**Class 12 A**

# English Holiday Homework

A. Revise the Lessons:

1. The Last Lesson
2. Lost Spring
3. Deep Water
4. The Rattrap

and also prepare the Note Making of the same (Do it in your Notebook)

B. Also write the Notice and the Job Application from the PT 1 Question Paper in your Notebook.

# Summer Holiday Homework Subject - Yoga

Prepare Shatkarma in detail (definition, procedure, types, benefits and precautions)

**By Shrikant Yadav**

## PHYSICS

- ✓ Revise the content taught till now.
- ✓ Solve numericals from NCERT and side books.
- ✓ Complete the project as discussed in the class.
- ✓ Solve the following questions on comment sheets and submit the work on the reopening day of school.

1) Why is the direction of electric field due to a charged conducting sphere at any point perpendicular to its surface?
2) Draw the pattern of electric field lines when a point charge +q is kept near an uncharged conducting plate.
3) Plot a graph showing the variation of coulomb force (F) versus $(1/r^2)$, where r is distance between the two charges, of each pair of charges (1 μC, 2 μC) and (2 μC, -3 μC). Interpret the graphs obtained.
4) Two identical point charges, q each, are kept 2m apart in air. A third point charge Q of unknown magnitude and sign is placed on the line joining the charges such that the system remains in equilibrium. Find the position and nature of Q.
5) Given a uniform electric field $E = 5 \times 10^3$ i N/C, find the flux of this field through a square of side 10 cm on a side whose plane is parallel to the Y-Z plane. What would be the flux through the same square if the plane makes an angle of 30° with the X-axis?

6) Two isolated metal spheres A and B have radii R and 2R respectively, and same charge q. Find which of the two have greater energy density just outside the surface of the spheres.
7) A charged particle +q moves in a uniform electric field E in the direction opposite to E. What will be the effect on its electrostatic potential energy during its motion?
8) Obtain an expression for electrostatic potential energy of asystem of three charges q, 2q and -3q placed at the vertices of an equilateral triangle of side a.
9) a) a parallel plate capacitor $C_1$ having charge Q is connected to an identical uncharged capacitor $C_2$ in series. What would be the charge accumulated on the capacitor $C_2$?
b) Three identical capacitors each of capacitance 3 μF are connected in turn in series and in parallel combination to the common source V volt. Find out the ratio of the energies stored in two configurations.
10) A parallel plate capacitor (A) of capacitance C is charged by a battery to voltage V. The battery is then disconnected and an uncharged capacitor B of capacitance 2C is connected across A. Find the ratio of

(i) final charges on A and B

(ii) total electrostatic energy stored in A and B finally and that stored in A initially.

# Chemistry holiday assignment

**Note :1. Assignment is to be done on the comment sheets.**

**2. Complete the salt analysis of 8 salts in your practical notebook**

**3. Learn the confirmatory test to be performed in the lab for the various positive and negative radicals.**

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**Chapter 1: Solutions**

1. Calculate the freezing point of a solution containing 60 g of glucose . (Molar mass = 180 g mol-1) in 250 g of water. ( Kf of water = 1.86 K kg mol-1)

2. Give reasons for the following:

(i)Measurement of osmotic pressure method is preferred for the determination of molar masses of macro-molecules such as proteins and polymers.

(ii)Aquatic animals are more comfortable in cold water than in warm water.

(iii)Elevation of boiling point of 1M KCl solution is nearly double than that of 1 M sugar solution.

3. A 10% solution (by mass) of sucrose in water has freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water, if freezing point of pure water is 273.15 K.Given : (Molar mass of sucrose = 342 g mol–1 , Molar mass of glucose = 180 g mol–1)

4. State the formula relating pressure of a gas with its mole fraction in a liquid solution in contact with it. Name the law and mention its two applications.

5. Two liquids A and B boil at $145^0$C and $190^0$C respectively. Which of them has a higher vapour pressure at 800C?

6. (a) Why is the vapour pressure of a solution of glucose in water lower than that of water?

(b) A 6.90 M solution of KOH in water contains 30% by mass of KOH. Calculate the density of the KOH solution? ( molar mass of KOH = 56 g/mol)

7. Define azeotropes. What type of azeotrope is formed by positive deviation from Raoult's law? Give an example.

8. Explain with suitable examples in each case why the molar masses of some substances determined with the help of colligative properties are (i) higher (ii) lower than actual values.

10. Calculate the freezing point of solution when 1.9 g of $MgCl_2$(M=95 g mol–1) was dissolved in 50 g of water, assuming $MgCl_2$ undergoes complete ionization. (Kf for water = 1.86 K kg mol–1)

11. a) Out of 1 M glucose and 2 M glucose, which one has a higher boiling point and why?

b) What happens when the external pressure applied becomes more than the osmotic

pressure of solution ?

12. State Raoult's law for solutions of volatile liquids. Taking suitable examples explain the meaning of positive and negative deviations from Raoult's law. What is the sign of $\Delta H$ mix for positive deviation?

13. a) Define the term osmotic pressure. Describe how the molecular mass of a substance can be determined by a method based on measurement of osmotic pressure.

b) Determine the osmotic pressure of a solution prepared by dissolving 0.025g of $K_2SO_4$ in 2L of water at 25°C, assuming that is completely dissociated.(R=0.0821 L atm/K/mol, molar mass of $K_2SO_4$= 174g/mol)

14. 15 g of an unknown molecular material was dissolved in 450 g of water. The resulting solution was found to freeze at -0.34°C. What is the molar mass of this material? Kf for water = 1.86 K Kg mol-1)

15. A solution is prepared by dissolving 1.25g of oil of winter green (methyl salicylate) in 99.0g of benzene has a boiling point of $80.31^0$C. Determine the molar mass of this compound. (B.P. of pure benzene = 80.10°C and Kb for benzene = 2.53°C kg mol-1)

(152.21 g/mol)

16. A 1.00 molal aqueous solution of trichloroacetic acid ( $CCl_3COOH$) is heated to its boiling point. The solution has the boiling point of 100.18ºC. Determine the van't Hoff factor for trichloroacteic acid (Kb for water = 0.512 K Kg mol-1).

