{x}{y} = 3 \log x$$

61. 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

62. Ans. a
Explanation:
HM is the reciprocal of the AM of reciprocal of observations.

$$H.M = \frac{n}{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{n}}$$

63. Ans. c
Explanation:
Suitable form of average in this case is HM because it used for average rate.

64. Ans. a
Explanation:
$Q2 - Q1 \Rightarrow Q3 - Q2$

65. Ans. b
Explanation:

$$D2 = \frac{2(n+1)}{10}th = \frac{n+1}{5}th \quad So\ it\ is\ 20\ th\ Percentile$$

66. Ans. a
Explanation:

10 x 2.5 = 25 and marks of passed is 281-25 Avg. is $= \frac{256}{40} \Rightarrow 6.4$

67. Ans. a
Explanation:

$$\sigma = \sqrt{\frac{\sum(x - \bar{x})^2}{n}}$$

68. Ans. c
Explanation:

1, 2, 3, 4……..n SD is $\sqrt{\frac{n^2 - 1}{12}}$

69. Ans. c
Explanation:
If events are mutually exclusive, then both events cannot occur at the same time.

70. Ans. a
Explanation:
$P(A^1) = 1 - P(A)$

1- 3 / 8
= 5 / 8

71. Ans. a
Explanation:

(2, 3) (3, 2) (1, 4) (4, 1) SO $\frac{4}{36} = \frac{1}{9}$

72. Ans. b
Explanation:

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

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

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

73. Ans. c
Explanation:
$\mu = 0 \quad \sigma = 1$

74. Ans. c
Explanation:
The normal curve is symmetrical

75. Ans. c
Explanation:
Because of the symmetry of Normal distribution the median and the mode have the same value as that of the mean

76. Ans. d
Explanation:
If X & Y are two independent normal variates with means μ_1 & μ_2 and standard deviations σ_1 & σ_2 respectively, then X + Y follows Means = $\mu_1 + \mu_2$, S.D = $\sqrt{\sigma_1^2 + \sigma_2^2}$

77. Ans. d
Explanation:

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

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

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

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

78. 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

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

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

81. Ans. c
Explanation:

$$y = 19 - \frac{5}{2}x$$

$$byx = \frac{-5}{2}$$

82. Ans. b
Explanation:

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

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

83. Ans. b
Explanation:

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

It means worker is in loss.

84. Ans. c
Explanation:
For attributes, rank correlation is the best mehtod.

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

86. Ans. c
Explanation :

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

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

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

$0.5B = 0.01$

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

87. Ans. c
Explanation :
Average age of 10 students = 20 yrs
The sum of age of 10 students = 20 x 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 x 12 = 288
The sum of age of two boys = 288 – 200 = 88
Average age of two boys = $\frac{88}{2}$ = 44

88. Ans. d
Explanation:

$b_{xy} = \frac{2}{7}$; $b_{yx} = \frac{-7}{2}$

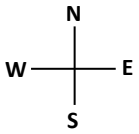
Not Possible

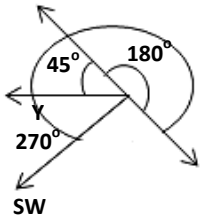
89. Ans. b
Explanation:
Less than ogive & more than Ogive intersect at a point called MEDIAN or we can say second quartile.

90. Ans. a
Explanation:

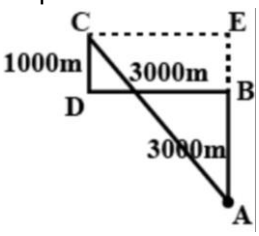
H + 1 = I	Now,	N + 1 = O
E + 1 = F		O + 1 = P
A + 1 = B		R + 1 = S
L + 1 = M		T + 1 = U
T + 1 = U		
H + 1 = I		

91. Ans. a
Explanation:



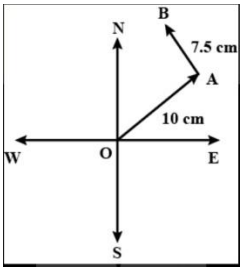


92. Ans. b
Explanation:



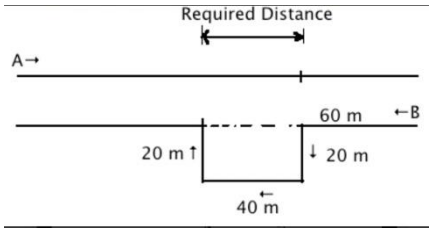
93. Ans. a
Explanation:
The only daughter of woman's father is she herself. So, the person is woman's son, i.e. the woman is the person's mother. Hence, the answer is a.

94. Ans. d
Explanation:

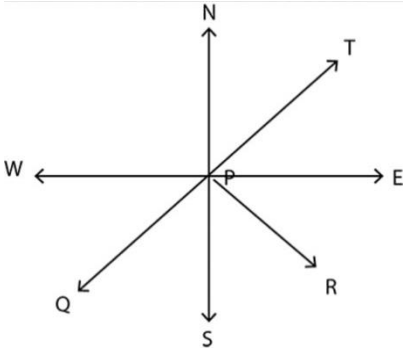


95. Ans. d
Explanation:
CI = 8000 $[(1 + 10\%)^2 (1 + 4\%) = 2067.2 - 1]$
SI = 8000 x $\frac{10}{100} \times \frac{12}{5} = 1920$
Difference CI - SI = 147.2

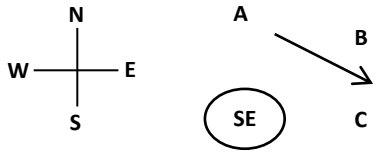
96. Ans. c
Explanation:



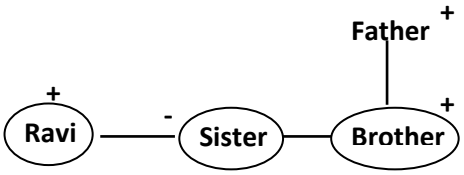
97. Ans. b
Explanation:



98. Ans. b
Explanation:

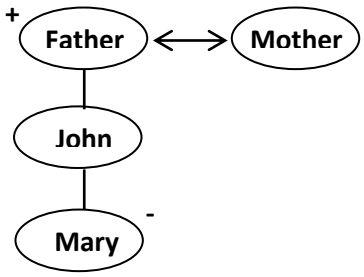


99. Ans. c
Explanation:



Answer- Sister

100. Ans. d
Explanation:



Answer-Daughter

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