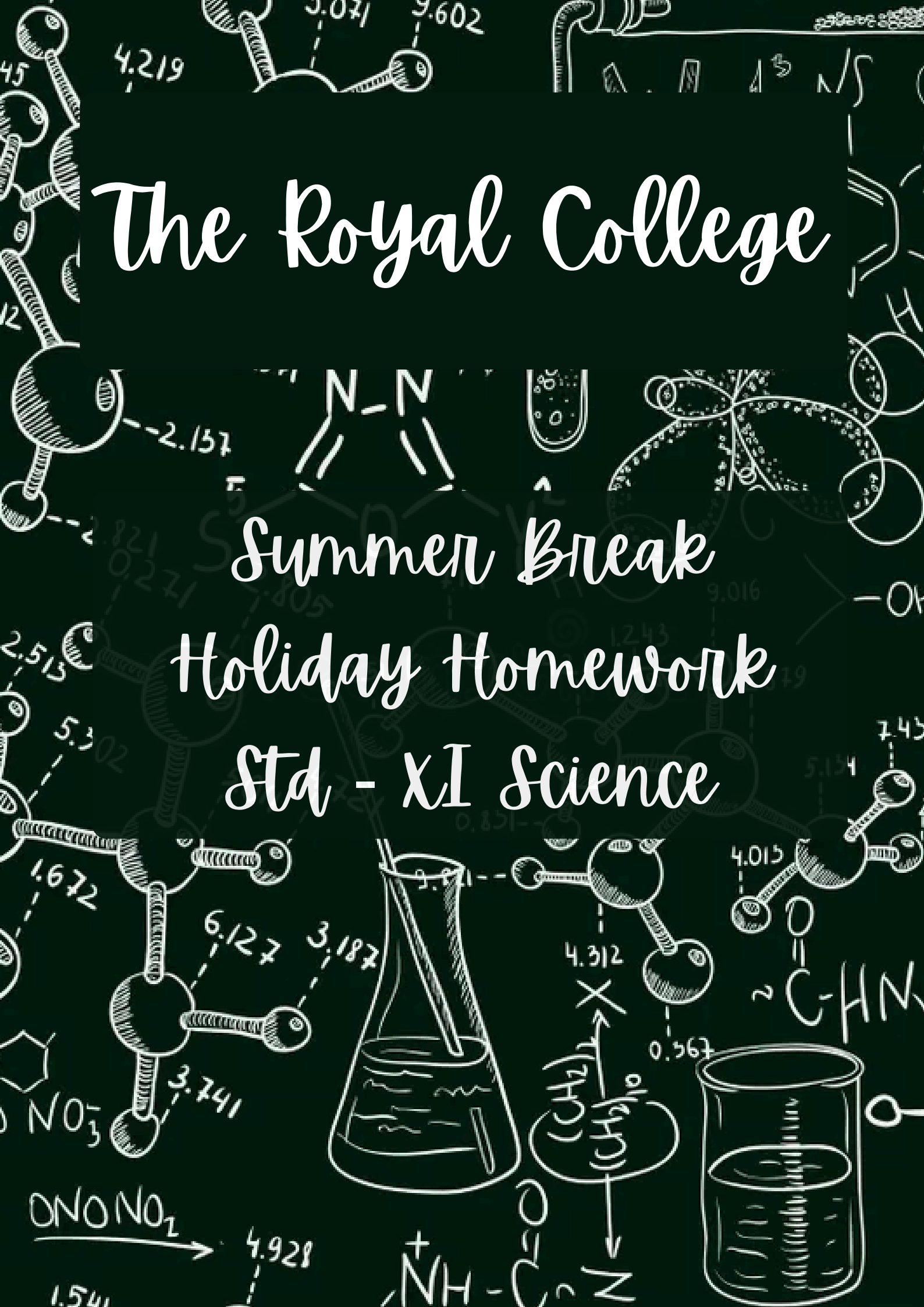


The Royal College

Summer Break Holiday Homework Std - XI Science



Dear Explorers of Knowledge.

