INDIAN SCHOOL AL WADI AL KABIR

MATHEMATICS (CLASS XI)

HOLIDAY HOMEWORK **Dt. 13th Dec'15**

QUESTIONS

1. If $S_n = n^2 p$ and $S_m = m^2 p, m \neq n$, in A.P., prove that $S_p = p^3$.

2. The sum of three numbers which are consecutive terms of an A.P. is 21. If the second number is reduced by 1 and the third is increased by 1, we obtain three consecutive terms of a G.P. Find the numbers.

3. The sum of three numbers a, b, c in A.P. is 18. If a and b are each increased by 4 and c increased by 36, the new numbers form a G.P. Find a, b, c.

4. If a, b, c are in G.P., then prove that : $\frac{a^2 + ab + b^2}{bc + ca + ab} = \frac{b + a}{c + b}$.

5. Find the sum the series to n terms : $3 + 5 + 9 + 15 + 23 + ...$

6. Prove that the lines $2x + 3y = 19$ and $2x + 3y + 7 = 0$ are equidistant from the line $2x + 3y = 6$.

7. If the lines $y = 3x + 1$ and $2y = x + 3$ are equally inclined to the line $y = mx + 4$. Find the value of m.

8. One side of a rectangle lies on the line $4x + 7y + 5 = 0$. Two of its vertices are $(-3,1)$ and $(1,1)$. Find the equations of the other three sides.

9. The points $(1,3)$ and $(5,1)$ are the opposite vertices of a rectangle. The other two vertices lie on th $y = 2x + c$ .Find c and the other two vertices.

10. The diagonal of a square lies along the line $8x - 15y = 0$ and one vertex of the square is $(1,2)$. Find the equations of the sides of the square passing through its vertex.

11. *Find the equation of the circle having centre at $(a\cos\theta, a\sin\theta)$ and radius a.

12. *Show that the radii of the circles $x^2 + y^2 = 1, x^2 + y^2 - 2x - 6y - 6 = 0$ and $x^2 + y^2 - 4x - 12y - 9 = 0$ are in A.P.

13. *Find the equation of the circle which passes through the points $(2,3)$ and $(-1,1)$ and whose centre is in the line $x-3y-11=0$.

14. *For the ellipse $3x^2+2y^2=18$, find the length of major and minor axes, foci, vertices and the eccentricity.

15. Find the equation of the ellipse having foci$(\pm 3,0)$ and passing through$(4,1)$.

16. Find the equation of the line passing through the intersection of lines $x+y+1=0$ and $x-y+1=0$ and whose distance from the origin is 1.

17. Find the equation of the hyperbola (with foci along x-axis), the length of whose latus rectum is 8 and eccentricity is $\frac{3}{\sqrt{5}}$.

18. *Find the eccentricity of the hyperbola with foci on the x axis of the length of its conjugate axis is (3/4) of the length of its transverse axis.

19. Find the equation of the ellipse satisfying the conditions
a) vertices at $(0,\pm 10)$, $e=4/5$ b) Foci at $(\pm 2,0), e=1/2$.

20. Find the equation of the circle having line segment, with end points $(0,-1)$ and $(2,3)$ as diameter.

Evaluate each of the following limits

21. $\lim_{x\to 0}\frac{\sqrt[3]{8+x}-2}{x}$

22. $\lim_{x\to 1}\frac{x^2-\sqrt{x}}{\sqrt{x}-1}$

23. $\lim_{x\to 0}\frac{1-cosmx}{1-cosnx}$

24. $\lim_{x\to 5}\frac{(x-3)^5-32}{x-5}$

25. $\lim_{x\to \frac{\pi}{2}}\frac{1-sinx}{(\pi-2x)^2}$

26. $\lim_{x\to 2}\frac{e^x-e^2}{x-2}$

27. $\lim_{x\to 0}\frac{\sqrt{1+2x}-\sqrt{1-2x}}{sinx}$

28. $\lim_{x\to 0}\frac{e^x+e^{-x}-2}{x^2}$

29. Find all the possible values of a if
$\lim_{x\to a}\frac{x^9-a^9}{x-a}=\lim_{x\to 5}4+x$

30. Evaluate the left hand and right hand limits of the following function at $x=1$
$f(x)=\begin{cases}1+x^2, 0\le x\le 1\\ 2-x, x\ge 1\end{cases}$ .Does $\lim_{x\to 1} f(x)$

Differentiate each of the following functions with respect to x

31. $y=\sqrt{\frac{1+sinx}{1-sinx}}$

32. $y=tan\sqrt{x^3+x+1}$

33. $y=\frac{x+cosx}{tanx}$

34. $y=(ax+b)^n(cx+d)^m$

35. If $f(x)=\left(cos\frac{x}{2}+sin\frac{x}{2}\right)^2$, find $f'\left(\frac{\pi}{4}\right)$.

36. If $y=xsinx$, prove that $\frac{1}{y}\frac{dy}{dx}-\frac{1}{x}=cotx$.

37. For the function f ,given by $f(x)=x^2-6x+8$,prove that
$f'(5)-3f'(2)=f'(8)$.