

**SURAJ
SCHOOL
PATAUDI**

**SURAJ
EDUCATION**

XI B

*Summer
Vacation*

HOLIDAY HOMEWORK

SESSION 2026-27

Make your vacation
meaningful, fun-filled
and full of learning!



Name : _____

Class & Section : _____

Roll No. : _____

EXPLORE

LEARN

ENJOY

GROW

READ

LEARN

GROW

Mathematics

Holiday homework has been assigned. All MCQs from NCERT must be solved properly; students should not only tick the correct options but also write complete solutions with proper steps wherever required.

Note: Along with this, prepare short notes of your respective chapters in a neat, clear, and well-organized manner. The notes should include important formulas, definitions, key concepts, and examples for quick revision. Complete all the work sincerely and maintain proper presentation in your notebook.

SECTION-Trigonometry

30. If $\sin \theta + \operatorname{cosec} \theta = 2$, then $\sin^2 \theta + \operatorname{cosec}^2 \theta$ is equal to
(A) 1 (B) 4
(C) 2 (D) None of these
31. If $f(x) = \cos^2 x + \sec^2 x$, then
(A) $f(x) < 1$ (B) $f(x) = 1$
(C) $2 < f(x) < 1$ (D) $f(x) \geq 2$
[Hint: A.M $\geq$ G.M.]
32. If $\tan \theta = \frac{1}{2}$ and $\tan \phi = \frac{1}{3}$, then the value of $\theta + \phi$ is
(A) $\frac{\pi}{6}$ (B) π (C) 0 (D) $\frac{\pi}{4}$
33. Which of the following is not correct?
(A) $\sin \theta = -\frac{1}{5}$ (B) $\cos \theta = 1$
(C) $\sec \theta = \frac{1}{2}$ (D) $\tan \theta = 20$
34. The value of $\tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \tan 89^\circ$ is
(A) 0 (B) 1
(C) $\frac{1}{2}$ (D) Not defined

35. The value of $\frac{1 - \tan^2 15^\circ}{1 + \tan^2 15^\circ}$ is

- (A) 1 (B) $\sqrt{3}$ (C) $\frac{\sqrt{3}}{2}$ (D) 2

36. The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \cos 179^\circ$ is

- (A) $\frac{1}{\sqrt{2}}$ (B) 0 (C) 1 (D) -1

37. If $\tan \theta = 3$ and θ lies in third quadrant, then the value of $\sin \theta$ is

- (A) $\frac{1}{\sqrt{10}}$ (B) $-\frac{1}{\sqrt{10}}$ (C) $\frac{-3}{\sqrt{10}}$ (D) $\frac{3}{\sqrt{10}}$

38. The value of $\tan 75^\circ - \cot 75^\circ$ is equal to

- (A) $2\sqrt{3}$ (B) $2 + \sqrt{3}$ (C) $2 - \sqrt{3}$ (D) 1

39. Which of the following is correct?

- (A) $\sin 1^\circ > \sin 1$ (B) $\sin 1^\circ < \sin 1$
(C) $\sin 1^\circ = \sin 1$ (D) $\sin 1^\circ = \frac{\pi}{18^\circ} \sin 1$

[Hint: 1 radian = $\frac{180^\circ}{\pi} = 57^\circ 30'$ approx]

40. If $\tan \alpha = \frac{m}{m+1}$, $\tan \beta = \frac{1}{2m+1}$, then $\alpha + \beta$ is equal to

- (A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{4}$

41. The minimum value of $3 \cos x + 4 \sin x + 8$ is

- (A) 5 (B) 9 (C) 7 (D) 3

42. The value of $\tan 3A - \tan 2A - \tan A$ is equal to

- (A) $\tan 3A \tan 2A \tan A$
(B) $-\tan 3A \tan 2A \tan A$
(C) $\tan A \tan 2A - \tan 2A \tan 3A - \tan 3A \tan A$
(D) None of these

43. The value of $\sin(45^\circ + \theta) - \cos(45^\circ - \theta)$ is
(A) $2 \cos \theta$ (B) $2 \sin \theta$ (C) 1 (D) 0

44. The value of $\cot\left(\frac{\pi}{4} + \theta\right) \cot\left(\frac{\pi}{4} - \theta\right)$ is
(A) -1 (B) 0 (C) 1 (D) Not defined

45. $\cos 2\theta \cos 2\phi + \sin^2(\theta - \phi) - \sin^2(\theta + \phi)$ is equal to

- (A) $\sin 2(\theta + \phi)$ (B) $\cos 2(\theta + \phi)$
(C) $\sin 2(\theta - \phi)$ (D) $\cos 2(\theta - \phi)$

[Hint: Use $\sin^2 A - \sin^2 B = \sin(A + B) \sin(A - B)$]

46. The value of $\cos 12^\circ + \cos 84^\circ + \cos 156^\circ + \cos 132^\circ$ is

- (A) $\frac{1}{2}$ (B) 1 (C) $-\frac{1}{2}$ (D) $\frac{1}{8}$

47. If $\tan A = \frac{1}{2}$, $\tan B = \frac{1}{3}$, then $\tan(2A + B)$ is equal to

- (A) 1 (B) 2 (C) 3 (D) 4

48. The value of $\sin \frac{\pi}{10} \sin \frac{13\pi}{10}$ is

- (A) $\frac{1}{2}$ (B) $-\frac{1}{2}$ (C) $-\frac{1}{4}$ (D) 1

[Hint: Use $\sin 18^\circ = \frac{\sqrt{5}-1}{4}$ and $\cos 36^\circ = \frac{\sqrt{5}+1}{4}$]