As you step into the sunshine of your summer break, we just wanted to say a big **THANK YOU** for learning with heart, thinking with spark. and making this term truly remarkable!

This holiday homework is not a checklist - it's a passport to curiosity. A canvas for your ideas and a chance to dream beyond the classroom walls. We can't wait to see your creative sparks turn into brilliant work.

Until then...

Stay inspired, stay kind, and don't forget to laugh a little louder!
Happy Holidays & Happy Creating!

GENERAL INSTRUCTIONS

- Design your own folder using Eco-friendly material (old calendars, newspapers, old paper bags etc.). Be creative and use your imagination. Write your name and paste your own picture on the cover.
- Try not to finish the homework in a short time.
- Complete all the worksheets neatly and submit them to your class teacher after the vacation.
- There are many more ways to make vacations memorable.
- Get up early in the morning and see the rising sun. Go for a nature walk and feel the fresh air. Try to spend quality time with your elders and share your thoughts and ideas with them.
- Eat healthy food, drink lots of water and healthy drinks during summer.
- Keep two bowls out in the open- on your balcony or your lawn. Fill one with water and the other with some grains. Welcome your feathered guests and watch them flutter around your house. Click their pictures and display in the class.
- Inculcate good manners use these four magic words 'Please, Thank you, Excuse me, Sorry' and see the difference.
- Help your parents to keep the house clean. Do small household jobs like dusting, watering the plants, laying dinner table and so on.
- Request your grandparents to tell you interesting anecdotes from their life.
- Last but not the least - 'Try to converse in English with your family members and friends.'



HOLIDAY HOMEWORK INSTRUCTIONS

Dear Students,

Before commencing the Holiday Homework, all students are instructed to thoroughly revise the syllabus completed up to May 2026 in all subjects. Students should carefully review all concepts, notes, examples and classroom discussions conducted during the academic session.

Students must practise all questions that have been solved, discussed and assigned in class. Regular written practice is essential for strengthening conceptual understanding and improving examination performance.

All Holiday Homework questions are to be completed neatly in separate subject notebooks. Proper presentation, accuracy, completeness and timely completion of work are expected from every student.

The completed work will be reviewed after the reopening of the school and will form an important part of the academic assessment. Students are therefore advised to complete all assigned work sincerely and responsibly during the vacation period.

STD. XI

PHYSICS:

Read the following chapters from NCERT and solve all the exercises given at the last of the chapter and based on that solve the following sheets in a separate notebook.

