



HEM *harmonize*

SCIENCE

Grade IX

Integration of Values

Teacher's Manual



Teacher Manual for Integration of Values in Teaching Academic subjects

By

HEMA Foundation, Mumbai

Teacher Manual for Integration of Values in Academic subjects

SCIENCE

Grade IX

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Preface



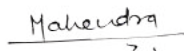
It gives immense pleasure to all of us at HEMA Foundation in presenting the “Teacher Manual for Value Integration” from Grade I to Grade X to our beloved teaching fraternity in school education. Teachers are the corner stones in building the huge edifice for the student community and they are the driving force and guiding spirit to the society. Little will change in the society, if the teachers do



not make any efforts. We are all living in a scenario where value systems need to be integrated and enhanced through essential school subjects so that the students assimilate values into their regular habits effortlessly. There may have been innumerable reasons why values from the society are disappearing, but there cannot be two opinions about the significance of educational institutions in restoring the culture and values of the society. When they say, ‘values are to be caught’, it is leaving a high degree of moral responsibility on the part of our teachers and this manual is our humble effort to lessen that burden for them. This manual is not a substitute to the academic teaching lesson plan, but is a supplementary assistance to the academic text. Nevertheless, the teachers are at perfect liberty to choose and aptly use the learning materials/activities wherever they find it relevant. This manual would be of great use to the teachers as they are written by practicing teachers in the school system and after thorough research and therefore, the general difficulties of teachers such as completion of portions in the given time to teach the subjects etc are taken care of. In fact, some of the lessons have been written after seeing their practical applications in actual classrooms.

We all have a responsibility of creating a society that is driven by values and our younger generation is the key change makers in the society. They all must be inspired by our educational institutions and their teachers so that their intellectual development is supported and augmented by the value systems and culture. HEMA Foundation takes it as a commitment to the society in participating in this huge endeavor. Inviting all the stakeholders to this venture of spreading and integrating values into the learning environment of schools, with all humility, we remain always your well wishers

Thank You,



Mahendra Kabra
Managing Trustee



Anita Maheshwari
Trustee & Creative Director

Acknowledgement

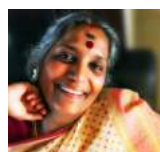
Welcome to HEMA Foundation's 'Teacher Manual for Value Integration'. I take this opportunity to thank each one of those who participated in it. At the outset I thank the Management of HEMA Foundation, its Managing Trustee Shri Mahendra Kabra and the Trustee and Creative Director, Smt. Anita Maheshwari, for their unstinted support and cooperation in making this happen. Our humble pranams to the Senior most Member of HEMA Foundation Padmashree Shri Rameshwarlal ji Kabra, for his abundant blessings. The Associate Director Hetal Desai, the IT department Head, Shri Arvind Pandey, Shri Akash Shah and all other team mates from HEMA Foundation have contributed immensely toward realizing this manual.

There are several people outside the system who have supported this cause by giving their valuable comments and suggestions and my thanks are due to them as well. My sincere appreciations to the authors of this book who have been esteemed Principals, Section heads and Department heads and educators from reputed institutes of the country and they deserve the highest appreciation in envisaging the concept so well. My sincere appreciation to Dr. Shobana Nandakumar Nair, Mrs. Shobha Rajkumar, Mrs. Priya Cibi, Mrs. Sopna T. R and Rashmi Menon, for authoring the manual for Math, EVS, English and Science respectively. It was their untiring work and willingness to modify the documents as and when changes were required or further researches were needed, that this book was made possible.

As the Academic Director of HEMA Foundation and the person who has conceived this idea of value integration, I have gone through this document several times before presenting it to you and am fully aware of the significance of each word used in this document. I am sure the faculty who uses this manual would strictly adhere to the norms of the school Boards and the suggestions given over here. The Central staff of HEMA Foundation is more than willing to take your valuable suggestions and I promise that we shall be able to incorporate them if found suitable in our next publications.

I thank you for all your incredible commitment. All the credits if you find this document useful, would go invariably to all those who wrote the book and those who helped in the realization of the book and all those demerits if any, are purely due to my oversight. Believing that you would find it very useful in reaching out to the students and become inspiring teachers for our younger generations

I remain your sincere



Vijayam Ravi, PhD

Introduction

(must read before the teacher proceeds)

Its 'a Friday evening'. Everyone looks forward to a joyful weekend with family. After a weeklong work, it is a much-needed break. The school campus that was brimming with noises and screams of children, is silent and calm- The evening twilight has set in on the tall buildings, creating beautiful silhouettes. All have shut their tables; cupboards and the office of the school is closed. Principal and staff were slowly proceeding to the gate. They all wished each other a happy weekend. The peon is stepping out. Suddenly it happened. None expected the normal events that take place every day would take a turn so unexpectedly. School watchman came rushing to them to announce that there has been a riot in the city and he said he could see few students along with some other miscreants sabotaging public and private properties and hurting people on streets, hooting and howling. He added that it is not safe now to walk out. That the rioting group included their students as well. The miscreants included some of their old students too. And they were all those 'good' students when they were inside the school campus.

That left the teaching staff and the leaders stunned for a while. For a moment many of them looked at the school building just like that, which is their Almamater, and it stood so tall and elevated with a pride of creating thousands of glorious citizens in the past. Each one had a question mark in their eyes. None spoke. There was a dumb silence. Each one silently started replaying what they have been doing in the classrooms all along. There was an unbelief, inexplicable feeling reflected in their eyes. Did we make any difference to our students today? Did we teach our children to live or did we teach only Math, Science and language?

This is a serious question that all teaching faculty must ask themselves-

Did we teach subjects? Or did we teach children?

Professional standards for teaching academic subjects and transferring the right knowledge to the students have been the main objective of teaching all along, across the universe. All the latest teaching and learning revolutions that are happening in the classrooms and the students are evaluated for their skill development. Education is the vehicle for development of human being. Situations turned out to be grim when the pandemic engulfed the world with its outstretched arms. Every nook and corner of the world reeled under pressure with the pain and uncertainty that was caused by this pandemic. The ambiguity around, the uncertainty, complexity and insecurity around the schools was huge that none could fathom a way to come out of it. Teachers started looking toward blended learning in a hybrid classroom situation as a solution to reach students. All the more a reason for us, to do introspection about what we were doing till yesterday in the classrooms.

Yes, we taught our students Math, English, Languages, Social sciences, Sports, Music, Art and Craft and everything else-but values. We boasted ourselves as the top schools

with more students falling into the distinction list in terms of marks. Every year we sent out to the world, thousands of students with less skills and values but more of academics and marks. We were happy. Schools were happy. But we realize today that only some of those schools have been teaching students and not teaching subjects alone. Teaching subjects has a goal post and that is the academic credentials in terms of marks, but teaching students per say has another purpose altogether and that is -Touching their lives. We were confused and placing our balls in the wrong goal' posts. Result? The riots on the street, misbehavior, calamities, destruction, suicide and a valueless society in the making! Yes, certainly we imparted knowledge of academic subjects, however while this intellectual development is transmitted, there was room for us -the teachers for integration of values into these subjects. Few schools include moral science or value education in the curriculum and the teachers do teach the kids values like an academic subject and most of the schools assess the moral science in a written examination. It is very doubtful whether the students have really gained anything out of this process. Chances are bright that they end up considering the value education as just another subject. Teaching values through books was not a mistake, but assessing the children on marks was the issue. So, students when they completed their moral science examination, and received their 'pass marks', they quietly 'passed on' the values to the dustbins.

They say that the society's growth and degradation depend to a large extent the way the students are produced by the schools. The economic prosperity of a Nation depends to a large extent on living style and value systems of the society and there is every reason to believe that when the crime rate in a country goes high, the economic prosperity has declined in the society. The thinking, the culture of coexistence, working as teams and maintaining the art of tolerance, if these are removed from the society, it is very difficult to revive the Nation. India has been such a rich country with its values and it is a very painful scenario to watch how our younger generation is missing out on values. To a large extent the responsibilities can be passed on to the Macaulay's education system, parents and schools. If the schools make deliberate attempts to impart academic subjects and create excellence in that, the student's generation that gets molded out of the schools would certainly prove to be an asset in creating wealth and prosperity for the nation. However, if the schools do not impart values to the students, the nation will end up in a huge disaster after some time in terms of its moral fibre.. Wealth and success alone do not bring happiness to the society or an individual. Yes, it may bring some kind of satisfaction and one can always get a pleasure out of it. But very soon, this feeling becomes very transient and the mind would look for something else. This is human nature and it happens because the purpose of human life is not imparted to the students in schools. And when the assessment is done, that subject is also done.

Is this the purpose of education? Swami Vivekananda conceives education as the process where the innate potential of the human being is revealed. The innate nature of a human being is peace and joy. The riots on the street shows totally opposite virtues. Then where did the schools go wrong?

The riot on the street by students is not the debate here. It may be right or it may be wrong. The question is of larger dimension. It is of citizenry, safety, security and morality of a Nation, of the Globe! But why does such a behavior happen? Why do our students or our citizens behave in such an unruly manner that is a pain to others? When did our children or our citizens who passed out of the portals of our school, become so very intolerant? What is the fundamental cause for such an unrest in the minds of students, or generally speaking mankind as a whole? The intellectual quotient is very much in place. But when the spiritual quotient and emotional quotient are misplaced, the human beings sometimes behave weirdly. They lose cool, the power to think and act. Most often human beings react.

Did we, at schools, teach our students to act, or react?

Did we, at schools, teach the students values? Or imbue values in them?

Did we teach the students only subjects? Or did we touch their lives?

The Context to Value Integration with subjects:

It is in this context of these questions, that the thought of integrating values with academic subject teaching dawned. Education and values are no two different subjects. They are mutually interwoven. As a teacher, the biggest role is to prepare their students behave like human beings with all values intact. All academic subjects may give them an opportunity to excel in life, but the values learnt help them to live as human being. Since the teacher is an integral part of education and the inspiration in the life of the children, they have to turn toward integrating values while they teach subjects. Value Integration does not mean quoting a value and discussing it, rather it is an effort to lead the students to see a personal meaning in whatever the teacher teaches in all subjects. It depends to a large extent on the creativity of the teacher to highlight the value that is hidden in all subjects, including the languages. Value means a person's personal principles or standards of behavior the judgement of how important that value is to him in his life. In nut shell we can say, "Value is a preferential behavior". What the teacher needs to do in class is to help the kids choose 'his/her preferential behaviour'

The fundamental shift that needs to happen here is this.

At the centre, is the value and all subjects are contributing to the stabilization of the value. Therefore, the teaching has to be intertwined with those values from the subjects and the teachers reach to the students in a very subtle way. Each Subject-be it Science, Math Or languages, or social science, or Non-academic subjects, have got something very fundamental to convey to the people who spend time to learn those subjects. And if we look at those subjects from a very objective perspective, we can clearly see what they are all dying to convey to the children. Math talks about precision, value of time, sharing caring, multiplying happiness and joy and several likes. Science talks about hard work and resilience and the will power to fail and still work hard to achieve. Languages give the

feelings of expression, love, compassion and what not. So, when a student goes out of the school portals, he would have assimilated within him values like precision, punctuality, rationality, truth, compassion, love, caring, sharing, determination, courage to fail, spirit of enquiry et etc. Along with similar such values, the content gets learnt by the kids.

What benefits do Value Integration bring to the students?

1. The students acquire several time honoured personal and collective values for life
2. Along with the cognitive development assured by modern education, integrating values in academic subjects prepares the children to develop their social and emotional lives
3. The approach of integration of values in teaching subjects, help the students enrich students' intellectually, physically, socially, morally, spiritually and artistically.
4. Schools can witness more of academic diligence with students showing increased attentiveness in the classroom and show capacity to do independent work
5. The school ambience also will see less of conflicting situations as the students start demonstrating greater empathy and responsibility
6. The student teacher relationships drastically improve and it becomes more trusting
7. Students feel a sense connectivity with others and belongingness

The argument

Teachers are the crucial ingredients in getting the values incorporated into the system and there is no two way about it. At present teachers are focused on completing their lessons on time amid all challenges and they do not have the extra time for doing any research for incorporating the lessons with values. Education and imparting values are no two different subjects. They are one. Additionally, thrusting a subject of value addition always attracts criticisms, primarily from the teaching community since they believe that it is an additional work and have to prepare more.

This argument is in place and cannot be ruled out and that is why HEMA Foundation pitches in for help.

What does HEMA Foundation offer to teachers?

This particular attempt from HEMA Foundation is to address this conflicting issue in education. HF is striving to reach out to teachers with ways and means to incorporate or integrate values while they teach academic subjects so that additional burden is not on them, while they address a major concern of education.

Values can never be taught, values can only be caught

Every subject has material knowledge that is needed for existence. What goes unnoticed more often is the subtle knowledge that the subjects try to convey. Any subject-Language, Math or science-all stand there for spreading virtues and values alongside the material knowledge. It is an integral part of learning the subject.

