

SUMMER BREAK HOLIDAY HOMEWORK

(Medical + Non Medical)

CLASS: 11 (Session: 2025-26)

English

Instructions: Attempt all questions to the best of your ability. Pay attention to grammar, spelling, and presentation. This assignment is designed to help you revise key concepts and express your creativity. Have a wonderful and productive holiday!

Total Marks: 25

Section A: Grammar (10 Marks)

1. Fill in the blanks with the most appropriate determiners: (2 Marks)

a) Have you got _____ new books to read? (some / any / many) b) He is _____ honest man. (a / an / the) c) She spent _____ money she had saved. (little / few / all) d) _____ of the students were present in the class. (Each / Every / Both)

2. Complete the following sentences using the correct tense of the verbs given in brackets: (2 Marks)

a) My train _____ (arrive) at 6 pm yesterday. b) They _____ (play) football in the park right now. c) By the time we reach the station, the bus _____ (leave). d) She _____ (live) in this city for ten years.

3. Fill in the blanks with the most suitable modals: (2 Marks)

a) You _____ (should / must / might) see a doctor if you have a fever. b) I _____ (can / could / may) swim across the river when I was younger. c) It _____ (will / would / shall) probably rain this evening. d) Students _____ (need / dare / ought to) submit their assignments on time.

4. Rewrite the following sentences correcting the subject-verb concord: (2 Marks)

a) The quality of the apples were not good. b) Each boy and girl have received a prize. c) Neither the cat nor the dogs was happy. d) Physics are a difficult subject for many students.

5. Change the following sentences into Reported Speech: (2 Marks)

a) He said to me, "What are you doing?" b) The teacher said, "Close the door, please."

Section B: Writing Skills (15 Marks)

6. Letter Writing (8 Marks)

Write a letter to the Editor of a local newspaper expressing your concern about the increasing noise pollution in your city and suggesting possible measures to control it.

7. Poster Making (7 Marks)

Design a creative and informative poster on one of the following topics:

- a) Save Water, Save Life
- b) Say No to Single-Use Plastic
- c) Importance of Reading Books

Your poster should include:

- A catchy title/slogan
- Relevant images or drawings
- A clear message
- Use of different fonts and colors to make it visually appealing.

Chemistry

- Update fair notebook with intext and exercise question answers of Chapter 2 Atomic Structure.
- To do correction work for class test in fair notebook.
- To solve and write the solutions to following questions based on chapter -1 and 2.

Chapter-1 Some Basic Concepts in Chemistry

1. 5.2 g of CaCO_3 when heated produced 1.99 g of carbon dioxide and the residue (CaO) left behind weighs 3.2 g. Show that these results illustrate the law of conservation of mass.
2. In an experiment, 2.4 g of iron oxide on reduction with hydrogen yields 1.68 g of iron. In another experiment 2.9 g of iron oxide give 2.03 g of iron on reduction with hydrogen. Show that above data illustrate the law of constant proportion.

- Two oxides of a metal contain 27.6 % and 30.0 % of oxygen respectively. If the formula of the first oxide is M_3O_4 , find that of the second oxide.
- X and Y are known to form two compounds, the X content in one is 5.93 % while in other is 11.2 %. Show that this data is in agreement with the law of multiple proportions.
- Find the percentage composition of potassium chlorate ($KClO_3$).
- The mass of 94.5 mL of a gas at STP is found to be 0.2231 g. Calculate its molecular mass.
- You are supplied with a gas containing 0.32 g of oxygen. Calculate the number of moles and number of molecules present in it.
- Carbon occurs in nature as a mixture of carbon-12 and carbon-13. The average atomic mass of carbon is 12.011. What is the percentage abundance of carbon-12 in nature?
- A compound contains Carbon, Hydrogen and Oxygen as 71.23%, 12.95% and 15.81 % respectively. What is the empirical formula of the compound?
- How many grams of barium chloride ($BaCl_2$) are needed to prepare 100 cm³ of 0.250 M $BaCl_2$ solution? [Given; atomic mass of Ba=137 u, Cl=35.5 u].
- Find the molarity and molality of 15 % solution of H_2SO_4 . (density of H_2SO_4 solution is 1.020 g cm⁻³).
- A solution contains 2.80 mole of Acetone and 8.20 mole of Chloroform. Calculate the mole fraction of acetone.
- Assume that you have 1.39 mol of N_2 and 3.44 mol of H_2 .
 - How many moles of ammonia can you make?
 - How many grams of which reactant will be left over?
- Chlorine is prepared in laboratory by treating manganese dioxide (MnO_2) with aqueous hydrochloric acid according to the reaction:

$$MnO_2 + 4HCl \longrightarrow MnCl_2 + Cl_2 + 2H_2O$$
 How many grams of HCl reacts with 5.0 g of manganese dioxide?
- How many grams of $KClO_3$ must be decomposed to prepare 3.36 litre of Oxygen at STP?