Chapter: Motion in a straight line

FAQs **Frequently Asked Short Answer Questions**

1. Differentiate between one, two or three dimensional motion. How do we describe a one dimensional motion?
2. Define one, two and three dimensional motions of a particle. Give atleast one example each. (H.P.S.S.C.E. 2008)
3. What is uniform motion? How would you represent uniform motion graphically? What are the uses of such graphs?
4. Distinguish between the distance covered by a body and its displacement. What are the characteristics of displacement?
5. Show that slope of displacement-time graph is equal to the velocity of uniform motion. (H.P.S.S.C.E. 2010, 2007 S, 2004)
6. Show that area under the velocity-time graph of a particle in uniform motion gives the displacement of the particle in a given time. (H.P.S.S.C.E. 2010, 2004)
7. What do slopes of position-time and velocity-time graphs of uniformly accelerated motion represent? What do positive and negative values of these slopes imply? (H.P.S.S.C.E. 2006)
8. Derive the equation :
$$x(t) = x(0) + v(0)t + \frac{1}{2}at^2$$
 (C.B.S.E. 1998)
9. Prove that $x = x_0 + ut + \frac{1}{2}at^2$, where symbols have their usual meanings. (H.P.S.S.C.E. 2004, 2003)
10. Define acceleration. Derive the velocity-time relation in the case of a body moving under constant acceleration.
11. Find an expression for the displacement of a uniformly accelerated body from its velocity-time graph. (C.B.S.E. 2001)
12. Show that area under the velocity-time graph of an object moving with constant acceleration in a straight line in certain time interval is equal to the distance covered by the object in that interval. (H.P.S.S.C.E. 2006 S, 2006)
13. Drawing velocity-time graph of uniform motion, prove that the displacement of an object in a given interval of time is equal to the area under velocity-time graph. (H.P.S.S.C.E. 2011)
14. Derive the equation of motion :
$$v = u + at,$$
 where letters have usual meanings. (H.P.S.S.C.E. 2009 S)
15. Derive the relation :
$$S = ut + \frac{1}{2}at^2$$
 for uniformly accelerated motion along a straight line. (H.P.S.S.C.E. 2011, 2010, 2009 S, 2009, 2007, 2001)
16. Derive the relation :
$$v^2 - u^2 = 2aS,$$
 for uniformly accelerated motion along a straight line. (H.P.S.S.C.E. 2010, 2009, 2004)
17. Using velocity-time graph, prove that
$$v^2 - u^2 = 2aS,$$
 where the letters have their usual meanings. (H.P.S.S.C.E. 2011, 2007)
18. Prove that the distance travelled by a body in n th second is given by
$$S_{nth} = u + \frac{a}{2}(2n - 1),$$
 where symbols have their usual meanings. (H.P.S.S.C.E. 2011, 2009, 2004, 2003)
19. What is meant by instantaneous velocity? How does this concept enable us to introduce the idea of acceleration? Why don't we expect the position-time graph of a uniformly accelerated motion to be a straight line? (H.P.S.S.C.E. 2007)

AQs Frequently Asked Long Answer Questions

1. What is the difference between speed and velocity? Show that the slope of displacement-time graph is equal to the velocity of uniform motion. (H.P.S.S.C.E. 2009)
2. Define uniform velocity of an object moving along a straight line. What will be the shapes of velocity-time and position-time graphs of such a motion?
3. Draw velocity-time graph of uniform motion and prove that the displacement of an object in a time interval is equal to the area under velocity-time graph in that time interval. (H.P.S.S.C.E. 2009, 2000)
4. Show that the area under velocity-time graph of an object moving with constant acceleration in a straight line in certain time interval is equal to the displacement of the object in that time interval. (H.P.S.S.C.E. 2009 S)
5. Define relative velocity of an object *w.r.t.* another. Draw position-time graphs of two objects moving along a straight line, when their relative velocity is (i) zero and (ii) non-zero. (H.P.S.S.C.E. 2006)
6. What do you mean by relative velocity of an object *w.r.t.* another? Obtain an expression for the relative position of the two objects at any time t in terms of their velocities and positions at time $t = 0$, when motion takes place along a straight line.
7. For an object moving in a straight line with constant acceleration, plot the velocity-time and position-time graph for its motion.
8. From the velocity-time graph of a uniformly accelerated motion, deduce the equations of motion between (i) velocity and time (ii) distance and time (iii) distance and velocity.
9. Deduce the following relations for motion of an object along a straight line with constant acceleration :
 (i) $v' = v + a(t' - t)$,
 (ii) $x' = x + v(t' - t) + \frac{1}{2} a(t' - t)^2$,
 (iii) $v'^2 - v^2 = 2a(x' - x)$;
 where the letters have their usual meanings. (H.P.S.S.C.E. 2003)
10. Derive an expression for the distance travelled by a uniformly accelerated body in t seconds. Also derive an expression for the distance travelled by the body in the n th second. (C.B.S.E. 1999)
11. Deduce the following relations analytically for a uniform motion along a straight time, where the terms have their usual meanings :
 (i) $v = u + at$ (ii) $S = ut + \frac{1}{2} at^2$
 (iii) $v^2 - u^2 = 2aS$
12. Define average and instantaneous velocity. Derive the relation :

$$S_{nth} = u + \frac{a}{2} (2n - 1),$$
 for uniformly accelerated motion of the particle. (H.P.S.S.C.E. 2009 S)