49. The value of $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ$ is equal to

- (A) 1 (B) 0 (C) $\frac{1}{2}$ (D) 2

50. If $\sin \theta + \cos \theta = 1$, then the value of $\sin 2\theta$ is equal to

- (A) 1 (B) $\frac{1}{2}$ (C) 0 (D) -1

51. If $\alpha + \beta = \frac{\pi}{4}$, then the value of $(1 + \tan \alpha)(1 + \tan \beta)$ is

- (A) 1 (B) 2
(C) -2 (D) Not defined

52. If $\sin \theta = \frac{-4}{5}$ and θ lies in third quadrant then the value of $\cos \frac{\theta}{2}$ is

- (A) $\frac{1}{5}$ (B) $-\frac{1}{\sqrt{10}}$ (C) $-\frac{1}{\sqrt{5}}$ (D) $\frac{1}{\sqrt{10}}$

53. Number of solutions of the equation $\tan x + \sec x = 2 \cos x$ lying in the interval $[0, 2\pi]$ is

- (A) 0 (B) 1 (C) 2 (D) 3

54. The value of $\sin \frac{\pi}{18} + \sin \frac{\pi}{9} + \sin \frac{2\pi}{9} + \sin \frac{5\pi}{18}$ is given by

- (A) $\sin \frac{7\pi}{18} + \sin \frac{4\pi}{9}$ (B) 1
(C) $\cos \frac{\pi}{6} + \cos \frac{3\pi}{7}$ (D) $\cos \frac{\pi}{9} + \sin \frac{\pi}{9}$

55. If A lies in the second quadrant and $3 \tan A + 4 = 0$, then the value of $2 \cot A - 5 \cos A + \sin A$ is equal to

- (A) $\frac{-53}{10}$ (B) $\frac{23}{10}$ (C) $\frac{37}{10}$ (D) $\frac{7}{10}$

56. The value of $\cos^2 48^\circ - \sin^2 12^\circ$ is

- (A) $\frac{\sqrt{5}+1}{8}$ (B) $\frac{\sqrt{5}-1}{8}$
(C) $\frac{\sqrt{5}+1}{5}$ (D) $\frac{\sqrt{5}+1}{2\sqrt{2}}$

[Hint: Use $\cos^2 A - \sin^2 B = \cos(A+B) \cos(A-B)$]

57. If $\tan \alpha = \frac{1}{7}$, $\tan \beta = \frac{1}{3}$, then $\cos 2\alpha$ is equal to

(A) $\sin 2\beta$ (B) $\sin 4\beta$ (C) $\sin 3\beta$ (D) $\cos 2\beta$

58. If $\tan \theta = \frac{a}{b}$, then $b \cos 2\theta + a \sin 2\theta$ is equal to

(A) a (B) b (C) $\frac{a}{b}$ (D) None

59. If for real values of x , $\cos \theta = x + \frac{1}{x}$, then

(A) θ is an acute angle (B) θ is right angle
(C) θ is an obtuse angle (D) No value of θ is possible

Fill in the blanks in Exercises 60 to 67 :

60. The value of $\frac{\sin 50^\circ}{\sin 130^\circ}$ is _____.

31. Find z if $|z| = 4$ and $\arg(z) = \frac{5\pi}{6}$.

32. Find $\left| (1+i) \frac{(2+i)}{(3+i)} \right|$

33. Find principal argument of $(1 + i\sqrt{3})^2$.

34. Where does z lie, if $\left| \frac{z-5i}{z+5i} \right| = 1$.

Choose the correct answer from the given four options indicated against each of the Exercises from 35 to 50 (M.C.Q)

35. $\sin x + i \cos 2x$ and $\cos x - i \sin 2x$ are conjugate to each other for:

