

Sample Paper

for Students presently in Class IX

Paper 4

Physics & Astronomy, Chemistry & Mathematics Olympiad

Duration : 100 minutes

Maximum Marks : 102

Please read the instructions and guidelines carefully :

Important Note : Please ensure to accurately input the details for the Class and Paper No. as indicated at the top of this sheet into the corresponding columns / fields on the OMR sheet before proceeding with the paper. Incorrectly filled information regarding the class or paper may result in inaccurate outcomes or results.

"This paper has been scientifically designed to evaluate your potential – manifested and hidden for the target examinations mentioned in various sections of the paper. Thus, your adherence to the instructions is critical in the evaluation of the same"

1. This Question paper consists of 3 sections.
2. Student should devote allotted time for each section. If a section is easy, then it is easy for everyone & was meant to be like that with a goal in mind. Do not switch over to another section if you find the section to be easy. If a section is tough, then it is tough for everyone. You are advised to spend 40 Minutes on Section-I, 30 Minutes on Section-II and 30 Minutes on Section-III. Dedicating the required time to finish each section successfully is essential. Opening the next section before completing the allotted time for the preceding section is not permitted. This adherence is crucial for assessing your true potential, as each section is meticulously crafted to evaluate your potential for the corresponding competitive examinations.
3. Candidate should open the seal of Section-II only after devoting 40 minutes on Section-I and Seal for Section-III is to be opened only after devoting 30 minutes on Section-II.
4. Sheets will be given to each candidate for rough work. Candidate must fill all details on the rough sheet and submit the same to invigilator along with OMR sheet. Candidate must mention the Question No. while doing the rough work in the sheet.
5. Please note candidates are not allowed to bring any prohibited items into the exam hall such as electronic devices, mobile phones, smart watch, earphones, calculators, books, notes, formula sheets, and bags.
6. Marking scheme is given in table below:

Section	Subject	Question no.	Marking Scheme for each question	
			Correct answer	Wrong answer
SECTION – I (Physics & Astronomy Olympiad) Time Allotted: 40 Minutes	PHYSICS (PART-A)	1 to 8	+3	-1
	MATHEMATICS (PART-B)	9 to 12	+3	-1
SECTION – II (Chemistry Olympiad) Time Allotted: 30 Minutes	CHEMISTRY (PART-A)	13 to 24	+3	-1
SECTION – III (Mathematics Olympiad) Time Allotted: 30 Minutes	MATHEMATICS (PART-A)	25 to 34	+3	-1

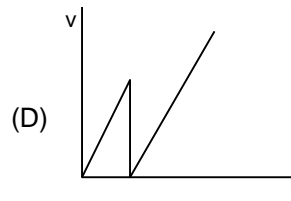
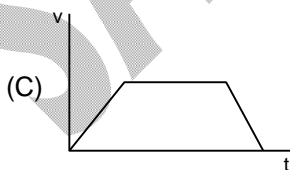
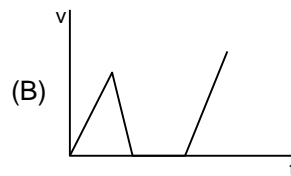
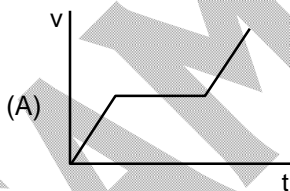
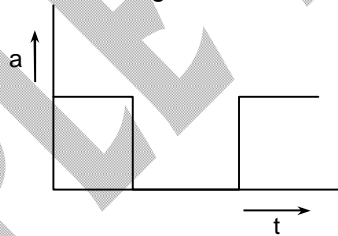
Section - I

Time: 40 Minutes

PHYSICS - (PART - A)

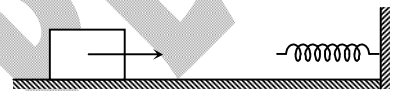
This part contains 8 Multiple Choice Questions number 1 to 8. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

- Which of the following statements are true for a moving body?
(A) if its speed changes, its velocity need not change but it must have some acceleration.
(B) If its velocity changes, its speed must change and it must have some acceleration.
(C) if its velocity changes its speed may or may not change and it must have some acceleration.
(D) If its speed changes and direction of motion does not change, its velocity remains constant
- A ball is released from the top of height 'h' metres. It takes 't' seconds to reach the ground. Where is the ball at the time t/2 s?
(A) At $\left(\frac{h}{4}\right)$ from the ground
(B) At $\left(\frac{h}{2}\right)$ from the ground
(C) At $\left(\frac{3h}{4}\right)$ from the ground
(D) Depends upon mass and volume of the ball
- Which of the following figure would probably show the velocity – time graph for a body whose acceleration – time graph is shown in the figure.



