SUGHAR SINGH ACADEMY (SWARN JAYANTI VIHAR)
SUMMER VACATION HOLIDAY HOMEWORK (2024-25)
CLASS-XII (Science)

English	English - Do the given Project: INDIGO - THE EMANCIPATION OF SHARECROPPERS BY MAHATMA GANDHI 1. Index, 2. Acknowledgement, 3. Certificate of Completion, 4. Objectives, 5. About the author, 6. What is Indigo Sharecropping? (Brief history), 7. Natural Indigo Harvesting and its uses (pictures), 8. Theme of Indigo, 9. Role of Rajkumar Shukla, 10. Summary of Indigo, 11. Efforts by Gandhi to put an end to Sharecropping in Champaran, 12. Gandhi as an effective leader, 13. Bibliography
Hindi	1-परियोजना कार्य (प्रोजेक्ट फाइल) तैयार करें। *हिंदी कविता में प्रकृति चित्रण (उषा/ बगुलों के पंख के आधार पर) *छायावाद भक्तिकाल या आधुनिक काल के किसी एक कवि या लेखक का समग्र परिचय । 2- कक्षा में कराए गए सभी पाठों का अभ्यास करें।
Chemistry	Do the given project work.
Biology	Prepare a project file on the allotted topics.
Physics	Do the given project Work
Maths	Do the given worksheet
Computer	Make a computer practical file of programs of python programming and Revise all the chapters of python.
Physical Education	1- Play outdoor Activity as Per Interest at least two hours daily. 2- Perform Yogasana every morning and send the Imges . 3- Learn all the topics done in class. 4- Prepare a chart of labelled diagram of any game.

SUGHAR SINGH ACADEMY

Holiday Homework-Mathematics

Class-XII

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1. If R is a relation 'is a divisor of' from the set $A = \{1, 2, 3\}$ to $B = \{4, 10, 5\}$.Then write down the set of ordered pairs corresponding to R.
2. Let $R = \{(a, a^3) :$ a is a prime number less than 5$\}$ be a relation.Find the range of R.
3. Show that the relation R in the set $\mathbb{R}$ of real numbers defined as $R = \{(a, b) \mid a, b \in \mathbb{R}$ and $a \leq b^3\}$ is neither reflexive nor symmetric nor transitive.
4. Show that the relation $R = \{(a, b) \mid a, b \in \mathbb{N}$ and a is a multiple of $b\}$ is reflexive and transitive but not symmetric.
5. Show that the relation R defined by $(a, b)R(c, d) \Rightarrow a + d = b + c$ on $\mathbb{N} \times \mathbb{N}$ is an equivalence relation.
6. Show that the relation 'is similar to' on the set of all triangles in a plane is an equivalence relation.
7. Check the injectivity of the function $f : Z \to Z$ defined by $f(x) = x^2 + 5$.
8. Let $f : R \to R$ be defined by $f(x) = x^2 + 1$. Then find the pre-image of 17 and -3.
9. Show that the function $f : R \to R$, defined by $f(x) = \frac{x}{x^2+1}, \forall\ x \in R$ is neither one-one nor onto.
10. Find the domain and range of the following functions.
    (a) $f(x) = \sqrt{4 - x^2}$
    (b) $f(x) = \sqrt{x^2 - 4}$
    (c) $f(x) = \sqrt{x}$
    (d) $f(x) = x^2 - 5$
    (e) $f(x) = x^2 + 2$
    (f) $f(x) = x^3$
    (g) $f(x) = |x + 2|$
    (h) $f(x) = \frac{|x-1|}{x-1}, x \neq 1$
    (i) $f(x) = \frac{4x-3}{2x+5}$
    (j) $f(x) = \frac{x^2}{1+x^2}$
    (k) $f(x) = \frac{1}{x^2+1}$
11. Show that the function $f : R \to (-1, 1)$ defined by $f(x) = \frac{x}{1+|x|}, x \in R$ is one-one and onto.
12. Show that $f : R \to R$ given by $f(x) = 4x^3 + 7$ is bijective.
13. Show that the function $f : N \to N$, given by $f(n) = n - (-1)^n, \forall\ n \in N$ is a bijection.
14. Make a table and write down the principal branches(Domain and Codomain) of all inverse trigonometric functions. Also sketch their graphs.
15. Find the values of the following-
    (a) $\cos^{-1}(\frac{1}{2}) + 2\sin^{-1}(-\frac{1}{2})$
    (b) $\tan^{-1}(-\frac{1}{\sqrt{3}}) + \cot^{-1}(\frac{1}{\sqrt{3}}) + \tan^{-1}\left[\sin(-\frac{\pi}{2})\right]$