Chapter: Vectors

FAQs Frequently Asked Short Answer Questions

- Define the following :
(i) unit vector, (ii) equal vectors, (iii) null vector, (iv) displacement vector. (H.P.S.S.C.E. 2011)
- What do you understand by a scalar and a vector?
(i) Can a vector be added to a scalar?
(ii) Can a vector be multiplied by a scalar? Explain.
- Distinguish between distance and displacement. (H.P.S.S.C.E. 2011)
- What do you understand by position vector and displacement vector? Distinguish between them.
- State triangle law of vector addition. Give its analytical treatment to find the magnitude and direction of a resultant vector by using this law. (H.P.S.S.C.E. 2011, 2010 S, 2008)
- State parallelogram law of vector addition. Show that resultant of two vectors \vec{A} and \vec{B} inclined at angle θ is given by

$$R = \sqrt{A^2 + B^2 + 2AB \cos \theta}$$
 (H.P.S.S.C.E. 2011, 2010, 2009 S, 2004)
- State and prove polygon law of vector addition. (H.P.S.S.C.E. 2011, 2010 S, 2009 S, 2007 S, 2007)
- Five vectors are represented by the sides of a closed polygon taken in the same order. Make use of triangle law to prove that their resultant is zero.
- Explain, how a vector \vec{B} can be subtracted from a vector \vec{A} .
- (a) What do you mean by resolution of a vector and components of a vector?
(b) What is rectangular resolution?
- What do you mean by the resolved parts of a vector? Find their values, when one of them makes an angle θ with the given vector.
- It is easier to pull a lawn roller than to push it. Explain. (H.P.S.S.C.E. 2009)
- Explain the scalar product of two vectors. Mention its any two properties. (H.P.S.S.C.E. 2006)
- Show that the vectors are mutually perpendicular, if their dot product is zero.

- Show that dot product of two vectors is commutative. (H.P.S.S.C.E. 2007)
- Explain vector product of two vectors. Mention its any two properties. (H.P.S.S.C.E. 2006)

- Given that

$$\vec{A} = A_x \hat{i} + A_y \hat{j} + A_z \hat{k} \quad \text{and} \quad \vec{B} = B_x \hat{i} + B_y \hat{j} + B_z \hat{k}$$
 Find $A \times B$.

FAQs Frequently Asked Long Answer Questions

- How will you add (a) two vectors and (b) more than two vectors graphically?
What do you understand by the resultant of two vectors?
- State the triangle law, parallelogram law and polygon law of addition of vectors. Show that triangle law of addition of vectors is basic law of addition of vectors.
- State parallelogram law of vector addition. Using the law, derive expressions for magnitude and direction of the resultant of two vectors inclined at an angle θ . What will be the magnitude and direction, if $\theta = \pi/2$? (H.P.S.S.C.E. 2007)
- State parallelogram law of vector addition. Find the magnitude and direction of the resultant of two vectors \vec{A} and \vec{B} inclined at an angle θ with each other by using this law. (H.P.S.S.C.E. 2010 S, 2009)
- State parallelogram law of vector addition and find the magnitude of the resultant of two vectors \vec{A} and \vec{B} inclined at an angle θ analytical method for finding its resultant, when the two vectors are inclined at an angle θ with each other. What happens, when $\theta = 0^\circ$ and $\theta = 90^\circ$? (H.P.S.S.C.E. 2006)
- Two vectors are inclined at an angle θ . Show how would you add these two vectors analytically. Discuss the special cases, when (i) $\theta = 0^\circ$, (ii) $\theta = 90^\circ$ and (iii) $\theta = 180^\circ$.
- How is relative velocity of a body A w.r.t. another body B determined, when the two are moving in two different directions inclined at angle θ .
- Explain the scalar product of two vectors. What does it physically represent?
- Define dot product of two vectors. Show that dot product of two vectors \vec{A} and \vec{B} varies from $-AB$ to AB .
- Explain the vector product of two vectors. Show that the vector product does not obey commutative law. (H.P.S.S.C.E. 2011)
- (a) Explain the vector product of two vectors. What does it physically represent?
(b) Show that the cross product of vectors obeys the distributive law.
- Define cross product of two vectors. Show that the cross product of two vectors \vec{A} and \vec{B} varies from 0 to AB .
- Derive an expression for the area of a triangle in terms of the cross-product of two vectors representing the two sides of the triangle. (H.P.S.S.C.E. 2007 S, 2003, 2001)