How and why are the Values Integrated by HF?

There is a very sound reason for HF to adopt the project of value integration into academic subjects and it is justified when any one reads the deliberations made in the NEP-2020 -NEP talks passionately about the integration of values, skills, and essential subjects to make the learning holistic. Let us refer to the clause 4.28, and it reads as follows: “Students will be taught at a young age the importance of “doing what’s right” and will be given a logical framework for making ethical decisions. In later years, this would then be expanded along themes of cheating, violence, plagiarism, littering, tolerance, equality, empathy, etc., with a view to enabling children to embrace moral/ethical values in conducting one’s life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. As consequences of such basic ethical reasoning, traditional Indian values and all basic human and Constitutional values (such as seva, ahimsa, swachchhata, satya, nishkam karma, shanti, sacrifice, tolerance, diversity, pluralism, righteous conduct, gender sensitivity, respect for elders, respect for all people and their inherent capabilities regardless of background, respect for environment, helpfulness, courtesy, patience, forgiveness, empathy, compassion, patriotism, democratic outlook, integrity, responsibility, justice, liberty, equality, and fraternity) will be developed in all students.”

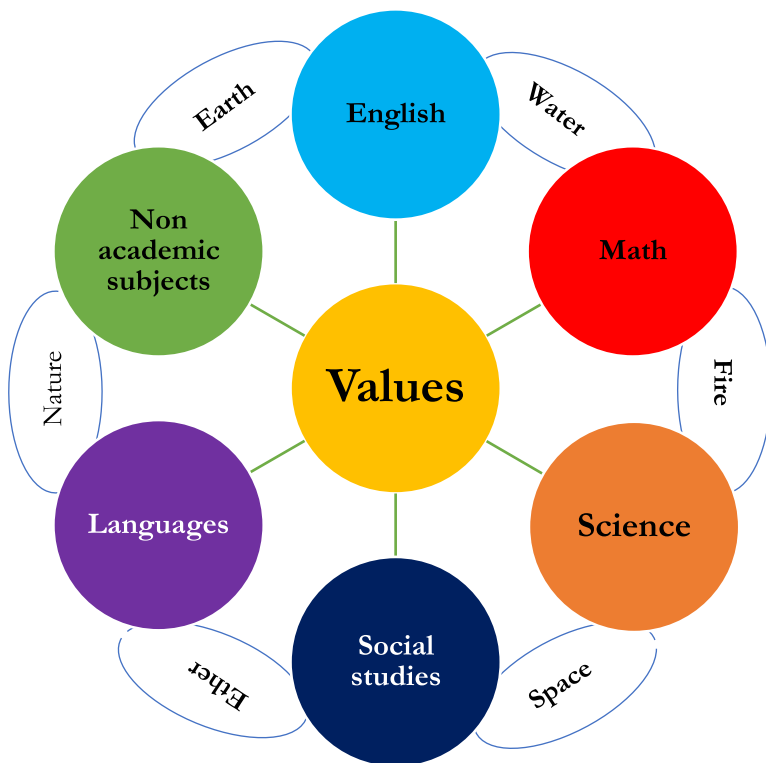
The new NEP and therein the NCERT insist on integration of values with essential subjects. Nature is the mother of all knowledge- Every learning that takes place with human beings is connected through the mind and intellect. While giving food for thought at the intellectual level, teachers have to supplement the emotional aspect through developing the mind. Mind develops by seeing, observations and hearing from sources that make sense to it. Human brain and human mind need to go hand in hand to make rational decisions and emotional attachments. If there are no emotions to any material knowledge learnt, it will remain a subject only. The love for the subject comes, when one extrapolates it to the application of it both at the material and emotional level. The emotional intelligence that gets originated while an academic subject is being taught is as powerful as the academic learning. Because it signals imagination and creativity and these are faculties associated with the mind. The rational brain which is provided with intellectual information about the academic subjects processes the knowledge with the help of the emotional brain-which is the mind. When no food is given to the emotional brain, it gets impoverished. Therefore, a balancing act needs to be done by teachers while imparting knowledge on academic subjects to incorporate the value or virtue that the subject is trying to convey to the reader or learner.

While the teacher teaches a topic ‘Patterns’ in Math, remember that the teacher has to touch the value of precision, discipline and punctuality. The whole universe gives us innumerable patterns and they all follow a certain order. That order brings discipline and it helps you see things in the right perspective. Similarly, the teacher, while discussing about geography, and earth in particular, what can be brought out is the virtue of evolution and the stability given by the earth. Earth is an evolved planet. The innate stability, the order, the growth and silence involved in this process are all virtues that can

be imparted to the students. On similar lines, the ecosystem, the biology, atmosphere, the plants, animals, air, water, aesthetics, and beauty-all talk about values and virtues of truth, tolerance and love, coexistence, interdependence, compassion and honesty.

Integration of values with academic subject teaching is an effort of HEMA Foundation to reach to the teachers with the varied ways of dealing with academic subjects and making it very interesting for the students to learn.

Whom does this manual serve?



The next thing that HF is trying to incorporate is Skills along with values. Skills are also considered to be an integral part of learning and hence while a value is highlighted the skills are also touched upon.

The additional advantage that teachers who use this manual of HF is that, the chart of the flow of lessons can be as such adopted in real teaching sessions without the need for doing a lesson plan again. The pattern of a school lesson plan used for imparting academic session is given incorporating the values integrated in it.

The perfect way of starting an academic lesson in a normal classroom situation so that the students get glued to the teacher's skills of teaching, is assured in the manual

through a context text-either by way of a story or an activity or discussion that rouses the interest of children

The description of the lesson ends with assignments for doing individually, at home or in class and this comes as a huge relief for the teachers

There is also a descriptive summary in the beginning of the text manual where in the topic, the core values, the skills and the activities that can be done and also the materials required for the same are all given so that the teacher gets a quick idea about how to go about the same.

HF, thus, is trying to travel that path of imbibing values to children along with the teachers!

Organization of the manual-How to read the manual?

The teacher will have to read and understand the manual as follows:

This teacher manual follows a certain structure that is not replacing the academic journal of the teacher. On the contrary, serves as an additional support as to how the teacher can link those values that are very relevant for a human life with the teaching of the subjects.

It has two parts:

A descriptive summary: this is a sheet in the beginning of each manual, showing what are the core values, sub values and skills that are linked with the topics and describes what activities can be undertaken to teach the values through subject integration and also shows what all education materials are required. Teacher has to glance through this to get a fair idea about how many values are integrated in total and understand this part first

The second part is the actual manual where the method of integration is dealt with the main academic concept.

The structure of the manual goes as follows: Start reading from introduction

1. **Introduction:** This gives what the lesson is about and what values, skills can be integrated here and the significance of it
2. **Learning objectives:** This plan talks about what are the academic and value driven objectives of learning the lesson
3. **Process and Action:** Here the way how the lesson has to be undertaken and it is shown in the form of a flow chart for quick understanding mentioning the activities at each stage. It starts with the context which actually serves as the introduction of the class to the new topic.
4. **Activities and related discussion:** Here the activities are dealt with in detail with discussion questions that lead to both academic and value driven integration. It is through these the teacher is able to deliver the total lesson effortlessly.
5. **Assignments:** Gives assignments that can be done individually, at home, or as group in the class.

The activities given can be chosen by the teacher as and when needed or as per the time available. It is not mandatory that the teacher does all activities.

Conclusion:

It is a proven fact that any particular value learnt becomes a habit when one practices it consistently. The purpose of integration of values with academic subjects is to learn the values along with the academic concepts and so whenever the academic concepts are tested, the value learnt is reiterated. The creativity and imagination of teacher make the lessons interesting to the students and HEMA Foundation presents this Value Integration Teacher Manual for the benefit of the teaching and student community.

Jai Hind

Conceived and presented by

Vijayam Ravi, PhD

Academic Director

HEMA Foundation

"वसुधैव कुटुंबकम्"

Vasudhaiva Kutumbakam ("vasudha", the earth; "iva", is ; and "kutumbakam", family). This Sanskrit phrase literally translates to mean that the whole world is one single family. The Sages have said that the entire world is truly just one family connected with thoughts, emotions, humanity and humility.



सर्वे भवन्तु सुखिनः सर्वे सन्तु निरामया ।
सर्वे भद्राणि पश्यन्तु मा कश्चित् दुःखभाग् भवेत् ॥

May all be prosperous and happy. May all be free from illness.
May all see what is spiritually uplifting. May no one suffer in anyway.
Om peace, peace, peace.



Vision

We aim to cultivate a conscious understanding of human values in individuals in order to help them coexist peacefully and harmoniously.



Mission

Our mission is to awaken the spirit of value based living in all individuals at school, organizational and community levels through well researched and structured programs resulting in a responsible, effective and harmonious existence for all



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Unit 1

Matter In Our Surroundings

Topic	Values / Life skills integrated & imbibed	Activities
Matter In Our Surroundings	<p>Core Values Considered: Integrity, Flexibility and Positivity</p> <p>Other Sub Values: Love ,Happiness and Adaptability</p> <p>Life Skills: Observation and scientific deduction skills.</p>	<p>1) This is a demonstration cum discussion which helps to understand the importance of integrity and flexibility in life. Refer B.1.</p> <p>2) This is a demonstration which helps the children to relate to values like love ,happiness and positivity Refer B.2.</p> <p>3) Home assignment that helps to improve the observation and scientific deduction skills. Refer.C.1</p>

Materials / Resources needed

- 1) Ice cubes, a steel pan, metal plates, incense sticks, matchbox.
- 2) NCERT text books of Class IX

Description (of the points of discussion)

This chapter deals with the constitution of matter and the characteristics of particles of matter, the different states of matter and the transition from one state to another.

The points of discussion are

- the different states of matter and their characteristics.
- the characteristics of the constituent particles of matter.
- the terms associated with change of state and the factors affecting change of state.
- the concept of latent heat of fusion and vaporisation as well as the difference between evaporation and boiling.
- different states of matter are like different phases in our life. Though we may have to go through different stages and play different roles in our life, we have to preserve our integrity and uniqueness and should be able to go back to the roots at any point of time.
- flexibility and adaptability are very important virtues in life. We should be like water which is ready to take the shape of the container and also ready to adapt and change to a new state when conditions demand.
- like the phenomena of diffusion in liquids and gases, if you fill your mind with virtues like love, kindness and positivity, it will eventually spread to others around you.

Unit 1**Matter In Our Surroundings
Integrity, Flexibility and Positivity****I. Introduction**

We see different types of substances around us. They have different forms and characteristics. A state of matter is one of the distinct forms that different phases of matter take on. This chapter deals with the constitution of matter and the characteristics of particles of matter, the different states of matter and the transition from one state to another.

While explaining the different states of matter, teacher gets an opportunity to highlight the values like integrity, flexibility and selflessness and also to touch upon the oneness among all forms. It can be highlighted that different states of matter are like different phases in our life. We may have to go through different stages in life and may play different roles in each stage. But ultimately one has to preserve one's integrity and uniqueness and should be able to go back to the roots at any point of time. Another aspect that can be discussed is the inherent flexibility shown by fluids like water. Water is flexible to any change in its form and enters a different state when conditions so demand. In liquid and gaseous states it is even ready to take the shape of the container in which it is kept. Likewise, one should be flexible and adaptable to situations.

The core values focused upon are Integrity, Flexibility and Positivity along with sub values such as Love, Happiness and Adaptability.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Recall the different states of matter and their characteristics.
- Learn about the characteristics of the constituent particles of matter.
- Describe the terms associated with change of state and the factors affecting change of state.

- Realise that different states of matter are like different phases in our life. Though we may have to go through different stages and play different roles in our life, we have to preserve our integrity and uniqueness and should be able to go back to the roots at any point of time.
- Appreciate the fact that flexibility and adaptability are very important virtues in life. We should be like water which is ready to take the shape of the container and also ready to adapt and change to a new state when conditions demand.
- Realise that just like the phenomena of diffusion in liquids and gases, if you fill your mind with virtues like love, happiness and positivity, it will eventually spread to others around you.

III. Process & Action Plan

This chapter helps the teacher to relate the state transition of matter with stages in life. Teacher gets an opportunity to inculcate values like Integrity, Flexibility and Positivity in the minds of the children. These values help in the overall development of the children as sensible individuals.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion and demonstration. *Refer A*



**B. Carry out the varied activities in class
(given below) in the sequence specified.**



**1. Integrity, Adaptability
and Flexibility**

This is a demonstration cum discussion which helps to understand the importance of integrity and flexibility in life. Refer B.1.

2. Positivity

This is a demonstration which helps the children to relate to values like love and positivity. Refer B.2.



**C. Aid generalization of the concepts learnt,
through assignments (given below).**



1. Home assignment that helps to improve the observation and scientific deduction skills. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The core values being considered are **Integrity, Flexibility and Positivity** along with sub values such as **Love, Kindness and Adaptability**.

