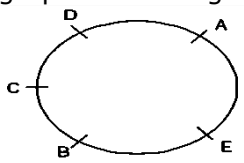
(GCF-1, 3, 4, 5, 6, 7+7A, 8+8A, 9, 12, 13 & 14, VCF-1,2 & 4, ACF-1,2 & 5, JCF-1 & 3, DCF-5,6,7 & 8, Drive-2)

DATE: 08.11.2023 **MAXIMUM MARKS: 100** **TIMING: 2 Hours**

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. Ans. c
Explanation:
byx = -5/2

2. Ans. d
Explanation:
Draw a figure as per given instruction in the question. We can see that according to graph C is facing towards East.



3. Ans. d
Explanation:
The required no. of ways = 4!×3! = 144

4. Ans. c
Explanation:
$(P+Q)x\frac{20}{100} = (P-Q)\,x\frac{50}{100}$
$2P+2Q = 5P-5Q$
$7Q = 3P$
$P:Q = 7:3$

5. 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 $\Rightarrow 10_{C_2} - 7_{C_2} + 1$
$\Rightarrow 25$

6. Ans. c
Explanation:

$$\frac{(243)^{\frac{n}{5}}.3^{2n+1}}{9^n \times 3^{n-1}} = \frac{\left(3^5\right)^{\frac{n}{5}} \times 3^{2n+1}}{\left(3^2\right)^n \times 3^{n-1}} = \frac{3^{\left(5\times\frac{n}{5}\right)} \times 3^{2n+1}}{3^{2n} \times 3^{n-1}} = \frac{3^n \times 3^{2n+1}}{3^{2n} \times 3^{n-1}}$$

Here

$$= \frac{3^{n+(2n+1)}}{3^{2n+n-1}} = \frac{3^{(3n+1)}}{3^{(3n-1)}} = 3^{(3n+1)-(3n-1)} = 3^2 = 9.$$

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7. Ans. c
Explanation:
$\frac{A}{B} X \frac{B}{C} X \frac{C}{D} = \frac{2}{3} X \frac{4}{5} X \frac{5}{8}$
$\frac{A}{D} = \frac{1}{3}$

8. Ans. b
Explanation:
Let third proportial 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:
a:b = b:c
b^2=ac
$a^4:(b^2)^2$
$a^4:(ac)^2$
$a^4:a^2c^2$
$a^2:c^2$

10. Ans. b
Explanation:
$^{n+2}Cr = {}^{n+2}C_{10-r}$
or $n+2 = r+10-r$
or n = 8
then $8_{C_6} = \boxed{28}$

11. Ans. b
Explanation:
By formula
$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$
92% = 42% + 51% + 68% – 30% – 28% – 36% + $n(A \cap B \cap C)$
$n(A \cap B \cap C)$ = 25%

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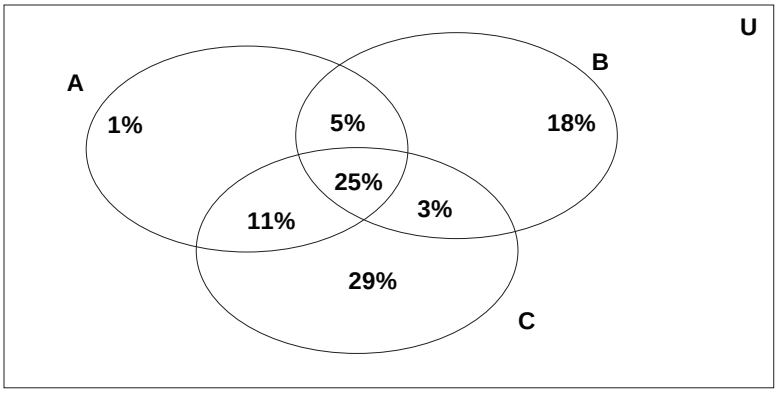

The percentage of persons who read only one paper
= 1% + 18% + 29% = 48%

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

13. 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

14. Ans. a
Explanation:
$n(A-B) = n(A) - n(A \cap B)$
$47 = 115 - n(A \cap B)$
$n(A \cap B) = 68$
$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
= 115 + 326 - 68 = 373

15. Ans. c
Explanation:

Commodity	R	W	RW
I	110	3	330
II	120	3	360

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III	70	1	70
Total		7	760

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

16. 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 $P(B) = \frac{6}{8+6} = \frac{6}{14}$

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

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

18. Ans. c
Explanation:
$np - npq = \frac{5}{9}$
$p = \frac{1}{3}, q = \frac{2}{3}$
Distribution is $\left(\frac{2}{3} + \frac{1}{3}\right)^5$

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

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

21. Ans. c
Explanation:
Change in scale.

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

23. Ans. c
Explanation:
$A = \{1, 2, 3\}$
Subsets of A = Power set of A
$\{\phi, \{1\}, \{2\}, \{3\}, \{1,2\}, \{2, 3\}, \{1, 3\}, \{1,2,3\}\}$

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

25. Ans. c
Explanation:
SI for 5 years = 1020 – 720
= 300
SI for years = $\frac{300}{5}$ x 2
= Rs. 120
Principal = Rs. 720 – Rs. 120
= Rs. 600

26. 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.

