Topic: **Quadratic Equations**

Chapter Flowchart

The Chapter Flowcharts give you the gist of the chapter flow in a single glance.

Quadratic Polynomials

A polynomial of the form $ax^2 + bx + c$ is called a quadratic expression in the variable x. This is polynomial of the second degree. In quadratic expression $ax^2 + bx + c$, a is the coefficient of x^2, b is the coefficient of x and c is the constant term (or coefficient of x^0)

Quadratic Equation

An equation of the form $ax^2 + bx + c = 0$, $a \neq 0$, is called a quadratic equation in one variable x, where a, b, c are constants.
For example, $2x^2 - 3x + 1 = 0$ and $5 - x - 6x^2 = 0$ are quadratic equations in x. But $\frac{4}{x^2}+\frac{1}{x}-5=0$ is a quadratic equation in $\frac{1}{x}$.

Zeroes of a Quadratic Expression or Roots of a Quadratic Equation :
Let $ax^2 + bx + c$ be a quadratic expression.
If $a\alpha^2+b\alpha+c=0$, then α is called a zero of the quadratic expression $ax^2 + bx + c$.
Thus, α is a zero of $ax^2 + bx + c$ if and only if $a\alpha^2+b\alpha+c=0$, then we say $x = \alpha$ satisfies the equation $ax^2 + bx + c = 0$, and $x = \alpha$ is a solution. Thus, every solution is a root.

Methods for Solving Quadratic Equations

- **By factorization**
- **By completion of square**
- **By solving quadratic formula**

Quadratic equation : $ax^2 + bx + c = 0$ has two roots α and β given by

$$\alpha=\frac{-b+\sqrt{b^2-4ac}}{2a} \text{ and } \beta=\frac{-b-\sqrt{b^2-4ac}}{2a}$$

and this formula is known as quadratic formula.
Discriminant : For the quadratic Equation $ax^2 + bx + c = 0$, the expression $b^2 - 4ac$ is denoted by D and is called the discriminant of the equation.
Taking, $D = b^2 - 4ac$ the roots of $ax^2 + bx + c = 0$ are given by $\alpha=\frac{-b+\sqrt{D}}{2a}$ and $\beta=\frac{-b-\sqrt{D}}{2a}$

Nature of the Roots

Case I : When $D > 0$ i.e., $b^2 - 4ac > 0$. In this case, the roots are real and distinct.

Case II : When $D = 0$, i.e., $b^2 - 4ac = 0$. In this case, the roots are real and equal.

Case III : When $D < 0$, i.e., $b^2 - 4ac < 0$. In this case, the roots are not real.

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Revision Question Bank

Subjective Type Questions

1. Solve the equation $2x^2-5x+3=0$ by the method of completing the square.

2. Using quadratic formula solve the following quadratic equation: $p^2x^2+\ p^2-q^2\ \ x-q^2=0$

3. Find the values of k for each of the following quadratic equations, so that they have two equal roots.

(i) $2x^2 + kx + 3 = 0$ (ii) $kx\,(x - 2) + 6 = 0$

4. Check whether the equation $6x^2 - 7x + 2 = 0$ has real roots, and if it has, find them by the method of completing the squares.

5. A train, travelling at a uniform speed for 360 km, would have taken 48 minutes less to travel the same distance if its speed were 5 km/h more. Find the original speed of the train.

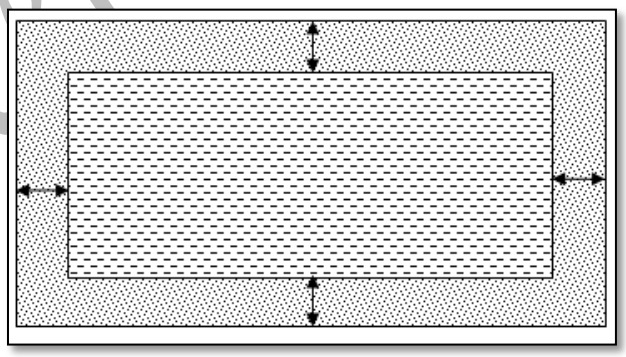
6. Two pipes running together can fill a cistern in $3\frac{1}{13}$ minutes. If one pipe takes 3 minutes more than the other to fill it, find the time in which each pipe would fill the cistern.

7. Seven years ago Varun's age was five times the square of Swati's age. Three years hence, Swati's age will be two-fifth to Varun's age. Find their present ages.

