

SUMMER VACATION WORK SHEET

CLASS:XI

MATHEMATICS. SETS; RELATIONS AND FUNCTIONS;TRIGONOMETRIC FUNCTIONS.

1.If $A = \{1,2,3\}$, $B = \{2,3,5\}$ and $U = \{1,2,3,4,5,6\}$, verify that (i) $(A \cup B)' = A' \cap B'$ (ii) $(A \cap B)' = A' \cup B'$.

2. Let A and B be sets. If $A \cap X = B \cap X = \emptyset$ and $A \cup X = B \cup X$ for some set X, show that $A = B$.

3. If $A = \{2, -3\}$, find $A \times A$.

4. If $A = \{a, b, c\}$, $B = \{a, b, d\}$ and $C = \{a, e\}$ verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

5. Draw the graph of $f(x) = |2x - 5|$.

6. Draw the graph of $f(x) = [x]$, for $-2 < x < 4$.

7. Let $f = \{(0, -3), (1, -1), (2, 1), (-1, -5)\}$ be a function from Z to Z defined by $f(x) = ax + b$, for some integers a and b. Find f(6).

8. Find the domain of the following functions:

$$(i) f(x) = \frac{1}{\sqrt{1 - \cos x}}$$

$$(ii) f(x) = \frac{1}{\sqrt{x + |x|}}$$

9. Let $f = \left\{ \left(x, \frac{x^2}{4 - x^2} \right) : x \in R \right\}$ be a function from R into R. Determine the range of f.

10. Find the range of the following functions:

$$(i) f(x) = 1 - |x - 3|$$

$$(ii) f(x) = \frac{|x - 5|}{x - 5}$$

11. A market research group conducted a survey of 2000 consumers and reported that 1440 consumers like tea and 900 consumers like coffee. What is the least number that might have liked both tea and coffee?

12. A college awarded 20 prizes for honesty; 8 prizes for hard work and 10 prizes for obedience. If these prizes went to a total of 32 students and only 4 students got prizes for all the three values, how many got prizes in exactly two of the three values? In your opinion, which other values should be added for prizes?

13. In a town of 10000 families it was found that 40% families buy news paper A, 20% families buy newspaper and 10% buy newspaper C, 5% families buy newspaper A and B, 3% buy

newspaper B and C and 4% buy newspaper A and C. If 2% buy all the three newspapers then find the number of families buying newspaper A only.

14. In an examination, question number 1 was attempted by 67 students, question number 2 by 46 students and question number 3 by 40 students. 28 students attempted both questions 1 and 2; 8 students attempted both question numbers 2 and 3; 26 attempted both questions 1 and 3 and 2 students attempted all the three questions. Find how many attempted question number 1 but not 2 and 3.

15. Prove that $\tan 15A - \tan 8A - \tan 7A = \tan 15A \tan 8A \tan 7A$.

16. Find the values of (a) $\sin 18^\circ$ (b) $\cos 36^\circ$ (c) $\sin 105^\circ$ (d) $\sin 54^\circ$

17. If $\operatorname{cosec} \theta = \frac{5}{4}$ and θ is in third quadrant, find the values of $\sin \frac{\theta}{2}$, $\cos \frac{\theta}{2}$ and $\tan \frac{\theta}{2}$.

18. Express $\tan 6\theta$ in terms of $\tan \theta$.

19. Evaluate: $\sin^2 \frac{21\pi}{6} - \cos^2 \frac{7\pi}{4} + \tan^2 \frac{3\pi}{4} - \sec^2 \frac{5\pi}{3}$.

20. Solve: $\sqrt{3} \sin \theta + \cos \theta = 1$.

21. Solve: $\sin^2 x + 2 \cos x = \frac{7}{4}$.

22. In a ΔABC , prove that $\cos B \sin A = \sin C - \cos A \sin B$.

23. If $f(x) = x^2 - 5x + 6$ and $g(x) = x - 2$, find (i) $f+g$ (ii) $f-g$ (iii) $f \cdot g$ (iv) f/g (v) $3f$.

24. If $a \cos \theta + b \sin \theta = c$, prove that $a \sin \theta - b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$

25. Prove that $\sin^6 \theta + \cos^6 \theta = 1 - 3 \sin^2 \theta \cos^2 \theta$.