



**THE LAWRENCE SCHOOL, LOVEDALE**  
**SUBJECT ENRICHMENT ACTIVITY - JUNE 2019**  
**CLASS 11 (MATHEMATICS)**

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1. Find the value of  $\tan\left(\frac{13\pi}{3}\right)$
2. Describe the following set in roster form:  
$$A = \{x : x \in Z, x^2 < 70\}$$
3. If  $\sin x = \frac{3}{5}$ , then find  $\cos 2x$ .
4. Show that :  $\cos 6x = 32\cos^6x - 48\cos^4x + 18\cos^2x - 1$
5. Find the general solution of the equation:  
 $\sin 2x - \sin 4x + \sin 6x = 0$ .
6. Prove that :  $\frac{\sin A - \sin 3A + \sin 5A - \sin 7A}{\cos A - \cos 3A - \cos 5A + \cos 7A} = \cot 2A$
7. Find  $\sin \frac{x}{2}$ ,  $\cos \frac{x}{2}$ ,  $\tan \frac{x}{2}$ , if  $\tan x = -\frac{4}{3}$ , where  $x$  lies in II quadrant.
8. Find the general solution:  **$\sin x + \sin 3x + \sin 5x = 0$**
9. Prove that :  $\sin^3 x + \sin^3\left(\frac{2\pi}{3} + x\right) + \sin^3\left(\frac{4\pi}{3} + x\right) = -\frac{3}{4} \sin 3x$
10. Solve the trigonometric equation:  $\tan^2 \theta + (1 - \sqrt{3}) \tan \theta - \sqrt{3} = 0$
11. Find the value of  $\cos 75^\circ$
12. Find the general solution for the following equation:  
 **$\sec^2 2x = 1 - \tan 2x$**
13. Prove that  $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$
14. Prove that  $\frac{(\sin 7x + \sin 5x) + (\sin 9x + \sin 3x)}{(\cos 7x + \cos 5x) + (\cos 9x + \cos 3x)} = \tan 6x$
15. Write the set  $A = \left\{ \begin{array}{l} x : x \text{ is a two digit natural number} \\ \text{such that the sum of its digits is 8} \end{array} \right\}$  in roster form.
16. write down all possible subsets of each of the following sets  
i)  $\{a, b, c\}$     ii)  $\{1, 2, 3, 4\}$
17. Write the following set in the roster form  **$A = \{x : x^2 \leq 100, x \text{ is an integer}\}$**
18. Write the set  $\left\{ \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7} \right\}$  in the set-builder form
19. Find the general solution of the equation  $2\cos^2 x + 3\sin x = 0$
20. Prove that  $\tan 4x = \frac{4 \tan x (1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$
21. Find the general solution of the equation:  $\cos 3x + \cos x - \cos 2x = 0$

22. Find the general solution of the equation:  $\tan^2 x + \cot^2 x = 2$
23. Find the principal solutions of the equation  $\tan x = -\frac{1}{\sqrt{3}}$
24. Evaluate :  $\sin 105^\circ$
25. Prove that  $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4 \cos^2 \frac{x+y}{2}$
26. If  $\sec x = \frac{13}{5}$ ,  $x$  lies in the fourth quadrant, then find the values of other five trigonometric functions.
27. Show that :  $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$
28. Prove that:  $\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$
29. Prove that  $\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2} \cos x$
30. Prove that :  $\sin^3 x + \sin^3\left(\frac{2\pi}{3} + x\right) + \sin^3\left(\frac{4\pi}{3} + x\right) = -\frac{3}{4} \sin 3x$