8. Solve for x : $2\left(\frac{2x+3}{x-3}\right)-25\left(\frac{x-3}{2x+3}\right) = 5.$

9. Does there exist a quadratic equation whose coefficients are rational but both of its roots are irrational? Justify your answer.

10. In the centre of a rectangular lawn of dimensions 50 m × 40m, a rectangular pond has to be constructed so that the area of the grass surrounding the pond would be $1184m^2$. See figure. Find the length and breadth of the pond.



Answers

1. $\frac{3}{2}$ and 1 **2.** $\frac{q^2}{p^2}\ \&\ -1$ **3.** (i) $k=\pm\sqrt[2]{6}$ (ii) k=6 **4.** $x=\frac{2}{3},\frac{1}{2}$

5. Original speed of the train is 46 km/h **6.** 8 minutes **7.** 27 yrs.

8. x =1 or x=6 **9.** $X^2-6x+7=0$, which has roots $3+\sqrt{2}\ ,3-\sqrt{2}$

10. Length of pond is 34 m & breadth is 24m.

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Previous Years Question Bank

1. If $ad \neq bc$, then prove that the equation $(a^2 + b^2)x^2 + 2(ac + bd)x + (c^2 + d^2) = 0$ has no real roots. **[CBSE Board, 2016-17]**

2. If $(x^2 + y^2)(a^2 + b^2) = (ax + by)^2$, prove that, $\frac{x}{a} = \frac{y}{b}$. **[CBSE Board, 2016-17]**

3. What constant number must be added or subtracted to $4x^2 + 12x + 8 = 0$ to solve it by method of completing the square? **[CBSE Schools, 2016-17]**

4. Find the value of k, for which the given quadratic equation has equal roots: $4x^2 + kx + 6 = 0$ **[CBSE Schools, 2016-17]**

5. Solve the quadratic equation $(x - 1)^2 - 5(x - 1) - 6 = 0$. **[CBSE Schools, 2016-17]**

6. Two taps running together can fill a cistern in $3\frac{1}{13}$ minutes. If one tap alone takes 3 minutes more than the other to fill it, find the time in which each tap would fill the cistern. **[CBSE Schools, 2016-17]**

7. If one root of $x^2 - 7x + 10 = 0$ and $x^2 - 10x + 6 = 0$ is common, find the common root. **[CBSE Schools, 2016-17]**

8. If the roots of the equation $(a^2 + b^2)\,x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ are equal, then prove that $\frac{a}{b} = \frac{c}{d}$. **[CBSE Schools, 2016-17]**

9. Solve for x: $\frac{1}{a} + \frac{1}{b} + \frac{1}{x} = \frac{1}{a+b+x}, x \neq 0$ **[CBSE Schools, 2016-17]**

10. Find the discriminant of the quadratic equation $3\sqrt{3}x^2 + 10x + \sqrt{3} = 0$. **[CBSE Schools, 2016-17]**

11. 250 Apples were divided equally among a certain number of students. If there was 25 more students, each would have received half apple less. Find the number of students. **[CBSE Schools, 2016-17]**

12. If one root of the quadratic equation is $\frac{3+2\sqrt{5}}{4}$, then what will be the other root? **[CBSE Schools, 2016-17]**

13. Find the positive values of k for which the equation $x^2 + 10x = 16 = 0$ has no real roots. **[CBSE Schools, 2016-17]**

14. Find the roots of the given equation: $2x - \frac{2}{x} = 6;\ x \neq 0$ **[CBSE Schools, 2016-17]**

15. If I has travelled by cycle 2 km/hour faster, I would have taken 20 minutes less to cover a distance of 4 km. Find the original speed of my cycling. **[CBSE Schools, 2016-17]**

16. If $x = 2$ is a common root of quadratic equations $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$, then find ab. **[CBSE Schools, 2016-17]**

17. If the quadratic equation $x^2 + 4x + k = 0$, has real and distinct roots, find the value of k. **[CBSE Schools, 2016-17]**

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18. If $(x^2 + y^2)(a^2 + b^2) = (ax + by)^2$, prove that, $\frac{x}{a} = \frac{y}{b}$. **[CBSE Schools, 2016-17]**

19. A sailor can row a boat 8 km downstream and return back to the starting point in 1 hour 40 minutes. If the speed of the stream is 2 km per hour, find the speed of the boat in still water. **[CBSE Schools, 2016-17]**

20. A taken 6 days less than B to finish a piece of work. If both A and B together can finish it in 4 days, find the time taken by B along to finish the work. **[CBSE Schools, 2016-17]**

21. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other. **[CBSE Schools, 2016-17]**

22. Solve for x: $\frac{1}{x+1} + \frac{3}{5x+1} = \frac{5}{x+4}, x \neq -1, -\frac{1}{5}, -4$ **[CBSE Schools, 2016-17]**

23. Solve for a : $(a - 2) + \frac{1}{a-2} = 3;\ a \neq 2$ **[CBSE Schools, 2016-17]**

24. In a class test, the sum of the marks scored by Prakash in Maths and Science is 28. Had he got 3 more marks in Maths and 4 marks less in Science, the product of the marks obtained in the two subjected would have been 180. Find the marks obtained by Prakash in both the subjects. **[CBSE Schools, 2016-17]**

25. Find nature of roots of quadratic equation $\sqrt{2}x^2 - \sqrt{3}x - \sqrt{8} = 0$. **[CBSE Schools, 2015-16]**

26. A train travels 90 km at a uniform speed. If the speed has been 15 km/hr more, it would have taken half an hour less for the same journey. Find the usual speed of the train. **[CBSE Schools, 2015-16]**

27. A two digit number is such that the product of its digits is 12. When 36 are added to this number, the digits interchange their place. Find the number. **[CBSE Schools, 2015-16]**

28. Solve for x: $\sqrt{6x+7} - 2x - 7 = 0$ **[CBSE Schools, 2015-16]**

29. Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Find the numbers. **[CBSE Schools, 2015-16]**

30. A motor boat whose speed is 24 km/h in still water takes 1 hour more to go 32km upstream than to return downstream to the same spot. Find the speed of the stream. **[CBSE Schools, 2015-16]**

31. Solve for x: $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$ **[CBSE Schools, 2015,17]**

32. The diagonal of a rectangular field is 16 metres more than the shorter side. If the longer side is 14 metres more than the shorter side, then find the lengths of the sides of the field. **[CBSE Schools, 2015-16]**

33. A truck covers a distance of 150 km at a certain average speed and then covers another 200 km at an average speed which is 20 km per hour more than the first speed. If the truck covers the total distance in 5 hours, find the first speed of the truck. **[CBSE Schools, 2014-15]**

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34. If a positive number is subtracted from $\left(\frac{1}{4}\right)^{th}$ of its square, the result is 48. Find the number.

[CBSE Schools, 2014-15]

35. A picture has a height that is $\frac{4}{3}$ its width. It is to be enlarged to have an area of 192 square inches.

What will be the dimensions of the enlargement? **[CBSE Schools, 2014-15]**

36. The sum of two numbers is 15 and the sum of their reciprocal is $\frac{3}{10}$. Find the numbers.

[CBSE Schools, 2014-15]

37. A fast train takes 3 hours less than a slow train for a journey of 600 km. If the speed of the slow train is 10 km/hr less than that of the fast train, find the speeds of the two trains? **[CBSE Schools, 2014-15]**

38. Find the values of p for which the quadratic equations $4x^2 + px + 3 = 0$ has equal roots.

[CBSE Schools, 2013-14]

39. If $x^2 - 2x + 1 = 0$, then find the value of $x + \frac{1}{x}$. **[CBSE Schools, 2013-14]**

40. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, then find base and altitude. **[CBSE Schools, 2013-14]**

41. Sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24m, find the sides of the two squares. **[CBSE Schools, 2013-14]**

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Chapter Test

Maximum Marks: 30 **Maximum Time: 1 hour**

1. What can be said about the nature of roots of the quadratic equation $x^2 - 3\sqrt{3}x + 10 = 0$? **[1]**

2. Find the value of p for which the quadratic equation $4x^2 + px + 3 = 0$ has equal roots. **[2]**

3. Using quadratic formula, solve the following equation for x: $abx^2 + (b^2 - ac)x - bc = 0$ **[3]**

4. For what value of k, the equation $4x^2 - 2(k + 1)x + (k + 1) = 0$ has real and equal roots? **[3]**

5. Find the roots of the equation $3x^2 - 2\sqrt{6}x + 2 = 0$ by method of completing the square. **[3]**

6. Solve : $\frac{4}{x} - 3 = \frac{5}{2x+3}, x \neq 0, x \neq -\frac{3}{2}$. **[3]**

7. The altitude of a right triangle 7 cm. less than its base. If the hypotenuse is 13 cm, find the other two sides. **[3]**