***MULTIPLE CHOICE QUESTIONS***

1. The molality of 98% $H_2SO_4$ (density = 1.8 g/ml) by weight is:

(a) 6 m (b) 18 m
(c) 10 m (d) 4 m

2. Which of the following does not show positive deviation from Raoult's law?

(a) benzene + chloroform (b) benzene + acetone

(c) benzene + ethanol (d) benzene + CCl4

3. Which solution will have least vapour pressure?

(a) 0.1 M $BaCl_2$ (b) 0.1 M Urea
(c) 0.1 M $Na_2SO_4$ (d) 0.1 M $Na_3PO_4$

4. Which condition is not satisfied by an ideal solution?

(a) $\Delta$Hmix = 0. (b) $\Delta$Vmix = 0
(c) $\Delta$Pmix = 0 (d) $\Delta$Smix = 0

5. Azeotrope mixture are:
(a) mixture of two solids
(b) those will boil at different temperature
(c) those which can be fractionally distilled
(d) constant boiling mixtures

6. If $K_f$ value of $H_2O$ is 1.86. The value of $\Delta T_f$ for 0.1 m solution of non-volatile solute is
(a) 18.6 (b) 0.186. (c) 1.86 (d) 0.0186

7. Solute when dissolve in water

(a) increases the vapour pressure of water (b) decreases the boiling point of water
(c) decrease the freezing point of water (d) All of the above

8. The plant cell will shrink when placed in:
(a) water (b) A hypotonic solution (c) a hypertonic solution (d) an siotonic solution

9. The freezing point of 11% aquous solution of calcium nitrate will be:
(a) 0°C (b) above 0°C
(c) 1°C (d) below 0°C

10. The Van't Hoff factor for 0.1 M $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is:

(a) 91.3% (b) 87% (c) 100% (d) 74%

11. Which of the following solutions would have the highest osmotic pressure:

(a) M10 NaCl (b) M10 Urea
(c) M10 $BaCl_2$ (d) M10 Glucose

12. 0.5 M aquous solution of Glucose is isotonic with:
(a) 0.5 M KCl solution. (b) 0.5 M $CaCl_2$solution
(c) 0.5 M Urea solution. (d) 1 M solution of sucrose

13. Which of the following is true for Henry's constant
(a) It decreases with temperature

(b) It increases with temperature

(c) Independent on temperature

(d) It do not depend on nature of gases.

14. Which one is the best colligative property for determination of molecular mass of polymer?

(a) osmotic pressure (b) elevation in boiling point

(c) depression in freezing point (d) osmosis

15. Which of the following do not depend on temperature?

(a) % W/V (weight/volume) (b) molality (c) molarity (d) normality

16. Henry's law constant $K_H$ of $CO_2$ in water at 25°C is $3 \times 10^{-2}$ mol/L atm–1. Calculation the mass of $CO_2$ present in 100 L of soft drink bottled with a partial pressure of $CO_2$ of 4 atm at the same temperatrue.
(a) 5.28 g. (b) 12.0 g
(c) 428 g. (d) 528 g

17. Mixing of $HNO_3$ and HCl is reaction:
(a) endothermic reaction (b) exothermic reaction

(c) both exothermic and endothermic (d) depend on entropy of reaction

18. The most likely on ideal solution is:
(a) NaCl—$H_2O$ (b) $C_2H_5OH$—$C_6H_6$
(c) $C_7H_{16}$—$H_2O$ (d) $C_7H_{16}$—$C_8H_{18}$

19. Van't Hoff factor for a dilute solution of a $K_2[HgI_4]$ is:

(a) 2. (b) 1. (c) 3 (d) zero

20. Benzoic acid dissolved in benzene shows a molecular weight of:
(a) 122. (b) 61. (c) 244 (d) 366

21. 6% (W/V) solution of urea will be isotonic with:

(a) 18% (W/V) solution of glucose (b) 0.5 M solution of NaCl

(c) 1 M solution of $CH_3COOH$ (d) 6% (W/V) solution of sucrose.

22. Solution showing (+) ve deviation from Raoult's law include:

(a) acetone + $CS_2$. (b) acetone + $C_2H_5OH$ (c) acetone + Benzene. (d) acetone + aniline

## *Case based questions*

**1.Read the given passage and answer the questions that follow.**

Boiling point or freezing point of liquid solution would be affected by the dissolved solids in the liquid phase. A soluble solid in solution has the effect of raising its boiling point and depressing its freezing point. The addition of non-volatile substances to a solvent decreases the vapour pressure and the added solute particles affect the formation of pure solvent crystals. According to many researches the decrease in freezing point directly correlated to the concentration of solutes dissolved in the solvent. This phenomenon is expressed as freezing point depression and it is useful for several applications such as freeze concentration of liquid food and to find the molar mass of an unknown solute in the solution. Freeze concentration is a high quality liquid food concentration method where water is removed by forming ice crystals. This is done by cooling the liquid food below the freezing point of the solution. The freezing point depression is referred as a colligative property and it is proportional to the molar concentration of the solution (m), along with vapour pressure lowering, boiling point elevation, and osmotic pressure. These are physical characteristics of solutions that depend only on the identity of the solvent and the concentration of the solute. The characters are not depending on the solute's identity.

**The following questions are multiple choice questions. Choose the most appropriate answer:**

**(i)** When a non volatile solid is added to pure water it will:

(a) boil above 100°C and freeze above 0°C

(b) boil below 100°C and freeze above 0°C

(c) boil above 100°C and freeze below 0°C

(d) boil below 100°C and freeze below 0°C

**(ii)** colligative properties are:

(a) dependent only on the concentration of the solute and independent of the solvent's and solute's identity.

(b) dependent only on the identity ot the solute and the concentration ot the solute and independent of the solvent's identity.

(c) dependent on the identity of the solvent and solute and thus on the concentration of the solute.

(d) dependent only on the identity of the solvent and the concentration of the solute and independent of the solute's identity

**(iii)** Assume three samples of juices A, B and C have glucose as the only sugar present in them. The concentration of sample A, B and C are 0.1 M, 0.5 M and 0.2 M respectively. .Freezing point will be highest for the fruit juice:

(a) A

(c) C

(b) B

(d) All have same freezing point

**(iv)** Identify which of the following is a colligative property:

(a) freezing point (b) boiling point (c) osmotic pressure (d) all of the above

**II. Read the passage given below and answer the following questions;**

Scuba apparatus includes a tank of compressed air toted by the diver on his or her back, a hose for carrying air to a mouthpiece, a face mask that covers the eyes and nose, regulators that control air flow, and gauges that indicate depth and how much air remains in the tank.

A diver who stays down too long, swims too deep, or comes up too fast can end up with a condition called "the bends." In this case, bubbles of gas in the blood can cause intense pain, even death.

**In these following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.**

(A) Assertion and Reason both are correct statements and reason is correct explanation of Assertion.

(B) Assertion and Reason both are correct statements but Reason is not correct explanation of assertion

(C) Assertion is correct statement but Reason is wrong statement.

(D) Assertion is wrong statement but Reason is correct statement.

Q. 1. **Assertion :** Scuba divers may face a medical condition called 'bends'.

**Reason** : 'Bends' can be explained with the help of Henry's law as it links the partial pressure of gas to that of its mole fraction.