(c) $\tan^{-1}\left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right]$

(d) $\tan^{-1}\left[\tan\left(\frac{15\pi}{4}\right)\right]$

(e) $\cos^{-1}[\cos(680^\circ)]$

(f) $\tan\left(2\tan^{-1}\frac{1}{5}\right)$

(g) $\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$

16. If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\frac{3\pi}{2}$, then find the value of

$$x^{100}+y^{100}+z^{100}-\frac{9}{x^{101}+y^{101}+z^{101}}$$

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17. Find x in each of the following cases-

(a) $\tan^{-1}(\sqrt{3})+\cot^{-1}x=\frac{\pi}{2}$

(b) $\cos(\tan^{-1}x)=\sin\left(\cot^{-1}\frac{3}{4}\right)$

(c) $\tan^{-1}x+2\cot^{-1}x=\frac{2\pi}{3}$

18. Find the domain of the following functions-

(a) $f(x)=\sin^{-1}(x^2-1)$

(b) $f(x)=\sin^{-1}\sqrt{x-1}$

(c) $f(x)=\cos^{-1}(x^2-5)$

19. If $F(x)=\begin{bmatrix}\cos x & -\sin x & 0\\ \sin x & \cos x & 0\\ 0 & 0 & 1\end{bmatrix}$, then show that $F(x+y)=F(x).F(y)$.

20. If $A=\begin{bmatrix}1 & -1\\ 2 & -1\end{bmatrix}$, $B=\begin{bmatrix}a & 1\\ b & -1\end{bmatrix}$ and $(A+B)^2=A^2+B^2$,then find the values of a and b.

21. If $A=\begin{bmatrix}1 & 3 & 2\\ 2 & 0 & -1\\ 1 & 2 & 3\end{bmatrix}$, then show that $A^3-4A^2-3A+11I=O$.

22. If $A=\begin{bmatrix}1 & 0 & 2\\ 0 & 2 & 1\\ 2 & 0 & 3\end{bmatrix}$ and $A^3-6A^2+7A+kI_3=O$,then find k.

23. If $A=\begin{bmatrix}1 & -1 & 2\\ 2 & 0 & 3\\ 1 & 3 & -2\end{bmatrix}$, then write A as the sum of symmetric and skew-symmetric matrices.

24. Show that the diagonal elements of a skew-symmetric matrix are all zero.

25. If $A=\begin{bmatrix}0 & 2b & -2\\ 3 & 1 & 3\\ 3a & 3 & -1\end{bmatrix}$ is a symmetric matrix, then find the values of a and b.

26. If A is a skew-symmetric matrix then show that A^2 is a symmetric matrix.

27. Write a 2×2 matrix which is both symmetric and skew-symmetric.

28. If $A = [a_{ij}]$ is a square matrix such that $a_{ij} = i^2 - j^2$, then check whether A is a symmetric or skew-symmetric matrix.

29. construct a matrix $A = [a_{ij}]_{3\times 3}$ such that $a_{ij} = \begin{cases} 2i+3j, & i<j \\ 5, & i=j \\ 3i-2j, & i>j \end{cases}$.

30. Find the value of x if $\begin{bmatrix} x & -5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x & 4 & 1 \end{bmatrix} = O$.

31. Do all the exercises of Chapter-3(Matrices) of NCERT.

32. Find the area of a triangle, whose vertices are (3,8), (-4,2) and (5,1).

33. If the points (2,-3), (λ,-1) and (0,4) are collinear, then find the value of λ.

34. Find the equation of a line joining (2,3) and (-1,2) using determinants.

35. Find the value of k, if the points ($k+1$,1),(2$k+1$,3) and $(2k+2, 2k)$ are collinear.

36. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, then show that $A^{-1} = A^2$.

37. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, then find A^{-1}.

38. For the matrix $A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$, find the numbers a and b such that $A^2 + aA + bI = O$.Hence, find A^{-1}.

39. If for any 2×2 square matrix A, $A(\text{adj}A) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$, then find the value of $|A|$.

40. Solve the system of linear equations by using the matrix method-

$$\begin{aligned} x - y + 2z &= 7 \\ 3x + 4y - 5z &= -5 \\ 2x - y + 3z &= 12 \end{aligned}$$

41. Solve the linear equations by matrix method-

$$\begin{aligned} 5x + 2y &= 4 \\ 7x + 3y &= 5 \end{aligned}$$

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42. If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, then find A^{-1}.Using A^{-1} solve the system of linear equations-

$$\begin{aligned} 2x - 3y + 5z &= 11 \\ 3x + 2y - 4z &= -5 \\ x + y - 2z &= -3 \end{aligned}$$

43. Do Activity 1 to Activity 6 from Arihant Lab Manual.