27. Ans. d
Explanation:
By options putting the value n = 9
$9c_2 - 9 = 27$

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:

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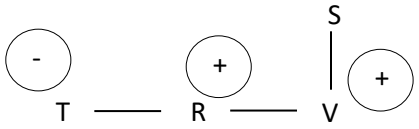
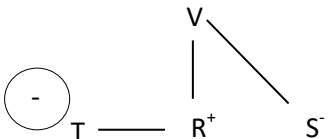
$$x^y = e^{x+y}$$
$$y \log x = x + y$$
$$y = \frac{x}{\log x - 1}$$
$$\frac{dy}{dx} = \frac{\log x - 2}{(\log x - 1)^2}$$

30. Ans. d
Explanation:



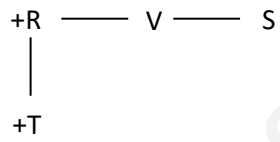
Daughter

31. Ans. b
Explanation:



Sister

32. Ans. a
Explanation:



Aunt

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

34. 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
∴ x = 3 x y = 3 x 15 = 45
Hence the present age of the main is 45 years.

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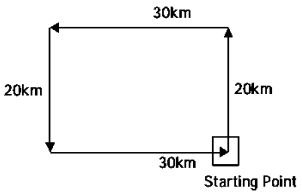
35. Ans. b
Explanation :
Suppose that I am x years old and my son is y years old. Then, according to question,
$x = 3y$ ...(i)
and $x + 5 = \frac{5}{2}(y + 5)$ ...(ii)
from (i) and (ii), $3y + 5 = \frac{5}{2}(y + 5)$
$\Rightarrow 6y + 10 = 5y + 25$
$\Rightarrow$ y = 15
Substituting in (i) gives, $x =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

36. 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.

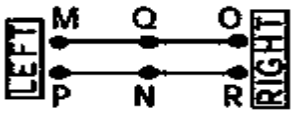
37. Ans. c
Explanation:
156 + 312 =468
468 + 312 = 780
780 + 312 = 1092
Hence 1092 is wrong

38. Ans. b
Explanation:
The correct pattern is x 2 - 2.
So, 48 is wrong and must be replaced by (26 x 2 - 2) i.e. 50.

39. Ans. b
Explanation:
Draw a figure as per given instruction in the question. We can see that according to graph he is driving towards east.



40. 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.



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41. Ans. a
Explanation:

42. 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

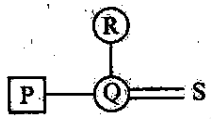
Two people sit between Z and X, X is at 5th place

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

43. Ans. d
Explanation:
Mother in Law



44. 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.

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

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

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47. Ans. c
Explanation:
For Finding correlation between two attributes, we consider spearman's rank correlation coefficient.

48. Ans. a
Explanation:

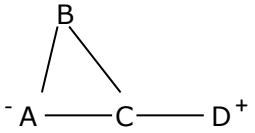
Largest angle = $\frac{32}{90}\times 360 = 128^0$

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

Difference = 60^0

49. Ans. a
Explanation:
AMNESTY = NMAEYTS
BRIGADE = IRBGEDA

50. Ans. c
Explanation:



Brother

51. Ans. d
Explanation:

$P_{01} = \sqrt{\frac{\sum P_1 q_0}{\sum P_0 q_0} x \frac{\sum P_1 q_1}{\sum P_0 q_1}} x100 = 94.88$

52. Ans. d
Explanation:

Using Formula : Real wage = $\frac{\text{Money wage}}{\text{Price Index}}\times 100$

$$\Rightarrow 1680 = \frac{\text{Money Wage}}{\left(\frac{215}{120}\times 100\right)}\times 100$$

$\therefore$ Money Wage = $\frac{215}{120}\times 1680 = 3010$ Rs.

$\therefore$ Loss of worker = 3010 – 3000 = 10 Rs.