(A) $x = n\pi$

(B) $x = \left(n + \frac{1}{2}\right) \frac{\pi}{2}$

(C) $x = 0$

(D) No value of x

36. The real value of α for which the expression $\frac{1-i\sin\alpha}{1+2i\sin\alpha}$ is purely real is :

(A) $(n+1)\frac{\pi}{2}$

(B) $(2n+1)\frac{\pi}{2}$

(C) $n\pi$

(D) None of these, where $n \in \mathbb{N}$

37. If $z = x + iy$ lies in the third quadrant, then $\frac{\bar{z}}{z}$ also lies in the third quadrant if

(A) $x > y > 0$

(B) $x < y < 0$

(C) $y < x < 0$

(D) $y > x > 0$

38. The value of $(z+3)(\bar{z}+3)$ is equivalent to

(A) $|z+3|^2$

(B) $|z-3|$

(C) z^2+3

(D) None of these

39. If $\left(\frac{1+i}{1-i}\right)^x = 1$, then

(A) $x = 2n+1$

(B) $x = 4n$

(C) $x = 2n$

(D) $x = 4n + 1$, where $n \in \mathbb{N}$

40. A real value of x satisfies the equation $\left(\frac{3-4ix}{3+4ix}\right) = \alpha - i\beta$ ($\alpha, \beta \in \mathbf{R}$) if $\alpha^2 + \beta^2 =$
 (A) 1 (B) -1 (C) 2 (D) -2
41. Which of the following is correct for any two complex numbers z_1 and z_2 ?
 (A) $|z_1 z_2| = |z_1| |z_2|$ (B) $\arg(z_1 z_2) = \arg(z_1) \cdot \arg(z_2)$
 (C) $|z_1 + z_2| = |z_1| + |z_2|$ (D) $|z_1 + z_2| \geq |z_1| - |z_2|$
42. The point represented by the complex number $2 - i$ is rotated about origin through an angle $\frac{\pi}{2}$ in the clockwise direction, the new position of point is:
 (A) $1 + 2i$ (B) $-1 - 2i$ (C) $2 + i$ (D) $-1 + 2i$
43. Let $x, y \in \mathbf{R}$, then $x + iy$ is a non real complex number if:
 (A) $x = 0$ (B) $y = 0$ (C) $x \neq 0$ (D) $y \neq 0$
44. If $a + ib = c + id$, then
 (A) $a^2 + c^2 = 0$ (B) $b^2 + c^2 = 0$
 (C) $b^2 + d^2 = 0$ (D) $a^2 + b^2 = c^2 + d^2$
45. The complex number z which satisfies the condition $\left|\frac{i+z}{i-z}\right| = 1$ lies on
 (A) circle $x^2 + y^2 = 1$ (B) the x -axis
 (C) the y -axis (D) the line $x + y = 1$.
46. If z is a complex number, then
 (A) $|z^2| > |z|^2$ (B) $|z^2| = |z|^2$
 (C) $|z^2| < |z|^2$ (D) $|z^2| \geq |z|^2$
47. $|z_1 + z_2| = |z_1| + |z_2|$ is possible if
 (A) $z_2 = \bar{z}_1$ (B) $z_2 = \frac{1}{z_1}$
 (C) $\arg(z_1) = \arg(z_2)$ (D) $|z_1| = |z_2|$

(D) none of these.

32. Fill in the blanks of the following:

- (i) If $-4x \geq 12$, then $x \dots -3$.
- (ii) If $\frac{-3}{4}x \leq -3$, then $x \dots 4$.
- (iii) If $\frac{2}{x+2} > 0$, then $x \dots -2$.
- (iv) If $x > -5$, then $4x \dots -20$.
- (v) If $x > y$ and $z < 0$, then $-xz \dots -yz$.
- (vi) If $p > 0$ and $q < 0$, then $p - q \dots p$.
- (vii) If $|x+2| > 5$, then $x \dots -7$ or $x \dots 3$.
- (viii) If $-2x + 1 \geq 9$, then $x \dots -4$.

60. There are 3 books on Mathematics, 4 on Physics and 5 on English. How many different collections can be made such that each collection consists of :

C_1

- (a) One book of each subject;
 (b) At least one book of each subject :
 (c) At least one book of English:

C_2

- (i) 3968
 (ii) 60
 (iii) 3255

61. Five boys and five girls form a line. Find the number of ways of making the seating arrangement under the following condition:

C_1

- (a) Boys and girls alternate:
 (b) No two girls sit together :
 (c) All the girls sit together
 (d) All the girls are never together :

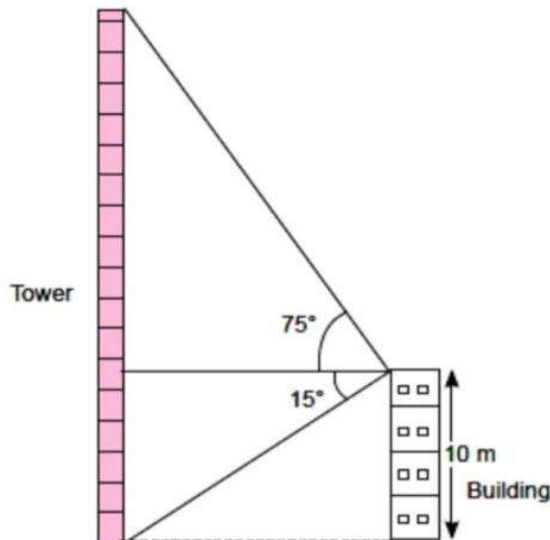
C_2

- (i) $5! \times 6!$
 (ii) $10! - 5! 6!$
 (iii) $(5!)^2 + (5!)^2$
 (iv) $2! 5! 5!$

Section -Case Study

Q1

From the top of a tower of 10 m high building the angle of elevation of top of a tower is 75° and the angle of depression of foot of the tower is 15° . If the tower and building are on the same horizontal surfaces.



- (i) Find the value of $\tan 15^\circ$. (2)
 (ii) Find the value of $\cos 75^\circ$. (2)

(a) 13:16 (b) 3:16 (c) 16:13 (d) 5:16

The figure displays two separate coordinate systems, one above the other, illustrating the periodic nature of the sine and cosine functions.

The top graph shows the function $y = \sin(x)$. The x-axis is labeled with -2π , $-\pi$, 0 , π , 2π , and 3π . The y-axis is labeled with 1 and -1 . The sine wave starts at the origin $(0,0)$, reaches a maximum of 1 at $x = \pi$, crosses the x-axis at $x = 2\pi$, reaches a minimum of -1 at $x = 3\pi$, and returns to the x-axis at $x = 4\pi$. A bracket labeled "1 period" spans from $x = 0$ to $x = 2\pi$. Arrows at the ends of the curve indicate it continues infinitely in both directions.

The bottom graph shows the function $y = \cos(x)$. The x-axis is labeled with -2π , $-\pi$, 0 , π , 2π , and 3π . The y-axis is labeled with 1 and -1 . The cosine wave starts at its maximum value of 1 at $x = 0$, crosses the x-axis at $x = \pi$, reaches a minimum of -1 at $x = 2\pi$, crosses the x-axis again at $x = 3\pi$, and returns to its maximum of 1 at $x = 4\pi$. A bracket labeled "1 period" spans from $x = 0$ to $x = 2\pi$. Arrows at the ends of the curve indicate it continues infinitely in both directions.