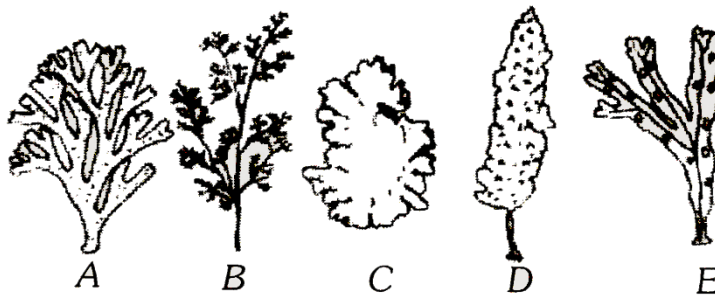
Chapter-2 Structure of Atom

- Write the representation of an isotope of $^{235}_{92}U$ that has 146 neutrons.
- Two nuclides A and B are isotones. Their mass numbers are 76 and 77 respectively. If atomic number of A is 32, then what will be the atomic number of B?
- Calculate the number of protons, neutrons and electrons in $^{80}_{35}Br$.
- What is the ratio of fifth orbits of He^+ and Li^{2+} ion?
- What is the energy needed to excite a hydrogen atom from its ground state to its third excited state?
- In photoelectric effect, irradiation of a metal with light of frequency $5 \times 10^{20} \text{ s}^{-1}$ yields electrons with kinetic energy $6.63 \times 10^{-14} \text{ J}$. Calculate threshold frequency (ν_0) for the metal.
- Derive de Broglie equation. Why do cars moving on the road not make a wave?
- What is the mass of a photon of sodium light with a wavelength of 5890 Å?
- If the velocity of the electron in Bohr's first orbit is $2.19 \times 10^6 \text{ m/s}$, calculate de Broglie wavelength associated with it.
- A molecule of O_2 and SO_2 moves with same velocity. What is the ratio of their wavelengths?
- Two particles A and B are in motion. If the wavelength associated with particle A is $5 \times 10^{-8} \text{ m}$, calculate the wavelength associated with particle B, if its momentum is half of A.
- State Heisenberg's uncertainty principle. Give its mathematical expression. Why is this principle significant only for microscopic particles?
- Table tennis ball has a mass of 10 g and a speed of 90 m/s. If speed can be measured within an accuracy of 4 %, calculate the uncertainty in speed and position.
- Draw the shapes of d_{xy} and $d_{x^2-y^2}$. And mention one point of difference between these orbitals.
- Give physical significance of Ψ and Ψ^2 .
- What designation is given to an orbital having
 - $n = 2, l = 0$
 - $n = 4, l = 2$
- How many electrons in sulphur ($Z = 16$) can have $n + l = 3$?
- An element X has electronic configuration $[Ar] 3d^4$ in its X^{3+} state. What will be the configuration of X?
- Give value of n, l, m and s for an unpaired electron in copper.
- Write electronic configuration for:
 - N (7)
 - B (5)
 - Na (11)
 - Ca (20)
 - Cr (24)

BIOLOGY

CH- 3 PLANT KINGDOM

Q1. Identify the given algae A to E.



Q2. Define phylogenetic classification systems, numerical taxonomy, cytotaxonomy and chemotaxonomy.

Q3. Give general characteristics of Kingdom Algae & discuss its mode of reproduction also.

Q4. Name two hydrocolloids obtained from algae.