CHEMISTRY:

Read the following chapters from NCERT and solve all the exercises given at the last of the chapter and based on that solve the following questions in a separate notebook.

Ch: SOME BASIC CONCEPTS OF CHEMISTRY

Q1. A vessel contains 1.6 g of dioxygen at STP (273.15 K, 1 atm pressure). The gas is now transferred to another vessel at constant temperature, where pressure becomes half of the original pressure.

Calculate (i) volume of the new vessel

(ii) number of molecules of dioxygen.

Q2. Calcium carbonate reacts with aqueous HCl to give CaCl₂ and CO₂ according to the reaction

Given below:



What mass of CaCl₂ will be formed when 250 mL of 0.76 M HCl reacts with 1000 g of CaCO₃?

Name the limiting reagent.

Calculate the number of moles of CaCl₂ formed in the reaction.

Q3. Define the law of multiple proportions. Explain it with two examples. How does this law point to the existence of atoms?

Q4. A box contains some identical red coloured balls, labelled as A, each weighing 2 grams. Another box contains identical blue coloured balls, labelled as B, each weighing 5 grams. Consider the Combinations AB, AB₂, A₂B and A₂B₃ and show that law of multiple proportions is applicable.

Q5. If 4 litres of water are added to 2 litres of 6M hydrochloric acid solution. What will be the Change in the molarity of the solution?

Q6. How much carbon dioxide would be obtained by heating 10 kg of 90% limestone?

Q7. If a 500 ml 5 M solution is diluted to 1500 ml, what will be the molarity of the final solution?

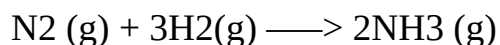
Q8. The molar mass and empirical formula of a compound are CH_2O and 180g. What will be its Molecular formula?

Q9. If 4 g of NaOH dissolves in 36 g of H_2O , calculate the mole fraction of each component in the solution. Also, determine the molarity of solution (specific gravity of solution is 1g ml^{-1})

Q10. What volume of 10M HCl and 3M HCl should be mixed to obtain 1L of 6M HCl solution?

Q11. What is the difference between empirical and molecular formula? A compound contains 4.07 % Hydrogen, 24.27 % carbon and 71.65 % chlorine. Its molar mass is 98.96 g. What are its empirical and molecular formulas?

Q12. Di-nitrogen (2kg) and Di-hydrogen (1kg) react with each other to produce ammonia according to the following chemical equation:



(i) Will any of the two reactants remain unreacted?

(ii) If yes, which one and what would be its mass?

Q13. A welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen, gives 3.38 g carbon dioxide, 0.690 g of water and no other products. A volume of 10.0 L (measured At STP) of this welding gas is found to weigh 11.6 g. Calculate (i) empirical formula, (ii) molar mass of the gas, and (iii) molecular formula.

Q14. A compound made up of two elements A and B has A= 70 %, B = 30 %. Their relative number of Moles in the compound are 1.25 and 1.88. Calculate (a) empirical formula Atomic masses of the elements A and B 14

b). Molecular formula of the compound, if its molecular mass is found to be 160

Q15. In a reaction $A + B_2 \rightarrow AB_2$

Identify the limiting reagent, if any, in the following reaction mixtures.