8. Solve the following equation for x: $9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$ **[4]**

9. Due to some problem, Amit left 30 minutes late than his schedule time. In order to reach the destination 150 km away in the time, he had to increase the speed by 15 km/h from the usual speed. Find his usual speed? **[4]**

10. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. **[4]**

Answers

1. D>0, real & distinct **2.** p=$3\sqrt{3}$ or $-4\sqrt{3}$ **3.** $x = x, \frac{-b^2}{a}$ **4.** $k \leq -1$ or $k \geq 3$

5. $x = \frac{\sqrt{2}}{\sqrt{3}}, \frac{\sqrt{2}}{\sqrt{3}}$ **6.** x=–2, 1 **7.** 5 cm & 12 cm **8.** $x = \frac{2a+b}{3}$ or $\frac{a+2b}{3}$

9. 60 km/h **10.** 15, 25 hours.

Metals and Non – Metals

Chapter Flow chart

The Chapter Flowcharts give you the gist of the chapter flow in a single glance

Element

Metals
(92 including metalloids)
Metals lose electrons and form +ve ions

Metalloids
Show characteristics, metallic as well as non-metallic. Examples:
Si, Ge, As, Sb and Te

Non-metals
(22 known)
Non-metals gain electrons and form –ve ions

Physical Properties

- Are malleable, i.e., they can be hammered into thin sheets.
- Are ductile, lustrous and can be polished.
- Are good conductors of heat and electricity.
- Have high, tensile strength.
- Melting and boiling points are usually high.
- All are solid at room temperature except mercury (liquid).

Chemical Properties

- Reaction with oxygen
  Metal + Oxygen
  ↓
  Metal oxide
  $4Na(s) + O_2(g)$
  sodium Oxygen
  ↓
  $2Na_2O_2(s)$
  sodium oxide
- Reaction with water
  Metal + water →
  ↓
  $2NaOH(aq) + H_2(g)$ + heat
  metals oxide + water
  ↓
  $Na_2O(s) + H_2O(l) \rightarrow 2NaOH(aq)$
- Reaction with acids
  Metal + Dilute acid
  ↓
  metals salt + 2HCl(aq)
  $Zn(s) + 2HCl(aq)$
  ↓
  $ZnCl_2(aq) + H_2(g)$
- Reaction with solutions of other metal salts
  metal A + Salt solution of B
  ↓
  Salt solution of A + Metals
  B $Mg(s) + CuSO_4(aq)$
  ↓
  $MgSO_4(aq) + Cu(s)$

Physical Properties

- Are solids or gases except bromine (liquid).
- Are brittle, i.e., they break down when hammered or stretched.
- Are non-malleable.
- Are non-ductile,
- Except graphite, all are bad conductors of heat and electricity.
- Have very low tensile strength.
- Have low melting and boiling points

Chemical Properties

- Reaction with oxygen
  $C(s) + O_2(g)$ - $CO_2(aq)$
  $CO_2(s) + H_2O(l) \rightarrow H_2CO_3(aq)$
  Carbonic add
- Reaction with acids Non-metals do not displace H_2,
- Reaction with chlorine $P_4(s) + 6Cl_2(g) \rightarrow 4PCl_3(g)$

Reactivity/Activity Series

It is the arrangement of **metals** in **a** series in the descending order of their reactivity.

Top of the series	K, Na, Ca, Mg, Al	Highly reactive metals are never found in free state.
Midle of the series	Zn, Fe, Ni, Sn, Pb	Moderately reactive metals are found in the combines state.
Bottom of the series	Cu, Ag	Less reactive metals are found in free state as well as combined state.
	Pt, Au	Least reactive metals are found in free state.

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Extraction and purification {Metallurgy}

Concentration of Ores

- Metals of high reactivity
  - Electrolysis of molten ores
    - Pure metal
  - Carbonate ores
    - Calcination
      - Oxide of metal
        - Reduction to metal
          - Purification of metal
  - Sulphide ores
    - Roasting
      - Oxide of metal
        - Reduction to metal
          - Purification of metal
- Metals of medium reactivity
  - Sulphide ores
    - Roasting
      - Roasting
        - Metal
          - Refining
- Metals of low reactivity
  - Sulphide ores
    - Roasting
      - Roasting
        - Metal
          - Refining

Ionic Compounds

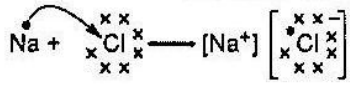
Properties

- Solid and crystalline in nature.
- Good conductors of electricity in aqueous solutions and molten state but do not conduct in the solids state.
- Melting and boiling points are high.
- Made up of positive and negative ions.

