

# Olympiad Foundation

**SAMPLE PAPER CLASS 12<sup>th</sup>**



**OLYMPIAD FOUNDATION**



## Division of Marks

S.No.	Topic/Section	No. of Question	Marks
1	Physics	10	10
2	Chemistry	10	10
3	Mathematics	15	15
	Achievers Section	03	15
	Total	38	50

### INSTRUCTIONS :

1. Use Blue/Black ballpoint pen only to darken the appropriate circle.
2. Mark should be dark and should completely fill the circle.
3. Dark only one circle for each entry.
4. Dark the circle in the space provided only.
5. Rough work must not be done on the answer sheet and do not use white- fluid or any rubbing material on Answer Sheet.
6. Each question carries one mark.

Select the correct answer and darken your answer in the table :

**PHYSICS**

1. When an electric dipole is placed in uniform electric field, it experiences:  
(A) force only (B) Torque only  
(C) Both force and torque (D) Neither force not torque
2. What is the charge on a metal, when 5 electrons are removed from it?  
(A)  $8.0 \times 10^{-19} \text{C}$  (B)  $16 \times 10^{-19} \text{C}$   
(C)  $1.6 \times 10^9 \text{C}$  (D) 0
3. S.I Unit of electric capacitance is :  
(A) A coulomb (1C) (B) A volt C (IV)  
(C) A farad (If) (D) A volt metre (IV-m)
4. Current flows in the semi - conductors through :  
(A) Protons (B) Electrons  
(C) Holes (D) Holes and electrons
5. The resistivity of semi conductor \_\_\_\_\_ will increase in temperature.  
(A) Increases (B) Decreases  
(C) May increase or decrease (D) No change
6. If a current is passed in a spring it :  
(A) Gets compressed (B) Gets Expanded  
(C) Oscillates (D) None of these
7. The angle of dip at magnetic equator is :  
(A)  $90^\circ$  (B)  $45^\circ$   
(C)  $30^\circ$  (D)  $0^\circ$

8. Which of the following is a ferromagnetic substance?
- (A) Zinc (B) Alnico  
(C) Chromium (D) Magnesium
9. A Solenoid has  $n$  turns, its coefficient of self inductance  $L \propto n$
- (A)  $L \propto n$  (B)  $L \propto n^2$   
(C)  $L \propto n^{-1}$  (D)  $L \propto n^{-2}$
10. Which of the following has the least wave length ?
- (A) Y-rays (B) B-rays  
(C)  $\alpha$ -rays (D) X-rays

### CHEMISTRY

11. How many chloride ions are surrounding sodium ion in sodium chloride crystal?
- (A) 4 (B) 8 (C) 6 (D) 12
12. The law which indicates the relationship between solubility of a gas in liquid and pressure is
- (A) Raoult's law (B) Henry's law  
(C) Lowering of vapour pressure (D) Van't hof't law
13. Fused NaCl on electrolysis gives \_\_\_\_\_ on cathode.
- (A) Chlorine (B) Sodium  
(C) Sodium amalgam (D) Hydrogen
14. The unit of rate and rate constant are same for a
- (A) Zero order reaction (B) First order reaction  
(C) Second order reaction (D) Third order reaction
15. The potential difference b/w the fixed charged layer and the diffused layer having opposite charge is called
- (A) Zeta potential (B) Electro kinetic potential  
(C) Both a and b (D) Streaming potential

16. Concentration of sulphide ore is done by

- (A) froth flotation process (B) Electrolysis  
(C) Roasting (D) None of these

17. Boron shows diagonal relation with

- (A) Al (B) C  
(C) Si (D) Sn

18. Which of the following are d block elements but not regarded as transition elements?

- (A) Cu, Ag, Au (B) Zn, Cd, Hg  
(C) Fe, Co, Ni (D) Ru, Rh, Rd

19. Trunbull's blue is

- (A) Ferricyanide (B) Ferrous Ferricyanide  
(C) Planets (D)  $\text{Fe}_3[\text{Fe}(\text{CN})_6]_4$