- i. 300 atoms of A + 200 molecules of B
- ii. 2 mol of A + 3 mol of B
- iii. 100 atoms of A + 100 molecules of B
- iv. 5 mol of A + 2.5 mol of B
- v. 2.5 mol of A + 5 mol of B

Ch. STRUCTURE OF ATOM

Q1. Define an atomic orbital. How is it different from an orbit?

Q2. Calculate the wavelength of light having a frequency of

Q3. State the main postulates of the Bohr model of atom.

Q4. Explain the significance of quantum numbers in describing an electron.

Q5. Write the electronic configuration of:

(a) Calcium ($Z = 20$)

(b) Chromium ($Z = 24$)

(c) Copper ($Z = 29$)

Q6. Why does chromium show an exceptional electronic configuration?

Q7. Differentiate between:

- a. Orbit and orbital
- b. Shell and subshell

Q9. What is the de Broglie wavelength? Write its mathematical expression.

Q10. Calculate the de Broglie wavelength of an electron moving with velocity

Q11. State the Heisenberg Uncertainty Principle. Why is it important?

Q12 An electron in an atom has the quantum numbers $n = 4, l = 2$. Identify: The sub shell, The orbital

Q13. Write all possible sets of quantum numbers for electrons present in the 2p sub shell.

Q14. Explain the significance of the four quantum numbers. Write the possible values of:

Principal quantum number (n)

Azimuthal quantum number (l)

Magnetic quantum number (m)

Q15. Calculate the maximum number of electrons that can be accommodated in:
(a) N shell (b) M shell

Q16. Explain the rules for filling electrons in orbital:

Aufbau principle, Pauli's exclusion principle, Hund's rule

Q17. What are isotopes? Give two examples.

An atom contains 17 electrons and 18 neutrons. Find:

Atomic number, Mass number, Number of protons

Q18. Explain the photoelectric effect with one example.

Q19. Calculate the frequency of light whose wavelength is 500 nm.

Q20. Why are spectral lines obtained instead of a continuous spectrum in hydrogen atom?

Q21. What is meant by ionization energy in the context of hydrogen atom? Write its value.

Q22. Write the electronic configuration and number of unpaired electrons in:
Nitrogen ($Z = 7$). Oxygen ($Z = 8$)

Q 23. Explain why: 2p orbital has higher energy than 2s orbital

S-orbital is spherical in shape

MATHEMATICS

Do the following questions from the RD SHARMA book of Mathematics in a separate notebook:

Chapter: Complex Numbers

Page No. 12.2, Example – 1, 2, 4

Page No. 12.3, Exercise – 12.1, Questions– 1, 3

Page No. 12.12, Example – 1, 2, 4 (4 parts of each)

Page No. 12.15, Example – 9, 10 (All Parts)

Page No. 12.28, Exercise – 12.2, Questions– 10, 12, 13, 14, 15

Page No. 12.40, Example – 1, 6, 7 (All Parts)

Page No. 12.49, Exercise – 12.4, Questions– 1, 3 (All Parts)

Chapter: Trigonometric Functions

Write & Learn all the Trigonometric Identities of Trigonometric Functions .

Measurement of Angles: Exercise–4.1, Questions–1,2,7,11,13,15

Trigonometric Functions: Exercise – 5.1, Questions– 1, 2, 6, 7, 13, 19

Exercise – 5.2, Que. – 1, 2 & Exercise – 5.3, Que.– 4, 5, 1, 2, 3, 9 (4 parts of each)

Values of Trigonometric Functions at Sum or Difference of Angle:

Exercise – 7.1, Questions– 1, 7, 11, 12, 17 (3 parts of each)

Transformation Formulae: Exercise – 8.1, Questions– 4, 7, 5 (4 Parts)

Exercise – 8.2, Questions– 2, 3, 6, 7

Values of Trigonometric Functions at Multiples & Submultiples of Angle :

Exercise – 9.1, Questions– 1, 5, 8, 11, 12, 16, 17, 21

BIOLOGY

Read the following chapters from NCERT and solve all the exercises given at the last of the chapter and based on that solve the following questions in a separate notebook.