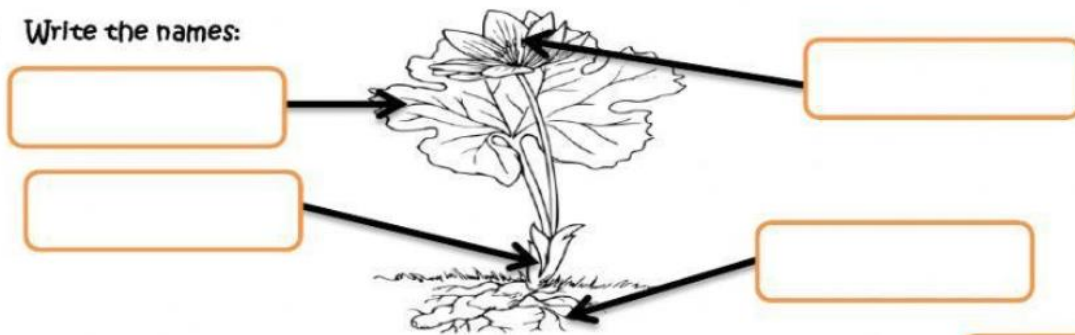
Q5. Name two algae from which agar is obtained. Give commercial use of agar.

Q6. Name two unicellular algae rich in proteins & which are used as protein supplements by space travelers.

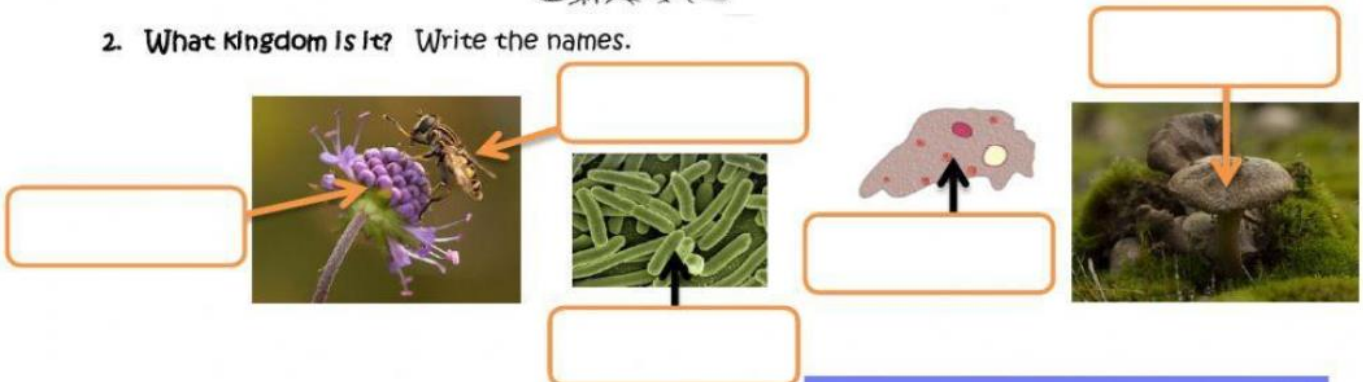
Q7. List the name divisions of kingdom Algae & give their characteristics.

Q8. Complete the following table using given clues-

1. Write the names:



2. What kingdom is it? Write the names.



Q9. Explain the following

(i) Sporophyll

(ii) Isogamy

(iii) Anisogamy

Q10. Explain briefly the life cycle of bryophytes in flow chart.

Q11. Match the following column A with column B

Column A	Column B
1. Bryophyta	A. Naked seeds
2. Thallophyta	B. Mosses
3. Gymnosperms	C. Liverworts
4. Pteridophyta	D. Ferns
5. Angiosperms	E. Flowering plants

Q12. **MULTIPLE CHOICE QUESTIONS**

1. A plant that has seeds but no flowers and fruits?

(a) Bryophytes (b) Gymnosperms (c) Mosses (d) Pteridophytes

2. Pteridophytes differ from mosses in
 - (a) Independent gametophyte
 - (b) Dependent gametophyte
 - (c) Flagellate antherozoids
 - (d) Independent and dominant sporophyte
3. Plants having vascular tissue without seeds
 - (a) Angiosperm
 - (b) Pteridophytes
 - (c) Bryophytes
 - (d) Gymnosperms
4. A colonial alga is
 - (a) Volvox
 - (b) Chlorella
 - (c) Ulothrix
 - (d) Spirogyra

COMPUTER SCIENCE WITH PYTHON

Topic: Python Programming

1. 'Python is an interpreted high level language'. What does it mean to you?
2. What is the difference between interactive mode and script mode in Python?
3. What does a cross platform language mean?
4. What is the difference between a keyword and an identifier?
5. How many types of strings are supported in Python?
6. What factors guide the choice of identifiers in program?
7. What is the error in following Python program with one statement?

```
print ("My name is ", name)
```