- A ball is thrown upwards with speed v from the top of a tower and it reaches the ground with speed $3v$. The height of the tower is
(A) $\frac{2v^2}{g}$
(B) $\frac{4v^2}{g}$
(C) $\frac{3v^2}{g}$
(D) $\frac{5v^2}{g}$

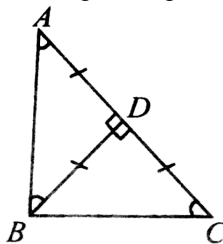
5. A nucleus of mass m originally at rest emits particle of mass $\frac{m}{2}$ with speed 2 m/s . The recoil speed of the nucleus is
 (A) 2 m/s (B) 5 m/s
 (C) 5 m/s (D) 6 m/s
6. A block placed on a frictionless table is pulled by a constant horizontal force of 20 N which displaces it 5 m in the direction of force. Then work done by gravitational force is
 (A) 10 J (B) 20 J
 (C) 0 (D) 40 J
7. A car comes to a skidding stop in 15 m . The force on the car due to the road is 1000 N . The work done by road on the car and car on the road respectively is
 (A) -15 kJ , zero (B) zero, 15 kJ
 (C) zero, zero (D) -15 kJ , 15 kJ
8. A 1 kg block moves towards a light spring with a velocity of 8 m/s . When the spring is compressed by 3 m , its momentum becomes half of the original momentum. Spring constant of the spring is
 (A) $18/3 \text{ N/m}$ (B) $16/3 \text{ N/m}$
 (C) 3 N/m (D) 8 N/m



MATHEMATICS – (PART – B)

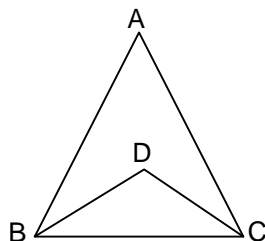
This part contains 4 Multiple Choice Questions number 9 to 12. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

9. In the given figure, $BD \perp AC$, the measure of $\angle ABC$ is



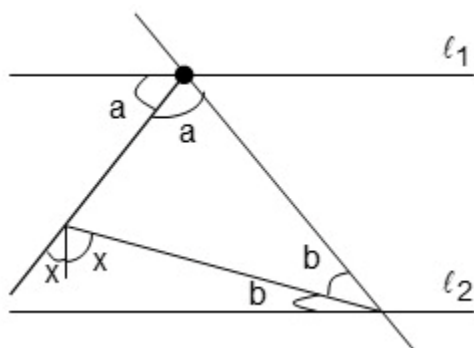
- (A) 60° (B) 30°
 (C) 45° (D) 90°

10. If the given figure, if $AB = AC$ and $DB = DC$, then the ratio of $\angle ABD$ to $\angle ACD$ is



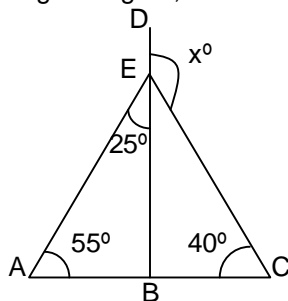
- (A) $1 : 2$ (B) $2 : 1$
 (C) $1 : 1$ (D) $1 : 3$

11. If $l_1 \parallel l_2$, then value of x is



- (A) $22\frac{1}{2}$ (B) $\frac{\pi}{2}$
 (C) 60° (D) $\frac{\pi}{4}$

12. In given figure, find the value of x



- (A) 65° (B) 80°
 (C) 95° (D) 120°

Section - II

Time: 30 Minutes

CHEMISTRY - (PART - A)

This part contains 12 Multiple Choice Questions number 13 to 24. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

13. Volume occupied by one molecule of water (density = 1 g cm^{-3}) is
 (A) $5.5 \times 10^{-23} \text{ cm}^3$ (B) $9.0 \times 10^{-23} \text{ cm}^3$
 (C) $6.023 \times 10^{-23} \text{ cm}^3$ (D) $3.0 \times 10^{-23} \text{ cm}^3$
14. 10g of MnO_2 on reaction with HCl forms 2.24L of Cl_2 (g) at NTP, the percentage impurity of MnO_2 is $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$
 (A) 87% (B) 25%
 (C) 33.3% (D) 13%