Q. 2. **Assertion** : Bends is caused due to formation of nitrogen bubbles in the blood of scuba divers which blocks the capillaries.

**Reason** : Underwater high pressure increases solubility of gases in blood, while as pressure gradually decreases moving towards the surface, gases are released and nitrogen bubbles are formed in blood.

Q. 3. **Assertion**: Soft drinks and soda water bottles are sealed under high pressure.

**Reason** : high pressure maintains the taste and the texture of the soft drinks

Q4 **Assertion** : Anoxia is a condition experienced by climbers which makes them suddenly agile and unable to think clearly.

**Reason** : at a height partial pressure of oxygen is less than at ground level.

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## COMPUTER SCIENCE --

1. Revise and Practice Class 11 and 12 Python concepts covered.
2. Complete all 11 and 12 programming questions given for practical file. (They are needed in both hardcopy and softcopy)

# Relations and Functions

1. Let the function '$f$' : $N \to N$ be defined by $f(x) = 2x + 3$, $\forall\, x \in N$. Then '$f$' is **(1 mark)**
   (*a*) not onto
   (*b*) bijective function
   (*c*) many-one, into function
   (*d*) None of these

2. A relation defined in a non-empty set $A$, having $n$ elements, has **(1 mark)**
   (*a*) $n$ relations (*b*) 2 relations
   (*c*) $n^2$ relations (*d*) $2^{n^2}$ relations

3. A relation $R$ in human beings defined as $R = \{(a, b) : a, b \in$ human beings ; $a$ loves $b\}$ is **(1 mark)**
   (*a*) reflexive
   (*b*) symmetric and transitive
   (*c*) equivalence
   (*d*) neither of these

4. A function $f : R \to R$ is defined as $f(x) = x^3 + 1$. Then the function has **[CBSE 2021] (1 mark)**
   (*a*) no minimum value
   (*b*) no maximum value
   (*c*) both maximum and minimum values
   (*d*) neither maximum value nor minimum value

5. Let $A = \{a, b, c\}$ and the relation $R$ be defined on $A$, as follows: $R = \{(a, a), (b, c), (a, b)\}$. Then, write minimum number of ordered pairs to be added in $R$ to make $R$ reflexive and transitive. **[NCERT Exemplar] (2 marks)**

6. Given set $A = \{a, b, c\}$. Is relation $R = \{(a, c)\}$ transitive? **(2 marks)**

7. Prove that the Greatest Integer Function $f : R \to R$, given by $f(x) = [x]$ is neither one-one nor onto. Where $[x]$ denotes the greatest integer less than or equal to $x$. **[NCERT] (2 marks)**

8. Let $A = \{1, 2, 3\}$, $B = \{4, 5, 6, 7\}$ and let $f = \{(1, 4), (2, 5), (3, 6)\}$ be a function from $A$ to $B$. Show that $f$ is one-one. **[NCERT] (2 marks)**

9. Let $f : N \to N$ be defined by $f(x) = 3x$. Show that $f$ is not onto function. **[HOTS] (2 marks)**

10. Let the function $f : R \to R$ be defined by $f(x) = \cos x$ $\forall\, x \in R$. Show that $f$ is neither one-one nor onto. **[NCERT Exemplar] (2 marks)**

11. Determine whether the relation $R$ defined on the set $R$ of all real numbers as $R = \{(a, b) : a, b \in R$ and $a - b + \sqrt{3} \in S$, where $S$ is the set of all irrational numbers$\}$, is reflexive, symmetric and transitive. **[Ajmer 2015] (3 marks)**

12. Given a non empty set $X$, consider $P(X)$ which is the set of all subsets of $X$. Define the relation $R$ in $P(X)$ as follows: For subsets $A$, $B$ in $P(X)$, $ARB$ if and only if $A \subset B$. Is $R$ an equivalence relation on $P(X)$? Justify your answer. **[NCERT] (3 marks)**

13. Let $A$ and $B$ be sets. Show that $f : A \times B \to B \times A$ such that $f(a, b) = (b, a)$ is bijective function. **[NCERT] (3 marks)**

14. Let $L$ be the set of all lines in $XY$ plane and $R$ be the relation in $L$ defined as $R = \{(L_1, L_2) : L_1$ is parallel to $L_2\}$. Show that $R$ is an equivalence relation. Find the set of all lines related to the line $y = 2x + 4$. **[NCERT] (5 marks)**

15. Let $A = \{x \in Z : 0 \le x \le 12\}$. Show that $R = \{(a, b) : a, b \in A,\ |a - b|$ is divisible by $4\}$ is an equivalence relation. Find the set of all elements related to 1. Also, write the equivalence class [2]. **[CBSE 2018] (5 marks)**

16. Let $N$ denote the set of all natural numbers and $R$ be the relation on $N \times N$ defined by $(a, b)\ R\ (c, d)$ if $ad\,(b + c) = bc\,(a + d)$. Show that $R$ is an equivalence relation. **[DoE; Delhi 2015] (5 marks)**

17. Let $f : N \to N$ be defined by

$$f(n) = \begin{cases} \dfrac{n+1}{2}, & \text{if } n \text{ is odd} \\ \dfrac{n}{2}, & \text{if } n \text{ is even} \end{cases} \quad \text{for all } n \in N.$$

State whether the function $f$ is bijective. Justify your answer. **[NCERT] (5 marks)**

18. Show that the function $f : R \to \{x \in R : -1 < x < 1\}$ defined by $f(x) = \dfrac{x}{1 + |x|}, x \in R$ is one-one and onto function. **[NCERT] (5 marks)**

# Relations and Functions

**In the following questions, a statement of assertion ($A$) is followed by a statement of reason ($R$). Choose the correct answer out of the following choices.**

**(a) Both $A$ and $R$ are true and $R$ is the correct explanation of $A$.**

**(b) Both $A$ and $R$ are true but $R$ is not the correct explanation of $A$.**

**(c) $A$ is true but $R$ is false.**

**(d) $A$ is false but $R$ is true.**

1. **Assertion ($A$):** In set $A = \{1, 2, 3\}$ a relation $R$ defined as $R = \{(1, 1), (2, 2)\}$ is reflexive.

   **Reason ($R$):** A relation $R$ is reflexive in set $A$ if $(a, a) \in R$ for all $a \in A$.

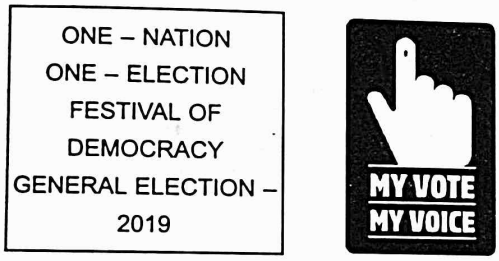
2. **Assertion ($A$):** In set $A = \{a, b, c\}$ relation $R$ in set $A$, given as $R = \{(a, c)\}$ is transitive.