The unit also provides the scope to develop the following skills in the students like **the observation and scientific deduction skills**.

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion on the different substances we see around us. Teacher can point out that all these materials are made up of small particles called atoms and molecules and different states happen as a result of their certain characteristics like inter particular space and attraction. To demonstrate a peculiar characteristic of fluids teacher can take some water in a beaker and add some ink or colour to it for visibility. Then pour the water to glass jars with different shapes as shown in the figure below.. It can be observed that in whichever vessel you pour water it takes the shape of the vessel.



This demonstrates the flexibility and adaptability of fluids like water. This can be adapted in our life also. When situations demand we should be able to adjust and adapt to it. Flexibility to some extent is a very good virtue.

Water demonstrates adaptability and flexibility when it changes its state from solid to liquid and liquid to gas and vice versa. When the temperature and pressure of the environment changes water adjusts to the conditions and change its form. Teacher can urge children to be adaptable and flexible in life by demonstrating these behaviour exhibited by water.

Things needed: glass beakers of different shapes, water and some ink or colours.

B. Activities:

B.1. This is a demonstration cum discussion activity. Teacher can demonstrate the change of state of water from solid to liquid and from liquid to gas and then back to old solid state.

- Take some ice cubes and keep them on a metal plate and slowly heat it. As the temperature of the metal plate increases ice cubes start melting.
- After the ice cubes get converted to water, heat it in a pan to the boiling temperature of 100 degree Celsius. Water slowly gets converted into water vapour.
- Now hold a cool metal plate over the water vapour. You can see water vapour condensing into water on the bottom side of the plate.
- If it is collected and frozen you will get ice.

Children can observe the state change from solid to liquid, liquid to vapour and back to liquid and then to solid again. It is interesting to note that during these phase transitions the constituent particles across all the states are only water molecules. They differ only in some characteristics.

This helps children to understand the fact that different states of matter are like different phases in our life. Teacher can relate it to real life situations. Though we may have to go through different stages and play different roles in our life, we have to preserve our integrity and uniqueness. We have some qualities that helps us to be unique and we should preserve them, even if some changes are inevitable in life. This helps us to go back to the original state without much difficulty, just like water vapour going back to the solid state. This also teaches us that we should not forget our roots and should always stick to our virtues.

Things needed: Ice cubes, a steel pan, metal plates.

B.2. The teacher can demonstrate the phenomenon of diffusion exhibited by fluids like gases and liquids. Burn an incense stick in the classroom. It can be observed that the fragrance of the incense stick spreads throughout the classroom. Instead, if some stinking garbage or a rotten egg is kept in the room, its bad smell will be reaching every corner of the room. Teacher can compare this to some life truths. If our mind is full of love and happiness, that will get propagated to all others around us. A happy person will make others happy. The presence of a positive mind makes others also feel the positivity. On the contrary if your mind is full of negativity and hatred then the same will be felt by others. Teacher can urge children to fill their minds with positivity, love and happiness, so that others in their vicinity will feel the same.

Things needed: Incense sticks, matchbox.

V. Assignments

C.1. Home Assignment.

The children can be asked to prepare a list of common household phenomena where change of state is observed. For e.g.: boiling of water, evaporation, melting of wax in a candle etc. This will help to improve the observation and scientific deduction skills of children.

Resources

References:

- NCERT Class IX Science Textbook.
- Picture courtesy: www.physicsworld.com

Unit 2

Is Matter Around Us Pure?

Topic	Values / Life skills integrated & imbibed	Activities
Is Matter Around Us Pure?	<p>Core Values Considered: Teamwork, Integrity and Positivity</p> <p>Other Sub Values: Flexibility</p> <p>Life Skills: Scientific observation and Inference skills and also the Communication skills.</p>	<ol style="list-style-type: none"> 1. This is a demonstration cum discussion which helps to understand the importance of Integrity and Teamwork in life..Refer B.1. 2. This is a demonstration which helps the children to relate to value like positivity. Refer B.2. 3. Home assignment to improve scientific observation and inference skills and also the communication skills of the students.. Refer.C.1.

Materials / Resources needed

- 1) One beaker with water in it, some sugar and sand.
- 2) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter elaborates on the elements, compounds and their characteristics, different types of mixtures and their properties, along with the various separation techniques for mixtures.

The points of discussion are

- Differentiate between pure and impure substances.
- Differentiate between solutions, suspensions and colloids.
- the different types of mixtures and various separation techniques for separating mixtures into its constituents.
- the properties of pure substances like elements and compounds and their characteristics.
- constituents of a solution work like a team. It is also a good example for flexibility.
- in solutions the constituents maintain their integrity and can be separated very easily.
- the concentration and properties of a solution can be related to the value of positivity among many negative factors.

Unit 2**Is Matter Around Us Pure?
Teamwork, Integrity and Positivity****I. Introduction**

When we speak of a pure substance, we are speaking of something that contains only one kind of matter. This can either be one single element or one single compound. This chapter elaborates on the elements, compounds and their characteristics, different types of mixtures and their properties, along with the various separation techniques for mixtures.

Teacher gets an opportunity to highlight the values like teamwork, integrity and flexibility while explaining the concepts in this chapter. Solutions are good examples of teamwork and flexibility. Mixtures also teach us how to preserve our unique identity and along with integrity although we may have to work together with many others. Concentration of solutions and the changes in property can be related to positive and negative attitudes.

The core values focused upon are Teamwork, Integrity and Positivity along with sub values such as Flexibility.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Differentiate between pure and impure substances.
- Differentiate between solutions, suspensions and colloids.
- Learn about the different types of mixtures and various separation techniques for separating mixtures into its constituents.
- Describe the properties of pure substances like elements and compounds and their characteristics.
- Realise that constituents of a solution work like a team. It is also a good example for flexibility.

- Appreciate the fact that in solutions the constituents maintain their integrity and can be separated very easily.
- Relate the concentration and properties of a solution to the value of positivity among many negative factors.

III. Process & Action Plan

A teacher can teach students life lessons while teaching the subject, which helps them to remember the values whenever they come across those scientific concepts. In this chapter teacher gets an opportunity to explain the value integrity which is the quality of being honest and having strong moral principles which is very important for success in life.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. *Refer A*



**B. Carry out the varied activities in class
(given below) in the sequence specified.**



**1. Integrity and
Teamwork**

This is a demonstration
cum discussion which helps
to understand the
importance of Integrity and
Teamwork in life. Refer B.1.

2. Positivity

This is a demonstration
which helps the children to
relate to value like positivity.
Refer B.2.



**C. Aid generalization of the concepts learnt,
through assignments (given below).**



1. Home assignment to improve scientific observation and inference skills and also the communication skills of the students. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the core approach – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are Teamwork, Integrity and Positivity along with sub values such as Flexibility.

The unit also provides the scope to develop the following skills in the students like *scientific observation and inference skills and also the communication skills*.

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion about pure and impure substances around us and the nature of mixtures. Children can be asked to give examples of mixtures they come across in their daily life. Teacher can point out that if we mix sugar and sand, both the particles are easily distinguishable and they stand apart. It is easy to separate them as they are not chemically combined with one another. Here each constituent safeguards its uniqueness and characteristics. In life, we may have to be part of a group and work together. But it is important to safeguard our integrity while ensuring that we shall not lose our identity. One should be able to stand apart in a crowd by preserving one's virtues. Even if you are with a bad group of people, you should not sacrifice your values and virtues and should be able to come out of it anytime, like in a mixture of sand and sugar.

Things needed: Some sand and sugar.

B. Activities:

B.1. This is a demonstration cum discussion activity which can be done in the class. Take some water in a beaker, add some sugar into it and stir well. It becomes a sugar solution. The solution has both the properties of water and sugar. The solution is a water like liquid and tastes sweet like the sugar. In fact it can be explained to students that in the solution, sugar molecules are going into the spaces between water molecules. Thus they adjust themselves into the available spaces. It can be observed that the level of water after adding the sugar does not rise which proves this aspect.

This can be demonstrated as a good example of teamwork and flexibility. In a team there may be different kinds of people with different talents and capabilities. The team gets strengthened by the talents of each of its members. At the same time each member has to adjust and get along with others to achieve the common goal. The sugar and water

molecules adjusted and got along well with each other, contributing to the characteristics of the solution, thus making it wet and sweet. It can also be noted that each component preserved its uniqueness; like which every member of a team also should maintain his/her integrity and uniqueness.

Things needed: One beaker with water in it and some sugar.

B.2. This is simple demonstration which can be done in a classroom. Teacher can perform this in the class with students' participation. Take one beaker and pour some water into it. Now add a small quantity of sugar into it and stir well. Teacher can ask the students to taste the solution. Now add more sugar into the solution and taste again. It can be observed that the sweetness of the solution increases more and more as we go on adding the sugar. More the concentration of sugar more sweet the solution will be.

This can be compared to our thoughts. It is quite natural that our minds may be filled with positive and negative thoughts. But if we infuse more and more positive thoughts, the overall state of mind becomes positive.. A positive mind is a peaceful and energetic mind. Teacher can urge children to fill their minds with positive thoughts and thus flush out negativity.

Things needed: A beaker, water and some sugar.

V. Assignments

C.1. Home Assignment.

Children can be asked to prepare a detailed study of any separation technique used in their house and present it in the class. This should include the principle and detailed process of separation .For e.g. Separation of tea leaves from the tea ,hand picking of impurities from rice, separation of buttermilk and butter etc. This activity helps to improve scientific observation and inference skills and also the communication skills of the students.

Resources

References:

- NCERT Class IX Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Atoms and Molecules	<p>Core Values Considered: Oneness, Optimism, Respect and Cooperation</p> <p>Other Sub Values: Positivity, Humility and Teamwork</p> <p>Life Skills: like scientific knowledge and judgement skills.</p>	<ol style="list-style-type: none"> 1. This is a demonstration cum discussion which helps to understand the importance of Optimism and Positivity in life..Refer B.1. 2. This is a demonstration which helps the children to relate to values like Teamwork, Respect and Cooperation. Refer B.2. 3. Class Assignment which helps to enhance the scientific knowledge and judgement skills. Refer.C.1.

Materials / Resources needed

- 1) 2 beakers, Vinegar , baking soda and a digital weighing scale, Beads of different colours and sizes and tooth picks.
- 2) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter elaborates on the laws governing chemical reactions and the concepts of atoms, molecules, and ions. It also explains the symbols and formulae for elements and compounds along with the concept of valency. This chapter also deliberates the concepts of atomic mass, molecular mass and mole ratios.

The points of discussion are

- all substances are made up of small particles like atoms and molecules.
- the law of conservation of mass and law of constant proportions.
- Differentiate between atoms, molecules and ions.
- the concept of atomic mass, molecular mass and mole concept.
- Realise the oneness and unity in universe, by knowing that all beings are made up of the same type of atoms and molecules.
- like law of conservation of mass, there is law of conservation of pain and joy.
- Both are interconvertible and if there is pain today there will be joy tomorrow. It can be realised that there is nothing lost or wasted in life. This inculcates positivity and optimism in the minds of children.
- the importance of cooperation, teamwork and unity while learning about the formation of molecules.

Unit 3**Atoms and Molecules**
Oneness, Optimism, Respect and Cooperation**I. Introduction**

Atoms are the smallest particles into which an element can be divided. Atoms can join together to form molecules, which in turn form most of the objects around you. This chapter elaborates on the laws governing chemical reactions and the concepts of atoms, molecules, and ions. It also explains the symbols and formulae for elements and compounds along with the concept of valency. This chapter also deliberates the concepts of atomic mass, molecular mass and mole ratios.

This chapter helps the teacher to relate the concepts of atoms and molecules with values like oneness, optimism and cooperation. While explaining the fact that all substances are made up of small particles like atoms and molecules, teacher can make children realize the oneness and unity in the universe. Teacher can also point out that similar to law of conservation of mass, there is law of conservation of pain and joy which can instill optimism and positivity in children. The importance of cooperation, teamwork and unity can also be highlighted while teaching the concept of the formation of molecules.

The core values focused upon are Oneness, Optimism, Respect and Cooperation along with sub values such as Positivity, Humility and Teamwork.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Realise that all substances are made up of small particles like atoms and molecules.
- Learn about the law of conservation of mass and law of constant proportions.
- Differentiate between atoms, molecules and ions.
- Understand the concept of atomic mass, molecular mass and mole concept.
- Realise the oneness and unity in universe, by knowing that all beings are made up of the same type of atoms and molecules.

- Learn that like law of conservation of mass, there is law of conservation of pain and joy.

Both are interconvertible and if there is pain today there will joy tomorrow. It can be realised that there is nothing lost or wasted in life. This inculcates positivity and optimism in the minds of children.

- Appreciate the importance of cooperation ,teamwork and unity while learning about the formation of molecules.