15. The amount of zinc required to produce 1.12 ml of H_2 at STP on treatment with dilute HCl will be.
 (A) 65g (B) 0.065g
 (C) 32.5×10^{-4} g (D) 6.5g
16. Boyle's Law states that
 (A) $P \propto V$ (at constant temperature and fixed amount of gas)
 (B) $P \propto \frac{1}{V}$ (at constant temperature and fixed amount of gas)
 (C) $P \propto T$ (at constant volume and fixed amount of gas)
 (D) $P \propto \frac{1}{T}$ (at constant volume and fixed amount of gas)
17. Which of the following relation is/are correct?
 (A) $PM = DRT$ (B) $\frac{P}{M} = DRT$
 (C) $P + M = DRT$ (D) $P - M = DRT$
18. For 20% decrease in volume of given amount of an Ideal gas at constant temperature, its pressure should be increased by
 (A) 20 % (B) 25 %
 (C) Less than 20 % (D) Can't be calculated
19. Which one is hydrophobic in nature?
 (A) Gelatin (B) Sulphur
 (C) Starch (D) Protein
20. Aerosols cannot be destabilized by
 (A) applying electric field of a high voltage.
 (B) by spraying dry ice on super cooled aerosols
 (C) by throwing electrified sand or fumes of Agl.
 (D) by spraying conc. solutions of non hygroscopic substances on clouds.
21. The normality of 4.9% $\left(\frac{w}{w}\right) H_2SO_4$ solution having density 1.02g/ml is
 (A) 1.02N (B) 0.51N
 (C) 2.04N (D) 4.9N
22. The crystalline salt $Na_2SO_4 \cdot XH_2O$ heating loses 55.9% of its mass and becomes anhydrous. The formula of crystalline salt is
 (A) $Na_2SO_4 \cdot 5H_2O$ (B) $Na_2SO_4 \cdot 7H_2O$
 (C) $Na_2SO_4 \cdot 2H_2O$ (D) $Na_2SO_4 \cdot 10H_2O$
23. Solubility is a good separation technique for
 (A) Pure metal (B) Noble gas
 (C) Different salts (D) Metallic alloys
24. Which graph is not a straight line for an ideal gas?
 (A) V versus T (n and p constant) (B) T versus p (n and V constant)
 (C) p versus $1/V$ (n and T constant) (D) n versus $1/p$ (V and T constant)

Section – III

Time: 30 Minutes

MATHEMATICS – (PART – A)

This part contains 10 Multiple Choice Questions number 25 to 34. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

25. The marked price of an article is Rs. 1250 and the shopkeeper allows a discount of 6% on it. Then selling price is
 (A) 1244 Rs. (B) 1325 Rs.
 (C) 1175 Rs. (D) 1400 Rs.
26. If $25^{x+1} = \frac{25}{5^x}$ then the value of x is
 (A) 2 (B) 0
 (C) 1 (D) 3
27.
$$\frac{(875)^2 - (874)^2 - 49}{(90)^2 - (80)^2}$$

 (A) 50 (B) 170
 (C) 0 (D) 1
28. If one of the factors of $6x^2 + 84x - 306$ is $x - 3$. The other factor will be
 (A) $6(x + 5)$ (B) $6(x + 3)$
 (C) $6(x + 17)$ (D) $3(x + 4)$
29. If $y = 3^{1/3} + 3$. Then $y^3 - 9y^2 + 27y = ?$
 (A) 40 (B) 30
 (C) 50 (D) 60
30. If $a + b + c = 4$ and $a^2 + b^2 + c^2 = 14$
 Then $ab + bc + ca = ?$
 (A) -2 (B) 0
 (C) 4 (D) 1
31. Find m if $\left[\left\{ \left(\frac{1}{7^2} \right)^{-2} \right\}^{-1/3} \right]^{1/4} = 7^m$
 (A) $\frac{1}{4}$ (B) $-\frac{1}{3}$
 (C) -3 (D) 2
32. The factorisation of $(m + n)^2 - 4mn - 16p^2$ gives
 (A) $(m + n + 4p)(m + n - 4p)$ (B) $(m - n + 4p)(m - n - 4p)$
 (C) $(m - n - 4p)(m + n + 4p)$ (D) $(m + n + 2p)(m - n - 2p)$

33. $\left(1 - \frac{1}{3}\right)\left(1 - \frac{1}{4}\right)\left(1 - \frac{1}{5}\right)\dots\left(1 - \frac{1}{n}\right) = ?$

(A) $\frac{1}{n}$

(C) $\frac{2}{n}$

(B) $\frac{2(n-1)}{n}$

(D) $\frac{2}{n(n+1)}$

34. $\frac{(967 + 289)^2 + (967 - 289)^2}{[967 \times 967 + 289 \times 289]}$

(A) 1256

(C) 2

(B) 678

(D) 1

SAMPLE PAPER

DRONACHARYA

360° DIAGNOSTIC & SCHOLARSHIP EXAM

Sample Paper

for Students presently in Class IX

Paper 4

Physics & Astronomy, Chemistry & Mathematics Olympiad

ANSWER KEY

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