53. Ans. c
Explanation:
26

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54. Ans. d
Explanation:
GM cannot be determined is data set have positive and negative observations

55. Ans. a
Explanation:
$\sigma x = 3$
$y = 5 - 2x$
$\sigma y = \frac{2}{1} \times 3 = 6$
$vy = 36$

56. Ans. c
Explanation:
$\sum dx^2 = 250 \qquad n = 10$
$\bar{x} = 50$
$\sigma = \sqrt{\frac{250}{10}} = 5$
$C.V. = \frac{5}{50} \times 100 = 10$

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

58. Ans. d
Explanation:
$np = 3$
$\sqrt{npq} = 1.5$
$3q = 2.25$
$q = \frac{2.25}{3} \qquad q = 0.75,\ p = 0.75$ so n = 12

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59. Ans. c
Explanation:

$$\int \frac{dx}{x^2+2x-3} = \int \frac{dx}{x^2+2x+1-4}$$

$$= \int \frac{dx}{(x^2+1)^2-2^2}$$

$$\therefore \int \frac{dx}{x^2-a^2} = \frac{1}{2a}\log\left(\frac{x-a}{x+a}\right)+c$$

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

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

61. Ans. d
Explanation:

$s_n = \sum n(n+1)$

$s_n = \sum n^2 + \sum n$

$s_n = \frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2}$

$= \frac{n(n+1)(n+2)}{3}$

62. Ans. d
Explanation:

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

$796870 = \frac{R}{0.1}[(1+0.1)^{10} - 1]$

R= 50,000

63. Ans. a
Explanation:

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

A:B:C=2:3:12

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

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64. 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

65. Ans. b
Explanation:
$SI = \frac{prt}{100}$
$\frac{3}{8}P = \frac{p \times r \times 25}{400}$
r = 6%

66. Ans. b
Explanation:
Roots are –3, 1, 2 then
Factors are x + 3, x – 1, x – 2
and equation is (x + 3) (x – 1) (x – 2) = 0
$x^3 - 7x + 6 = 0$

67. Ans. c
Explanation:
Let the total Capital be Rs. X
Then $\left(\frac{X}{3} \times \frac{7}{100} \times 1\right) + \left(\frac{X}{4} \times \frac{8}{100} \times 1\right) + \left(\frac{5X}{12} \times \frac{10}{100} \times 1\right) = 561$
X = 6600

68. Ans. a
Explanation:

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

= $\frac{6000}{0.09}[(1+0.09)^8 - 1]$

= Rs. 66170.84

69. Ans. a
Explanation:

First Time	Second Time
A = 3x	$A = 27x$
P = x	$P = x$
n = 6	n = ?

$\therefore 3x = x\left[1 + \frac{r}{100}\right]^6$

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$$3=\left[1+\frac{r}{100}\right]^6 \qquad 27x=x\left[1+\frac{r}{100}\right]^n$$

$$(3)^3=\left[1+\frac{r}{100}\right]^n$$

$$\left\{\left[1+\frac{r}{100}\right]^6\right\}^3=\left(1+\frac{r}{100}\right)^n$$

$$\left(1+\frac{r}{100}\right)^{18}=\left(1+\frac{r}{100}\right)^n \Rightarrow n=18$$

70. 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

71. Ans. a
Explanation:
If (b+c), (c+a),(a+b) are in A.p.
Then 2(c+a) = b+c+a+b
2b = a+c

72. Ans. a
Explanation:

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

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

73. Ans. b
Explanation:
If lines coincides then the value of r is + - 1.

74. Ans. a
Explanation:
The regression line : $y-\bar{y}=b_{yx}\left(x-\bar{x}\right)$
or $y-8.8=1.24(x-5.5)$
$\Rightarrow y=1.24x+1.98$

75. Ans. c
Explanation:

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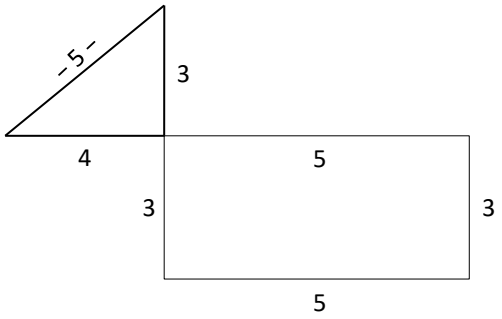
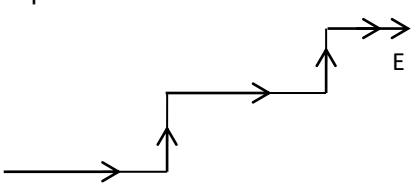
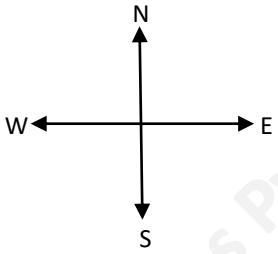


76. Ans. c
Explanation:





77. Ans. a
Explanation:
The colour of a flower is an example of An attribute.

78. Ans. b
Explanation:
The data are known to be Secondary if the data, as being already collected, are used by a different person or agency.