Formation

Compounds are formed by a give-and-take relation between the elements as shown below:

Na	$\rightarrow$	$Na^+ + e^-$	
2,8,1		2,8	
		(sodium cation)	
Cl	$+ e^-$	$\rightarrow$	Cl^-
2,8,7			2,8,8
			(Chloride anion)



sodium chloride

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Revision Question Bank

1. Name a metal which is most malleable and ductile.

2. A green layer is gradually formed on a copper plate left exposed to air for a week in a bathroom. What could this green substance be?

3. Select metalloids from the following elements.

(a) Bismuth (b) Copper (c) Zinc (d) Arsenic (e) Iron

4. Name any two non-metals which are used in industry. How is each one of them important to us?

5. Give reasons for the following:

(a) Metals are regarded as electropositive elements.

(b) When a piece of copper metal is added to a solution of zinc sulphate, no change takes place but the blue colour of copper sulphate fades away when a piece of zinc is placed in its solution.

(c) Articles made of aluminium do not corrode even though aluminium is an active metal.

6. What are strategic metals? Give one example also.

7. Write chemical equations for reactions taking place when

(a) manganese dioxide is heated with aluminium powders. (b) Steam is passed over hot iron.

8. What is corrosion of metals? Name one metal which does not corrode and one which corrodes on being kept in atmosphere.

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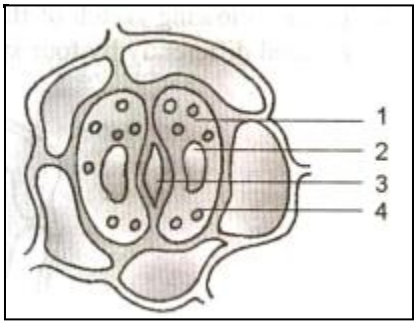
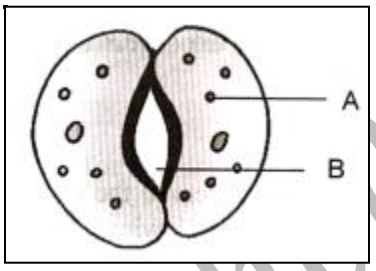
MCQs [Practical Based Questions]

1. A student draws the following sketch of stomatal apparatus and numbers the parts to label them. The chloroplast is denoted by:



(a) 1 (b) 2 (c) 3 (d) 4.

2. The parts shown A and B in the given diagram are:



(a) A is epidermal cell, B is stomatal pore (b) A is guard cell, B is stomatal pore

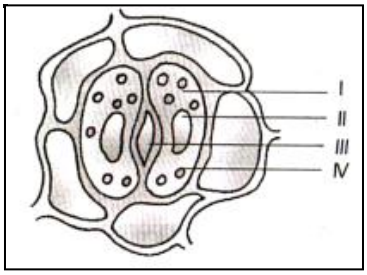
(c) A is epidermal cell, B is guard cell (d) A is guard cell, B is epidermal cell.

3. Nuclei can be clearly seen in a well prepared slide of epidermal peel of a leaf in the :

(a) guard cells only (b) epidermal cells only

(c) guard cells as well as epidermal cells (d) stomata, guard cells and epidermal cells.

4. In the following sketch of the stomatal apparatus, the parts, I, II, III and IV were labelled differently by four students.



The correct labelling, out of the following is :

(a) (I) guard cell, (II) stoma, (III) starch granule, (IV) nucleus

(b) (I) cytoplasm, (II) nucleus, (III) stoma, (IV) chloroplast

(c) (I) guard cell, (II) starch, (III) nucleus, (IV) stoma

(d) (I) cytoplasm, (II) chloroplast, (III) stoma, (IV) nucleus.

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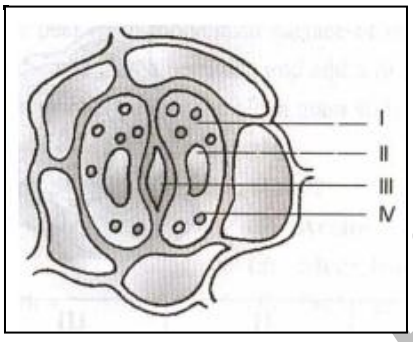
5. A well stained leaf peel mount when observed under the high powder of a microscope shows nuclei in :

(a) only epidermal cells (b) only guard cells

(c) guard cells and epidermal cells (d) guard cells, epidermal cells and stoma.