III. Process & Action Plan

This is a chapter that helps the teacher to make the children understand the oneness among all beings in this universe. The feeling of unity and belonging can be inculcated in the children while explain the concepts in this chapter.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. *Refer A*



**B. Carry out the varied activities in class
(given below) in the sequence specified.**



1. Optimism and Positivity

This is a demonstration cum discussion which helps to understand the importance of Optimism and Positivity in life.
Refer B.1.

2. Teamwork, Respect and Cooperation

This is a demonstration which helps the children to relate to values like Teamwork, Respect and Cooperation.
Refer. B.2.



**C. Aid generalization of the concepts learnt,
through assignments (given below).**



1. Class activity which helps to enhance the skills of students like scientific knowledge and judgement skills.
Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Oneness, Optimism, Respect and Cooperation along with sub values such as Positivity, Humility and Teamwork.*

The unit also provides the scope to develop the following skills in the students *like scientific knowledge and judgement skills.*

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion on the constitution of various substances around us like water, sugar, carbon dioxide, pencil lead, chalk etc. It can be pointed out that all these are made up of very small particles called atoms and many substances contain the same type of atoms. For eg. water contains hydrogen and oxygen. Sugar also contains hydrogen and oxygen in addition to carbon. Pencil lead contains carbon. Carbon dioxide contains carbon and oxygen. This explanation helps children to understand the fact that all the substances in this universe including living cells are made up of similar constituents. Teacher can instil a feeling of oneness and unity in the minds of children while explaining this concept.

B. Activities:

B.1. This is an experimental demonstration cum discussion activity on the law of conservation of mass.

- Keep two empty beakers on a weighing scale.
- Pour some vinegar into one beaker named A keeping it on the scale..
- Now to the second beaker B add some baking soda. keeping the beakers on the scale..
- Note the weight of the two beakers A and B with the contents..
- Now slowly pour some vinegar from beaker A into the other beaker B containing baking soda while keeping it on the weighing scale. Then keep back the beaker A on to the scale.
- You can see vigorous reaction taking place in beaker B.

- Note the weight again after the reaction is over.
- Repeat the same by pouring some more quantity of vinegar from beaker A to beaker B and note the weight again after the reaction stops.

It can be observed that in all the cases the total weight of the two beakers together with their contents remains the same even after the reaction. It can be concluded that if chemical reactions were carried out in a closed container, there is no change in the mass. The total mass of the reactants is equal to the total mass of the products .

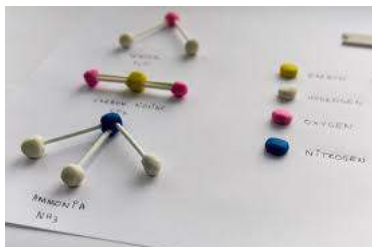
Note: Teacher can refer the Youtube video whose link is given below to refer or can show it to the students if classroom demonstration is not possible.

https://www.youtube.com/watch?v=MUKb0qZeZCE&feature=emb_rel_pause

The law of conservation of mass can be applied to pain and joy in life. Sometimes there may be a pain in one's life, but will necessarily be followed by an equal amount of joy. Life is full of happiness and sorrow. But the sum total of all will remain the same. You cannot create or destroy sorrows and joy. But if one wishes one can convert sorrow to joy or joy to sorrow. So it is always better to approach life with optimism and positivity and keep the weight of joy more than that of sorrow. Teacher can urge the children to find opportunity in every setback, rise every time they fall.

Things needed: 2 beakers, Vinegar , baking soda and a digital weighing scale.

B.2. This is another interesting demonstration. Children can be asked to bring beads of different sizes and colours. Teacher can guide them to identify beads as different elements based on their relative sizes. Then the children can be guided to form models of different molecules using these beads with the help of match sticks or tooth picks as shown in the figure. This will help the children to understand that size does not matter . Little things do count - most. Even the largest molecules are formed by smallest atoms. Children can be urged to respect each and every one around them irrespective of their social or community stature.. You are what you are with the support of so many people around you. So learn to respect every one and be humble.



Children can also learn the importance of teamwork and cooperation from this activity. The atoms combine in a special way to form different molecules Every atom contributes to the formation of the molecule and cooperate with each other by giving or sharing electrons and forming bonds.

This activity also enhances the scientific inference skills of children in addition to their creative skills.

Things needed: Beads of different colours and sizes and tooth picks.

V. Assignments

C.1. Assignment.

This is a game which can be played in the class. Keep a box with cards with the name of an element and its valency. Each student is given a chance to take element cards from the box and make one compound using the elements. For eg: if a student gets sodium card then he can take one more sodium and one oxygen card to form sodium oxide. If a student gets calcium card he/ she can take one oxygen card to make calcium oxide. After making the compound the student can show it to the class and explain the formation of that molecule. Teacher has to check whether the children are forming the compounds correctly based on the valencies. This activity enhances the scientific knowledge and judgement skills of the children.

Resources

References:

- NCERT Class IX Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Structure of the Atom	<p>Core Values Considered: Righteousness, Humility and Kindness</p> <p>Other Sub Values: Positivity and Generosity</p> <p>Life Skills: Judgement skills and analytical and critical thinking skills as well as coordination and team skills.</p>	<ol style="list-style-type: none"> 1. This is a demonstration cum discussion which helps to understand the importance of Humility in life...Refer B.1. 2. This is a game which helps the children to relate to values like Righteousness, Positivity and Generosity. Refer B.2. 3. Home Assignment on analysing relationships which helps to enhance judgement skills and analytical and critical thinking skills of students. Refer.C.1.

Materials / Resources needed

- 1) A strip of paper (any size will work, better to have 11"x1"), a pair of scissors, 5 Boxes, cards and buttons of various colours, a stopwatch.
- 2) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter is an introduction to atomic structure and the different models of atom proposed by various scientists. It also elaborates on the subatomic particles and the concept of valency.

The points of discussion are

- the various theories put forward about the structure of atom and their drawbacks including Bohr model of atom.
- the structure of atom and the various subatomic particles.
- the various sub atomic particles, their charges and their location.
- the concepts of atomic mass, atomic number, valency and isotopes.
- the importance of humility while learning about the size of an atom.
- the importance of being unbiased in life from the fact that an atom tries to remain neutral by balancing positive and negative charges. The importance of righteousness in life can be related here.
- how kindness and generosity helps you to remain positive. Atoms gain positive charge giving away their electrons to the other needy atoms.
- the significance of true friendships and love while learning the structure of the atom and the nature of subatomic particles.

Unit 4**Structure of the Atom
Righteousness, Humility and Kindness****I. Introduction**

An atom is the smallest unit of ordinary matter that forms a chemical element. Every matter, be it in any form - solid, liquid, gas or plasma is composed of neutral or ionized atoms. This chapter is an introduction to atomic structure and the different models of atom proposed by various scientists. It also elaborates on the subatomic particles and the concept of valency.

Through this chapter teacher can highlight the importance of various life values like righteousness, positivity, kindness and generosity. While explaining how an atom tries to remain neutral by balancing positive and negative charges, the importance of being neutral and not biased in life can be explained. Righteousness is a virtue one has to inculcate in life. By giving away negative charges an atom gains positive charge. This can be related to the fact that kindness and generosity helps you attain positivity in life. The analysis of the structure of the atom and the behaviour of various subatomic particles can also teach the significance of true friendships and love.

The core values focused upon are, Righteousness, Humility, and Kindness along with sub values such as Positivity and Generosity.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

Learn about the various theories put forward about the structure of atom and their drawbacks including Bohr model of atom.

- Explain the structure of atom and the various subatomic particles.
- Describe the various sub atomic particles, their charges and their location.
- Understand the concepts of atomic mass, atomic number, valency and isotopes.
- Appreciate the importance of humility while learning about the size of an atom.

- Explain the importance of being unbiased in life from the fact that an atom tries to remain neutral by balancing positive and negative charges. The importance of righteousness in life can be related here.
- Realise the fact that kindness and generosity helps you to remain positive. Atoms gain positive charge giving away their electrons to the other needy atoms.
- Learn about the significance of true friendships and love while learning the structure of the atom and the nature of subatomic particles.

III. Process & Action Plan

This chapter helps the teacher to explain values like righteousness and humility to children. Righteousness is the quality of being morally right or justifiable. In life, we may have to remain unbiased in certain situations. You have to stick to what you feel is a fair, transparent and balanced decision even if there are many other opinions.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:
Discussion. Refer A



**B. Carry out the varied activities in class
(given below) in the sequence specified.**



1. Humility

This is a demonstration cum discussion which helps to understand the importance of Humility in life... Refer B.1.

2. Righteousness, Positivity and Generosity

This is a game which helps the children to relate to values like Righteousness, Positivity and Generosity.
Refer B.2.



**C. Aid generalization of the concepts learnt,
through assignments (given below).**



1.Home Assignment on analyzing relationships which helps to enhance judgement skills and analytical and critical thinking skills of students. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the core approach – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The core values being considered are Righteousness, Humility, and Kindness along with sub values such as Positivity and Generosity.

The unit also provides the scope to develop the following skills in the students like judgement *skills and analytical and critical thinking skills as well as coordination and team skills*

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion on what constitutes every substance in this universe and what their structures are. Teacher can give the details of how atomic theory evolved into its new forms and describe about the contributions of various scientists towards the modern day theory of atomic structure.

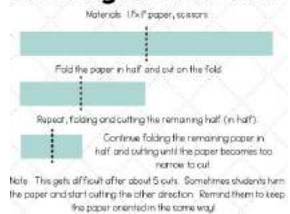
B. Activities:

B.1. Teacher can give a challenging activity to students to make them visualize the size of an atom.

- Challenge students to fold and cut a paper(any size will work), in half as many times as they can, as given below.
- Note, students should always fold and cut the paper in the same direction.
- It's gets really difficult after about 5 cuts. You might see students flip their paper to begin cutting in another direction. Make sure you tell them to keep it in the same direction.

Note: teacher can tell the students that if they were able to keep cutting, they would need to do this about 31 times to be the size of an atom!

How Big is an Atom?



Children will understand that this is an impossible task and they will be surprised to know that everything they see around including the celestial objects are made from these tiny units called atoms. The atom teaches us that the little things do count - most. Nothing is indifferent, nothing is powerless in the universe; an atom might destroy everything, an atom might save everything. An atom has tremendous energy inside, to destroy the whole mankind. This helps children to understand the value of humility.

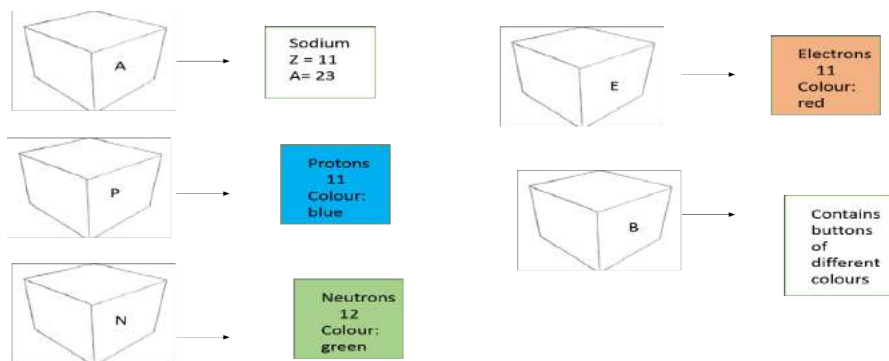
You should not belittle even the smallest thing in this world and never think that you are superior.

Things needed: A strip of paper (any size will work, better to have 11"x1"), a pair of scissors.

Note: Ask the children to be careful while using the scissors for cutting the paper..

B.2. This is a group game that can be played in the classroom. Teacher can divide the class into groups of four students each.

Keep 5 boxes on a table and name them as A, P, N, E, B. Here A stands for atoms, P stands for Protons, N stands for neutrons, E stands for electrons and B stands for Buttons. The box A contains a set of element cards. Each card contains the name of an element along with details of its atomic number and mass number. The box P contains cards with number of protons and a colour assigned to it. The box N contains cards with number of neutrons and another colour assigned to it and the box E contains the number of electrons and one colour assigned to it. The box B contains buttons of different colours. A set of sample cards and contents of the boxes are shown below.



Now each team gets a chance to play the game one by one. The leader of the team can pick an element card from box A. He/ She can then pass the element card to the next team member. The next member will go and collect the card from box P with the correct number of protons in it for the element they have chosen. Then he/ she gives the element card to the third member. The third member has to go and collect the card containing the correct number of neutrons from the box N. The third member has to give the element card to the last member of the team. He/ She has to go and collect the card containing correct number of electrons from the box E. Now all the team members have to return the cards to the team leader who will check the correctness of the cards. If any one of them is wrong the corresponding team member has to go and collect the correct card again from the respective box. Now the leader will go and collect the buttons with the relevant colours as per the cards. Then the whole team can make the model of the atom with the buttons of the said colours in a chart paper. Teacher can note the time taken to complete the task by each team with the help of a stop watch. The team that completes the task within the shortest time and with accuracy will be the winner.