- (i) If we draw line $y=1/2$, at how many points the graph of sine and this line intersects between interval $[-\pi, \pi]$
 (a) 0 (b) 1 (c) 2 (d) 3
- (ii) If both sine and cosine curve are drawn on the same graph and on the same interval $[-2\pi, 2\pi]$
 (a) 4 (b) 5 (c) 6 (d) 8
- (iii) The graph of cosine cuts on X axis between $(0, 2\pi)$
 (a) 0 (b) 1 (c) 2 (d) 3
- (iv) At how many points will be $\sin x = \sqrt{2}$ in interval $[-\pi, \pi]$
 (a) 0 (b) 1 (c) 2 (d) 3

- 1. Define physical education.**
- 2. What is sports journalism?**
- 3. Write any two objectives of physical education.**
- 4. What is adventure sports?**
- 5. Mention any two career options in physical education.**
- 6. What is the role of yoga in daily life?**
- 7. Define wellness.**
- 8. What is Khelo India programme?**

- 9. Write any two qualities of a good coach.**
10. Mention two benefits of physical activities.

3 Marks Questions

- 1. Explain the importance of physical education.**
- 2. Describe any three career opportunities in sports.**
- 3. Explain the objectives of adventure sports.**
- 4. Write three benefits of yoga.**
- 5. Explain the role of physical education in personality development.**
- 6. Describe the functions of Sports Authority of India (SAI).**
- 7. Explain the importance of fitness and wellness.**
- 8. Write short notes on sports journalism.**
- 9. Mention any three qualities required for sports management.**
- 10. Explain the role of media in sports promotion.**

5 Marks Questions

- 1. Explain changing trends in physical education.**
- 2. Discuss various career options in physical education.**
- 3. Explain the importance of yoga and wellness in modern life.**
- 4. Describe the role of physical education in all-round development.**
- 5. Explain the importance of adventure sports.**
- 6. Discuss the role of media in the field of sports.**
- 7. Explain the functions of Sports Authority of India.**
- 8. Describe the qualities and responsibilities of a coach.**
- 9. Explain the role of physical education in improving health and fitness.**
- 10. Discuss the importance of physical education in schools.**

Chapter 2: Olympic Value Education

MCQ (1 Mark Each)

1. The Olympic flag has:

- a) 4 rings**
- b) 5 rings**
- c) 6 rings**
- d) 7 rings**

2. The Olympic motto is:

- a) Play for Peace**
- b) Faster, Higher, Stronger**
- c) Unity in Sports**
- d) Health is Wealth**

d) SAI

PHYSICS

MOTION IN PLANE PHYSICS

Choose the correct option for the given questions:

Q1. A car travels 5m in X direction and then 7m in Y direction. What is the final vector position of the car with respect to the origin?

- a) $5\hat{i} + 7\hat{j}$ b) $7\hat{i} + 5\hat{j}$ c) $7\hat{i} + 7\hat{j}$ d) $5\hat{i} + 5\hat{j}$

Q2. A force vector (50 N) is making an angle of 30 degrees with X axis has a vertical component..Find the Magnitude.

- a) 25 b) 55 c) 50 d) $100/\sqrt{3}$

Q3. When two vectors in the same direction are added, the magnitude of resulting vector is equal to

- a) Sum of magnitudes of the vectors
b) Difference of magnitudes of the vectors
c) Product of magnitudes of the vectors
d) Sum of the roots of magnitudes of the vectors

Q4. What is the standard form for the resolution of a vector having magnitude 'a' and is inclined at an angle θ to the X axis?

- a) $a(\cos \theta \hat{i} + \sin \theta \hat{j})$ b) $a(\sin \theta \hat{i} + \cos \theta \hat{j})$
c) $a(\sin \theta \hat{i} + \sin \theta \hat{j})$ d) $a(\cos \theta \hat{i} + \cos \theta \hat{j})$

Q5. Find the vector product (**a X b**) of the two given vectors: $a = 2\hat{i} + 3\hat{j} + 4\hat{k}$, $b = 3\hat{i} + 5\hat{j}$. Here, i, j & k are unit vectors along three mutually perpendicular axes.

- a) $-20\hat{i} + 12\hat{j} + \hat{k}$ b) $10\hat{i} + 6\hat{j} + 1/2\hat{k}$
c) $20\hat{i} - 12\hat{j} - \hat{k}$ d) $10\hat{i} - 6\hat{j} - 1/2\hat{k}$

Q6. The angle of projection, for which the horizontal range and the maximum height of projectile are equal.

- a) 45° b) $T = \tan^{-1}4$ c) $T = \tan^{-1}(0.25)$ d) none of these.

Q7. A stone is projected with an initial velocity at an angle to the horizontal. A small piece separates from the stone before the stone reaches its maximum height. Then this piece will

- a) fall to the ground vertically
b) fly side by side with the parent stone along a parabolic path
c) fly horizontally initially and will trace a different parabolic path
d) lag behind the parent stone, increasing the distance from it.

Q8. How many minimum number of vectors in different planes can be added to give zero resultant?

- a) 2 b) 3 c) 4 d) 5

Q9. If a body A of mass M is thrown with velocity v at angle of 30° to the horizontal and another body B of the same mass is thrown with the same speed at an angle of 60° to the horizontal, the ratio of the horizontal ranges of A and B will be

- a) 1 : 3 b) 1 : 1 c) $\sqrt{3} : 1$ d) 1 : $\sqrt{3}$

Q10. A wheel is subjected to uniform angular acceleration about its axis. Initially its angular velocity is zero. In the first two seconds, it rotates through angle θ_1 . In the next two seconds, it rotates through angle θ_2 . What is the ratio θ_2/θ_1 .

- a) 1 b) 2 c) 3 d) 4

Q11. A particle is moving eastward with a velocity of 5 ms^{-1} . In 10 seconds, the velocity changes to 5 m/s northward. The average acceleration in this time is

- a) zero. b) $1/\sqrt{2} \text{ ms}^{-2}$ towards north
c) $1/\sqrt{2} \text{ ms}^{-2}$ towards north-east d) $1/\sqrt{2} \text{ ms}^{-2}$ towards north-west

Q22. Why do passengers tend to fall forward when a bus suddenly stops? How can this phenomenon be explained using Newton's laws?