79. Ans. b
Explanation:
Mutually exclusive classification is usually meant for a continuous variable

80. Ans. c
Explanation:

0-10	15	
10-20	23	
20-30	27	SO=19+16=35
30-40	19	
40-50	16	

81. Ans. a
Explanation:

$$\bar{x} = A + \frac{\sum dx}{n}$$

82. Ans. c
Explanation:

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$$New\,Mean = \frac{\bar{x}}{\alpha} \qquad New\,Mean = \frac{\bar{x}}{\alpha} + 10$$

83. Ans. d
Explanation:

$$25000 = \frac{n_1 \times 27000 + n_2 \times 17000}{n_1 + n_2} \qquad SO \;\; n_1 = 80\% \quad n_2 = 20\%$$

84. Ans. a
Explanation:

$$\frac{15+25}{2} = 20 \quad SD = \frac{range}{2} = \frac{10}{2} = 5$$

85. Ans. a
Explanation:
52, 56, 68, 70, 75, 80, 82
Median = 70

X	|X-M|
52	18
56	14
68	2
70	0
75	5
80	10
82	12
	61

$$M\,D = \frac{61}{7} = 8.71428$$

$$MD\,Coefficient = \frac{8.71428}{70} \times 100$$

86. Ans. b
Explanation:
40 x 100 = 4000-50+40 = $\frac{3990}{100}$ = 39.90

$\bar{x}$ =39.90

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

$$5.1 = \sqrt{\frac{\sum x^2}{100} - 1600}$$

Ex^2 = 162601-2500+1600 = 161701

$$\sigma = \sqrt{\frac{161701}{100} - 1592.01}$$

$$\sigma = 5$$

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87. Ans. a
Explanation:

$A=\frac{2}{5}$ $A'=\frac{3}{5}$ $B=\frac{7}{10}$ $B'=\frac{3}{10}$

$AB' + BA'$

$\frac{2}{5}\times\frac{3}{10}+7/10\times\frac{3}{5}$ SO $\frac{6}{50}+\frac{21}{50}=\frac{27}{50}$

88. Ans. a
Explanation:

$\frac{13}{52}\times\frac{12}{51}=\frac{1}{17}$

89. Ans. c
Explanation:

$\frac{5c_2}{7c_2}=\frac{10}{21}$

90. Ans. c
Explanation:
P=2
P=2(1-P)
P=2-2P
3P=2
P=2/3

q= $\frac{1}{3}$

$^{5}C_{3}\left(\frac{2}{3}\right)^{3}\left(\frac{1}{3}\right)^{2}$

$=\frac{80}{243}$

91. Ans. a
Explanation:

$A=\frac{1}{5}$ $A'=\frac{4}{5}$

92. Ans. b
Explanation:

$4_{C_0}\ p^0q^4=\frac{16}{81}$

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

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$$4_{C_4}\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^0=\frac{1}{81}$$

93. Ans. d
Explanation:

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

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

94. Ans. b
Explanation:
Here, we have an A.P. with a = 3,00,000 d= 10,000
And n = 20
Using the sum formula , we get,

$S_{20}=\frac{20}{2}=[6{,}00{,}000+19X10{,}000]$

= 79,00,000

95. Ans. b
Explanation:

a=3 , r= $\frac{1}{2}$

$s_n=\frac{a(1-r^n)}{1-r}$

$$\frac{3069}{512}=\frac{3[1-\frac{1}{2^n}]}{1-\frac{1}{2}}$$

$$\frac{3069}{3072}=1-\frac{1}{2^n}$$

$$\frac{1}{2^n}=\frac{1}{1024}$$

n= 10

96. Ans. c
Explanation:

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

$$\frac{25}{16}P=P(1+\frac{r}{100})^2$$

$$\left(\frac{5}{4}\right)^2=(1+\frac{r}{100})^2$$

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$$\frac{5}{4} = 1 + \frac{r}{100}$$

r = 25%

97. Ans. d
Explanation:
first part = x , second part = 2600-x

$$\frac{x \times 3 \times 5}{100} = \frac{(2600 - x) \times 6 \times 4}{100}$$

15x = 62,400-24x
39x = 62,400
X = 1,600
Second part = 2,600 – 1,600
= Rs. 1,000

98. Ans. c
Explanation:

$$A = P(1 + \frac{5}{100})^{n}$$

$$A = P\left(\frac{21}{20}\right)^{n}$$

$$\frac{P}{A} = \left(\frac{20}{21}\right)^{n}$$

99. Ans. a
Explanation:

$$\log_t^a + \log_t^b + \log_t^c = \log_t^z$$

$$\log_t^{(abc))} = \log_t^z$$

Z =abc

100. Ans. a
Explanation:

Present value of growing property = $\frac{R}{i - g}$

$$= \frac{60}{0.07 - 0.05} = 3000$$

__**__

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