An important thing to note while playing the game is that the team members should not discuss among themselves about the number of protons, neutrons and electrons of their element, while collecting the cards. This will ensure that every team member knows the concept of the number of each subatomic particles. This fun game not only helps children to have a good understanding of the atomic structure, but also enhances their coordination and team skills.

While teaching the structure of atoms, teacher can highlight the fact that atoms try to remain neutral by balancing positive and negative charges. In life, we may have to remain unbiased in certain situations. There may be positive and negative opinions about a particular decision you may have to take. But you have to stick to what you feel is a fair, transparent and balanced decision. Do not get swayed by vested opinions. Righteousness is an important virtue which has to be inculcated in the mind of every child.

Another aspect about atoms is that they gain positive charge by giving away their electrons to the other needy atoms. Children can be made to realise the fact that kindness and generosity helps you remain positive in life.

While describing the charges of subatomic particles teacher can relate the behaviour of these particles to that of our friends and acquaintances. Around you some people are like electrons. They are full of negativity and they leave you at the slightest disturbance. Some are like neutrons, they will not take any effort to help you nor do any harm to you. Some are like protons. They are positive and will be there with you always. Try to identify the electrons, protons and neutrons in your life. Try to avoid or keep away from people like electrons, to stay positive, while accumulate friends who are like protons who will never leave you at a time you need them.

Things needed: 5 Boxes, cards and buttons of various colours, a stopwatch.

V. Assignments

C.1. Home Assignment.

As a continuation of activity B.2., teacher can ask students to prepare a list of people who they consider as protons in their life. They can prepare a writeup on why they consider them as their protons. Some selected write ups can be shared in the class. This activity will encourage children to analyse their relationships and friendships. This also enhances the judgement skills apart from analytical and critical thinking skills of the students.

Resources

References:

- NCERT Class IX Science Textbook.
- Context Activity B.1. courtesy:
<https://beakersandink.com/activities-for-teaching-atoms>

Topic	Values / Life skills integrated & imbibed	Activities
The Fundamental Unit of Life	<p>Core Values considered : Accuracy and Harmony</p> <p>Other Sub Values: Cooperation</p> <p>Life Skills: Creativity and Planning</p>	<ol style="list-style-type: none"> 1. In order to make the children understand the value of how accurately all the cell organelles work in harmony for the various functions of our body to run smoothly, this topic of fundamental unit of life can be used. While doing the skit of the Cellsian safari teacher can emphasize on this aspect . Children can be asked to make the cutouts of different organelles as they themselves act as the organelles. As they enact the entire skit not only will they learn the structure and function of the organelles but the skit will help them to put their skills of planning, understanding, cooperation and team work into practice. 2. Children have to prepare models of various Organelles like Golgi apparatus, Mitochondria, Nucleus, Vacuoles, Lysosomes, Endoplasmic reticulum and plasma membrane. As they do this activity, it will enhance their creativity and planning skills which are very important for developing their personality.

Materials / Resources needed

1. A yellow piece of cloth 12 meters in length and 1 meter in width for a double layered cell membrane with phospo lipids, proteins etc painted in red,
2. Fabric colours
3. Cardboards for cut outs,
4. Chart papers and sketch pens for big labellings.
5. Note books for writing their dialogues etc.
6. NCERT text books of Class IX

Description (of the points of discussion)

In this chapter we learn about the fundamental unit of life i.e. The Cell and its Organelles through a skit.

- To learn about the discovery of the Cell
- To understand the structural organization of the Cell.
- To study the structure and function of the various cell organelles.
- To differentiate between mitosis and meiosis
- To differentiate between Diffusion and Osmosis.
- To draw a labelled diagram of the Compound microscope.
- To develop the skill of Co-operation and Accuracy.
- To develop the understanding the working in Harmony.

Unit 5**The Fundamental unit of life
Accuracy, Cooperation and Harmony****I. Introduction**

Cells were discovered by Robert Hooke in 1665. The fundamental structural and functional unit of life is the Cell. Cells are enclosed by a plasma membrane composed of lipids and proteins. Selectively permeable plasma membrane regulates the movement of materials in and out of the cell. The cytoplasm contains various membrane bound cell organelles like the Nucleus, Golgi apparatus, Mitochondria, lysosomes etc. In plants, in addition to plasma membrane, they have another rigid outer covering called the cell wall, which is made up of cellulose. Besides all the above organelles plant cells also contain plastids which are responsible for colour pigmentation.

To explain the structure and functions of the cell organelles in an interesting manner, teacher can undertake the activity of doing the skit, which will also help to ingrain the values of accuracy cooperation and harmony, among the students.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value-based goals:

- To learn about the discovery of the Cell.
- To understand the structural organization of the Cell.
- To study the structure and function of various cell organelles.
- To differentiate between Mitosis and Meiosis.
- To differentiate between Diffusion and Osmosis.
- To draw labelled diagram of a Compound microscope.
- To develop the skill of cooperation and accuracy.
- To develop the understanding of working in harmony.

III. Process & Action Plan

The chapter of Cell as a fundamental unit of life is already introduced to children in standard VIII and to further reinforce the various aspects of the topic and to learn the structure and functions in an innovative method the teacher can encourage the students to enact a skit wherein the children become these organelles, thus helping them to learn science as well as to learn various skills of accuracy, cooperation and harmony.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

The teacher will introduce the concept of understanding the chapter “The fundamental unit of life, via a skit about cell and cell organelles.



B. Carry out the given activity in class.



Accuracy, Co-operation and Harmony

In order to make the children understand the value of how accurately all the cell organelles work in harmony for the various functions of our body to run smoothly, this topic of fundamental unit of life can be used. While doing the skit of the Cellsian safari teacher can emphasize on this aspect . Children can be asked to make the cutouts of different organelles as they themselves act as the organelles. As they enact the entire skit not only will they learn the structure and function of the organelles but the skit will help them to put their skills of planning, understanding, cooperation and team work into practice. Ref. B1



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Creativity and Planning:

Children have to prepare models of various Organelles like Golgi apparatus, Mitochondria, Nucleus, Vacuoles, Lysosomes, Endoplasmic reticulum and plasma membrane. Ref C1

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – Knowing, Understanding Valuing and Acting the values embedded in the topic.

The core values being considered are **Harmony and Accuracy**, along with other sub-values like Cooperation.

The unit also provides the scope to develop the following life skills in the students like creativity and **Planning skills**.

IV. Activities & Related Discussion

A. To make children understand and learn the structure and function of various cell organelles the teacher can suggest to enact a play wherein the children can learn the content along with building the skills of planning and teamwork.

The teacher can divide the class into various groups giving the work of making the cell organelles models to some children, the learning of the dialogues to some children. Two children can be asked to represent one organelle, children with good painting skills can be asked to draw the outer phospho lipid cell membrane on a yellow colored lining cloth piece, not too much in width but having enough length to cover three sides.

This one activity will completely help them to learn the content of the chapter along with development of various skills. The skit can be enacted either in class or in front of the whole school.

B1. Accuracy: Accuracy is being at the right place at the right time, it is moving from a position of quiet to a position of speech at the right time, to moving from participation to withdrawal, from work to play, from laughter to thought – all of these at the right time. Accuracy is that most delicate point of transition from one thing to another. Accurate functioning of all cell organelles leads to a cell working perfectly.

Cooperation: Cooperation is perhaps one of the least recognized but most valuable of human virtues. It is recognized because it is not part of an end product, it is to do with the process of achieving something and thus its greatness lies in the fact that it is expressed through everyday actions.

So, for a person to be cooperative means for them to have a quite eye for what is needed to bring success, and to supply it at the right time, in the right place. Someone who cooperates, offers their services invisibly, with precision and with a discerning eye.

Harmony : As all the cell organelles work in harmony to make the cell function at its best, similarly children can have harmony in work and fun while learning this topic through a skit. It will help them to learn how harmony bring success and joy.

The following skit aims at developing these values along with learning the structure and functions of cell

Narrator : “CELLSIA was an empire by itself. There were many factories in Cellsia like Mitochondria, Golgi complex , Ribosomes, Nucleus etc., which worked round the clock to ensure its working.

A great traveler Cellumbus and his friend Questor decided to undertake a journey into Cellsia to unravel its secrets.

They discussed their action plan and went to sleep.

In the morning Cellumbus and Questor started their journey towards Cellsia.”

Cellumbus : “We have reached the border of Cellsia, but they seem to be having a big fortification.”

Questor : “What kind of fortification is this?”

Cellumbus : “This is called the Cell membrane or the plasma membrane which protects the city of Cellsia. It is a double layered membrane made up of protein and lipid molecules.” *(for the skit, the teacher can ask the children to take a long yellow cloth and ask children to paint the double layered phospho lipid membrane on it.)*”

Plasma : “Well, I the plasma membrane, which allows only certain materials to Membrane come in or out, I am the protective layer of cellsia, a selectively permeable membrane.”

Cellumbus : “What will we have to do to gain entry through plasma membrane?”

Plasma : “Well, the choice is yours. You can either change yourself into O₂ or membrane CO₂ and enter me through the process of Diffusion or convert yourself into a liquid form like water and enter me “The selectively permeable membrane’ through Osmosis.”

Questor : “O I know Osmosis is the movement of solvent (water} particles across a semipermeable membrane from a dilute solution to a concentrated solution. ”

Cellumbus : “And Diffusion is the movement of particles (mostly O₂ and CO₂) from an area of higher concentration to an area of lower concentration. The overall effect is to equalize the concentration throughout the medium”

Plasma : “Yes, now you understand. So now quickly adorn your blue water suit membrane and I will give you the permission to enter me. ”

Narrator : Cellumbus and Questor gained entry into Cellsia and jumped into the

cytoplasm, where they could see many specialized cell organelles enclosed in membranes. (Prokaryotes)

They soon come across a big factory which had many parallel buildings in it.

Cellumbus : “I know, this is the Golgi factory”

Cellumbus : “Golgi factory was discovered by Camillo Golgi. It consists of a system of

membrane bound vesicles (flattened sacs) arranged approximately parallel to each other in stacks called Cistern. Its function includes storage, modification and packaging of products in vesicles.

The golgi apparatus is also involved in the formation of Lysosomes.”

Questor : “What are Lysosomes?”

Cellumbus : “Lysosomes are membrane bound sacs filled with digestive enzymes.

If any metabolism in Cellsia goes wrong, then the Lysosomes will burst and the digestive enzymes will destroy its own cells.

Questor : “O I know this is why Lysosomes are also known as suicidal bags. Well lets quickly get away from here, lest they consider us a threat.”

Narrator : As they moved forward, they saw another township.

Questor : “What is this township”

Cellumbus : “This is the Mitochondrion township”

Questor : “Mitochondrion township? Which goods are produced in this township”

Cellumbus : “This township is the powerhouse of Cellsia”

Questor : “Powerhouse?”

Cellumbus : “Yes, Food substances are oxidized to produce energy”.

The process of oxidation is conducted in a well-controlled manner in the mitochondrion township within its double layer membranes”

Questor : “What happens to the energy produced in Mitochondria?”

Cellumbus : “This energy produced by Mitochondria in the form of ATP (Adenosine Triphosphate) molecules is required by Cellsia for doing its various chemical activities.

ATP is known as the energy currency of the cell.

Also, one surprising thing about Mitochondria is that they have their own DNA and Ribosomes unlike other organelles in Cellsia.”

Questor : “Now that we have understood so much about Mitochondria let us move to the round structure that we see there. What is that?”

- Cellumbus : “These round structures are vacuoles.”
- These vacuoles are storage sacs for liquid or solid contents.
- In plants there are large vacuoles which help to provide turgidity and rigidity to the cells”
- Questor : “Oh yes, I have heard about them.
- In single celled organisms like amoeba, the food vacuole contains the food items that the amoeba has consumed and in some other unicellular organisms, specialized vacuoles play important roles in expelling excess water and some waste from the cell.”
- Questor : “Hey look at the glorious structure in the center. What is that?”
- Cellumbus : “O wow! That is the capital of Cellsia called as the Nucleus.”
- Questor : “Let’s take some ATP molecules from Mitochondria. It will provide us with some energy to reach the capital.”
- Narrator : They reach the capital in a jiffy. The capital was a glorious sight.
- Cellumbus : “The functioning of the whole of Cellsia is controlled from here.
- The future generations are constituted here”
- Nucleus : “Yes, I am the Nucleus having a double layered covering called the Nuclear membrane. I contain Chromosomes which have information for inheritance of characteristics from parents to next generations in the form of DNA. (Deoxyribo Nucleic Acid). These DNA molecules contain information for constructing and organizing cells. Functional segments of DNA are called Genes. Genes are responsible for transmission of characters.”
- Cellumbus : “Thus, the nucleus plays a central role in cellular reproduction. The process by which a single cell divides and forms two new cells”
- Questor : “Yes, I have heard about cell division. Mitosis and Meiosis – right? What exactly happens in mitosis and meiosis?”
- Nucleus : “Mitosis takes place in body cells or somatic cells, where a mother cell divides to form 2 identical daughter cells.
- The daughter cells have the same number of chromosomes as the mother cell
- This mitotic division mostly helps in growth and repair of tissues in organisms.”
- Cellumbus : “Meiosis is a cell division which takes place in specific cells of reproductive organs .
- In meiosis the mother cell produces four new cells instead of two.