Reason (R): This happens due to the inertia of motion.

Chemistry

Chapter: Some Basic Concepts of Chemistry

Section A: Multiple Choice Questions (20 Marks)

1. Which of the following is a heterogeneous mixture?

- A. Air B. Salt solution C. Blood D. Alcohol-water mixture

2. The SI unit of amount of substance is:

- A. Mole B. Liter C. Gram D. Kilogram

3. Avogadro number is:

- A. 6.022×10^{22} B. 6.022×10^{23} C. 6.022×10^{24} D. 6.022×10^{21}

4. 1 mole of a substance contains:

- A. 1 molecule B. 6.022×10^{23} atoms C. 1 atom D. 1 gram of substance

5. The empirical formula of glucose is:

- A. $C_6H_{12}O_6$ B. CH_2O C. $C_2H_4O_2$ D. $C_3H_6O_3$

6. Which of the following has maximum number of atoms?

- A. 18 g of H_2O B. 1 mole of CH_4 C. 1 mole of $NaCl$ D. 1 mole of O_2

7. Mass percent of oxygen in water is:

- A. 88.89% B. 11.11% C. 33.33% D. 66.66%

8. Limiting reagent is:

- A. Always in excess B. Reactant that gives maximum product
C. Reactant that gives minimum product D. Reactant which is never used up

9. Which of the following is not a fundamental unit in SI?

- A. Candela B. Gram C. Mole D. Kelvin

10. Avogadro's hypothesis states that:

- A. Equal volumes of gases at same temperature and pressure contain equal number of particles
B. Gases have equal densities
C. Gases behave ideally at low temperature
D. All of the above

11. The number of molecules in 4.4 g of CO_2 is:

- A. 6.022×10^{22} B. 6.022×10^{23} C. 1.204×10^{23} D. 3.011×10^{22}

12. Which is the correct relation?

- A. Density = Volume / Mass B. Mass = Density $\times$ Volume
C. Volume = Mass $\times$ Density D. None of these

13. The molar mass of Na_2SO_4 is:

- A. 142 g/mol B. 124 g/mol C. 112 g/mol D. 154 g/mol

4. Which rule states that no two electrons in an atom can have the same set of four quantum numbers?
a) Aufbau principle b) Hund's rule
c) Pauli's exclusion principle d) Heisenberg uncertainty principle
5. The energy of a photon is given by:
a) $E = mc^2$ b) $E = h\nu$ c) $E = hc/\nu$ d) $E = h\nu/c$
6. What is the wavelength of a particle of mass m moving with velocity v ?
a) h/mv b) mv/h c) $h\nu/m$ d) h/m^2v
7. The angular momentum of an electron in Bohr's orbit is:
a) $nh/2\pi$ b) mv^2r c) $n^2h/2\pi$ d) $mv^2/2$
8. Principal quantum number determines:
a) Shape b) Orientation c) Size and energy d) Spin
9. Who discovered the neutron?
a) J.J. Thomson b) Rutherford c) Chadwick d) Bohr
10. Which orbital is not possible?
a) 1s b) 2p c) 3f d) 4d
11. The frequency of a photon of wavelength 600 nm is:
a) 5×10^{14} Hz b) 6×10^{14} Hz c) 7×10^{14} Hz d) 4×10^{14} Hz
12. The number of nodes in 3p orbital is:
a) 0 b) 1 c) 2 d) 3
13. The number of radial nodes in 4s orbital:
a) 1 b) 2 c) 3 d) 4
14. Bohr's atomic model could not explain:
a) Hydrogen atom spectrum b) Stability of atom c) Zeeman effect d) Quantized energy levels
15. The speed of light is equal to:
a) 3×10^8 m/s b) 3×10^6 m/s c) 3×10^5 m/s d) 3×10^9 m/s
16. The value of Planck's constant is:
a) 6.626×10^{-34} Js b) 9.1×10^{-31} kg c) 1.6×10^{-19} C d) 3.0×10^8 m/s
17. Which quantum number is not required to specify an orbital?
a) n b) l c) m d) s
18. Shape of the p-orbital is:
a) Spherical b) Dumbbell c) Double dumbbell d) Circular
19. In hydrogen atom, the energy of an electron in n th orbit is:
a) Directly proportional to n b) Inversely proportional to n
c) Inversely proportional to n^2 d) Directly proportional to n^2
20. The magnetic quantum number (m) determines:
a) Spin b) Orientation c) Shape d) Size

Section B

Assertion and Reasoning (5)

1. A: Electrons in the same orbital must have opposite spins.
R: The Pauli Exclusion Principle states that no two electrons can have the same set of quantum numbers.

15. Explain why the 2s orbital is lower in energy than the 2p orbital in multi-electron atoms.

BIOLOGY

ALL QUESTIONS ARE COMPULSORY

❓ MULTIPLE CHOICE QUESTIONS:

Chapter 1: The Living World

- 1. Who is known as the father of taxonomy?**
 - A) Darwin
 - B) Linnaeus
 - C) Mendel
 - D) Hooke
- 2. Binomial nomenclature was given by?**
 - A) Lamarck
 - B) Linnaeus
 - C) Darwin
 - D) Watson
- 3. Which of the following is not a characteristic of living organisms?**
 - A) Growth
 - B) Reproduction
 - C) Consciousness
 - D) Metabolism
- 4. What is the basic unit of classification?**
 - A) Species
 - B) Genus
 - C) Family
 - D) Order
- 5. Which of the following is an example of a unicellular organism?**
 - A) Paramecium
 - B) Hydra
 - C) Frog
 - D) Human
- 6. Which of the following is an example of a prokaryote?**
 - A) Amoeba
 - B) Bacteria
 - C) Fungi

