(GCF-19, GCF-20, GCF-21, VCF-4, SCF-6 & SCF-7)

DATE: 07.07.2020 **MAXIMUM MARKS: 100** **TIMING: 3¼ Hours**

MATHS, STATS & REASONING

All Questions is compulsory.

1. Ans. b
Explanation:
f(x) = $x^2 - 4x$
F(x) = $A^2 - 4A$
$= \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} - 4\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$
$= \begin{bmatrix} 7 & 18 \\ 6 & 19 \end{bmatrix} - \begin{bmatrix} 8 & 12 \\ 4 & 16 \end{bmatrix}$
$= \begin{bmatrix} -1 & 6 \\ 2 & 3 \end{bmatrix}$

2. Ans. c
Explanation:
$A^T = A$
$\begin{bmatrix} 5 & b & 4 \\ 2 & c & d \\ a & -3 & -7 \end{bmatrix} = \begin{bmatrix} 5 & 2 & a \\ b & c & -3 \\ 4 & b & -7 \end{bmatrix}$
a = 4, b = 2

3. Ans. a
Explanation:
$A^1 = \frac{1}{|A|}$ adj A
$= \frac{1}{(6-5)}\begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$
$= \begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$

4. Ans. c
Explanation:
$x\left(1+\frac{5\times 2}{100}\right) = 4\left(1+\frac{3\times 5}{100}\right) = 2\left(1+\frac{4\times 5}{100}\right)$
$22x = 23y = 24z$
$x : y : z = 552 : 528 : 506$
A = $\frac{552}{1586}\times 7930$
= 2760

5. Ans. a

6. Ans. b

7. Ans. c

8. Ans. b

9. Ans. d
Explanation:
$\frac{x-1}{x} = 3$
x-1 = 3x
2x = -1
$x = \frac{-1}{2}$
$1+\frac{1}{x^2} = 1 + 4 = 5$

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

11. Ans. d
Explanation:
$E = \left[\left(1+\frac{r}{100}\right)^n -1\right]\times 100$

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

12. Ans. a

13. Ans. b

14. Ans. d

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

672 = P $\left(1+\frac{r}{100}\right)^2$ ..... (i)

714 = P $\left(1+\frac{r}{100}\right)^3$ ..... (ii)

$\frac{equation\,(ii)}{equation\,(i)}$ $\quad 1.0625=1+\frac{r}{100}$

$r=6.25\%$

16. 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

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

$\left(\frac{X\times6\times2}{100}\right)+\left(\frac{xX\times9\times3}{100}\right)+\left(\frac{X\times14\times4}{100}\right)=11{,}400$

$\Leftrightarrow\left(\frac{3x}{25}+\frac{27x}{100}+\frac{14x}{25}\right)=11{,}400\Leftrightarrow\frac{95x}{100}=11{,}400\Leftrightarrow x=\left(\frac{11{,}400\times100}{95}\right)=12{,}000$

Hence, Sum borrowed Rs.12,000

18. Ans. c

19. Ans. b

20. Ans. a

21. Ans. a

22. Ans. b

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

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

Hence, the sum is Rs. 800.

24. Ans. c
Let the sum be Rs. x. Then,

$$\text{C.L.} = \left[X \times \left(1 + \frac{50}{3 \times 100} \right)^3 - X \right] = \left(\frac{343x}{216} - X \right) = \frac{127x}{216.}$$

$$\therefore \quad \frac{127X}{216} = 1,270 \text{ or } X = \frac{1,270 \times 216}{127} = 2,160.$$

Thus, the sum is Rs. 2,160.

$$\therefore \quad \text{S.L.} = \text{Rs.} \left(2,160 \times \frac{50}{3} \times 3 \times \frac{1}{100} \right) = \text{Rs.} 1,080.$$

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

26. 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

27. Ans. b

28. Ans. b

29. Ans. c

30. Ans. c
Explanation:
Present value of growing property = $\frac{R}{i - g}$

$$= \frac{80}{0.07 - 0.05} = 4000$$

31. Ans. b
Explanation:
$^{n+2}C_r = {}^{n+2}C_{10-r}$
or $n + 2 = r + 10 - r$
or n = 8
then $^{8}C_{6} = \boxed{28}$

32. Ans. a

$$\log_5^{1024}$$

$$= \frac{\log^{1024}}{\log_5}$$

$$= \frac{10\log^2}{\log_5}$$

$$= \frac{10\log^2}{\log_{10} - \log_2} = \frac{10 \times 0.3010}{1 - 0.3010}$$

33. Ans. b
Mean Proportion

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

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

34. Ans. d

35. Ans. a

36. Ans. d

37. Ans. c

38. Ans. c

39. Ans. b

40. Ans. c

41. Ans. c

42. Ans. c
Explanation:

$$\int \frac{8^{1+x} + 4^{1-x}}{2^x} dx$$

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

$$= \int (2^{2x+3} + 2^{2-3x}) dx$$

$$= \frac{2^{2x+3}}{2\log 2} + \frac{2^{2-3x}}{(-3)\log 2} + C$$

$$= \frac{2^{2x+3}}{2\log 2} - \frac{2^{2-3x}}{3\log 2} + c$$

43. Ans. b
Let the three consecutives
Multiples of 13 is
13x, 13x+13, 13x+26
13x + 13x + 13 + 13x + 26 = 390
39x + 39 = 390
39x = 351
x = 9
Second Multiple of 13 = 13x + 13
= 13x9 + 13
= 130