20.  $\text{S}_\text{N}^1$  reaction of alkyl halides lead to

- (A) Retention of configuration (B) Racemisation  
(C) Inversion of configuration (D) None of these

### MATHEMATICS

21. If  $A$  is a square matrix of  $3 \times 3$  order, where  $|A| = 3$ , then find out the value of  $|\text{adj } A|$

- (A) 3 (B) 9  
(C) 30 (D)  $\frac{1}{3}$

22. If  $A$  and  $B$  are two events, where  $P(A) = 0.2$ ,  $P(B) = 0.4$  and  $P(A \cup B) = 0.5$ . Find the value of  $P(A/B)$

- (A) 0.25 (B) 0.08  
(C) 0.1 (D) 0.080

23. Which point does not lie in the half plane for the given equation  $2x + 3y - 12 \leq 0$ ?

(A) (2, 3)

(B) (-3, 2)

(C) (1, 2)

(D) (2, 1)

24. Find the value of  $\cos^{-1} x + \cos^{-1} y$ , if  $\sin^{-1} x + \sin^{-1} y = \pi/3$

(A)  $2\pi/3$

(B)  $\pi$

(C)  $\pi/2$

(D)  $\pi/3$

25. Calculate the distance in units between the below-mentioned places:

$$3x + 5y + 7z = 3 \text{ and } 9x + 15y + 21z = 9$$

(A) 3

(B) 7

(C) 0

(D) 6

26. If  $(2\hat{i} + 6\hat{j} + 27\hat{k}) \times (\hat{i} + p\hat{j} + q\hat{k}) = \vec{0}$ , then the values of p and q are ?

(A)  $p = 6, q = 27$

(B)  $p = 3, q = 27/2$

(C)  $p = 6, q = 27/2$

(D)  $p = 3, q = 27$

27. Let P and Q be two different matrices of  $3 \times n$  and  $3 \times p$  order. Find out the order of  $P \times Q$  matrix.