D) Algae

7. Who gave the concept of species?

- A) Lamarck
B) Aristotle
C) Linnaeus
D) Darwin

8. The study of naming and classification of organisms is called?

- A) Ecology
B) Taxonomy
C) Morphology
D) Genetics

9. The smallest unit of classification that can reproduce is?

- A) Family
B) Species
C) Genus
D) Order

10. The hierarchical category above species is?

- A) Genus
B) Family
C) Order
D) Class

Chapter 2: Biological Classification

1. Which kingdom includes organisms without a nucleus?

- A) Protista
B) Monera
C) Fungi
D) Plantae

2. Algae belong to which kingdom?

- A) Protista
B) Monera
C) Fungi
D) Plantae

3. Which kingdom contains multicellular, autotrophic organisms?

- A) Fungi
B) Plantae
C) Animalia

D) Protista

4. Fungi obtain nutrition by?

- A) Photosynthesis
B) Absorption
C) Ingestion
D) Parasitism only

5. Which of these is a unicellular eukaryote?

- A) Bacteria
B) Amoeba
C) Mushroom
D) Algae

6. Viruses are?

- A) Living organisms
B) Acellular entities
C) Bacteria
D) Protists

7. Bacteria have?

- A) Nucleus
B) Cell wall
C) Mitochondria
D) Chloroplast

8. Protists are?

- A) Prokaryotes
B) Eukaryotes
C) Acellular
D) None of the above

9. Which of the following is a photosynthetic protist?

- A) Paramecium
B) Euglena
C) Amoeba
D) Plasmodium

10. The organism responsible for fermentation is?

- A) Bacteria
B) Yeast
C) Amoeba

D) Algae

Chapter 3: Plant Kingdom

1. **Bryophytes are?**
 - A) Vascular plants
 - B) Non-vascular plants
 - C) Seed plants
 - D) Gymnosperms
2. **Gymnosperms bear?**
 - A) Seeds inside fruits
 - B) Naked seeds
 - C) Spores
 - D) Flowers
3. **The largest phylum of plants is?**
 - A) Bryophyta
 - B) Pteridophyta
 - C) Angiosperms
 - D) Gymnosperms
4. **The female reproductive organ in plants is called?**
 - A) Anther
 - B) Ovary
 - C) Stigma
 - D) Pistil
5. **The plant group having both xylem and phloem is?**
 - A) Bryophytes
 - B) Pteridophytes
 - C) Algae
 - D) Fungi
6. **Which of the following is a seedless vascular plant?**
 - A) Fern
 - B) Cycas
 - C) Pinus
 - D) Mango
7. **In angiosperms, seeds are enclosed in?**
 - A) Ovule
 - B) Fruit
 - C) Cone

D) Sporangium

8. **Plants with naked seeds are called?**

- A) Angiosperms
- B) Gymnosperms
- C) Bryophytes
- D) Pteridophytes

9. **The main function of roots is?**

- A) Photosynthesis
- B) Anchorage and absorption
- C) Reproduction
- D) Storage only

10. **Phloem transports?**

- A) Water
- B) Minerals
- C) Food
- D) Hormones

Chapter 4: Animal Kingdom

1. **Sponges belong to which phylum?**

- A) Cnidaria
- B) Porifera
- C) Annelida
- D) Arthropoda

2. **Which phylum includes organisms with jointed appendages?**

- A) Mollusca
- B) Arthropoda
- C) Annelida
- D) Porifera

3. **The characteristic feature of cnidarians is?**

- A) Segmented body
- B) Radial symmetry and stinging cells
- C) Jointed legs
- D) Bilateral symmetry only

4. **Earthworms belong to which phylum?**

- A) Annelida
- B) Mollusca
- C) Arthropoda

D) Chordata

5. The animal with a water vascular system is?

- A) Starfish
B) Earthworm
C) Snail
D) Jellyfish

6. Which animal has a notochord?

- A) Starfish
B) Frog
C) Jellyfish
D) Earthworm

7. Insects belong to the class?

- A) Arachnida
B) Crustacea
C) Insecta
D) Mollusca

8. The largest phylum in the animal kingdom is?

- A) Mollusca
B) Annelida
C) Arthropoda
D) Chordata

9. Birds belong to which class?

- A) Mammalia
B) Reptilia
C) Aves
D) Amphibia

10. Mammals are characterized by?

- A) Laying eggs
B) Cold-bloodedness
C) Presence of mammary glands
D) Scales on skin

Chapter 5: Morphology of Flowering Plants

1. The stalk of a flower is called?

- A) Petal
B) Pedicel

- C) Sepal
- D) Receptacle

2. **The main function of sepals is?**
 - A) Protection of flower in bud stage
 - B) Attraction of pollinators
 - C) Production of pollen
 - D) Photosynthesis
3. **The male reproductive part of a flower is?**
 - A) Pistil
 - B) Stigma
 - C) Anther
 - D) Ovule
4. **The female reproductive part of a flower is?**
 - A) Anther
 - B) Stigma
 - C) Ovary
 - D) Pistil
5. **The part of the flower which receives pollen is?**
 - A) Ovary
 - B) Stigma
 - C) Style
 - D) Sepal
6. **The flower with all four whorls is called?**
 - A) Complete flower
 - B) Incomplete flower
 - C) Imperfect flower
 - D) Unisexual flower
7. **Which part of the flower develops into fruit?**
 - A) Ovule
 - B) Ovary
 - C) Style
 - D) Stigma
8. **Plants having flowers on separate plants are called?**
 - A) Monoecious
 - B) Dioecious
 - C) Bisexual
 - D) Perfect flowers
9. **The floral formula of a flower indicates?**
 - A) Number of floral parts
 - B) Symmetry of flower
 - C) Both A and B
 - D) None

1. **Assertion (A):** Kingdom Monera includes prokaryotic organisms.
Reason (R): Prokaryotes lack membrane-bound organelles.
2. **Assertion (A):** Protists include both autotrophic and heterotrophic organisms.
Reason (R): All protists are unicellular.
- 3.