 Suggest a solution.
8. Write a program to obtain temperature in Celsius and convert it into Fahrenheit using formula $F = C \times 9 / 5 + 32$.
9. Predict the output :

```
F = 2
S = 3
T = F * S
print(F,S,T)
F = F + S + T
T = S * F
print(F,S,T)
```
10. Write a program to accept radius from the user and print its area.
11. Write a program that asks for your height in centimeters and then convert your height to feet and inches.
12. Write a program to read details like name, class, age of a student and then print the details firstly in same line and then in separate lines. Make sure to have break lines in these two different types of prints.
13. What are data types? What are Python's built in core data types?
14. What is a function? How is it useful?
15. Write a python program to count the number of characters (character frequency) in a string.

Email all programs with your name and class to sandeepsinghsgs@gmail.com

Physics

1. Do a family trip and record the initial and final readings of the odometer of your vehicle. Calculate the average speed for the trip.

2. Record the maximum reading of the speedometer of the vehicle Did it exceed the maximum speed limit recommended by the transport authority? Be honest in your response.
3. Take any five readings of the speedometer during the trip and plot v-t curve according to a scale of your choice. Draw conclusions about the motion from the graph obtained.
4. Take a square sheet of dimensions 30X30 cm. Using the knowledge of application of derivative make an open box from it with the maximum possible volume.
5. Using online graph maker get a graph of the equation $y = \sin x$.Find the area under y-x curve within the limits of $x=0$ to $x=\pi$ (180°) by integration method and then compare its value with the area obtained by cutting and adding method.
6. Make a list of the physical quantities added recently in our modern life and write their units also.(any 5 at least).
7. Practice all NCERT questions of the chapters **UNITS AND MEASUREMENT** and basics of **MOTION IN STRAIGHT LINE**.

HOLIDAY HOMEWORK

CLASS XI- MATHS

Trigonometric Functions

1. If $\sin \theta = \frac{3}{5}$, $\tan \varphi = \frac{1}{2}$, $\frac{\pi}{2} < \theta < \pi < \varphi < \frac{3\pi}{2}$ then find the value of $8 \tan \theta - \sqrt{5} \sec \varphi$.
 $\left(A = \frac{-7}{2} \right)$
2. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$, $\cos B = \frac{-12}{13}$, $\pi < B < \frac{3\pi}{2}$, find the value of $\sin(A - B)$, $\cos(A + B)$, $\tan(A - B)$
3. If A lies in the fourth quadrant and $\cos A = \frac{5}{13}$, find the value of $\frac{13 \sin A + 5 \sec A}{5 \tan A + 6 \csc A}$
4. If $\cos \theta = \frac{-1}{2}$ and $\pi < \theta < \frac{3\pi}{2}$, find the value of $4 \tan^2 \theta - 3 \cos^2 \theta$
5. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$ and $\cos B = \frac{-12}{13}$, $\pi < B < \frac{3\pi}{2}$ then find the following:
 (i) $\sin(A - B)$ (ii) $\cos(A + B)$ (iii) $\tan(A - B)$ $\left(A = \frac{-16}{65}, \frac{-33}{65}, \frac{16}{63} \right)$
6. Find the value of $\tan(A + B)$, given that $\cot A = \frac{1}{2}$, $\sec B = \frac{-5}{3}$, $\pi < A < \frac{3\pi}{2}$, $\frac{\pi}{2} < B < \pi$
7. Prove the following:
 - a) $\cos 570^\circ \sin 510^\circ + \sin(-330^\circ) \cos(-390^\circ) = 0$
 - b) $\frac{\cos(2\pi + \theta) \csc(2\pi + \theta) \tan\left(\frac{\pi}{2} + \theta\right)}{\sec\left(\frac{\pi}{2} + \theta\right) \cos(\theta) \cot(\pi + \theta)} = 1$
 - c) $\frac{\cos(90^\circ + \theta) \sec(-\theta) \tan(180^\circ - \theta)}{\sec(360^\circ - \theta) \sin(180^\circ + \theta) \cot(90^\circ - \theta)} = -1$
 - d) $\sin^2 \frac{\pi}{4} + \sin^2 \frac{3\pi}{4} + \sin^2 \frac{5\pi}{4} + \sin^2 \frac{7\pi}{4} = 2$
 - e) $\sin 600^\circ \tan(-690^\circ) + \sec 840^\circ \cot(-945^\circ) = \frac{3}{2}$
 - f) $\cos 306^\circ + \cos 234^\circ + \cos 162^\circ + \cos 18^\circ = 0$
 - g) $\sin^2 54^\circ - \sin^2 72^\circ = \sin^2 18^\circ - \sin^2 36^\circ$
8. In any quadrilateral ABCD, prove that: $\sin(A + B) + \sin(C + D) = 0$
9. Prove that:
 - a) $\tan 315^\circ \cot(-405^\circ) + \cot 495^\circ \tan(-585^\circ) = 2$
 - b) $\cos 510^\circ \cos 330^\circ + \sin 390^\circ \cos 120^\circ = -1$
 - c) $\sin \frac{8\pi}{3} \cos \frac{23\pi}{6} + \cos \frac{13\pi}{3} \sin \frac{35\pi}{6} = \frac{1}{2}$
 - d) $\cos 570^\circ \sin 510^\circ + \sin(-330^\circ) \cos(-390^\circ) = 0$