(A)  $3 \times p$

(B)  $p \times 3$

(C)  $n \times n$

(D)  $3 \times 3$

28. What will be the general solution of the differential equation  $dy/dx = e^{x+y}$ ?

(A)  $e^x + e^{-y} = c$

(B)  $a + b = e^y$

(C)  $e^x + e^c = y$

(D) none of these

29. Evaluate  $\int_{-2}^2 (x^3 + 1) dx$

(A) 2

(B) 3

(C) 4

(D) 5

30. Differentiate :  $\sin^2(x^2)$  w.r.t.  $x^2$

(A)  $2\sin(x^2) \cos(x^2)$  or  $\sin(2x^2)$

(B)  $\sin(3x^2)$

(C)  $2\sin(x) \cos(x^3)$

(D) None of these

31. The value of the determinant

$$\begin{bmatrix} 3 & 1 & 7 \\ 5 & 0 & 2 \\ 2 & 5 & 5 \end{bmatrix}$$

(A) 124

(B) 125

(C) 134

(D) 144

32. If  $\Delta = \begin{bmatrix} 10 & 2 \\ 30 & 6 \end{bmatrix}$ , then  $A =$

(A) 0

(B) 10

(C) 12

(D) 60

33.  $\int \frac{dx}{\sqrt{x}}$

(A)  $\sqrt{x} + K$

(B)  $2\sqrt{x} + k$

(C)  $x + k$

(D)  $\frac{2}{3} x^{3/2} + k$

34. A matrix  $A = [a_{ij}]_{m \times n}$  is said to be symmetric if

(A)  $a_{ij} = 0$

(B)  $a_{ij} = a_{ji}$

(C)  $a_{ij} = a_{ij}$

(D)  $a_{ij} = i$

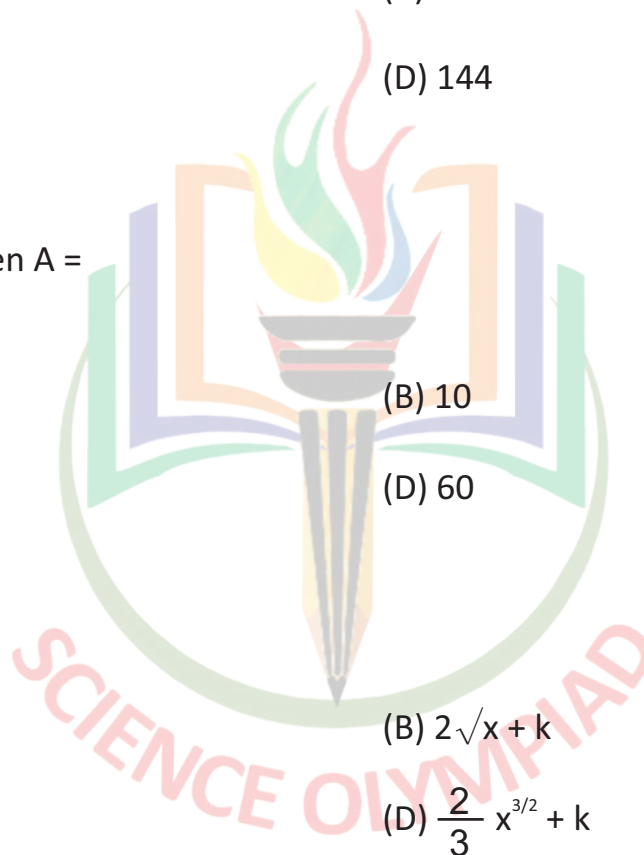
35. Objective function of a linear programming problem is

(A) A constraint

(B) Function to be between the variables

(C) A relation between the variables

(D) None of these





### ACHIEVERS SECTION

36. Find  $|\vec{a}|$  and  $|\vec{b}|$ , if  $(\vec{a} + \vec{b}) = 8$  and  $|\vec{a}| = 8|\vec{b}|$   
 Find  $|\vec{x}|$  if for a unit vector  $\vec{a}$ ,  $(\vec{x} - \vec{a}) \cdot (\vec{x} + \vec{a}) = 12$   
 Find  $|\vec{x}|$  if magnitude of  $\vec{a}$  is 5 and  $(\vec{x} - \vec{a}) \cdot (\vec{x} + \vec{a}) = 4$
- (A) (i)  $\frac{16}{3}\sqrt{\frac{2}{7}}$  (ii)  $\frac{2}{3}\sqrt{\frac{2}{7}}$  (iii)  $\sqrt{13}$  (B) (i)  $\frac{2}{3}$ ,  $\frac{4}{3}$  (ii)  $\sqrt{5}$  (iii) 3  
 (C) (i) 9 (ii) 8 (iii) 6 (D) (i)  $\sqrt{2}$  (ii) 7 (iii) 5
37.  $\text{C}_2\text{H}_5\text{OH} + \text{SOCl}_2 \xrightarrow{\text{Pyridine}} \text{C}_2\text{H}_5\text{Cl} + \text{SO}_2 + \text{HCl}$   
 this reaction is known as
- (A) Williammson's (B) Hofmann's reaction  
 (C) Mendies reaction (D) Darzen's reaction
38. A sample of paramagnetic salt contains  $2.0 \times 10^{24}$  atomic dipoles each of diopole moment  $1.5 \times 10^{-23} \text{ JT}^{-1}$ . The sample is placed under a homogeneous magnetic field of 0.64 T and cooled to a temperature of 4.2 K. The degree of magnetic. Saturation achieved is equal to 15% what is the total dipole moment of the sample for a magnetic field of 0.98 T and a temperature of 2.8 K? (Assume curie's law)
- (A) 110.2 JT (B)  $10.336 \text{ JT}^{-1}$   
 (C) 12.10 J (D) None of these

### ANSWER KEY

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. B  | 11. C | 21. C | 31. C |
| 2. A  | 12. B | 22. B | 32. C |
| 3. A  | 13. B | 23. C | 33. C |
| 4. D  | 14. A | 24. A | 34. A |
| 5. A  | 15. A | 25. D | 35. C |
| 6. A  | 16. A | 26. D | 36. A |
| 7. D  | 17. C | 27. D | 37. D |
| 8. B  | 18. B | 28. C | 38. B |
| 9. B  | 19. B | 29. C |       |
| 10. A | 20. B | 30. B |       |