   **Reason ($R$):** A singleton relation is transitive.

3. **Assertion ($A$):** Given set $A = \{1, 2, 3, \ldots 9\}$ and relation $R$ in set $A \times A$ defined by $(a, b)\ R\ (c, d)$ if $a + d = b + c$, be an equivalence relation. The ordered pair $(1, 3)$ belongs to equivalence class related to $[(5, 3)]$

   **Reason ($R$):** Any ordered pair of $A \times A$ belongs to equivalence class $[(5, 3)]$ if $(x, y)R\ (5, 3)\ \forall\ (x, y) \in A \times A$.

1. A general election of Lok Sabha is a gigantic exercise. About 911 million people were eligible to vote and voter turnout was about 67%, the highest ever




Let $I$ be the set of all citizens of India who were eligible to exercise their voting right in general election held in 2019. A relation '$R$' is defined on $I$ as follows:

$\{R = \{(V_1, V_2): V_1, V_2 \in I$ and both use their voting right in general election – 2019$\}$

(*i*) Two neighbours $X$ and $Y \in I$. $X$ exercised his voting right while $Y$ did not cast her vote in general election-2019. Check whether $X$ is related to $Y$ or not.

(*ii*) Mr. '$X$' and his wife '$W$' both exercised their voting right in general election-2019. Show that $(X, W) \in R$ and $(W, X) \in R$.

(*iii*) Three friends $F_1, F_2$ and $F_3$ exercised their voting right in general election-2019. Show that $(F_1, F_2) \in R$, $(F_2, F_3) \in R$ and $(F_1, F_3) \in R$.

**OR**

Show that the relation $R$ defined on set $I$ is an equivalence relation.

2. Sherlin and Danju are playing Ludo at home during Covid-19. While rolling the dice, Sherlin's sister Raji observed and noted that possible outcomes of the throw every time belongs to set $\{1, 2, 3, 4, 5, 6\}$. Let $A$ be the set of players while $B$ be the set of all possible outcomes.

$A = \{S, D\}$, $B = \{1, 2, 3, 4, 5, 6\}$

(*i*) Let $R : B \to B$ be defined by $R = \{(x, y) : y$ is divisible by $x\}$. Show that relation $R$ is reflexive and transitive but not symmetric.

(*ii*) Let $R$ be a relation on $B$ defined by $R = \{(1, 2), (2, 2), (1, 3), (3, 4), (3, 1), (4, 3), (5, 5)\}$. Then check whether $R$ is an equivalence relation.

(*iii*) Raji wants to know the number of functions from $A$ to $B$. How many number of functions are possible?

**OR**

Raji wants to know the number of relations possible from $A$ to $B$. How many numbers of relations are possible?

# Inverse trigonometric functions

1. Principal value of the expression $\cos^{-1}[\cos(-680°)]$ is

   (a) $\frac{2\pi}{9}$ (b) $-\frac{2\pi}{9}$

   (c) $\frac{34\pi}{9}$ (d) $\frac{\pi}{9}$

2. If $\tan^{-1} x = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$, then $x$ is equal to

   (a) $\frac{5\pi}{4}$ (b) 1

   (c) $\frac{3\pi}{4}$ (d) $\frac{\pi}{4}$

3. Find the principal value of $\cos^{-1}\left(\cos\frac{7\pi}{5}\right)$.

**Write the principal value of each of the following (Exercises 4 to 9):**

4. $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ [NCERT Exemplar; DoE]

5. $\sec^{-1}(-2)$ [DoE]

6. $\cos^{-1}\left(\frac{1}{2}\right) - 2\sin^{-1}\left(-\frac{1}{2}\right)$. [Delhi 2012]

7. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$.

8. $\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$.

9. $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$ [NCERT]

10. Find the value of $\tan^{-1}\left[2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right]$ [NCERT]

11. Find the value of $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ [NCERT]

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1. The principal value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is (1 Mark)

   (a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{3}$

   (c) $-\frac{\pi}{6}$ (d) $\frac{\pi}{6}$

2. The value of $\cos^{-1}\left(\frac{1}{2}\right) + 3\sin^{-1}\left(\frac{1}{2}\right)$ is equal to (1 Mark)

   (a) $\frac{\pi}{4}$ (b) $\frac{\pi}{6}$

   (c) $\frac{2\pi}{3}$ (d) $\frac{5\pi}{6}$

3. The greatest and least values of $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$ are respectively (1 Mark)

   (a) $\frac{\pi^2}{8}, \frac{5\pi^2}{4}$ (b) $\frac{\pi^2}{4}, \frac{5\pi^2}{8}$

   (c) $\frac{5\pi^2}{4}, \frac{\pi^2}{8}$ (d) $\frac{5\pi^2}{8}, \frac{\pi^2}{4}$

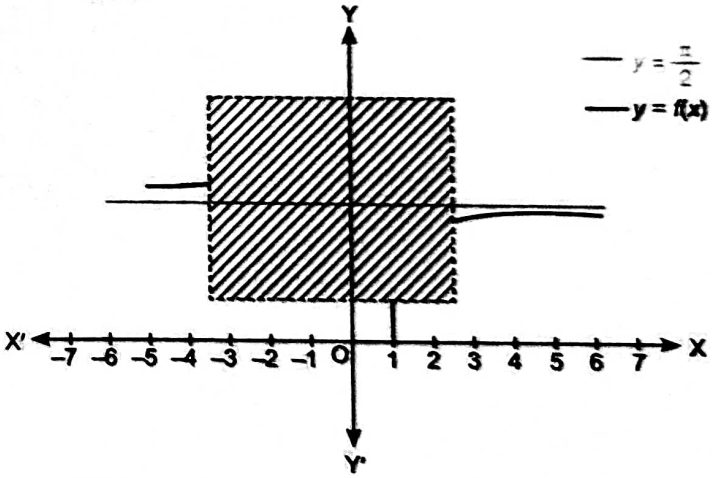
4. The value of $\sin\frac{3\pi}{2} - \sin(\sec^{-1}t + \operatorname{cosec}^{-1}t)$, when $|t| \geq 1$.