Chapter: Cells

Chapter: Breathing and exchange of gases

Chapter: Body fluids and Circulations

1. Who proposed the cell theory?
2. State the modern cell theory.
3. Differentiate between prokaryotic and eukaryotic cells.
4. Name the organelle known as the “powerhouse of the cell”.
5. Why are ribosomes called the protein factories of the cell?
6. State two functions of plasma membrane.
7. What is the fluid mosaic model of plasma membrane?
8. Differentiate between smooth endoplasmic reticulum and rough endoplasmic reticulum.
9. State the functions of Golgi apparatus.
10. What are lysosomes? Why are they called suicidal bags?
11. Differentiate between plant cell and animal cell.
12. What are plastids? Name their types.
13. Explain the structure and functions of mitochondria.
14. Draw a labelled diagram of chloroplast.

15. What is nucleolus? Mention its function.
16. Differentiate between chromatin and chromosomes.
17. What are vacuoles? State their functions.
18. Explain passive transport and active transport.
19. What is osmosis?
20. Differentiate between diffusion and osmosis.
21. Define cell cycle.
22. Name the phases of interphase.
23. Explain the significance of mitosis.
24. Differentiate between mitosis and meiosis.
25. What happens during prophase of mitosis?
26. Explain metaphase of mitosis.
27. What is cytokinesis?
28. Why is meiosis called reduction division?
29. Explain crossing over.
30. Mention the significance of meiosis.
31. Draw a labelled diagram of stages of mitosis.
32. What is synapsis?
33. Differentiate between meiosis I and meiosis II.
34. Define respiration.
35. Differentiate between breathing and respiration.
36. Explain the mechanism of breathing in humans.
37. What is the role of diaphragm during inhalation?

38. Name the respiratory pigment in humans.
39. What are alveoli? Mention their significance.
40. Explain exchange of gases in lungs.
41. What is the transport form of carbon dioxide in blood?
42. Differentiate between oxygenated and deoxygenated blood.
43. What is tidal volume?
44. Define vital capacity.
45. What is the function of haemoglobin?
46. What are the components of blood?
47. Differentiate between plasma and serum.
48. State the functions of lymph.
49. Explain blood clotting mechanism.
50. Draw a labelled diagram of human heart and explain double circulation.

MANDATORY

1. Create your LinkedIn profile and upload all of your certificates you have received till date and then send the connection request to your known ones.
2. All of you are required to enrol in the Online Python (Basic & Beginner Level) Course. The registration link has been provided—please ensure that you register and pay the required fee at the earliest, spend an hour everyday on this course.

Upon successful completion of the course, a certificate will be generated. You must bring a printed copy of this certificate to the school at the time of reopening.

This course is extremely important for your future studies and will be

beneficial for admissions to higher institutions.

Kindly take this seriously and complete it within the given time.

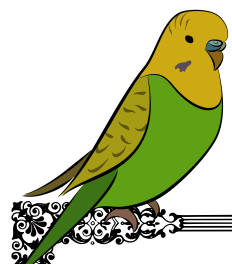
Link for the course

<https://www.udemy.com/course/python-complete-course-for-beginners/?srsltid=AfmBOoqGXbvqG6qry3zUiAllhW7kr24d9xXWug9nYJbwABDxS-c1Ll5Z>



MOST IMPORTANT:

- Do a good social activity per week, click pictures. Paste and write about it in the scrapbook.
- Plant a sapling on “World Environment Day” (5 June). Click a picture with it and write a paragraph on world environment day. Paste it in the scrapbook.
- 90% of the homework is offline. Please don't use mobile phones.



For any query, please connect Mr. Saurabh Thakur between 11:00 am to 12:00 noon on 6396735683.