## I. Choose The Correct Answer: WWW.MATHSTIMES.COM   15X1=15

1. Given $f(x) = (-1)^x$ is a function form N to Z. Then the range of f is
    A) {1}   B) Z   C) N   D) {1,-1}

2. Which one of the following is not true?
   A) Every function represents a sequence   B) A sequence may have infinitely many terms
   C) A sequence is a real valued function defined on N   D) A sequence may have a finite number of terms

3. The common ratio of the G.P a^{m-n}, a^m, a^{m+n} is
    A) a^n B) a^m C) a^{-n} D) a^{-m}

4. The system of equation x – 4y = 8, 3x – 12y = 24
   A) has no solution   B) has a unique solution   C) has infinitely many solution
   D) may or may not have a solution

5. The lowest form of the rational expansion $\dfrac{x^3-27}{x^2-9}$
    A) x-3   B) x+3   C) $\dfrac{x^2+3x+9}{x+3}$ D) $\dfrac{x+3}{x^2-3x+9}$

6. $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$, then find the value of a, b, c, d are
    A) -1, 0, 0, -1   B) 1, 0, 0, 1   C) -1, 0, 1, 0   D) 1, 0, 0, 1

7. Area of the quadrilateral formed by the points (1, 1), (0, 1), (0, 0) and (1, 0) is
    A) 4 Sq.units   B) 2 Sq.units   C) 1 Sq.units   D) 8 Sq.units

8. The equation of the straight line passing through the origin and perpendicular to the straight line 2x + 3y − 7 = 0 is
    A) y + 5 = 0   B) 2x + 3y = 0   C) 3x − 2y = 0   D) y − 5 = 0

9. In the figure, PA and PB are tangents to the circle drawn from an external point P. Also CD is a
   tangent to the circle at Q. If PA = 8cm and CQ = 3cm, then PC is equal to
    A) 5cm   B) 38cm   C) 11cm   D) 24cm

10. The perimeter of two similar triangles are 24cm and 18cm respectively. If one side of the first triangle is
     8cm, then the corresponding side of the other triangle is
    A) 4cm   B) 3cm   C) 9cm   D) 6cm

11. $9\tan^2\theta - 9\sec^2\theta =$
    A) 1   B) 0   C) 9   D) -9

12. If x=a secθ, y=b tanθ, then the value of $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} =$
    A) 1   B) -1   C) $\tan^2\theta$ D) $\csc^2\theta$

13. Two right circular cones have equal radius. If their slant heights are the ratio 4:3, then their
     respective C.S.A are in the ratio
    A) 4:3   B) 8:6   C) 3:4   D) 16:9

14. Standard deviation of a collection of data is $2\sqrt{2}$. If each is multiplied by 3, then the standard deviation of the new data is
    A) $6\sqrt{2}$ B) $4\sqrt{2}$ C) $9\sqrt{2}$ D) $\sqrt{12}$

15. The probability that a student will score centum in mathematics is 4/5. The probability that he
     will not score centum is
    A) 2/5   B) 1/5   C) 4/5   D) 3/5
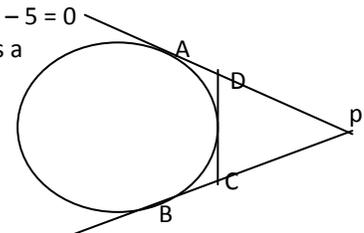
II. Answer any 9 out of 14 (Q.NO:16 to 29) and 30th question is compulsory: 10X2 = 20

16. If x = {10, 11, 12, 13, 14}, Y = {0, 1, 2, 3, 5} determine which of the following relations from X and Y are functioning?
It's function State its type. (Give reason)
   i)f_2={(10,0)(11,0)(12,1)(13,1)(14,2)}
   ii)f_3={(10,0)(11,1)(12,2)(13,3)(14,5)}

17. For A = { x/x is a prime factor of 42 }, B = { x/5< x ≤12,x£N } and C = { 1,4,5,6 }, verify A $\cup$ (B $\cup$ C) = (A $\cup$ B) $\cup$ C.

18. Which term of the A.P.3, 10, 17, ... will be 84 more than its 13th term.

19. Find the value of k for which the roots are real and equal in the following equation $12x^2 + 4kx + 3 = 0$.

20. Find the square root of $x^6 + \dfrac{1}{x^6} - 2$

21. Construct 2 x 3 matrix A = $[a_{ij}] = \dfrac{(i - 2j)^2}{2}$

22. Solve $\begin{bmatrix} y \\ 3x \end{bmatrix} = \begin{bmatrix} 6-2x \\ 31+4y \end{bmatrix}$

23. The centre of a circle is at (-6, 4). If one end of a diameter of the circle is at the origin, then find the other end.

