PHYSICS

CHOOSE THE CORRECT OPTION:

01. The distance covered by the body in time t is proportional to the square of the time 't'. The acceleration of the body is:

(a) increasing **(b)** decreasing **(c)** zero **(d)** constant

02. A train of length 200 m travelling at 30 m/sec overtakes another train of length 300 m travelling at 20 m/sec. The time taken by the first train to pass the second is:

(a) 30 sec **(b)** 50 sec **(c)** 10 sec **(d)** 40 sec

03. A particle at rest starts moving in a horizontal straight line with a uniform acceleration. The ratio of the distance covered during the fourth and the third second is:

(a) 4/3 **(b)** 26/9 **(c)** 7/5 **(d)** 2

04. A jar containing water is placed in a train. The train accelerates from left to right. Which of the following shows the water level in the jar correctly?

(a)  **(b)**  **(c)**  **(d)** 

05. When a bicycle is in motion, the force of friction exerted by the ground on the two wheels is such that it acts:

(a) in the backward direction on the front wheel and in the forward direction on the rear wheel.

(b) in the forward direction on the front wheel and in the backward direction on the rear wheel.

(c) in the backward direction on both the front and the rear wheels.

(d) in the forward direction on both the front and the rear wheels.

06. A person is sitting in a travelling train and facing the engine. He tosses up a coin and the coin falls behind him. It can be concluded that the train is:

(a) moving forward and gaining speed **(b)** moving forward and losing speed

(c) moving forward with uniform speed **(d)** moving backward with uniform speed

07. A body of mass 'm' is taken to the bottom of a deep mine. Then:

(a) its mass increases **(b)** its mass decreases

(c) its weight increases **(d)** its weight decreases

08. The sudden fall of atmospheric pressure indicates:

(a) fair weather **(b)** storm **(c)** rain **(d)** cold wave

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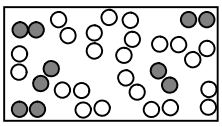
CHEMISTRY

CHOOSE THE CORRECT OPTION:

09. Which compound contains the highest percentage of magnesium by mass?

(a) $MgNH_4PO_4$ **(b)** $Mg(H_2PO_4)_2$ **(c)** $Mg_2P_4O_7$ **(d)** $Mg_3(PO_4)_2$

10. In the given diagram, the paired open spheres represent H_2 molecules and the paired solid spheres represent N_2 molecules.



When the molecules in the box react to form the maximum possible amount of ammonia (NH_3) molecules, what is the limiting reactant and how many molecules of NH_3 can be formed?

(a) N_2 is limiting, 5 molecules of NH_3 can be formed.

(b) N_2 is limiting, 10 molecules of NH_3 can be formed.

(c) H_2 is limiting, 8 molecules of NH_3 can be formed.

(d) H_2 is limiting, 12 molecules of NH_3 can be formed.

11. Vanillin, $C_8H_8O_3$ (M = 152 g/mol), is the molecule responsible for the vanilla flavor in food. How many oxygen atoms are present in a 45.0 mg sample of vanillin?

(a) 1.78×10^{20} **(b)** 5.35×10^{20} **(c)** 1.78×10^{23} **(d)** 5.35×10^{23}

12. What is the molarity of sodium ions in a solution prepared by diluting 250 mL of 0.550 M Na_2SO_4 to 1.25 L?

(a) 0.110 M **(b)** 0.138 M **(c)** 0.220 M **(d)** 0.275 M

13. The solubility of $K_2Cr_2O_7$ in water is 125 g/L at 20^oC. A solution is prepared at 20^oC that contains 6.0 grams of $K_2Cr_2O_7$ in 50 mL of water. This solution is

(a) dilute **(b)** saturated **(c)** supersatured **(d)** unsaturated

14. Which method(s) can be used to determine the concentration of HNO_3 in an aqueous solution of nitric acid?

(I) titration with a standard base

(II) titration with a standard oxidizing agent

(III) precipitation with Ag^+

(a) (I) only **(b)** (III) only **(c)** (I) and (II) only **(d)** (I), (II), and (III)

15. The kinetic theory of gases assumes all of the following EXCEPT:

(a) Gases are composed of particles in random, ceaseless motion.

(b) The sizes of gas particles are negligible compared to the size of the container.

(c) Gas particles do not attract or repel each other.

(d) When gas particles collide, kinetic energy is lost.

16. A sample of He gas in a flexible container at room temperature exhibits a certain pressure. What will be the new pressure when the absolute temperature and volume of the container are both halved? The pressure of the He will be

(a) the same **(b)** doubled **(c)** halved **(d)** quadrupled

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MATHEMATICS

CHOOSE THE CORRECT OPTION:

17. The sum of the series $\frac{7}{2^2 \cdot 5^2} + \frac{13}{5^2 \cdot 8^2} + \frac{19}{8^2 \cdot 11^2} + \ldots$ upto 10 terms is :

(a) $\frac{21}{256}$ **(b)** $\frac{85}{1024}$ **(c)** $\frac{95}{1024}$ **(d)** $\frac{75}{1024}$

18. If $a + b + c = 3$ and $ab + bc + ca = 672abc$ then the value of $\frac{a(b^2+c^2)+b(c^2+a^2)+c(a^2+b^2)}{abc}$ is :

(a) 2012 **(b)** 2011 **(c)** 2013 **(d)** 2014

19. Simplify: $403^5 - 402^2\left(403^3 + 2 \cdot 403^2 + 3 \cdot 403 + 4\right)$

(a) 2012 **(b)** 2011 **(c)** 2010 **(d)** 2015

20. Length of common chord of circles with radii 3 cm and 5cm, centres at (0, 0) and (6, 8) respectively is (in cms) :

(a) 10 **(b)** 0 **(c)** 8 **(d)** none of these

21. In ΔABC , BC = 11 cm, CA = 13 cm and the median to side AB is 10 cm then the area of the triangle is :

(a) 66 cm^2 **(b)** 17 cm^2 **(c)** 55 cm^2 **(d)** 110 cm^2

22. Number of real solution(s) (x, y) to the equation

$(3x - y - 1)^2 - (3x - y - 1)(x + 2y - 3) + (x + 2y - 3)^2 = 0$

(a) 0 **(b)** 1 **(c)** 2 **(d)** infinite

23. Solve for x : $\sqrt{x + \sqrt{7 + \sqrt{x + \sqrt{7 + ...\infty}}}} = 2$

(a) 0 **(b)** 2 **(c)** 4 **(d)** none of these

24. What is the number of distinct terms in the expansion of $(a + b + c)^{20}$?

(a) 231 **(b)** 253 **(c)** 242 **(d)** none of these

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Answer Key

	Physics		Chemistry		Mathematics
1	**d**	9	**d**	17	**b**
2	**b**	10	**c**	18	**c**
3	**c**	11	**b**	19	**b**
4	**b**	12	**c**	20	**b**
5	**d**	13	**d**	21	**a**
6	**a**	14	**a**	22	**b**
7	**d**	15	**d**	23	**d**
8	**b**	16	**a**	24	**a**

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