But the interesting thing is, the new cells only have half the number of chromosomes as the mother cell, showing a reduction division.”

Questor : “Wow what an amazing journey this has been of discovering Cellsia. I am so much more knowledgeable now.”

Narrator : “To leave Nucleus and reach the outer membrane through the cytoplasm Cellumbus and Questor had to travel through a large network, called the ER (Endoplasmic reticulum).

There were two types of ER.

1)RER – Rough Endoplasmic reticulum

2)SER – Smooth Endoplasmic reticulum

RER looks rough because it has particles called Ribosomes attached to its surface. The Ribosomes which are present in all active cells are the sites where proteins are manufactured. The manufactured proteins are then sent to various places in the cell depending on need, using the ER. The SER helps in the manufacture of fat molecules or lipids, important for cell function.”

Cellumbus : “So, ER cells serves as a channel for the transport of materials between the various regions of cytoplasm or between the cytoplasm and the nucleus.”

Questor : “Now that we have learnt everything about Cellsia, we would like to take your permission and bid adieu to Cellsia.”

Cellumbus : “Thank you so much for this wonderful journey – Bye Bye”

C1. Children have to prepare models of various Organelles like Golgi apparatus, Mitochondria, Nucleus, Vacuoles, Lysosomes, Endoplasmic reticulum and plasma membrane. As they do this activity, it will enhance their creativity and planning skills which are very important for developing their personality.

Resources

References:

Resources for Teachers:

The Inner Beauty by Bhrbamakumaris

Book: NCERT Class IX Science text book

Topic	Values / Life skills integrated & imbibed	Activities
Tissues	<p>Core Values considered: Enthusiasm, Initiative and Self confidence</p> <p>Other Sub Values: Imagination and Action</p> <p>Life Skills: Planning skills, Oratory Skills and Listening Skills.</p>	<p>The chapter of tissues as a continuation from cell shows the path of development of an individual from a cell, to tissue,s to organs , organ systems and then a complete individual1. Similarly through the medium of this chapter we can aim at the personality development of our students by making them understand the different rungs of it.</p> <ol style="list-style-type: none"> 1. Children will be divided into pairs and assigned one small topic from the chapter by the teacher. The respective pairs of children will understand the topic from teacher, make required enlarged charts, prepare questions and answers in an interactive manner with explanation and present it in front of the class. Two topics can be presented in one period or as per the discretion of the teacher. 2. To develop self-confidence in children they can be given an assignment of preparing a grocery list for the month, with the help of their parents and procuring it from a nearby store. This activity will give them an insight into one of the main repeated activity being performed at an adult level, an overview of pricing and cost of running a household and repeatedly doing the activity will give them the confidence of doing it on their own and at the same time they begin to lend a helping hand at home 3. In order to inculcate life skills children can be asked to fill-up a transaction slip for depositing a cheque in the bank or withdrawing cash from the bank, with the help of their parents. This assignment will not only help them in gaining experience in undertaking some typical requirements of life and gives them an introduction to the functioning of the bank

Materials / Resources needed

Pen, Pencil, Eraser, Scale, Chart papers, printouts, multimedia and internet wherever required NCERT text books of Class IX

Description (of the points of discussion)

In this chapter we learn about different types of tissues, their structures and function and how they together coordinate to make us function as a complete individual. We aim to develop this individual further, by developing a certain level of confidence in every child, by explaining the various aspects of personality development.

- To learn about the structure and function of Meristematic and Permanent Tissue and types of permanent tissue among plant tissues.
- The learn about the various animal tissues and in that the structure and function of types of Epithelial tissues.
- To learn about the types of Connective tissues like blood, bone and Cartilage.
- To learn about the Muscular tissue.
- To learn about Nervous tissue.
- To help children learn about a definite aim in life with the help of initiative and Self confidence.
- To help them understand the value of imagination and action in self-development.

Unit 6**Tissues****Enthusiasm, Self-confidence, Initiative, Imagination and Action****I. Introduction**

All living organisms are made up of cells. In unicellular organisms, a single cell performs all basic functions. But in multicellular organisms there are millions of cells which are specialized to carry out specific function called as tissues. Tissue is a group of cells performing a specialized function.

Life begins with a single cell which divides and differentiates into groups of cells having a specific function, thus forming a tissue. Different tissues work together to form an organ. Many organs work together to form an organ system and all the organ system work together for the smooth functioning of an individual life.

In this topic of development of an individual from a cell, to tissue to organ and organ systems, teacher can also simultaneously look at personality development of the students by guiding them to develop the values of Self-confidence, Enthusiasm Initiative, Imagination and Action.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value-based goals:

- To learn about the structure and function of Meristematic and Permanent tissue and types of permanent tissue among plant tissues.
- To learn about various animal tissues and in that structure and function of types of Epithelial tissues.
- To learn about types of Connective tissues like blood, bone and cartilage.
- To learn about Muscular tissue.
- To learn about Nervous tissues.
- To help children develop a definite aim in life with the help of Initiative and Self-confidence.
- To make them understand the value of imagination and action in self-development.

III. Process & Action Plan

In this chapter we learn about different types of tissues, their structures and function and how they together coordinate to make us function as a complete individual. We aim to develop this individual further, by developing a certain level of confidence in every child, by explaining the various aspects of personality development.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

The learning of the chapter ‘Tissues’ – which are specialized cells with definite functions, showing division of labour, can be taken up by dividing the content of the chapter amongst the students.elles.



B. Carry out the varied activities in class (given below) in the sequence



Confidence and Personality Development

As explained in detail later in B1 section this activity will be conducted with the aim of developing initiative, self-confidence, imagination, action and enthusiasm along with covering all the topics of the chapter. Children will be divided into pairs and assigned one small topic from the chapter by the teacher. The respective pairs of children will understand the topic from teacher, make required enlarged charts, prepare questions and answers in an interactive manner with explanation and present it in front of the class. Two topics can be presented in one period or as per the discretion of the teacher. Ref. B1



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Make a monthly grocery list and procuring it. Ref C1

2. Conducting a bank transaction, in the bank, with the help of parent. Ref

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the *core approach* – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The *core values* being considered are **Enthusiasm, Initiative** and **Self-confidence** along with other sub-values like **Imagination** and **Action**.

The unit also provides the scope to develop the following life skills in the students like **Planning skills, Oratory skills** and **listening skills**

IV. Activities & Related Discussion

A. In this chapter we aim at developing **Self-confidence** in children by asking them to do an activity. In this activity the class should be divided into groups of 2 (two) and they will be presenting the following topics to their classmates at the end of the teacher's discussion on the chapter. This session will be for 15 minutes and each period will cover 2 topics.

The chart below gives the correlation between the academic teaching flow and the flow for achieving self-development in life.

ORGANISATIONAL STRUCTURE- TISSUE

VALUE: DEVELOPMENT STRUCTURE

Cell -A single cell differentiates into many cells.

Tissue - A group of cells with similar function

Organ - Many tissues together make an organ

Organ systems - Various organs function together to form an organ system.

Organism - All organ systems work in coordination for the perfect functioning of an organism.

Rung 1 - A definite aim in Life

Rung 2 - Self-confidence

Rung 3 - Initiative

Rung 4 - Imagination and Action

Rung 5 - Enthusiasm and Self-control

B1. After the teacher explains the structural organization of cell, tissue, organ and organ system working together for the smooth functioning of an individual, she can simultaneously aim to help the children develop a similar structural organization aiming at developing self-confidence, initiative, imagination, action and enthusiasm as explained below in the activity. There are many steps in organization of tissues and in a similar way there are several steps to develop confidence. Developing these qualities will help to pave way for success.

Most of us ask for success without the usual hardships that come with it. We want success with as little effort as possible. Therefore, it is a good idea to define success in order to understand it.

“Success is a sum total of ones acts and thoughts that have, on account of their positive, constructive nature, brought happiness and good cheer to the majority of ones associates in the past and those in the coming years.”

The roadway to that thing we call ‘success’ leads only in one direction and that is straight through the great field of human service.

The activity goes as follows : In an attempt to help develop the overall personality of the students, teachers can explain the importance of these rungs like having an aim in life, both small aims and big aims, developing self- confidence, taking initiative, having enthusiasm and last but not the least, importance of action in life. As each child is given the small aim of selecting, understanding and representing the topics in the chapter in front of the whole class, helping them to overcome their fears and develop various skills for their personality development. A small explanation of each rung towards personality development can be given by the teacher to the students helping them better to understand the aim of this activity.

Rung No.1	It is necessary, not only to have a definite aim in life, but you must have a definite plan for attaining that aim. Therefore, place on paper a written statement of your definite aim and also written statement, in as much detail as possible of your plan for attaining that aim. The important thing for you to do now is to learn the significance of working always with a definite aim, and always with a definite plan. This principle is one that you must make a part of the process of organizing your faculties, and you must apply it in everything you do, thus forming the habit of systematic and organized effort.	Content division for presentation	
A definite aim in life		Roll no	Topic
		1-2	Meristematic tissues in plants
		3-4	Simple permanent tissues in plants
		5-6	Complex permanent tissues in plants
		7-8	Squamous epithelial tissue in animals
		9-10	Stratified squamous tissues in animals
		11-12	Cuboidal tissues in animals
AIM	TO PRESENT THE TOPIC	13-14	Ciliated columnar tissues in animals

Rung No.5 Enthusiasm and Self –mastery	<p>in the world stored away in your head -- but unless you organize this knowledge and express it in action it would be nothing to you or to the world.</p> <p>Enthusiasm is a feeling of happiness which one feels while undertaking an activity of interest. An enthusiastic person tends to go out and achieve things. He or she does not allow fear or negativity to come in the way of their actions.</p> <p>Self-mastery is the first stepping stone to real achievement.</p>	<p>All this will happen only if the children take up the activity enthusiastically.</p>
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Internal marks can be given on the activity if required.

V. Assignments

C1. To develop self-confidence in children they can be given an assignment of preparing a grocery list for the month, with the help of their parents and procuring it from a nearby store. This activity will give them an insight into one of the main repeated activity being performed at an adult level, an overview of pricing and cost of running a household and repeatedly doing the activity will give them the confidence of doing it on their own and at the same time they begin to lend a helping hand at home.

C2. In order to inculcate life skills children can be asked to fill-up a transaction slip for depositing a cheque in the bank or withdrawing cash from the bank, with the help of their parents. This assignment will not only help them in gaining experience in undertaking some typical requirements of life and gives them an introduction to the functioning of the bank.

Resources

References: “The lost prosperity secrets of Napoleon Hill “by Patricia G. Horan.

Resources for Teachers:

Book: NCERT Class IX Science text book

Topic	Values / Life skills integrated & imbibed	Activities
Diversity in Living Organisms	<p>Core Values considered: Self realization and Self development</p> <p>Other Sub Values: Understanding and Hard work</p> <p>Life Skills: Self awareness, Self learning and Independence.</p>	<p>‘What can I do well?’ is an activity which helps children in getting to know themselves. Teacher can give a printout of the verbs mentioned in the activity to each child. This exercise will point the way towards each child recognizing the many skills they have. As with the diversity of the organisms seen in this world there are diverse skillsets and values, which children need to develop, in order to carve a better place for themselves in this world.</p> <p>Children can be asked to group their above identified abilities to get a better idea, of the kind of skills they are most interested in, thus helping them towards identifying their career paths. The 8 types of skills for reference are:</p> <ul style="list-style-type: none"> • Artistic (Creative skills such as music, sewing painting) • Athletic (hiking, playing tennis) • Communications (writing, speaking, translating) • Educational (teaching, guiding) • Interpersonal (advising, mediating, comforting) • Manual (typing, repairing) • Organisational (coordinating, managing) • Persuasive (promoting, selling)

Materials / Resources needed

Pen, Pencil, Eraser, Scale, Chart papers, Note book, printouts, multimedia and internet wherever required

NCERT text books of Class IX

Description (of the points of discussion)

This world, with so many different species of animals and plants existing in it, makes us wonder as to how to understand and remember this diversity. In this chapter we learn about the diversity of living organisms and classification of living organisms based on binomial nomenclature i.e. taxonomy. Similarly in every individual too there exists a diverse sets of skills, identification and classification of which, can help the children for Career guidance which is a very important aspect of their life.

- To understand the basis of classification.
- To learn about the hierarchy of classification.
- To learn about the sub-divisions of kingdom plantae with examples.
- To learn the characteristics of ten sub-divisions under kingdom animalia with examples.
- To learn about binomial nomenclature.
- To help children identify various skills they possess.
- To help children understand the various abilities required for various careers in life.