e) $3\sin\frac{\pi}{6}\sec\frac{\pi}{3} - 4\sin\frac{5\pi}{6}\cot\frac{\pi}{4} = 1$

f)
$$\frac{\cos(2\pi + \theta)\operatorname{cosec}(4\pi + \theta)\tan\left(\frac{\pi}{2} + \theta\right)}{\sec\left(\frac{\pi}{2} + \theta\right)\cos(-\theta)\cot(\pi + \theta)} = 1$$

10. In any cyclic quadrilateral ABCD, prove:

a) $\tan A + \tan B + \tan C + \tan D = 0$

b) $\cos(180^\circ - A) + \cos(180^\circ + B) + \cos(180^\circ + C) - \sin(90^\circ + D) = 0$

11. Find x from the following equation: $\operatorname{cosec}(90^\circ + \theta) + x \cos \theta \cot(90^\circ + \theta) = \sin(90^\circ + \theta)$

12. If A,B,C,D are angles of a cyclic quadrilateral, prove that:

$\cos A + \cos B + \cos C + \cos D = 0$

13. Find x from the following equation:

a) $\operatorname{cosec}(270^\circ + A) = \cos(180^\circ + A) + x \sin(90^\circ + A) \cot(270^\circ + A)$

b) $x \cot(90^\circ + A) + \tan(90^\circ + A) \sin A + \operatorname{cosec}(90^\circ + A) = 0$

14. Prove that:

a) $\tan 8\theta - \tan 6\theta - \tan 2\theta = \tan 8\theta \tan 6\theta \tan 2\theta$

b) $\tan 70^\circ = \tan 20^\circ + 2 \tan 50^\circ$

c) $\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ$

d) $\frac{\cos 15^\circ - \sin 15^\circ}{\cos 15^\circ + \sin 15^\circ} = \frac{1}{\sqrt{3}}$

15. If $A + B = \frac{\pi}{4}$, prove that $(1 + \tan A)(1 + \tan B) = 2$

16. Evaluate : a) $\cos(-1125^\circ)$ b) $\tan\left(\frac{11\pi}{6}\right)$ c) $\operatorname{cosec}(-1200^\circ)$

17. Prove that :

a) $\frac{\sin(A+B) + \sin(A-B)}{\cos(A+B) + \cos(A-B)} = \tan A$

b) $\frac{\sin(A-B)}{\cos A \cos B} + \frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A} = 0$

c) $\tan 13\theta - \tan 9\theta - \tan 4\theta = \tan 13\theta \tan 9\theta \tan 4\theta$

d) $\tan 15^\circ + \tan 30^\circ + \tan 15^\circ \tan 30^\circ = 1$

e) $\tan 36^\circ + \tan 9^\circ + \tan 36^\circ \tan 9^\circ = 1$

f) $\frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ} = \tan 37^\circ$

g) $\frac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \tan 54^\circ$

h) $\tan 50^\circ = \tan 40^\circ + 2 \tan 10^\circ$

i) $\tan\left(\frac{\pi}{4} + A\right) \tan\left(\frac{\pi}{4} - A\right) = 1$

j) $(1 + \tan A)(1 + \tan B) = 2 \tan A$, where $A - B = \frac{\pi}{4}$

k) $\tan 75^\circ - \tan 30^\circ - \tan 75^\circ \tan 30^\circ = 1$

18. If $\tan x + \tan\left(x + \frac{\pi}{3}\right) + \tan\left(x + \frac{2\pi}{3}\right) = 3$, then prove that : $\frac{3 \tan x - \tan^3 x}{1 - 3 \tan^2 x} = 1$