6. Which structure out of I, II, III and IV marked in the given diagram of the epider mal peel of leaf should be labelled as stoma ?



(a) I (b) II (c) III (d) IV

7. While preparing a temporary stained mount of a leaf epidermal peel, the extra stain) is removed by :

(a) washing with water (b) washing with calcium chloride solution

(c) soaking with filter paper (d) absorbing with cotton wool.

8. A well stained leaf peel preparation when focussed under high power of the J microscope would show :

(a) epidermal cells, stomata, guard cells each with one nucleus and many chloro- plasts

(b) epidermal cells, stomata, guard cells with many nuclei and one chiorcplast each

(c) stomata and guard cells without nuclei or chloroplasts

(d) stomata but no guard cells or epidermal cells.

Student	I	11	III	IV
A	Stoma	Nucleus	Epidermal cell	Cell wall
B	Nucleus	Stoma	Epidermal cell	Cell wall
C	Epidermal cell	Stoma	Nucleus	Cell wall
D	Cell wall	Epidermal cell	Nucleus	Stoma

9. The labelling for the slide of leaf peel showing stoma by the four students who made the diagram and tabulated the labels, is as follows :

The student who made the correct labelling is :

(a) student A (b) student B (c) student C (d) student D.

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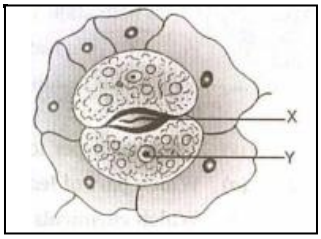
10. Four students A, B, C and D make the records given below, for the parts marked X and Y in this diagram.



Student	X	Y
A	Stoma	Guard cell
B	Guard cell	Stoma
C	Epidermal cell	Stoma
D	Stoma	Epidermal cell

The correct record, out of these, is that of student:

(a) A (b) B (c) C (d) D.

Answers

1.	d	**2.**	b	**3.**	c	**4.**	c	**5.**	c
6.	c	**7.**	c	**8.**	a	**9.**	b	**10.**	a

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Previous Years Questions Bank

1. Write the electron dot structures of magnesium and chlorine and show the formation of magnesium chloride by the transfer of electrons. **[CBSE Schools 2016–17]**

2. What is cinnabar? How is a metal extracted from cinnabar? Explain briefly. **[CBSE Schools 2014, 17]**

3. (a) Why do metals not evolve hydrogen gas with nitric acid? **[CBSE Schools 2016–17]**

(b) Write thermite reaction. Why is it used to join railway lines? (c) What is gangue?

4. (a) Give reasons for the following: **[CBSE Schools 2016–17]**

(i) Gold is used for making jewellery. (ii) Sodium is stored under Kerosene.

(iii) Ca and Mg float on the surface of water.

(b) In the formation of compound 'XY'. 'X' looses one election. T gains one electron. What is the nature of bond? Predict two properties of the compound 'XY'

5. (a) What is meant by metallurgy? **[CBSE Schools 2016–17]**

(b) State the steps associated with extraction of copper from its ore. Write chemical equations involved.

(c) Draw a labelled diagram to illustrate the electrolytic refining of copper write the reactions involved at cathode and anode.

6. Brass is an alloy of **[CBSE Schools 2016–17]**

(a) Cu + Zn (b) Cu + Sn (c) Cu + Ni (d) Cu + Pb

7. Galvanisation is a method of protecting iron from rusting by coating with a thin layer of **[CBSE Schools 2016–17]**

(a) Calcium (b) Aluminium (c) Zinc (d) Silver

8. (a) When calcium metal is added to water, the gas evolved does not catch fire but the same gas evolved on adding potassium metal to water catches fire. Explain why? **[CBSE Schools 2016–17]**

(b)Name a metal for each case:

(i) It displaces hydrogen gas from nitric acid.

(ii) It does not react with any physical state of water.

(iii) It does not react with cold as well as hot water but reacts with steam.

9. Write one example each of : **[CBSE Schools 2016–17]**

(i) a metal which is so soft that, it can be cut with a knife and

(ii) a non-metal which is the hardest natural substance.

10. Give reason for the following: **[CBSE Schools 2016–17]**

(a) Ionic compounds are usually hard. (b) Sodium chloride has a high melting point.

(c) Non-metals do not displace hydrogen from dilute acids.