III. Process & Action Plan

Children of Standard IX are at an appropriate age to understand and formulate their future educational and career path. Teachers while dealing with the topic of diversity in organisms can at some point take up the following given activities to help children understand the diverse skills they possess and how these can be identified and enhanced further, to give them some idea with regards to development of their future.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

Unit 7**Diversity in living Organisms****Self-awareness, Self Learning, Self-development, Career guidance****I. Introduction**

In diversity of living organisms, we will be dealing with the classification of living organisms into the main five kingdoms of Monera, Protista, Fungi, Plantae and Animalia. Plants are further divided into Thallophytes, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms. Animals are divided into ten groups: Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata, Protochordata and Vertebrata. The scientific names of all species are based on binomial nomenclature and is made up of generic name and a specific name. The name of the genus begins with a capital letter and the name of the species begins with a small letter, which when printed is usually in italics.

Like diversity in living organisms there are multitude of diverse values and skills which children possess in themselves but it needs to be identified and harnessed. The identification and development of these values can help them to understand various

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value-based goals:

- To understand the basis of classification.
- To learn the hierarchy of classification.
- To learn the subdivisions of kingdom plantae with examples.
- To learn the characteristics of ten subdivisions under kingdom animalia with examples.
- To learn about Binomial Nomenclature.
- To help children identify various skills they possess.
- To help children understand the various abilities required for various careers in life.

A. Introduce the context activity:

A career counselling session can be organised by the school at any given point of time to help children understand the various skill sets and the skillsets they need to possess via this exercise.



B. Carry out the varied activities in class (given below) in the sequence specified.



1. ‘What can I do well?’ is an activity which helps children in getting to know themselves. Teacher can give a printout of the verbs mentioned in the activity to each child. This exercise will point the way towards each child recognizing the many skills they have. As with the diversity of the organisms seen in this world there are diverse skillsets and values which children need to develop in order to make this world a better place for themselves. Ref B1



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Skill Set identification related to the above activity. Ref C1
Ref C1

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – helping children identify diverse values and skillset which they possess.

The core values being considered are **Self Realization** and **Self-Development**., along with other sub-values like **Understanding** and **Hard-work**.

The unit also provides the scope to develop the following life skills in the students like **self-awareness, self-learning** and **independence**.

IV. Activities & Related Discussion

B1. Activity : What can I do well?

Take a look at the list of verbs (action verbs) given below. Some of them describe specific skills. Others characterize types of behavior. Identifying your skillset will help you find a career path with more clarity.

Go through this list and:

1. Place a tick next to those that express something you can do.
2. Place a star next to the ticked items, you do well.
3. Circle those items with ticks and stars that you especially enjoy doing.
4. Note down the circled words and try relating them to a career or a profession.

Accounting	Defining	Inventing	Reflecting
Acting	Delegating	Investing	Relating
Adapting	Delivering	Joking	Relaxing
Addressing	Demonstrating	Judging	Remembering
Administrating	Designing	Knitting	Repairing
Advocating	Detailing	Leading	Reporting
Allocating	Detecting	Learning	Researching
Analyzing	Developing	Lecturing	Restoring
Anticipating	Diagnosing	Listening	Reviewing
Appraising	Directing	Lobbying	Risking
Arranging	Discovering	Managing	Scanning
Assembling	Discussing	Manipulating	Scheduling

Assessing	Dissecting	Mapping	Screening
Assigning	Drawing	Mediating	Self-motivating
Assisting	Driving	Memorizing	Selling
Balancing	Editing	Modifying	Servicing
Bargaining	Educating	Motivating	Serving
Bookkeeping	Encouraging	Navigating	Shaping
Brainstorming	Enforcing	Negotiating	Simplifying
Budgeting	Enlisting	Nursing	Singing
Building	Evaluating	Nurturing	Speaking
Calculating	Examining	Observing	Staging
Caring	Exercising	Operating	Stimulating
Catering	Expediting	Ordering	Studying
Changing	Experimenting	Organizing	Styling
Classifying	Explaining	Painting	Summarizing
Collaborating	Expressing	Perceiving	Supervising
Collecting	Facilitating	Performing	Supporting
Communicating	Feeding	Persevering	Surveying
Comparing	Filing	Persuading	Symbolizing
Compiling	Fixing	Planning	Systematizing
Composing	Forecasting	Policy making	Tabulating
Computing	Fund raising	Preaching	Talking
Conceptualizing	Graphing	Preparing	Terminating
Conducting	Guiding	Prioritizing	Teaching
Consulting	Gardening	Processing	Team building
Contributing	Gathering	Programming	Tending
Controlling	Hearing	Promoting	Training
Cooking	Helping	Problem solving	Traveling
Cooperating	Hostessing	Proof Reading	Translating
Coordinating	Humoring	Publicizing	Thinking
Copying	Identifying	Public speaking	Troubleshooting
Counseling	Implementing	Reacting	Typing
Creating	Influencing	Reading	Understanding
Critiquing	Initiating	Reasoning	Updating
Curing	Innovating	Recommending	Validating
Debating	Inspiring	Reconciling	Visualizing
Deciding	Installing	Recording	Washing
Decorating	Interpreting	Reducing	Writing

The exercise is intended towards recognizing the many skills that children have or can develop to have fulfilling careers. The teacher can give a printout of the above table, in the class, along with discussing the meanings of the various words with children.

Like the diversity seen in the chapter “Living Organisms” there is a diverse set of skill sets that can be developed in the children.

V. Assignments

C1. Children can be asked to group their above identified abilities to get a better idea of the kind of skills they are most interested in, thus helping them towards identifying their career paths. Following are 8 types of skills.

- Artistic (Creative skills such as music, sewing painting)
- Athletic (hiking, playing tennis)
- Communications (writing, speaking, translating)
- Educational (teaching, guiding)
- Interpersonal (advising, mediating, comforting)
- Manual (typing, repairing)
- Organisational (coordinating, managing)
- Persuasive (promoting, selling)

Children can be given the assignment of using the previous circled verbs of activity B1 to be under the above given skillsets that come closest to describing them. The purpose of the assignment would be to bring in some clarity in the minds of children while the further educational and career path.

Resources

References: “You can make your dreams come true” by Dale Hansen Bourke

Resources for Teachers:

Book: NCERT Class IX Science text book

Topic	Values / Life skills integrated & imbibed	Activities
Motion	<p>Core Values Considered: Determination, Focus and Consistency</p> <p>Other Sub Values: Discipline and Hard work</p> <p>Life Skills: like observation skills, scientific aptitude , decision making and reasoning skills</p>	<ol style="list-style-type: none"> 1. This is an activity which helps to understand the importance of determination and discipline in life. Refer B.1. 2. This is an activity which helps the children to relate to values like consistency and hardwork. Refer B.2. 3. Home Assignment that helps to improve the decision making skills of students and also improve their reasoning skills. Refer.C.1.

Materials / Resources needed

- 1) Paper, scale and pencil, Measuring tape, stop watch, graph paper, scale and pencil.
- 2) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter deals with the concepts of distance and displacement, uniform and non-uniform motion, speed, velocity and acceleration. It also helps to understand how speed, velocity and acceleration can be calculated; and also how to interpret different graphical representations of motion.

The points of discussion are

- Comprehend the concepts of distance and displacement and differentiate them.
- Understand the concepts of uniform and non-uniform motion, speed, velocity and acceleration.
- Calculate the speed, velocity and acceleration of an object and represent the motion by graphical method and draw the inference from a given graph.
- Realise how the concepts of motion can be related to goal setting and goal achievement.
- Know that you should work towards your goal with determination, and should focus on your goal in the proper direction, just like knowing displacement and velocity of a moving body helps you to identify its destination.
- Understand and relate the fact that you should find your own pace and move forward in life without stopping or slowing down, towards your goal like that in uniform motion.

Unit 8**Motion****Determination, Focus and Consistency****I. Introduction**

Motion is a phenomenon that is observed everywhere around us. But when we talk about motion in Physics, it is with a point of reference. This chapter deals with the concepts of distance and displacement, uniform and non-uniform motion, speed, velocity and acceleration. It also helps to understand how speed, velocity and acceleration can be calculated; and also how to interpret different graphical representations of motion.

This chapter gives the teacher an opportunity to explain the importance of goal setting in life and the need for proper planning to reach that goal. Just like displacement and velocity helps one to know the direction and pace of a moving body, one should be aware of the direction towards one's goal. Without getting distracted from the path towards the aim, one should always move forward in a comfortable pace with focus and determination, without stoppage until the goal is achieved. This requires lot of self-motivation, discipline and hard work. This can be compared to uniform motion of a body that moves with a constant speed till the final destination. It should also be pointed out that sometimes, as circumstances demand, one should also be able to accelerate or change pace just like one may slow down or accelerate when the road is bumpy and again smooth.

The core values focused upon are Determination, Focus and Consistency along with sub values such as Discipline and Hard work.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Comprehend the concepts of distance and displacement and differentiate them.
- Understand the concepts of uniform and non-uniform motion, speed, velocity and acceleration.
- Calculate the speed, velocity and acceleration of an object and represent the motion by graphical method and draw the inference from a given graph.

- Realise how the concepts of motion can be related to goal setting and goal achievement.
- Know that you should work towards your goal with determination, and should focus on your goal in the proper direction, just like knowing displacement and velocity of a moving body helps you to identify its destination.
- Understand and relate the fact that you should find your own pace and move forward in life without stopping or slowing down, towards your goal like that in uniform motion.

III. Process & Action Plan

A good teacher can guide the children in the right path by inculcating good values in them. This chapter helps teacher to explain values like determination and focus including hard work which helps a student to succeed academically as well as in life.

A. Introduce the context activity:

Discussion. *Refer A*



B. Carry out the varied **activities in class (given below) in the sequence specified.**



1. Determination and Discipline

This is an activity which helps to understand the importance of determination and discipline in life. *Refer B.1.*

2. Consistency and Hardwork

This is an activity which helps the children to relate to values like consistency and hardwork. *Refer B.2.*



C. Aid generalization of the concepts learnt, through assignments (given below).



1.Home Assignment that helps to improve the decision making skills of students and also improve their reasoning skills.

Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the core approach – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The core values being considered are Determination, Focus and Consistency along with sub values such as Discipline and Hard work.

The unit also provides the scope to develop the following skills in the students like observation skills, scientific aptitude, decision making and reasoning skills.

IV. Activities & Related Discussion

A. The teacher can start the lesson by asking children about the various routes available from their house to the school and which one is the shortest of all. A discussion can be initiated about how distance changes while the routes change but displacement remains the same. Children can be asked about the time required to reach the school by various means of transportation and which one they prefer.

B. Activities:

B.1. The lesson can proceed with a simple activity given below which will clarify the difference between speed and velocity and at the same time how both are beneficial in our daily life.

Students can be given a task of finding the house of a friend. The teacher can give two sets of directions which are given below. In each case the students can be asked to draw, to a convenient scale, the route to the house as per the instructions given by the teacher. The starting point for all the students should be from left bottom corner of the paper.

Instruction set 1:

- Start from the left hand bottom corner of the page. Move 500m.
- Move 600m.
- Move 700m.
- Move 2 km.
- You reached your destination.

Take another sheet of paper and follow instruction set 2.

Instruction set 2:

- Start from the left hand bottom corner of the page. Move 500m with a speed of 5 m/s .
- Move 600m with a speed of 7m/s.
- Move 700m with a speed of 2 m/s .
- Move 2 km with a speed of 10 m/s
- You reached your destination.

Repeat the same using another sheet of following instruction set 3.

Instruction set 3:

- Start from the left hand bottom corner of the page. Move 500m with a speed of 5 m/s in north direction
- Move 600m at 7m/s towards east.
- Move 700m at 2 m/s towards south.
- Move 2 km at 10 m/s towards west.
- You reached your destination.

It can be observed that the children could correctly mark the route, only with instruction set 3 which gives you not only distance covered and speed but also the direction. In the other two cases students will reach different locations with different routes. Knowing your speed and direction helps you to reach the destination correctly and also helps you to estimate the time duration required for it.

This activity teaches us that we are responsible for every single choice that we make in our lives. When we are moving forward, we need to be aware of the direction, the purpose and the target that we are heading to. There is always a chance that when we choose the wrong direction, we will not be able to reach our goal.

Children should be encouraged to set their goal and work towards it with determination and discipline. They should be advised to focus on their goal and work hard and proceed in the right direction, just like knowing displacement and velocity of a moving body helps you to identify its destination.

Things needed: Paper, scale and pencil.

B.2. This is another activity which helps to understand how to interpret various graphical representations of motion.

Children can be asked to plot the displacement time graph of various moving bodies in their vicinity by measuring the distance moved and the time taken to cover the distance. For e.g. they can plot the graph of a speed wheel toy car or that of an ant or his/ her friend's cycle riding or that of a jogger etc.

