

M Prakash Institute

30 November 2025

XI Entrance Test 1

Each question carries five marks

10 am to 1 pm

Paper Type AD

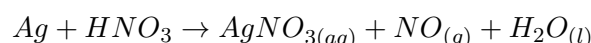
Student Receipt number:

Student Name:

Chemistry

Given : Atomic mass: $H = 1, Li = 7, B = 11, C = 12, N = 14, O = 16, F = 19, Na = 23, Mg = 24, Al = 27, S = 32, Cl = 35.5, K = 39, Ca = 40, Cu = 63.5, Zn = 65, Ag = 108$
 Avogadro's number = 6×10^{23} Particles per mole.

Q.1 Silver metal reacts with nitric acid as following unbalanced reaction:



The amount of silver required to produce 9.00 g of water is ---- g.

Q.2 A larger sized balloon contains 2.5 moles of NO_2 gas . If 6×10^{23} molecules of the same gas is leaked out due to a pin hole from the balloon than the amount of NO_2 gas left in the balloon is ---- g.

Q.3 Which of the following compound can lower down the temperature of solution, when is added to water. Identify from the following and write its molecular mass.

$H_2SO_4, NaNO_3, NaOH, CaO$

Q.4 How many are correct from the following:

- (i) Melting Point: $NaBr > NaCl$; (vi) Boiling Point: $KCl > NaBr$
 (ii) Melting Point: $NaCl > KCl$; (vii) Boiling Point: $MgCl_2 > NaCl$
 (iii) Melting Point: $KCl > MgCl_2$; (viii) Boiling Point: $ZnCl_2 > MgCl_2$
 (iv) Melting Point: $MgCl_2 > ZnCl_2$; (ix) Boiling Point: $NaCl > KCl$
 (v) Melting Point: $MgCl_2 > NaCl$; (x) Boiling Point: $MgCl_2 > NaBr$

Q.5 The molar mass of monomer unit which is used to manufacture a polymer known as Polyacrylonitrile is ---- .

Q.6 One of the Dobereiner triad belongs to 1st group of modern periodic table having elements X, Y and Z , where Y is middle element. Other Dobereiner triad belongs to 17th group of modern periodic table having elements P, Q and R , where Q is middle element. The difference in atomic number of elements Z and X is A , and difference in atomic number of elements R and P is B . The value of $(A + B)$ is

Q.7 What is maximum valency of the element, which is kept at 20th position in Newland's table of octaves?

Q.8 The number of water molecules present in 22.41 ml of liquid water is $A.BC \times 10^{23}$ molecules . Given density of water is 1 g/ml. What is the value of A ?

Q.9 To get $3 \times 10^{23} H^+$ or $H_3 \overset{+}{O}$ ions , the amount of H_3BO_3 added to water is = ---- g.

Q.10 Elements X, Y and Z belong to modern periodic table as given

Elements	Group number	Period number
X	11	5
Y	14	2
Z	16	2

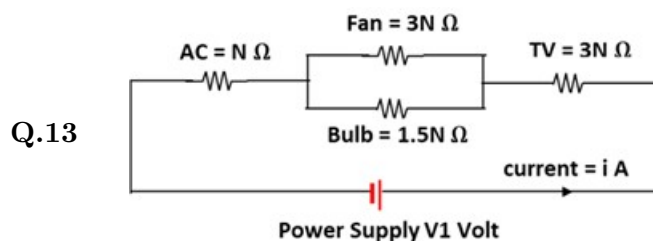
The 0.25 mole of compound formed by elements X, Y and Z = ---- gram.

Physics

Use $g = 10 \text{ m/s}^2$ wherever required.

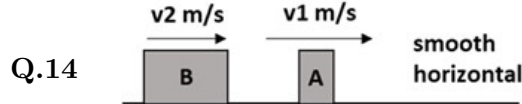
Q.11 At the initial moment, a mouse is 35 m ahead of a cat and a hole in the ground is 25 m further away from the mouse. At that moment the cat's velocity is 2 m/s towards the mouse and it accelerates at $(a_1) \text{ m/s}^2$. At that moment, mouse is stationary and it starts moving at acceleration of 2 m/s² towards the hole. The cat just misses catching the mouse as it slips into the hole just when cat is about to catch it. The whole motion happens in a straight line. Find value of (a_1) , multiply it by 10 and then write that as your answer.

Q.12 Mass of ice is 0.6 kg and its temperature is minus $T^\circ\text{C}$. (i.e. $-T^\circ\text{C}$). In an insulated container, the ice is mixed with 1.2 kg water at 60°C . The final equilibrium temperature of the mixture is 10°C . Specific heat capacity (in cal / g $^\circ\text{C}$) of ice and water is 0.5 and 1 respectively. Latent heat of melting of ice is 80 cal/g. Find T and write that as your answer.



N is a positive number. A circuit as shown below draws current i A from the power source. Later, TV and bulb positions are interchanged and power source is replaced with a V_2 volt source.

In modified circuit also, the current drawn from the power source remains same. Find the % change in the supply voltage and write that as your answer.

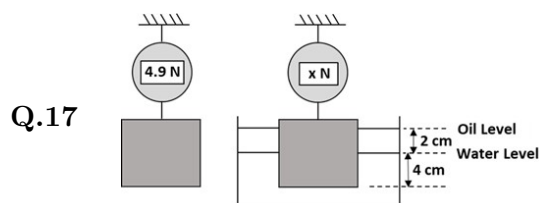


A smaller block A (2 kg) was moving to right on a smooth horizontal table at a constant velocity of 1 m/s.