Reason (R): They have a segmented body and bilateral symmetry.

Assertion (A): Vertebrates have a notochord throughout their life.

Reason (R): The notochord is replaced by the vertebral column during development.

Chapter 5: Morphology of Flowering Plants

1.

Assertion (A): The pedicel supports the flower.

Reason (R): It attaches the flower to the stem.

2.

Assertion (A): Sepals protect the flower when in bud.

Reason (R): They are usually green and leaf-like.

3.

Assertion (A): Stamens are the male reproductive parts of the flower.

Reason (R): Stamens consist of anthers and filaments.

4.

Assertion (A): Ovules develop into seeds after fertilization.

Reason (R): Fertilization involves fusion of male and female gametes.

5.

Assertion (A): Flowers with all four whorls are called incomplete flowers.

Reason (R): Incomplete flowers lack one or more whorls.

SHORT QUESTION ANSWER

Chapter 1: The Living World

1. What is taxonomy?

2. Who introduced binomial nomenclature?

3. What is a species?

4. Name the smallest unit of classification.

5. characteristic is common to all living organisms?

Chapter 2: Biological Classification

1. Which kingdom includes prokaryotes?

2. What kind of nutrition do fungi exhibit?

3. Are viruses living or non-living?

4. Which kingdom do algae belong to?

5. What is a unicellular eukaryote?

Chapter 3: Plant Kingdom

1. **What are bryophytes?**
2. **What kind of seeds do gymnosperms produce?**
3. **Which plant group has flowers and fruits?**
4. **What vascular tissues are present in plants?**
5. **What is the female reproductive organ in plants?**

Chapter 4: Animal Kingdom

1. **To which phylum do sponges belong?**
2. **What kind of symmetry do cnidarians show?**
3. **Which animal has a water vascular system?**
4. **What is the largest phylum in the animal kingdom?**
5. **What characterizes mammals?**

Chapter 5: Morphology of Flowering Plants

1. What is the stalk of a flower called?
2. What do sepals protect?
3. What is the male reproductive part of a flower?
4. What does the ovary develop into?
5. Which part of the flower receives pollen?

LONG QUESTION ANSWERS

Chapter 1: The Living World

Q: Explain the characteristics of living organisms.

Chapter 2: Biological Classification

Q: Describe the five-kingdom classification proposed by R.H. Whittaker.

Chapter 3: Plant Kingdom

Q: Describe the classification and characteristics of Bryophytes.

Chapter 4: Animal Kingdom

Q: Differentiate between non-chordates and chordates.

Chapter 5: Morphology of Flowering Plants

Q: Describe the various parts of a typical angiosperm flower.

Q HOTS

Chapter 1: The Living World

Q (HOTS):

Why is metabolism considered a defining feature of all living organisms, while growth and reproduction are not?

Hint:

Metabolism occurs in all living organisms and involves a series of chemical reactions essential for life. Unlike growth and reproduction, which may not be observed in all living beings (e.g., mules do not reproduce), metabolism is always present in some form. Hence, metabolism is a universal and defining feature.

Chapter 2: Biological Classification

Q (HOTS):

Why are viruses not included in the five-kingdom classification?

Chapter 3: Plant Kingdom

Q (HOTS):

Why are bryophytes called the “amphibians of the plant kingdom”?

Chapter 4: Animal Kingdom

Q (HOTS):

Why is the presence of a notochord considered a major advancement in evolution?

Chapter 5: Morphology of Flowering Plants

Q (HOTS):

How does the structure of a flower aid in cross-pollination?

Q CASE STUDY

Case Study 1: The Living World (Chapter 1)

Topic: Identifying Living Organisms

Case:

During a science exhibition, students were asked to identify which of the following objects are living and which are non-living: a growing crystal, a rabbit, a virus, and a robot programmed to react to stimuli.

Question:

Using the characteristics of living organisms, classify each of the above and justify your reasoning.

Case Study 2: Biological Classification (Chapter 2)

Topic: Classification of a New Microorganism

Case:

A team of scientists discovered a new microorganism in a hot spring. It is unicellular, lacks a true nucleus, and can survive in extreme temperatures. It reproduces by binary fission and has a rigid cell wall.

Question:

To which kingdom and domain would you classify this organism? Give reasons for your answer.

Case Study 3: Plant Kingdom (Chapter 3)

Topic: Habitat Adaptation in Plants

Case:

Two plant samples were collected from different locations. Plant A had no true roots, stems, or vascular tissues and was found near a moist wall. Plant B had xylem and phloem, reproduced via spores, and was found in shaded forests.

Question:

Identify Plant A and Plant B and classify them into appropriate plant groups. Justify your classification.

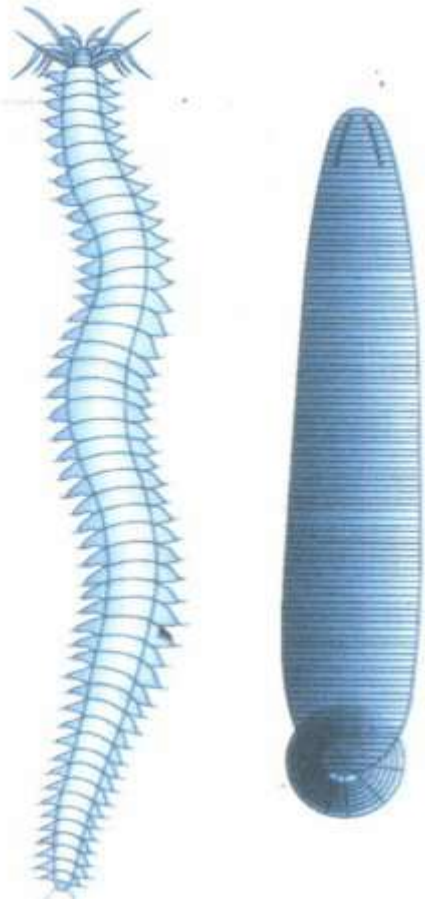
PICTURE BASED QUESTION:

1.