   [CBSE Learning Framework] (1 Mark)

   (a) 0 (b) –1

   (c) 1 (d) –2

5. Shown below is graph of function '$f$' whose domain is $R - (-1, 1)$ some portion of graph is hidden behind square.




   Which of the following is '$f(x)$'? (1 Mark)

   (a) $\tan^{-1}x$ (b) $\cot^{-1}x$

   (c) $\sec^{-1}x$ (d) $\operatorname{cosec}^{-1}x$

6. $\cot^{-1}x = \cos^{-1}(-1) - \operatorname{cosec}^{-1}\left(\frac{2}{\sqrt{3}}\right)$

   Based on above find $\tan^{-1}\left(\frac{1}{x}\right)$ using the principal value of inverse trigonometric function. Show your work. (2 Marks)

7. Find the domain of the function:
$f(x) = \frac{1}{2}\sec^{-1}(5x - 3)$ **(2 Marks)**

8. Find the range of principal value branch of the function:
$f(x) = 3\cos^{-1}\left(\frac{1}{2x-1}\right) - 2$. Show your work. **(2 Marks)**

9. Find the principal value of $\text{cosec}^{-1}(2)$. **[NCERT] (2 Marks)**

10. Evaluate $\tan^{-1}\left\{\sin\left(-\frac{\pi}{2}\right)\right\}$. **[NCERT Exemplar] (2 Marks)**

11. Write the value of $\cos^{-1}\left(-\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$.
**[Foreign 2014] (2 Marks)**

12. Write one branch of $\sin^{-1}x$ other than the principal branch.
**(2 Marks)**

13. Find the principal value of $\tan^{-1}(-1)$ **[NCERT] (2 Marks)**

14. Find the principal value of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$.
**[NCERT; HOTS] (2 Marks)**

15. Find the value of $\sin\left(2\sin^{-1}\frac{3}{5}\right)$. **[Foreign 2013] (2 Marks)**

16. Find the value of $\tan^{-1}\left(\tan\frac{9\pi}{8}\right)$.
**[NCERT Exemplar; Foreign 2013] (2 Marks)**

17. Write the principal value of $\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$.
**[NCERT; HOTS] (2 Marks)**

18. Find the value of $\sin^{-1}\left[\sin\left(-\frac{17\pi}{8}\right)\right]$.
**[CBSE 2020] (2 Marks)**

19. Find the principal value of $\tan^{-1}\left(\tan\frac{5\pi}{6}\right)$. **[DoE] (2 Marks)**

## ASSERTION AND REASON QUESTIONS

**In the following questions, a statement of assertion ($A$) is followed by a statement of reason ($R$). Choose the correct answer out of the following choices.**

**(a) Both $A$ and $R$ are true and $R$ is the correct explanation of $A$.**

**(b) Both $A$ and $R$ are true but $R$ is not the correct explanation of $A$.**

**(c) $A$ is true but $R$ is false.**

**(d) $A$ is false but $R$ is true.**

1. **Assertion ($A$):** Inverse of sine function exists in interval $[0, \pi]$

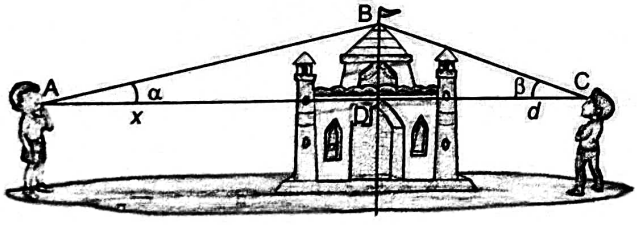
   **Reason ($R$):** $\sin^{-1}$ function becomes bijective if we restrict its domain to $[-1, 1]$.

2. **Assertion ($A$):** Principal value of $\tan^{-1}(-1)$ is $-\frac{\pi}{4}$.

   **Reason ($R$):** The range of principal value branch of $\tan^{-1}$ is $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$ and $\tan(-x) = -\tan x$.

## CASE-BASED QUESTIONS

1.




Two men on either side of a temple of 30 metres high from the level of eye observe its top at the angles of elevation $\alpha$ and $\beta$ respectively. (as shown in the figure above). The distance between the two men is $40\sqrt{3}$ metres and the distance between the first person A and the temple is $30\sqrt{3}$ metres. Based on the above information answer the following:

(*i*) Find $\angle CAB$ and $\angle ACB$ (*ii*) Find $\angle ABC$

(*iii*) Find the principal value of $\sin^{-1}\left\{\sin\left(\alpha + \frac{2\pi}{3}\right)\right\}$

**OR**

Find the principal value of $\cos^{-1}\left\{\cos\left(\beta + \frac{\pi}{3}\right)\right\}$

2. Let $f: A \to B$ be a bijective function then $f^{-1}: B \to A$ is a function such that $f[f^{-1}(x)] = x \ \forall\ x \in B$ and $f^{-1}[f(x)] = x \ \forall\ x \in A$. For ensuring bijectivity, domain of trigonometric function are restricted.

Based on the above information, answer the following questions:

(*i*) Find the value of $\sin^{-1}(\sin 10)$.

(*ii*) Find the value of $\tan^{-1}\left(\sqrt{\frac{1-\cos x}{1+\cos x}}\right)$ if $x \in (-\pi, \pi)$.

(*iii*) Find the value of function $\sin(\tan^{-1} x)$.

**OR**

Find the value of function $\cos[\text{cosec}^{-1}(x)]$.

# Inverse trigonometric functions

1. Solution of $\tan^{-1}x - \cot^{-1}x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ is

   (a) $-\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$

   (c) $\sqrt{3}$ (d) $-\frac{1}{\sqrt{3}}$

2. If $\alpha \le 2\sin^{-1}x + \cos^{-1}x \le \beta$, then $\alpha$ and $\beta$ are

   (a) $\alpha = 0, \beta = \pi$ (b) $\alpha = \pi, \beta = 0$

   (c) $\alpha = -\frac{\pi}{2}, \beta = \frac{\pi}{2}$ (d) $\alpha = \frac{\pi}{2}, \beta = -\frac{\pi}{2}$

3. If $\tan^{-1}x = \frac{\pi}{10}$ for some $x \in R$, then the value of $\cot^{-1}x$ is

   (a) $\frac{\pi}{5}$ (b) $\frac{2\pi}{5}$ (c) $\frac{3\pi}{5}$ (d) $\frac{4\pi}{5}$

4. The principal value of $\tan^{-1}\left(\tan\frac{9\pi}{8}\right)$ is

   (a) $\frac{\pi}{8}$ (b) $\frac{3\pi}{8}$ (c) $-\frac{\pi}{8}$ (d) $-\frac{3\pi}{8}$

   **[CBSE 2021]**

5. The principal value of $\cos^{-1}\left(\frac{1}{2}\right) + \sin^{-1}\left(-\frac{1}{\sqrt{2}}\right)$ is

   (a) $\frac{\pi}{12}$ (b) $\pi$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

