



# INDIAN SCHOOL DARSAIT DEPARTMENT OF MATHEMATICS



Subject : Mathematics      Topic : Revision      Date of Worksheet :8/6/2017

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Name of the Student : \_\_\_\_\_ Class & Division : XI      Roll Number : \_\_\_\_

S.NO	Questions	Marks
1.	<p>If <math>A = \{x : x \text{ is a natural number}\}</math>  <math>B = \{x : x \text{ is an even natural number}\}</math>  <math>C = \{x : x \text{ is an odd natural number}\}</math>  <math>D = \{x : x \text{ is a prime number}\}</math>                      Find i) <math>A \cap B</math>      ii) <math>C \cap D</math>.</p>	1
2.	<p>Are the following pair of sets equal  <math>A = \{2, 3\}</math>,    <math>B = \{x : x \text{ is solution of } x^2 + 5x + 6 = 0\}</math></p>	1
3.	<p>In a survey of 25 students it was found that 15 had taken Mathematics, 12 had taken Physics and 11 had taken Chemistry, 15 had taken Chemistry and Mathematics, 9 had taken mathematics and physics, 4 had taken Physics and Chemistry and 3 had taken all the three subjects.                      Find the number of Students who had taken:                      (a) Only Chemistry                      (b) Only Mathematics                      (c) Only one of the Subjects.                      (d)</p>	4
4.	<p>Write the set <math>\left\{\frac{1}{3}, \frac{3}{5}, \frac{5}{7}, \frac{7}{9}, \frac{9}{11}, \frac{11}{13}\right\}</math> in set builder form.</p>	1
5.	<p>If <math>U = \{1, 2, 3, 4, 5, 6, 7\}</math>, <math>A = \{2, 4, 6\}</math> and <math>B = \{3, 5\}</math> and <math>C = \{1, 2, 4, 7\}</math> determine the following sets;                      i) <math>A \cup (B \cap C)</math>      ii) <math>(B - A) \cup (A - C)</math>                      ii)</p>	4
6.	<p>In a town of 10000 families, it was found that 40% families buy newspaper A, 20% families buy newspaper B, 10% families buy newspaper C, 5% families buy newspaper A and B, 3% families buy newspaper B and C and 4% families buy newspaper A and C. If 2% families buy all the three newspapers. Determine the number of families which buy                      i) Newspaper A only                      ii) B only                      iii) A and B but not C                      iv) None A, B and C.</p>	6
7.	<p>Draw a Venn – diagram to represent the sets <math>A - B</math> and <math>B - A</math>.</p>	1



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8. Prove by the principle of Mathematical Induction that  
 $1.2 + 2.3 + 3.4 + \dots = n(n+1) = \frac{n(n+1)(n+2)}{3}$  4
9. Using Principle of Mathematical Induction prove that:  
 $1.3 + 2.4 + 3.5 + \dots = n(n+2) = \frac{n(n+1)(2n+7)}{6}$  3
10. Prove by Induction that the sum  $S_n = n^3 + 3n^2 + 5n + 3$  is divisible by 3 for all  $n \in \mathbb{N}$  4
11. By using Principle of Mathematical Induction prove the following for all  $n \in \mathbb{N}$ : 4  

$$1 + \frac{1}{1+2} + \frac{1}{1+2+3} + \frac{1}{1+2+3+4} + \dots + \frac{1}{1+2+3+4+\dots+n} = \frac{2n}{n+1}$$
12. By using Principle of Mathematical Induction prove the following for all  $n \in \mathbb{N}$ : 6  

$$\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \dots + \frac{1}{(3n-2)(3n+1)} = \frac{3}{3n+1}$$
13. Prove the following by the principle of mathematical induction: 6  

$$\frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \dots + \frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1} \quad \forall n \in \mathbb{N}$$
14. Prove by the principle of Mathematical Induction that  $x^{2n} - y^{2n}$  is divisible by  $x + y$  4
15. Evaluate  $\sin \left[ -\frac{11\pi}{3} \right]$  6
16. Find the degree measure of the angle subtended at the centre of a circle of radius 100cm by an arc of length 22cm. (use  $f = 22/7$ ) (Express the answer in degree and minutes). 6
17. If  $\tan x = \frac{-5}{12}$ ,  $x$  lies in the second quadrant; find  $\sec x$ . 1
18. Find the values of  $\cos \theta$  and  $\tan \theta$ , if  $\sin \theta = \frac{-3}{5}$  and  $\pi < \theta < \frac{3\pi}{2}$  1
19. Prove that  $\sin(-420^\circ) + \cos(-660^\circ) \sin(330^\circ) = -1$  4
20. If A, B, C are in A.P, then prove that  $\frac{\sin A - \sin C}{\cos C - \cos A} = \cot B$  4
21. If  $\tan x = \frac{3}{4}$ ,  $\pi < x < \frac{3\pi}{2}$ , find the value of  $\sin \frac{x}{2}$ ,  $\cos \frac{x}{2}$  and  $\tan \frac{x}{2}$  3
22. Prove that  $\cos^2 x + \cos^2 \left( x + \frac{2\pi}{3} \right) = \frac{3}{2}$  3