- Identify the structure given above and name the phylum, it is characteristically present in.
- Where is it generally present in the body of the animals?
- Name the cell it contains.
- Mention two of its functions.

Two animals of Phylum Annelida are shown in the picture given below. Observe them and answer the questions that follow:



(a) Identify and write the scientific names of the animals A and B.
(b) Write two major differences between them.

PROJECTS:

- Make Herbarium file.

<https://youtu.be/eHBfQE2xzQg?si=F4nqTVVWGoSa87X9>

English Core

This covers reading, writing, literature, and creativity .

A. Literature – Reading & Understanding*

1. *Character Sketch*

Choose any 2 characters from Hornbill prose chapters you've studied.

Write 150 words on each: their traits, role in the story, and 1 quote that shows their character.

2. *Theme Analysis*

Pick any 1 poem from _Hornbill_ and write 200 words on its central theme and 2 poetic devices used with examples.

Example: "A Photograph" – theme of loss and memory; devices = imagery, alliteration

B. Writing Skills

3. *Notice & Advertisement*

- Write a notice for your school noticeboard announcing an Inter-House Debate Competition.

- Design a classified advertisement for a lost pet dog.

4. *Article Writing*

Write a 250-word article on:

“The Role of Technology in Education: Boon or Bane?”

Use a clear heading, introduction, body, and conclusion.

5. *Letter Writing*

Write a formal letter to the Principal requesting permission to start an Environmental Club in school.

C. Grammar & Vocabulary

6. *Vocabulary Building*

Make a vocabulary notebook with 20 new words from your literature chapters. For each word write:

Word – Meaning –

D. Creative & Project Work

7. *Poster Making*

Make an A4 size poster on one of these themes:

- Save Water
- Mental Health Matters
- Unity in Diversity

Use slogans and illustrations. Paste it in your notebook.

E. Oral / Listening Task

8. *Speak & Record*

Record a 2-minute audio/video speaking on:

__“One Habit I Want to Change During These Holidays”__

Submit the link or play it when school reopens.

Submission Guidelines

1. Do written work neatly in a separate A4 size notebook or ruled sheets.
2. Use headings, margins, and underline sub-headings.
3. Project work can be on chart paper/A4 sheet with color and neat writing.
4. Label everything with Name, Class, Sec, Roll No.

MUSIC

1. संगीत कितने प्रकार का होता है?
 - a) 2
 - b) 3
 - c) 4
 - d) 5
2. आहत नाद का मुख्य आधार क्या होता है?
 - a) वस्तुओं के टकराने से
 - b) घर्षण
 - c) वायु के परवेश से
 - d) उपरोक्त सभी
3. अलंकार का प्रयोग क्यों किया जाता है?
 - a) स्वर साधना हेतु
 - b) ताल समाप्त करने हेतु
 - c) गीत लिखने हेतु
 - d) वाद्य निर्माण हेतु
4. भारतीय संगीत में स्वर कितने प्रकार के होते हैं?
 - a) एक
 - b) दो
 - c) तीन
 - d) चार
5. निम्न में से कौन-सा ग्राम प्राचीन काल में लुप्त हो गया था ?
 - a) गांधार ग्राम
 - b) पंचम ग्राम
 - c) षड्ज ग्राम
 - d) निषाद ग्राम
6. विकृत स्वर कितने होते हैं?
 - a) 12
 - b) 22
 - c) 7
 - d) 5
7. भारतीय संगीत में कितनी श्रुति मानी गयी है
 - a) 20
 - b) 21
 - c) 22
 - d) 15
8. राग की स्वर लिपि संगीत के किस रूप में आती है ?
 - a) शास्त्रीय रूप
 - b) भाव रूप
 - c) क्रियात्मक रूप
 - d) इनमें से कोई नहीं
9. कोमल स्वर की पहचान क्या है?
 - a) नीचे बिंदु
 - b) उपर बिंदु
 - c) नीचे लेटी रेखा

d) उपर खड़ी रेखा

10. अचल स्वर कोनसे होते हैं?

- a) સા, પ
b) ગ, નિ
c) રે, ધ
d) મ, ધ

11. मन्द्र सप्तक के स्वरो का उच्चारण स्थान क्या है?

- a) हिर्दय
b) कंठ
c) तालु
d) नाक

12. अलंकार के प्रकार हैं?

- a) 3
b) 4
c) 5
d) 2

13. सा और प स्वर की कितनी श्रुतिया होती हैं?

- a) 4-4
b) 3-3
c) 2-2
d) 5-5

14. त्रिव्र स्वर कितने होते हैं ?

- a) 3
b) 2
c) 1
d) 5

15. अनाहत नाद सुना जाता है

- a) कानों से
b) ज्ञान इंद्रियो से
c) आत्मा से
d) मन से

लघु उत्तरीय प्रश्न

- 1) किन्हीं भी 3 प्रकार के 2-2 अलंकारों की रचना करके लिखो
- 2) स्वर क्या है पूर्ण विस्तार करे
- 3) अलंकार और वर्ण का विस्तार करे
- 4) संगीत के किसी भी एक आधुनिक शास्त्रीय संगीतकार का परिचय दे जो ध्रुपद, धमार, व खयाल गायक हो
(इंटरनेट के माध्यम से लिखो)