   **[CBSE 2021]**

6. Show that $\sin^{-1}\left(\sqrt{\frac{a-x}{2a}}\right) = \frac{1}{2}\cos^{-1}\frac{x}{a}$.

**Write the principal values in Exercises 7 to 10:**

7. $\operatorname{cosec}^{-1}(2)$

8. $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

9. $\tan^{-1}(-\sqrt{3})$

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

**Write the value in Exercises 11 to 13:**

11. $\operatorname{cosec}^{-1}(\sqrt{2}) + \sec^{-1}(\sqrt{2})$

12. $\cos^{-1}\left(\cos\frac{2\pi}{3}\right) + \sin^{-1}\left(\cos\frac{2\pi}{3}\right)$

13. $\tan^{-1}(\sqrt{3}) + \cot^{-1}\left(\frac{1}{\sqrt{3}}\right)$

14. What is the domain of the function $\operatorname{cosec}^{-1}x$?

15. Write one branch of $\tan^{-1}x$ other than the principal branch.

**Evaluate in Exercises 16 to 27:**

16. $\sin^{-1}\left\{\cos\left(\sin^{-1}\frac{3}{2}\right)\right\}$

17. $\operatorname{cosec}^{-1}\left\{\operatorname{cosec}\left(-\frac{\pi}{4}\right)\right\}$

18. $\cos\left\{\frac{\pi}{3} - \cos^{-1}\left(\frac{1}{2}\right)\right\}$

19. $\sec^2(\tan^{-1}2)$

20. $\cos^{-1}\left(\cos\frac{5\pi}{3}\right)$

21. $\tan^{-1}\{\cos\pi\}$

22. Find the value of $\sin\left\{2\cot^{-1}\left(-\frac{5}{12}\right)\right\}$.

**In the following questions, a statement of assertion (*A*) is followed by a statement of reason (*R*). Choose the correct answer out of the following choices.**

**(a) Both *A* and *R* are true and R is the correct explanation of *A*.**

**(b) Both *A* and *R* are true but *R* is not the correct explanation of *A*.**

**(c) *A* is true but *R* is false.**

**(d) *A* is false but *R* is true.**

23. **Assertion (*A*):** The domain of the function $f(x) = \cos^{-1}(3x + 1)$ is $\left[\frac{-2}{3}, 0\right]$

    **Reason (*R*):** Domain of $\cos^{-1}$ is $[-1, 1]$

24. **Assertion (*A*):** $\sin^{-1}(-1.0001)$ is defined.

    **Reason (*R*):** Domain of $\sin^{-1}x$ is $[-1, 1]$.

25. **Assertion (*A*):** Principal value of $\sin^{-1}\left(\sin\frac{17\pi}{18}\right)$ is $\frac{\pi}{18}$.

    **Reason (*R*):** Domain of principal value branch of $\sin^{-1}$ is $[-1, 1]$.

26. **Assertion (*A*):** The range of principal value branch of $\operatorname{cosec}^{-1}x$ is $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] - \{0\}$.

    **Reason (*R*):** Domain of principal value branch of $\operatorname{cosec}^{-1}x$ is $[-1, 1] - \{0\}$

27. A teacher gives a table of the domain and range of inverse trigonometric functions to the students and told them that when we dealing with the inverse trigonometric functions, we need to careful about their range, which is defined from restricted domain of trigonometric functions.

# Matrix

1. If $A = \begin{bmatrix} 5 & x \\ y & 0 \end{bmatrix}$ and $A = A'$ then

   (a) $x = 0, y = 5$ (b) $x = y$

   (c) $x + y = 5$ (d) $x - y = 5$

2. If a matrix $A$ is both symmetric and skew symmetric then matrix $A$ is

   (a) a scalar matrix

   (b) a diagonal matrix

   (c) a zero matrix of order $n \times n$

   (d) a rectangular matrix.

3. If $A$ is a skew symmetric matrix then $A^2$ is a

   (a) square matrix

   (b) diagonal matrix

   (c) symmetric matrix

   (d) skew symmetric matrix

4. If $A$ and $B$ are two matrices such that their multiplication is defined, then $(AB)'$

   (a) $A'B'$ (b) $AB$

   (c) $AB'$ (d) $B'A'$

5. For the matrix $X = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$, $(X^2 - X)$ is [CBSE 2021]

   (a) $2I$ (b) $3I$ (c) $I$ (d) $5I$

6. For two matrices $P = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ and $Q^T = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$, $P - Q$ is [CBSE 2021]

   (a) $\begin{bmatrix} 2 & 3 \\ -3 & 0 \\ 0 & -3 \end{bmatrix}$ (b) $\begin{bmatrix} 4 & 3 \\ -3 & 0 \\ -1 & -2 \end{bmatrix}$

   (c) $\begin{bmatrix} 4 & 3 \\ 0 & -3 \\ -1 & -2 \end{bmatrix}$ (d) $\begin{bmatrix} 2 & 3 \\ 0 & -3 \\ 0 & -3 \end{bmatrix}$

7. If $A' = \begin{bmatrix} -2 & 3 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 \\ 1 & 2 \end{bmatrix}$, then find $(A + 2B)'$. [NCERT]

8. Is matrix $A = \begin{bmatrix} 0 & -1 & 2 \\ 1 & 0 & -3 \\ -2 & 3 & 0 \end{bmatrix}$ symmetric or skew symmetric? Give a reason.

9. If $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, prove that $A - A^T$ is a skew symmetric matrix, where $A^T$ denotes the transpose of $A$.

10. If $A = \begin{bmatrix} 4 & 1 \\ 5 & 8 \end{bmatrix}$, show that $A + A^T$ is a symmetric matrix, where $A^T$ denotes the transpose of matrix $A$.

11. For the matrix $A$, show that $A + A^T$ is a symmetric matrix. [HOTS]

12. Matrix $A = \begin{bmatrix} 0 & 2b & -2 \\ 3 & 1 & 3 \\ 3a & 3 & -1 \end{bmatrix}$ is given to be symmetric, find values of $a$ and $b$. [Delhi 2016]

13. If $A = \begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$, $B = [-2 \ -1 \ -4]$, verify that $(AB)' = B'A'$.

14. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, verify that $AA' = I$

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1. If $F(x) = \begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$, then $F(x)\,F(y)$ is equal to (1 Mark)

   (a) $F(x)$ (b) $F(xy)$

   (c) $F(x + y)$ (d) $F(x - y)$

2. The matrix $A$ satisfies the equation $\begin{bmatrix} 0 & 2 \\ -1 & 1 \end{bmatrix} A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then matrix $A$ is (1 Mark)

   (a) $\begin{bmatrix} 2 & 0 \\ 1 & -1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & -2 \\ 1 & 0 \end{bmatrix}$

   (c) $\begin{bmatrix} \frac{1}{2} & -1 \\ \frac{1}{2} & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 2 \\ -1 & 0 \end{bmatrix}$

3. If $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, then $A^6$ is equal to (1 Mark)

   (a) zero matrix (b) $A$

   (c) $I$ (d) None of these

4. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then $A^2 - 5A - 7I$ is **(1 Mark)**

(a) a zero matrix (b) an identity matrix

(c) diagonal matrix (d) None of these

5. If a matrix has 28 elements, what are the possible orders it can have? What if it has 13 elements?

[NCERT Exemplar] **(2 Marks)**

6. Construct $a_{2\times 2}$ matrix where, $a_{ij} = |-2i + 3j|$.

[NCERT Exemplar] **(2 Marks)**

7. If $A = [a_{ij}] = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = [b_{ij}] = [-3\ 2]$, then find $\frac{a_{11} \cdot b_{12}}{a_{21} \cdot a_{12}} + b_{11}$. **(2 Marks)**

8. If $\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = A + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix}$, then find the matrix $A$. [Delhi 2013] **(2 Marks)**

9. Find the value of $x + y$ from the following equation:

$$2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}$$

[NCERT; Bhubaneshwar 2015; AI 2012] **(2 Marks)**

10. If $2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$, then write the value of $(x + y)$. [Delhi 2013(C)] **(2 Marks)**

11. Simplify

$$\tan\theta\begin{bmatrix} \sec\theta & \tan\theta \\ \tan\theta & -\sec\theta \end{bmatrix} + \sec\theta\begin{bmatrix} -\tan\theta & -\sec\theta \\ -\sec\theta & \tan\theta \end{bmatrix}.$$

**(2 Marks)**

12. Solve the following matrix equation for $x$,

$$[x\ \ 1]\begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = O.$$ [Delhi 2014] **(2 Marks)**

13. If $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$, then find $(3A - B)$.

[Guwahati 2015] **(2 Marks)**

14. Write the element $a_{12}$ of the matrix $A = [a_{ij}]_{2\times 2}$, whose elements $a_{ij}$ are given by $a_{ij} = e^{2ix} \sin jx$.

[Punchkula 2015] **(2 Marks)**

15. Write a $3 \times 3$ skew symmetric matrix.

[Chennai 2015] **(2 Marks)**

16. If $A = \begin{bmatrix} 1 & 3 & 5 \\ -2 & 5 & 7 \end{bmatrix}$ and $2A - 3B = \begin{bmatrix} 4 & 5 & -9 \\ 1 & 2 & 3 \end{bmatrix}$, find $B$. **(2 Marks)**

17. Find $x$, if $[x\ \ 1]\begin{bmatrix} 1 & 0 \\ -2 & -3 \end{bmatrix}\begin{bmatrix} x \\ 3 \end{bmatrix} = O$. [HOTS] **(2 Marks)**

18. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, find $A^2 - 5A + 16I$.

[Patna 2015] **(3 Marks)**

19. If $f(x) = x^2 - 4x + 1$, find $f(A)$, when $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$. **(3 Marks)**

20. Find the matrix $X$ such that,

$$\begin{bmatrix} 2 & -1 \\ 0 & 1 \\ -2 & 4 \end{bmatrix} X = \begin{bmatrix} -1 & -8 & -10 \\ 3 & 4 & 0 \\ 10 & 20 & 10 \end{bmatrix}.$$ [HOTS] **(3 Marks)**

21. If $A$ is a square matrix such that $A^2 = A$, show that $(I + A)^3 = 7A + I$. [NCERT Exemplar; AI 2014] **(3 Marks)**

22. Find $x$, if $[x\ -5\ -1]\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}\begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix} = O$.

[NCERT] **(3 Marks)**

23. If $A = \begin{bmatrix} 0 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 0 \end{bmatrix}$ and $I$ is the identity matrix of order 2, show that

$$I + A = (I - A)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$$

[NCERT] **(5 Marks)**

24. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, find $A^2 - 5A + 4I$ and hence find a matrix $X$ such that $A^2 - 5A + 4I + X = O$.

[Delhi 2015] **(5 Marks)**

25. For the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 4I = O$. Hence find $A^{-1}$.

[Guwahati 2015] **(5 Marks)**

# Determinants

1. $A$ and $B$ are invertible matrices of the same order such that $|(AB)^{-1}| = 8$, If $|A| = 2$, then $|B|$ is

   (*a*) 16 (*b*) 4 (*c*) 6 (*d*) $\frac{1}{16}$.

2. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$, then adj $A$ is

   (*a*) $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ (*b*) $\begin{bmatrix} -\sin\theta & \cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$

   (*c*) $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ (*d*) $\begin{bmatrix} \sin\theta & \cos\theta \\ \cos\theta & -\sin\theta \end{bmatrix}$

3. The matrix $\begin{bmatrix} 4+3k & 3 \\ 1+2k & 2 \end{bmatrix}$ is singular matrix, for $k$ equal to

   (*a*) 0 (*b*) –1

   (*c*) 1 (*d*) no value of $k$

4. If the value of a third order determinant is 7, then the value of a determinant formed by replacing each element by its cofactor will be

   (*a*) 7 (*b*) –7

   (*c*) 49 (*d*) 14

5. The values of '$x$' for which $\begin{vmatrix} 6 & -2 \\ 2 & 4 \end{vmatrix} = x^2 - 12x$ are

   (*a*) –2, 14 (*b*) 2, –14

   (*c*) –2, –14 (*d*) None of these

6. For what value of $x$, the matrix $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ is singular?

7. Determinant of a non-singular matrix $P$ of order 2 is 12. Find the determinant of $P^{-1}$.

8. If $A^2 - 3A + I = O$ and $A$ is a non-singular matrix, then write $A^{-1}$ in terms of $I$ and $A$.

9. If the value of third order determinant is 12, then find the value of the determinant formed by its cofactors.

10. If $A = \begin{bmatrix} 2x & 0 \\ x & x \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$, find the value of $x$.

11. For $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ write $A^{-1}$. [CBSE 2020]

12. Find $A^{-1}$, if $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ and show that $A^{-1} = \frac{A^2 - 3I}{2}$.