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23. Prove that i)  $\tan 4x = \frac{4 \tan x (1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$  3
24.  $(\cos \theta + \cos \phi)^2 + (\sin \theta - \sin \phi)^2 = 4 \cos^2 \frac{\theta + \phi}{2}$  3
25. Find the principal solutions of the equation  $2 \sin^2 \theta = 3 \cos \theta$  4
26. Find the slope and y – intercept of the line whose equation is  $2x + 4y - 7 = 0$ . 1
27. Find the equations of the straight lines passing through the point (3, 2) which makes an angle  $45^\circ$  with the line  $x - 2y = 3$ . 6
28. Find the value of k for which the line  $(k - 3)x - (4 - k^2)y + k^2 - 7k + 6 = 0$  is parallel to the y-axis. 1
29. Find the distance between the parallel lines  $3x - 4y + 7 = 0$  and  $3x - 4y + 5 = 0$ . 1
30. i) Find the value of x for which the points ( x , 1), ( 2 , 1) and ( 4,5) are collinear. 4  
ii) Find the point on the x – axis, which is equidistant from the points ( 7 , 6) and ( 3 , 4).
31. Find the equation of a line drawn perpendicular to the line  $\frac{x}{4} + \frac{y}{5} = 1$  through the point where it meets y – axis. 4
32. Find the distance of the point (2 , 3) from the line  $2x - 3y + 9 = 0$  measured along a line  $x - y + 1 = 0$ . 4
33. In triangle ABC with vertices A (1 , 2), b (4 , 5) and C (0 , -3). Find the equation of the perpendicular from A to BC. 4
34. Find the equation of the lines through the point (3 , 2) which makes an angle of  $45^\circ$  with the line  $x - 2y = 3$ . 4
35. Find the distance of the point (2 , 3) from the line  $2x - 3y + 9 = 0$  measured along a line  $x - y + 1 = 0$ . 4
36. In triangle ABC with vertices A ( 1 , 2), B (4 , 5), C (0 , -3). Find the equation of the perpendicular from A to BC. 4
37. If p and q are the lengths of perpendiculars from the origin to the lines  $x \cos \theta - y \sin \theta = k \cos 2 \theta$  and  $x \sec \theta + y \operatorname{cosec} \theta = k$  respectively, prove that  $p^2 + 4q^2 = k^2$ . 6



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- 38 Find the image of the point (3 , 8) with respect to the line  $x + 3y = 7$  assuming the line to be a plane mirror. 6
- 39 Determine the point in XY plane which is equidistant from three points A(2 , 0, 3), b (0 , 3 , 2) and C (0, 0, 1). 4
- 40 Find the ratio in which the line segment joining the points (1, 2, 3) and (-3, 4, 5) is divided by xy plane. Also find the coordinate of the point of division. 4
- 41 The centroid of a triangle with vertices (-2, 1, 3), (-2, a, -5) and (4 , 7, b) is origin. Find value of a and b. 1
- 42 The vertices of a triangle are A (0, 7, 10), B (-1, 6, 6) and C(-4, 9, 6). Show that ABC is an isosceles right angled triangle. 1
- 43 Write the domain and range of signum function 1
- 44 Determine the domain and range  
a)  $f(x)=\sqrt{16-x^2}$       b)  $f(x) = -|x|$  4
- 45 A relation R is defined on the set Z of integers as follows:  
 $(x,y) \in R$  if and only if  $x^2 + y^2 = 25$   
Express R as set of ordered pairs and hence find the domain. 1
- 46 Let  $A = \{x, y, z\}$  and  $B = \{1, 2\}$ . Find the number of relations from A to B. 1
- 47 If  $f(x) = x^2 + x - 1$  and  $g(x) = 4x - 7$  be real valued functions then find:  
 $(f+g)(2), (f-g)(7), fg(-5)$  and  $f/g(4)$  4
- 48 Solve  $5x - 3 < 3x + 1$  when x is a real number 1
- 49 Solve the following system of inequalities graphically:  
 $x + 2y \leq 8, x + y \geq 4, x - y \leq 0, x \geq 0, y \geq 0$  6
- 50 Solve graphically:  
 $3x + 2y \leq 150, x + 4y \leq 80, x \leq 15, x \geq 0$  6