11. A metal 'X' combines with a non-metal 'Y' by the transfer of electrons to form a compound Z.

(i) State the type of bond in compound Z.

(ii) What can you say about the melting point and boiling point of compound Z?

(iii) Will this compound dissolve in kerosene or petrol?

(iv) Will this compound be a good conductor of electricity? **[CBSE Schools 2016–17]**

12. Answer the following questions: **[CBSE Schools 2016–17]**

(a) Name two metals which melt when kept on Palm.

(b) Name two metals which do not react with oxygen even on heating. What is the likely position of such metals in the reactivity series?

(c) What happens when steam is passed over hot iron. Write its chemical equation.

13. (a) Write two points of differences between roasting and calcination. **[CBSE Schools 2016–17]**

(b) What do you mean by reactivity series of metals?

14. (a) Define the following terms : **[CBSE Schools 2016–17]**

(i) Mineral (ii) Ore (iii) Gangue

(b) Give the constituents of:

(i) Brass (ii) Bronze

15. (a) With the help of a diagram explain electrolytic refining of impure copper metal.

(b) Explain any two methods of preventing corrosion of metals. **[CBSE Schools 2016–17]**

16. In one method of rust prevention, the iron is not coated with anything. Name the method and define it.

[CBSE Schools 2016–17]

17. Explain how the properties of an alloy are different from those of constituent metals.

[CBSE Schools 2016–17]

18. Describe an activity to show how the following metals can be arranged in the decreasing order of reactivity with dil sulphuric acid : Al, Zn, Cu, Fe, Mg. **[CBSE Schools 2016–17]**

19. What is meant by electrolytic reduction? How is sodium obtained from its molten chloride? Explain. **[CBSE Schools 2016–17]**

20. Explain how the properties of an alloy are different from those of constituent metals.

[CBSE Schools 2016–17]

21. Write the electron-dot structure for sodium and chlorine atoms. How do these form a chemical bond? Name the type of bond so formed. Why does the compound formed have high melting point?

[CBSE Schools 2015–16]

22. Explain:

(i) Carbonate and sulphide ores are usually converted into oxides during the process of extraction of metals.

(ii) Ionic compounds have generally high melting points.

(iii) Hydrogen is not a metal but it has assigned a place in the reactivity series of metals.

(iv)The galvanised iron article is protected against rusting even if the zinc layer is broken.

[CBSE Schools 2015–16]

23. State the property utilized in the following:-

(i) Graphite in making electrodes.

(ii) Electric wires are coated with polyvinyl chloride (PVC) or a rubber like material.

(iii) Metal alloys are used for making bells and strings of musical instruments. **[CBSE Schools 2015–16]**

24. (a) Write the chemical reactions taking place when:

(i) Manganese dioxide is heated with aluminium powder

(ii) Steam is passed over red hot iron

(iii) Magnesium reacts with hot water.

(b) The oxide X_2O_3 is unaffected by water. Name a method by which metal X can be obtained from its ore.

[CBSE Schools 2015–16]

25. Copper coin is kept immersed in silver nitrate solution for some time. What change will take place in the coin and colour of the solution? Write the reaction involved. **[CBSE Schools 2015–16]**

26. Why is sodium kept in kerosene oil? **[CBSE Schools 2014–15]**

27. Name cathode, anode and electrolyte in electrolytic refining of copper. Also draw the labeled diagram for the same. **[CBSE Schools 2014–15]**

28. (a) What is ionic bond? **[CBSE Schools 2014–15]**

(b) Show the formation of ionic bond by transfer of electrons between sodium and chlorine to form sodium chloride. (Atomic number of Na = 11, Cl = 17)

(c) Why do ionic compounds have high melting point?

29. Explain the following: **[CBSE Schools 2014–15]**

(a) Why are platinum, gold and silver used to make jewellery?

(b) Why-is hydrogen gas not liberated when metal reacts with nitric acid?

(c) Why is copper used to make hot water tanks and not steel (an alloy of iron)?

(d) Why are silver and copper usually alloyed with gold to make jewellery items?

(e) Why do metals conduct electricity? **[CBSE Schools 2014–15]**

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30. An ore on heating in air produces sulphur dioxide. Which type of ore is it? Describe briefly any two steps involved in the conversion of this concentrated ore into related metal. Also give the reactions involved.