Another block B (4 kg) behind it and moving at constant velocity 2 m/s towards right collided with A . After collision they separate and move at constant velocities V_1 m/s and V_2 m/s as shown in the diagram below. Total of kinetic energy of both the blocks after collision is 8.5 J. Find V_1 and V_2 . Then mark value of N as your answer where $N = 10(V_1 + V_2)$.

Q.15 A ball is thrown vertically upwards from ground at 80 m/s. point A is 5 m below the highest level the ball reaches. Point B is 275 m above the ground. Find time t (in seconds) taken by the ball to travel downwards from level A to level B . Multiply t by 12 and write that number as your answer.

Q.16 A bus and all people inside has mass 3000 kg. It starts from bus depot A . The first stop B is 1275 m away. The bus engine can safely produce a net drive force on bus of 3000 N or 7500 N depending on how the driver drives. The maximum safe braking force on bus is 11250 N. The greatest speed at which the bus can safely travel is 54 km/h. T seconds is the least possible time taken by a good driver to travel the path AB without any risk or damage to anyone. Find T .



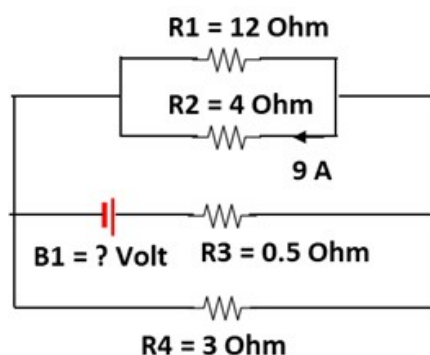
A cylinder in air is suspended from the ceiling. Its axis is vertical and horizontal cross-section area is 80 cm^2 . A weight meter reads 4.9 Newton as shown in the diagram below. Later it is suspended again keeping partially 4 cm in water

(density 1 g/cc), partially 2 cm in oil (density 0.8 g/cc) and a small part out in air. Now, the reading is x Newton. As your answer, write the number $(100x)$.

Q.18 A concave mirror A of radius of curvature 20 and another concave mirror B of focal length 40 cm are kept with their axes coinciding and reflective sides facing each other. Distance between the two mirrors is 50 cm. A tiny object is kept on the axis so that its distance from the mirror B is four times its distance from the mirror A . Consider reflection of the object first due to mirror A and then due to the mirror B . Find the distance (in cm) between the mirror A and the 2^{nd} image formed.

Q.19 A small fish inside a lake is 4 cm below the water surface. Almost vertically (at a small angle), above his head a small insect is hovering (that is, remaining steady in air) at a distance of 12 cm above the water surface. As seen by the fish, the insect is N cm above the water surface. Refractive index of water is $4/3$ and that of air is 1. As your answer mark the number $2N$.

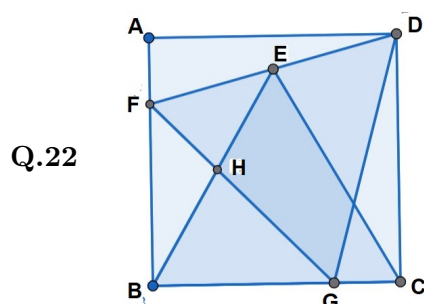
Q.20 Observe the diagram below and find (in Volt) the potential difference of the battery.



Maths

Q.21 A geometric series is the sequence of numbers like $a, ar, ar^2, ar^3, \dots$ where the ratio of next term to previous is constant.

Consider a geometric series (in which the ratio of consecutive terms is not 1) such that the sum of the first two terms is 2 and the sum of the first three terms is 3. S be the sum of first 8 terms of this series. Report $32S$.



Q.22

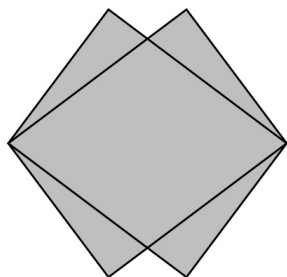
Let $ABCD$ be a square with equilateral triangles BCE and DFG positioned inside it as shown. Find the ratio of the areas of HBG and EFH .

Q.23 The x -coordinates of the vertices of a square in the plane are 1, 3, 8 and 10. Determine the area of the square.

Q.24 $ABCD$ is a parallelogram with $AB = 13, BC = 14, AC = 15$. M and N are the centers of incircles of $\triangle ABC$ and $\triangle CDA$. Find MN^2 .

Q.25 A is the angle between $0 - 90$ degrees. If $\sec^4 A + \tan^4 A = 5101$ find the value of $\sec^2 A + \tan^2 A - 25$

Q.26



Two rectangles each with width 3 and length 4 are placed so that they share a diagonal, as shown. The shaded area in the diagram is $\frac{m}{n}$, where m and n are relatively prime positive integers. Find the value of $\frac{m-5}{n}$.

Q.27 Find the positive real number x for which

$$2\sqrt[3]{1 + \frac{x}{2}} + \sqrt[3]{1 - x} = 3$$

Report $x/2$ as answer.

Q.28 There are positive integers m and n such that $m - n = 18$ and $\frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{m} + \frac{1}{n} = \frac{1}{2}$. Find $m + n$

Q.29 Right triangle $\triangle ABC$ has sides $AB = 75$, $AC = 100$, and $BC = 125$. Point D lies on $\overline{BC}$ and point E lies on $\overline{AC}$ such that $\overline{AD} \perp \overline{BC}$ and $AD = DE$. Find the area of $\triangle ADE$. Report sum of the digits of area of triangle ADE .

Q.30 A polynomial $p(x)$ is defined, in terms of a constant a , by

$$p(x) = x^4 + 2x^3 + 9x + a.$$

When $p(x)$ is divided by $x^2 - x + 2$ the quotient is $x^2 + bx + 1$ and the remainder is $cx + 5$, where b and c are constants. Find $a + b + c$