19. Prove that:

a) $\frac{1 + \sin 2\theta + \cos 2\theta}{1 + \sin 2\theta - \cos 2\theta} = \cot \theta$

b) $\frac{\cos 2\theta}{1 + \sin 2\theta} = \tan\left(\frac{\pi}{4} - \theta\right)$

c) $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \cot \frac{\theta}{2}$

d) If $\tan \frac{x}{2} = \frac{n}{m}$, find the value of $m \cos x + n \sin x$

20. Show that: $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2 \cos 8\theta}}} = 2 \cos \theta$

21. Prove that :

a) $\frac{\sin 2\theta}{1 - \cos 2\theta} = \cot \theta$

b) $\frac{1 + \sin \theta - \cos \theta}{1 + \sin \theta + \cos \theta} = \tan \frac{\theta}{2}$

c) $\sqrt{\frac{1 - \cos 2\theta}{1 + \cos 2\theta}} = \tan \theta$

d) $\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}} = 2 \cos \theta$

e) $\frac{\sin 2\theta + \sin \theta}{1 + \cos \theta + \cos 2\theta} = \tan \theta$

f) $\cos 4\theta = 1 - 8 \sin^2 \theta + 8 \sin^4 \theta$

22. If $\sin x = \frac{\sqrt{5}}{3}$ and $\frac{\pi}{2} < x < \pi$, find the value of $\sin \frac{x}{2}, \cos \frac{x}{2}, \tan \frac{x}{2}$.

23. Prove that : $\cos^4 \frac{\pi}{8} + \cos^4 \frac{3\pi}{8} + \cos^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8} = \frac{3}{2}$

24. Prove that: $\left(1 + \cos \frac{\pi}{8}\right)\left(1 + \cos \frac{3\pi}{8}\right)\left(1 + \cos \frac{5\pi}{8}\right)\left(1 + \cos \frac{7\pi}{8}\right) = \frac{1}{8}$

25. Prove that : $\sin^4 \frac{\pi}{8} + \sin^4 \frac{3\pi}{8} + \sin^4 \frac{5\pi}{8} + \sin^4 \frac{7\pi}{8} = \frac{3}{2}$

26. Prove that: $\cos 5A = 16 \cos^5 A - 20 \cos^3 A + 5 \cos A$

27. Prove that :

a) $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$

- b) $\frac{\sin x - \sin y}{\cos x + \cos y} = \tan\left(\frac{x - y}{2}\right)$
- c) $\frac{\cos x - \cos 2x + \cos 3x}{\sin x - \sin 2x + \sin 3x} = \cot 2x$
- d) $\frac{(\cos x - \cos 3x)(\sin 8x + \sin 2x)}{(\sin 5x - \sin x)(\cos 4x - \cos 6x)} = 1$
- e) $\frac{\sin A + 2\sin 3A + \sin 5A}{\sin 3A + 2\sin 5A + \sin 7A} = \frac{\sin 3A}{\sin 5A}$
- f) $\frac{\sin 3A + \sin 5A + \sin 7A + \sin 9A}{\cos 3A + \cos 5A + \cos 7A + \cos 9A} = \tan 6A$
- g) $\frac{\sin(x + y) - 2\sin x + \sin(x - y)}{\cos(x + y) - 2\cos x + \cos(x - y)} = \tan x$
- h) $\cos 40^\circ + \cos 50^\circ + \cos 70^\circ + \cos 80^\circ = \cos 10^\circ + \cos 20^\circ$
- i) $\cos \theta - \cos 3\theta + \cos 5\theta - \cos 7\theta = 4\sin \theta \sin 4\theta \cos 2\theta$
- j) $\sin \theta + \sin\left(\frac{2\pi}{3} + \theta\right) + \sin\left(\frac{4\pi}{3} + \theta\right) = 0$
- k) If $\frac{\sin x}{a} = \frac{\cos x}{b}$, prove that $a \sin 2x + b \cos 2x = b$