    [NCERT Exemplar]

13. Find the adjoint of matrix $\begin{bmatrix} 1 & -1 & 2 \\ 2 & 3 & 5 \\ -2 & 0 & 1 \end{bmatrix}$ and verify that

    $A(\text{adj } A) = (\text{adj } A)A = |A|I$. [NCERT]

14. Find the inverse of matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha \\ 0 & \sin\alpha & -\cos\alpha \end{bmatrix}$. [NCERT]

# Determinants

1. Use product $\begin{bmatrix}1 & -1 & 2\\ 0 & 2 & -3\\ 3 & -2 & 4\end{bmatrix}\begin{bmatrix}-2 & 0 & 1\\ 9 & 2 & -3\\ 6 & 1 & -2\end{bmatrix}$ to solve the system of equations $x - y + 2z = 1$; $2y - 3z = 1$; $3x - 2y + 4z = 2$

2. Using matrix method solve the following system of linear equations: $x - y + 2z = 7$; $3x + 4y - 5z = -5$, $2x - y + 3z = 12$ **[NCERT; Delhi 2012]**

3. The cost of 4 kg onion, 3 kg wheat and 2 kg rice is ₹ 60. The cost of 2 kg onion, 4 kg wheat and 6 kg rice is ₹ 90. The cost of 6 kg onion, 2 kg wheat and 3 kg rice is ₹ 70. Find cost of each item per kg by matrix method. **[NCERT]**

4. If $A = \begin{bmatrix}2 & -3 & 5\\ 3 & 2 & -4\\ 1 & 1 & -2\end{bmatrix}$, find $A^{-1}$. Hence using $A^{-1}$ solve the system of equations $2x - 3y + 5z = 11$; $3x + 2y - 4z = -5$; $x + y - 2z = -3$. **[CBSE 2020; AI 2017]**

5. If $A = \begin{bmatrix}1 & 2 & 5\\ 1 & -1 & -1\\ 2 & 3 & -1\end{bmatrix}$ find $A^{-1}$ and hence solve the system of equations $x + 2y + 5z = 10$; $x - y - z = -2$; and $2x + 3y - z = -11$. **[Foreign 2017]**

6. If $A = \begin{bmatrix}1 & -2 & 0\\ 2 & 1 & 3\\ 0 & -2 & 1\end{bmatrix}$, find $A^{-1}$ and hence solve the system of equations $x - 2y = 10$; $2x + y + 3z = 8$; and $-2y + z = 7$. **[Foreign 2017]**

## ☆ Do Holiday HW in a separate notebook.

1. Maximum value of $\Delta = \begin{vmatrix}1 & 1 & 1+\cos\theta\\ 1 & 1+\sin\theta & 1\\ 1 & 1 & 1\end{vmatrix}$, $\theta$ is a real number is **(1 Mark)**

   (a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $-\frac{3}{4}$

2. If $A$ and $B$ are invertible matrices then which of the following is not correct **(1 Mark)**

   (a) $AdjA = |A|.A^{-1}$ (b) $\det(A^{-1}) = (\det A)^{-1}$

   (c) $(AB)^{-1} = B^{-1}A^{-1}$ (d) $(A + B)^{-1} = A^{-1} + B^{-1}$

3. Let A be a non-angular square matrix of order 3 × 3, then $|A \cdot \text{adj } A|$ is equal to **(1 Mark)**

   (a) $|A|^3$ (b) $|A|^2$ (c) $|A|$ (d) $3|A|$

4. Let $A$ be a square matrix of order 3 × 3 and $k$ a scalar, then $|kA|$ is equal to **(1 Mark)**

   (a) $k|A|$ (b) $|k||A|$

   (c) $k^3|A|$ (d) None of these

5. If $C_{ij}$ denotes the cofactor of element $p_{ij}$ of the matrix $P = \begin{bmatrix}1 & -1 & 2\\ 0 & 2 & -3\\ 3 & 2 & 4\end{bmatrix}$, then the value of $C_{31} \cdot C_{23}$ is **(1 Mark)**

   (a) 5 (b) 24 (c) −24 (d) −5

6. If for the matrix $A = \begin{bmatrix}\alpha & -2\\ -2 & \alpha\end{bmatrix}$, $|A^3| = 125$, then the value of $\alpha$ is **(1 Mark)**

   (a) ± 3 (b) −3 (c) ± 1 (d) 1

7. If $A$ is a square matrix of order 3 and $|A| = -5$, then $|adj\ A|$ is **(1 Mark)**

   (a) 125 (b) −25 (c) 25 (d) ±25

8. Let matrix $X = [x_{ij}]$ is given by $X = \begin{bmatrix}1 & -1 & 2\\ 3 & 4 & -5\\ 2 & -1 & 3\end{bmatrix}$. Then the matrix $Y = [m_{ij}]$, where $m_{ij}$ = Minor of $x_{ij}$, is **(1 Mark)**

   (a) $\begin{bmatrix}7 & -5 & -3\\ 19 & 1 & -11\\ -11 & 1 & 7\end{bmatrix}$ (b) $\begin{bmatrix}7 & -19 & -11\\ 5 & -1 & -1\\ 3 & 11 & 7\end{bmatrix}$

   (c) $\begin{bmatrix}7 & 19 & -11\\ -3 & 11 & 7\\ -5 & -1 & -1\end{bmatrix}$ (d) $\begin{bmatrix}7 & 19 & -11\\ -1 & -1 & 1\\ -3 & -11 & 7\end{bmatrix}$

9. If $x = -4$ is a root of $\begin{vmatrix}x & 2 & 3\\ 1 & x & 1\\ 3 & 2 & x\end{vmatrix} = 0$, then the sum of the other two roots is **(1 Mark)**

   (a) 4 (b) −3 (c) 2 (d) 5

10. If points (2, 0), (0, 5) and $(x, y)$ are collinear, then show that $\frac{x}{2} + \frac{y}{5} = 1$. **(2 Marks)**

11. If $A$ is a square matrix of order 3 and $|3A| = k|A|$, then write the value of $k$. **(2 Marks)**

12. $A$ is a non-singular matrix of order 3 and $|A| = -4$. Find $|\text{adj } A|$. **[HOTS] (2 Marks)**

## Subject Hindi

1-सिल्वर वेडिंग कहानी के माध्यम से पुरानी पीढ़ी एवं नई पीढ़ी के अंतराल को समझाइए तथा यह भी बताइए कि इस अंतराल में सामंजस्य कैसे बैठाया जा सकता है।(कॉपी में)

2-हरिवंश राय बच्चन द्वारा लिखित मधुशाला की किन्ही 10, 12 पंक्तियों को लिखिए जो आपको बहुत प्रभावित करती हो। (फाइल पेज में)

3-किन्ही दो दैनिक हिंदी समाचार पत्र के संपादकीय पृष्ठ मे आए फीचर लेखन, संपादकीय ,आलेख ,स्तंभ लेखन ,प्रेरक प्रसंग, संपादक के नाम पत्र, और लेख आदि को काटकर और उनके बारे में भी लिखकर परियोजना कार्य तैयार करें। -जैसे फीचर लेखन किसे कहते हैं यह कैसे लिखा जाता है इसी प्रकार अन्य के बारे में भी लिखें(फाइल में)

**नोट-प्रश्न 2 और 3 के रचनात्मक क्रियाकलाप के लिए एक फाइल बनाएं। जिसमें रंगीन पेपर पर विषय की अभिव्यक्ति चित्रात्मक रूप से करें ।चित्रों को पृष्ठ के बाएं ओर (left side) स्वच्छता के साथ चिपकाएं।**