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:
Total line can be made by 10_{C_2}
and 7_{C_2} lines could not be drawn because points are collinear
So Remaining $\Rightarrow 10_{C_2} - 7_{C_2} + 1$
$\Rightarrow 25$

46. Ans. a
Explanation :
$f(x) = (x-1)^3 + 2$ (bijection function)
Let $(x-1)^3 + 2 = y$
$(x-1)^3 = y-2$
$x = (y-2)^{1/3} + 1$
So $f^{-1} = (x-2)^{1/3} + 1$

47. Ans. a
Explanation:
$2x^2 + 5xy + 3y^2 = 1$
$$4x + 5x\frac{dy}{dx} + 5y + 6y\frac{dy}{dx} = 0$$
$$\frac{dy}{dx} = \frac{-4x-5y}{5x+6y}$$

48. Ans. a

49. Ans. a

50. Ans. d

51. Ans. b

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

53. Ans. c
Explanation:
The no. of ways $= {}^4P_3 \times 4!$
$= 24 \times 24 = 576$

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

55. Ans. b

56. Ans. c

57. Ans. b

58. Ans. c
Explanation:
a=132 , l = 468
l = a +(n-1)d
468 = 132 + (n-1)(12)
n =29
$S_n = \frac{n}{2}(a + l)$
$S_{29} = \frac{29}{2}(132 + 468) = 8700$

59. Ans. c

60. Ans. a

61. Ans. b

62. Ans. a
Explanation:
Scrap Value = $P(1 - \frac{r}{100})^n$
$21,870 = P\ (.9)^3$
P = Rs. 30,000

63. Ans. c
Explanation:
$S\infty = \frac{a}{1-r}$
$a = 2, b = \frac{6}{5}$
$ab = \frac{12}{5}$

64. Ans. a

65. Ans. a

66. Ans. a

67. Ans. a

68. Ans. c

69. Ans. d

70. Ans. a

71. Ans. d

72. Ans. b

73. Ans. b

74. Ans. b

75. Ans. c

76. Ans. c

77. Ans. d

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

79. Ans. a
Explanation:

$$\frac{dx}{dt} = \frac{1}{t} \text{ and } \frac{dy}{dt} = -\frac{1}{t^2}$$

$$\Rightarrow \frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{-\frac{1}{t^2}}{\frac{1}{t}} = -\frac{1}{t}$$

$$= -y$$

Differentiating w.r.t. x

$$\frac{d^2y}{dx^2} = -\frac{dy}{dx}$$

$$\Rightarrow \frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$$

80. Ans. c
Explanation:
$A^T=-A$
$|A^T|=|-A|$
$|A|=-|A|$
$|A|+|A|=0$
$2|A|=0$
$|A|=0$

81. Ans. b
Explanation:
$-2x+3y \geq 6$ Cuts on X axis (−3, 0)
Y axis (0, 2)
and y is more than x so option (B) is Correct.

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

83. Ans. b
Explanation:
$A = \frac{R}{r}[(1+r)^n - 1]$
$400000 = \frac{R}{0.10}[(1+0.10)^{10} - 1]$
R = Rs. 25098.16

84. Ans. c
Explanation:
fog (x) = f[g(x)]
= $f(x^2+7)$
$fog(x) = 2(x^2+7) + 7$
$fog(x) = 2x^2+21$
$\Rightarrow 2x^2 + 21 = 25$
$x^2 = 2$

$x = \pm\sqrt{2}$

85. Ans. d

86. Ans. c

87. Ans. a

88. Ans. c

89. Ans. a

90. Ans. d
Explanation:
$r = -3$

$S_\infty = \frac{a}{1-r}, -1 < r < 1$

91. Ans. d
Explanation:

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

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

P = 0.83

92. Ans. a
Explanation:
One root = $\propto$
Other root = $\propto$

Sum = $4\propto = \frac{-b}{a}$

$\propto = \frac{-b}{4a}$

Product = $3\propto^2 = \frac{c}{a}$

$\propto^2 = \frac{c}{3a}$

$\frac{b^2}{16a^2} = \frac{c}{3a}$

$3b^2 = 16ac$

93. Ans. c

94. Ans. d

95. Ans. d

96. Ans. b

97. Ans. d
Explanation:
$E(x-\mu)^2$ and $E[x-E(x)]^2$ both are variance.

98. Ans. c
Explanation:

$$P(A \cap B) = 1 - \frac{5}{6} = \frac{4}{6}$$

$$P(B) = 1 - \frac{2}{3} = \frac{1}{3}$$

$$P(A \cup B) = \frac{1}{2} + \frac{1}{3} - \frac{4}{6} = \frac{2}{3}$$

99. Ans. a
Explanation:

$$5x + 7y - 22 = 0$$

$$6x + 2y - 22 = 0$$

$$r = \sqrt{\frac{10}{42}}$$

$$byx = \frac{-5}{7}$$

$$bxy = -\frac{2}{6} \qquad -\frac{5}{7} = -\frac{\sqrt{\frac{10}{42}} \times \sqrt{15}}{\sigma x} \qquad \sigma x = 2.64\ 6$$

100. Ans. b

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