28. Prove that: $\frac{\cos 8A \cos 5A - \cos 12A \cos 9A}{\sin 8A \cos 5A + \cos 12A \sin 9A} = \tan 4A$

29. Prove that: $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$

30. Prove that: $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$

31. Prove the following :

a) $\frac{\sin 3A \cos 2A - \sin 6A \cos A}{\sin A \sin 2A - \cos 2A \cos 3A} = \frac{\sin 3A}{\cos A}$

b) $\frac{\sin 3A \cos 4A - \sin A \cos 2A}{\sin 4A \sin A + \cos 6A \cos A} = \tan 2A$

c) $\frac{\sin 2A \sin 3A - \sin A \sin 4A + \sin 5A \sin 2A}{\cos 4A \cos 5A - \cos 3A \cos 6A + \cos 5A \cos 2A} = \tan 4A \tan 3A$

d) $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$

e) $\sin 10^\circ \sin 50^\circ \sin 60^\circ \sin 70^\circ = \frac{\sqrt{3}}{16}$

f) $\tan 20^\circ \tan 30^\circ \tan 40^\circ \tan 80^\circ = 1$

- (iii) $\cot \theta + \operatorname{cosec} \theta = \sqrt{3}$
 (iv) $\sin 2x = \cos 3x$
 (v) $4 \cos x - 3 \sec x = \tan x$
 (vi) $\tan x + \tan 2x + \tan x \tan 2x = 1$
 (vii) $\cos x + \cos 3x - 2 \cos 2x = 0$

33. Find the general solutions of the following equations :

a) $\cos 3\theta = -\frac{1}{2}$

b) $\tan\left(\frac{2}{3}\theta\right) = \sqrt{3}$

c) $\tan^2 \theta + (1 - \sqrt{3})\tan \theta - \sqrt{3} = 0$

d) $\tan x + \tan 2x + \tan 3x = \tan x \tan 2x \tan 3x$

e) $2 \sin^2 x + \sqrt{3} \cos x + 1 = 0$

f) $\sin x + \sin 2x + \sin 3x = 0$

g) $\cos x + \cos 3x - \cos 2x = 0$

h) $\sqrt{3} \cos x + \sin x = 1$

i) $\operatorname{cosec} x = 1 + \cot x$

Ch: COMPLEX NUMBERS

1. If a, b, c are real numbers such that $a \leq b, c > 0$, then:

(i) $ac \leq bc$ (ii) $ac < bc$ (iii) $ac > bc$ (iv) $ac \geq bc$. (Choose the correct option)

2. Solve for x : $3x + 9 \geq -x + 19$

3. Solve: $3x - 4 < 7$, when $x \in \mathbb{Z}$

4. Solve the following system of inequalities: $2x - 3 < 7, 2x > -4$

5. How many litres of a 30% acid solution must be added to 500 litres of a 12% solution so that acid content in the resulting mixture will be more than 14% but less than 20%.

6. Solve: $6x + 2 < 4x + 7$, when (i) x is a natural number (ii) x is an integer (iii) x is a real number and represent solution for each part on the number line.

7. Find all pairs of consecutive even positive integers, both of which are larger than 7, such that their sum is less than 30.

8. The water acidity in a pool is considered normal when the average pH reading of three daily measurements is between 7.2 and 7.8. If the first two pH readings are 7.48 and 7.85, find the range of pH value for the third reading that will result in the acidity level being normal.

9. Solve the following linear inequalities and show the graph of solution in each case on the number line : ($x \in \mathbb{R}$)

(i) $\frac{2x+3}{4} - 3 < \frac{x-4}{3} - 2$ (ii) $|3x-7| > 4$ (iii) $\frac{5x+8}{4-x} < 2$

(iv) $\left| \frac{3x-4}{2} \right| \leq \frac{5}{12}$ (v) $3x-2 > x + \frac{4-x}{3} > 3$

10. Solve the following system of inequalities:

(i) $5x - 7 < 3(x+3), 1 - \frac{3x}{2} \geq x - 4$

(ii) $\frac{5x}{4} + \frac{3x}{8} > \frac{39}{8}, \frac{2x-1}{12} - \frac{x-11}{3} < \frac{3x+1}{4}$