24. Find the slope and y-intercept of the line whose equation is 10x + 15y + 6 = 0

25. AB and CD are two chords of a circle which intersect each other externally at P if AB = 4cm, BP = 5cm and PD = 3cm, then find CD.

26. Prove that $\dfrac{1 + \cos\theta - \sin^2\theta}{\sin\theta (1 + \cos\theta)} = \cot\theta$

27. Find the angular elevation (angle of elevation from the ground level) of the sun when the length of the shadow of a 30 m long pole is $10\sqrt{3}$.

28. The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of the surface area of the moon to that of the earth.

29. A group of 100 candidates have their average height 163.8 cm with coefficient of variation 3.2. what is the S.D of their heights?

30. a) Volume of a hollow sphere is $\dfrac{11352}{7}$ cm^3. If the outer radius is 8cm, find the inner radius of the sphere. (Take π = 22/7)

(OR)

b) Find the probability that a leap year selected at random will have only 52 Fridays.

III. Answer any 8 out of 14 (Q.NO:31 to 44) and 45th question is compulsory: 9X5 = 45

31. An advertising agency finds that, of its 170 clients, 115 use television, 110 use radio and 130 use magazines. Also, 85 use television and magazines, 75 use television and radio, 95 use radio and magazines, 70 use all the three. Find
    i) How many do not use any of the three?   ii) How many use two types only?
    iii) How many use television and magazine but not radio? iv) How many use television but not magazine?

32. Let A = {5, 6, 7, 8}; B = {-11, 4, 7, -10, -7, -9, -13} and f = {(x, y): y= 3-2x, x∈A, y∈B}
    i) Write down the elements of f.   ii) What is the co-domain?
    iii) What is the range?   Iv) Identify the type of function.

33. Find the sum to n terms of the series 7+77+777+…

34. Find the total area of 12 squares whose sides are 12cm, 13cm, 14cm . . . . 23cm respectively.

35. The sum of the ages of two friends is 20 yrs, 4 yrs ago, the product of their ages was 48 yrs. Is the situation possible? If so, determine their present ages.

36. If $ax^4 - bx^3 + 40x^2 + 24x +36$ is a perfect square, then find the value of 'a' and 'b'.

37. Find X and Y if 2X + 3Y = $\begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$ and 3X + 2Y = $\begin{bmatrix} 2 & -2 \\ -1 & 5 \end{bmatrix}$

38. In an isosceles $\triangle$PQR PQ=PR. The base QR lies on the x-axis, P lies on the y-axis and 2x − 3y + 9 = 0 is the equation of PQ. Find the equation of the straight line along PR.

39. Do the points (3, 2), (-2, -3) and (2, 3) form a triangle? If so, name the type of triangle formed.

40. ABCD is a quadrilateral with AB = AD. If AE and AF are internal bisectors of $\angle$BAC and $\angle$DAC respectively, then prove that EF II BD.

41. From the top and foot of a 40m high tower, the angles of elevation of the top of a light house are found to be 30° and 60° respectively. Find the height of the light house. Also find the distance of the top of the light house from the foot of the tower.

42. The external surface area of a hollow cylinder is 540πcm^2. Its internal diameter is 16cm and height is 15cm. Find the T.S.A.

43. Spherical shaped marbles of diameter 1.4cm each, are dropped into a cylindrical beaker of diameter 7cm containing some water. Find the number of marbles that should be dropped into the beaker so that the water level rises by 5.6cm.

44. A die is thrown twice. Find the probability that at least one of the two throws comes up with the number 5. (use addition theorem).

45. a) Find the G.C.D of the following polynomials $3x^4 + 6x^3 - 12x^2 - 24x$ and $4x^4 + 14x^3 + 8x^2 - 8x$.

(OR)

b) Prove that the standard deviation of the first n natural numbers is square root of $\dfrac{n^2 - 1}{12}$

IV. Answer any one of the following: 10 X 1 =10

46. a) Draw a circle of radius 4.2 cm, and take any point of the circle. Draw the tangent at that point using the centre.

(OR)

b) Construct a cyclic quadrilateral ABCD with AB=7cm, $\angle$A=80°, AD=4.5cm and BC=5cm.

V) Answer any one of the following: 10x1 =10

47. a) Draw the graph of $y = 2x^2 + x - 6$ and hence solve $2x^2 + x - 10 = 0$.

(OR)

b) A bank gives 10% S.I on deposits for senior citizens. Draw the graph for the relation between the Sum deposited and the interest earned for one year. Hence find
    (i) The interest on the deposit of Rs.650   (ii) The amount to be deposited to earn an interest of Rs.45