Or

Name the process of obtaining a pure metal from an impure metal through electrolysis. Suppose you have to refine copper using this process' then explain with the help of a labeled diagram the process of purification, mentioning in brief the materials used as:

(i) cathode (ii) anode and (iii) electrolyte,

31. What are amphoteric oxides? Why ZnO is considered an amphoteric oxide? **[CBSE Schools 2014–15]**

(a) What happens when CO_2 is passed through lime water? Write chemical reactions also,

(b) Explain why metals have tendency to loose electrons? **[CBSE Schools 2014–15]**

32. (a) Support your answer with chemical equations in each case. What happens magnesium ribbon is burnt in air? What is the state of the metal in the product formed?

(b) An element A forms two oxides AO and AO_2. The oxide AO is neutral whereas the oxide AO_2 is acidic in nature. Would you call element A metal or a non-metal? **[CBSE Schools 2014–15]**

33. How metals can be differentiated from non-metals on the basis of any three chemical properties? **[CBSE Schools 2014–15]**

34. Name two metals in each of the following cases :

(i) Metals that are stored in kerosene.

(ii) Metals that are alloyed with iron to make stainless steel.

(iii) Metals which are highly malleable and ductile. **[CBSE Schools 2014–15]**

35. Write the chemical equations for the reactions taking place when:

(i) Magnesium ribbon is burnt in presence of air.

(ii) Sodium metal catches fire in contact with water.

(iii) Steam is passed over hot aluminum. **[CBSE Schools 2014–15]**

36. State reason for the following statements:

(a) When calcium is dropped in water, it starts floating on the surface of water.

(b) Ionic compounds in the solid state do not conduct electricity.

(c) Carbon (coke) cannot be used to reduce aluminium oxide to metal. **[CBSE Schools 2014–15]**

37. Explain how the following metals are obtained from their compounds by reduction process :

(a) Metal X which is low in reactivity series. .

(b) Metal Y which is in the middle of reactivity series.

(c) Metal Z which is high in the reactivity series. **[CBSE Schools 2014–15]**

38. In the formation of a compound XY_2, atom X denotes one electron to each Y atom. Show the electron dot structure of X and Y and the formation of XY_2 what is the nature of bond in XY_2? Write any three properties of XY_2. The electronic configurations of three elements X and Y are as follows:

x–2,8,2 y–2,7 **[CBSE Schools 2014–15]**

39. Name a metal which:

(a) is the best conductor of heat

(b) has a very low-meting point

(c) does not react with oxygen even al high temperature

(d) is most ductile **[CBSE Schools 2014–15]**

40. (a) Why does calcium start floating when it reacts with water? Write the balanced chemical equation of the reaction.

(b) Name two metals which do not react with water. **[CBSE Schools 2014–15]**

41. (a) Name two metals which are purified by electrolytic refining.

(b) Mention the anode, cathode and the electrolyte used in the refining process.

(c) At which electrode would the pure metal be deposited? **[CBSE Schools 2013–14]**

42. (a) What is thermit reaction? How is it used to join railway tracks or cracked machine parts? Explain with the help of chemical equation.

(b) Write short note on the following:

(i) Roasting of copper (II) sulphide

(ii) Reduction of copper (I) oxide with copper (I) sulphide

(iii) Reactivity series **[CBSE Schools 2013–14]**

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Chapter Test

Maximum Marks 30 **Maximum Time: 1 hr.**

1. On reaction of Zn with NaOH, which gas is released? **[1]**

2. A metal M does not liberate hydrogen from acids but reacts with oxygen to give a black coloured product. Identify M and black coloured product and also explain the reaction. **[2]**

3. (a) In what forms are metals found in nature? **[2]**

(b) How do metals react with oxygen and water? Give examples to explain.

4. What are ionic compounds? What are their important properties? Give one example of ionic compound and give its electron dot diagram. **[3]**

5. Give the steps involved in the extraction of metals of low and medium reactivity from their respective sulphide ores. **[4]**

6. What are alloys? How are they made? Name the constituents and uses of brass, bronze and solder. **[4]**

7. What is meant by refining of metals? Describe the electrolytic refining of copper with a neat labelled diagram. **[4]**

8. Compare metals and non-metals on the basis of their **[5]**

(a) physical state (b) luster

(c) ductility (d) melting and boiling points (e) density

9. (a) Given below are the steps for extraction of copper from its ore. Write the reactions involved. **[5]**

(i) Roasting of copper (I) sulphide,

(ii) Reduction of copper (I) oxide with copper (I) sulphide.

(iii) Electrolytic refining

(b) Draw a neat and well labelled diagram for electrolytic refining of copper.

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