11. Solve the following system of inequalities graphically:

(i) $3x + 4y \geq 12, 4x + 7y \leq 28, y \geq 1, x \geq 0, y \geq 0$

(ii) $x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$

(iii) $x + 2y \leq 40, 3x + y \geq 30, 4x + 3y > 60, x \geq 0, y \geq 0$

Ch: Linear Inequations

1. Find the value of x and y ($x, y \in R$) if : $2y + (3x - y)i = 5 - 2i$
2. Express $3i^3 + 6i^{16} - 7i^{29} + 4i^{27}$ in the form $x + iy$ where $x, y \in R$.
3. Evaluate : $\left(i^{41} + \frac{1}{i^{257}}\right)^9$
4. If $Z_1 = 1 - i, Z_2 = -2 + 4i$, find $\operatorname{Im}\left(\frac{Z_1 Z_2}{Z_1}\right)$.
5. Find the conjugate of the complex number: $\frac{1}{2 - 3i}$
6. Write the following complex numbers in the polar form:
(i) $-2 - 2i$ (ii) $\frac{1}{1 + i}$
7. Find the complex conjugate of $\frac{(8 - 3i)(6 - i)}{2 - 2i}$.
8. Find the multiplicative inverse of $\left(\frac{3 + 4i}{4 - 5i}\right)$
9. Find the modulus and argument of $\frac{1 + 2i}{1 - 3i}$
10. If $(a + ib)^2 = (x + iy)$, prove that $(a^2 + b^2)^2 = (x^2 + y^2)$
11. Find x and y if $\frac{(1 + i)x - 2i}{3 + i} + \frac{(2 - 3i)y + i}{3 - i} = i$
12. For what values of x and y are the numbers $-3 + ix^2y$ and $x^2 + y + 4i$ complex conjugates? (x, y are real numbers.)
13. Solve the following quadratic equations:
(i) $6x^2 - 17ix - 12 = 0$
(ii) $3x^2 + 7ix + 6 = 0$
(iii) $x^2 - (7 - i)x + 18 - i = 0$
(iv) $x^2 - (3\sqrt{2} - 2i)x - 6\sqrt{2}i = 0$
(v) $2x^2 - (3 + 7ix)x + 9i - 3 = 0$
14. Find the square root of: (i) $-8 - 6i$, (ii) $-5 + 12i$, (iii) $-i$

Ch: Permutations

1. How many even numbers of 3 digits can be formed with the digits 1,2,3,4,6 if no digit is repeated?
2. How many numbers of six digits can be formed from the digits 0,1,3,5,7 and 9, which are divisible by 10 and no digit is repeated?
3. Find the number of different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, if five different flags are available.
4. How many numbers greater than 1000 and less than 4000 can be formed with the digits 0,1,2,3,4 if (a) repetition of digits is allowed (b) repetition of digits is not allowed?
5. How many odd numbers greater than 80000 can be formed using the digits 2,3,4,5 and 8 if each digit is used only once in a number?
6. Three dice are rolled. Find the number of possible outcomes in which at least one die shows a 5.
7. Evaluate: (a) $12! - 10!$ (b) $\frac{9!}{5! \times 4!}$
8. Which of the following is true? (a) $(2 + 3)! = 2! + 3!$ (b) $(2 \times 3)! = 2! \times 3!$
9. Find x , if: $\frac{1}{9!} + \frac{1}{10!} = \frac{x}{11!}$
10. If ${}^{11}P_r = {}^{12}P_{r-1}$, find r .
11. Find r , if $5 \cdot {}^4P_r = 6 \cdot {}^5P_{r-1}$
12. If ${}^{2n-1}P_n \cdot {}^{2n+1}P_{n-1} = 22 : 7$, find n .
13. How many words can be made from the letters of the word MONDAY assuming that no letter is repeated if (a) 4 letters are used at a time (b) All letters are used at a time? (c) All letters are used but the first letter is a vowel?
14. The letters of the word TRIANGLE are arranged in such a way that vowel and consonants remain together. How many different arrangements will be obtained?
15. Four different mathematics books, six different physics books and two different chemistry books are to be arranged on a shelf. How many different arrangements are possible if (a) the book in a particular subject must all stand together (b) only the mathematics books must stand together?
16. In how many ways can 5 children be arranged in a row such that two boys Akash and Samir are (a) always together (b) never together?
17. How many different 8 letter words can be formed out of the letters of the word DAUGHTER so that (a) The word starts with D and ends with R (b) Position of H remains unchanged (c) Relative position of vowels and consonants remain unaltered (d) No two vowels are together (e) All vowels never occur together?
18. How many words can be formed with the letters of the word EQUATION? In how many of them (a) vowels occur together (b) the vowels never occur together (c) the vowels and the consonants are together?
19. In how many ways can 5 boys and 3 girls be seated in a row so that no two girls are together?