This activity will not only help in improving the observation skills of children, but also encourages them to develop their scientific aptitude. It also conveys that different bodies have different types of motion and have different speeds. Teacher can convey that children should find their own pace and move forward in life without stopping or slowing down, towards their goal like in uniform motion. It is also important that you should move forward in your comfortable pace rather than trying to be like others or compare yourself with others and trying to race with them. Consistent in your speed when moving towards your goal is very important. Once you have set your goal, you should plan judiciously and move towards it at your comfortable pace without distractions.

Things needed: Measuring tape, stop watch, graph paper, scale and pencil.

V. Assignments

C.1. Home Assignment.

A home assignment can be given to children to find the shortest route between any two cities of their choice. They can also decide on the modes of travel, which help them to travel from one city to the other in the shortest time. The children can be asked to explain scientifically which route and mode they prefer and how much time it would take to reach the destination. This activity helps to improve the decision making skills of students and also improve their reasoning skills.

Note: Children can use a city map or google map for this purpose.

Resources

References:

- NCERT Class IX Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Force and Laws of Motion	<p>Core Values Considered: Self-control, Empathy and Self-motivation</p> <p>Other Sub Values: Affection, Care for others and Determination</p> <p>Life Skills: like observation skills and scientific inference skills.</p>	<ol style="list-style-type: none"> 1. This is a demonstration cum discussion which helps to inculcate Self-control, Self-motivation. Refer B.1. 2. This is an experimental demonstration which helps the children to relate to values like Empathy and Affection Refer B.2. 3. Class Assignment which helps to enhance the observation skills and scientific inference skills. Refer.C.1.

Materials / Resources needed

- 1) A rope and a ribbon, A heavy box, A rubber ball.
- 2) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter deals with the effects of balanced and unbalanced forces, the concept of inertia and momentum as well as the Newton's laws of motion.

The points of discussion are

- Comprehend the concepts of balanced and unbalanced forces, contact and non-contact forces.
- Learn about Newton's three laws of motion and their applications.
- Understand the concepts of inertia and momentum, their relation with force and acceleration.
- Realise from Newton's first law that you need a force to move forward towards your goal which is your self-motivation; you require determination to overcome your inertia.
- Appreciate the fact that just like unbalanced forces help objects to move, instability and challenges are required for one to encourage and move forward with positivity.
- Learn that for a greater momentum, mass also should be high in addition to velocity. Your friends and well-wishers are your mass and you should keep enlarging their size to succeed in life.
- Realise that, as explained by Newton's third law, your actions result in what you get back in return. You should treat others with empathy to get back favourable responses from them. Before doing anything which involves other people, think about the consequences and the feelings that may get generated in others as a consequence of your actions.

Unit 9**Force and Laws of Motion**
Self-control, Empathy and Self-motivation**I. Introduction**

Everything that happens in this world have a cause and an effect. A moving body is moving as a result of many forces acting on it. All these actions are based on scientific principles. This chapter deals with the effects of balanced and unbalanced forces, the concept of inertia and momentum as well as the Newton's laws of motion.

Through this chapter teacher can inculcate values like determination, self-motivation ,self-control and empathy in the minds of children. Just like how a force is required to move a body or change its direction, we have to push ourselves to move forward if we want to succeed. In life one encounter ups and downs but these challenges should encourage one to move ahead with determination, like only unbalanced forces can make a body move from its position. It is difficult to move a body from rest initially due to inertia. Likewise, it is really difficult to change our bad habits and beliefs; it requires lot of determination and self control to change them. It can also be emphasized that before you say something or act in a certain way, think about the consequences and the feelings it may cause to others. Remember that as per third law of Newton, every action has an equal and opposite reaction; this postulate is applicable both in physical sense and philosophical sense.

The core values focused upon are Self-control, Empathy and Self-motivation along with sub values such as Affection, Care for others and Determination.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Comprehend the concepts of balanced and unbalanced forces, contact and non-contact forces.
- Learn about Newton's three laws of motion and their applications.
- Understand the concepts of inertia and momentum, their relation with force and acceleration.

- Realise from Newton's first law that you need a force to move forward towards your goal which is your self-motivation; you require determination to overcome your inertia.
- Appreciate the fact that just like unbalanced forces help objects to move, instability and challenges are required for one to encourage and move forward with positivity.
- Learn that for a greater momentum, mass also should be high in addition to velocity. Your friends and well-wishers are your mass and you should keep enlarging their size to succeed in life.
- Realise that, as explained by Newton's third law, your actions result in what you get back in return. You should treat others with empathy to get back favourable responses from them. Before doing anything which involves other people, think about the consequences and the feelings that may get generated in others as a consequence of your actions.

III. Process & Action Plan

Along with academic skills students should be able to learn value based skills like self control and self motivation to succeed in life. Teacher can take the opportunities available in this lesson to inculcate these values in the minds of the children..

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Self-control, Self-motivation and Determination

This is a demonstration cum discussion which helps to inculcate Self-control and Self-motivation . Refer B.1.

2. Empathy

This is an experimental demonstration which helps the children to relate to values like Empathy and Affection . Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Affection

Class Assignment which helps to enhance the observation skills and scientific inference skills. *Refer.C.1.*

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Self-control, Empathy and Self-motivation along with sub values such as Affection, Care for others and Determination.*

The unit also provides the scope to develop the following skills in the students like *observation skills and scientific inference skills..*

IV. Activities & Related Discussion

A. The teacher can start the lesson with a small activity demonstrating balanced and unbalanced forces. Teacher can ask two students to stand on opposite sides of a table. Now give them a strong rope with a ribbon tied at the centre of the rope as a marker. Now ask each one of them to pull with equal force from both ends. It can be noticed that since the forces are equal they balance each other and hence the marker will not move to either side. Now ask one more student to join only on one side to pull. Now the rope is under the influence of unbalanced forces. Hence it can be observed that the marker will be moving towards the side of the bigger force.

This activity demonstrates that only unbalanced forces cause movement. In our life there may be ups and downs, but the downs in life should encourage one to move ahead with determination, just like the fact that only unbalanced forces make a body move. The challenges one faces in life should be dealt with a positive attitude and the instabilities in life should make one stronger and determined to move ahead. Dreams and ambitions won't ever be achieved unless there is affirmative and positive action in our daily life. Unless we push ourselves forward and stay self-motivated, we aren't going to achieve anything in our lives.

Things needed: A rope and a ribbon.

B. Activities:

B.1. This is a simple demonstration of inertia and Newton's first law of motion. Keep a heavy object like a box full of books on the floor and ask a student to push and move it. It can be seen that it is difficult to move the box initially. But once the box starts moving it becomes easy to move. This can be explained with the help of Newton's first law. The box was initially at rest and it wanted to continue in its state of rest due to inertia. But once the

force applied exceeds the inertial force the body starts moving easily. This can be related to habits in our life. We all have an inertia to change our bad habits. But with self-control and determination we can overcome this inertia and get rid of those bad habits. For e.g. Suppose you have the habit of getting up late in the morning and you sincerely want to change it. Initially it will be difficult to get up early and you may feel discouraged. But once you start doing it with determination regularly, it becomes easier.

The first law also teaches us to eliminate all negative forces like self-doubt, hate, jealousy, fear, depression etc. that would come to disrupt our dreams, our will and goals by overcoming them with positive thought forces so that we can move forward.

Things needed: A heavy box.

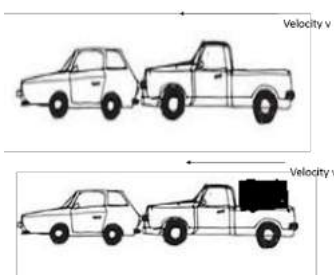
B.2. This is another simple activity that helps to demonstrate action and reaction. Throw a rubber ball on the floor and it can be seen that it bounces back. Now throw it again with a greater force, it will bounce back with a greater force. Greater the force you apply greater will be the reaction.

This activity not only demonstrates Newton's third law but also conveys that your actions decide what you get back in return. Before you say something or act in a certain way, think about the consequences. This also conveys that whatever you face in life are the results of your actions and every action of yours have a consequence. Always treat others with empathy to receive back good responses from them. Empathy is the ability to sense other's emotions, coupled with the ability to imagine what someone else might be thinking or feeling. Always respect the feelings of others so that they react to your actions in a favourable manner.

Things needed: A rubber ball.

V. Assignments

C.1. This activity can be given as a class assignment. Teacher can arrange a toy car and a toy truck for the purpose. Now let the truck without any load hit the car with some speed as shown in the figure below. Now load the truck with some materials like stones or sand. Now let the truck hit the car with the same speed as in the first case. Ask the children to note down their observation.



It can be observed that the truck with less load has less impact and will not set the car in motion through a long distance. But the truck with the heavier load and with the same velocity will be able to push the car ahead through a longer distance than in the first case. This is because momentum is directly proportional to mass, if velocity remains constant. This activity helps to enhance the observation skills and scientific inference skills of the students.

In life we may have to push away many obstacles from our path to achieve success. For achieving this we require adequate momentum. Our friends and relations and the goodwill we gather through our actions, act like the additional mass on the truck, which helps us to have enough strength and power to push away or overcome the challenges in life. Children can be advised to always give importance to inter personal relationships and nurture relations and friendships. Such actions will help them when faced with difficult situations in life. One should be affectionate, warm hearted and caring in order to nurture good friendships.

Resources

References:

- NCERT Class IX Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Gravitation	<p>Core Values Considered: Oneness, Mindfulness and Kindness</p> <p>Other Sub Values: Love and Affection</p> <p>Life Skills: like imaginative and creative skills.</p>	<ol style="list-style-type: none"> 1. This is a demonstration cum discussion which helps to convey the importance of mindfulness. Refer B.1. 2. This is a discussion activity which helps the children to relate to values like Kindness and Affection . Refer B.2. 3. Home Assignment which helps to enhance skills like imaginative and creative skills of students. Refer.C.1.

Materials / Resources needed

- 1) One paper cup, water and a bucket.
- 2) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter gives an over view of Newton's universal law of gravitation and its importance, how it affects falling objects and also touches upon concepts like thrust, pressure, mass and weight

The points of discussion are

- the phenomenon of gravitation and Newton's law of gravitation.
- the motion of a body under the force of gravity.
- Differentiate between the concepts of mass and weight.
- the concepts like thrust, pressure, relative density and buoyancy.
- floatation and Archimedes' principle.
- there is a force of attraction between all the bodies in this universe which helps us to understand the oneness among all of us.
- all falling bodies are treated equally irrespective of the mass and shape, which can be compared to a fall in our life. Even the massive elephant can fall if a wrong step is made. Mindfulness is an importance virtue that helps one to avoid such sudden falls in life.
- people get attracted to you based on you actions and not by your looks. If you treat others with more kindness, love and affection they also get attracted to you, just like the force of attraction of a body of larger mass is larger than that of one with smaller mass.

Unit 10**Gravitation****Oneness, Mindfulness and Kindness****I. Introduction**

Gravity or gravitation is a natural phenomenon by which all things with mass or energy—including planets, stars, galaxies, and even light are brought towards one another. This chapter gives an over view of Newton’s universal law of gravitation and its importance, how it affects falling objects and also touches upon concepts like thrust, pressure, mass and weight.

This chapter helps the teacher to make children realize the oneness among all living and non-living beings. It also helps them to understand how we are all connected to the universe. Every falling body experiences the same acceleration downwards irrespective of their mass, size or shape. While explaining Newton’s law of gravitation and how everybody attracts every other body, teacher can instill values like kindness, love and affection in the minds of children.

The core values focused upon are *Oneness, Mindfulness and Kindness along with sub values such as Love and Affection.*

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Understand the phenomenon of gravitation and Newton’s law of gravitation.
- Describe the motion of a body under the force of gravity.
- Differentiate between the concepts of mass and weight.
- Comprehend the concepts like thrust, pressure, relative density and buoyancy.
- Learn about floatation and Archimedes’ principle.
- Realise that there is a force of attraction between all the bodies in this universe which helps us to understand the oneness among all of us.
- Appreciate the fact that all falling bodies are treated equally irrespective of the mass and shape, which can be compared to a fall in our life. Even the massive elephant can fall if a wrong step is made. Mindfulness is an importance virtue that helps one to avoid such sudden falls in life.

- Realise that people get attracted to you based on your actions and not by your looks. If you treat others with more kindness, love and affection they also get attracted to you, just like the force of attraction of a body of larger mass is larger than that of one with smaller mass.

III. Process & Action Plan

This chapter helps the teacher to explain the importance of Mindfulness. This is the quality or state of being conscious or aware of something. Teacher can point out that one should be fully conscious of his/ her actions and should be prepared to face any consequence of his/ her actions. Children can be made to understand the value of interpersonal relationships that can be nurtured only through love, kindness and affection.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Mindfulness

This is a demonstration cum discussion which helps to convey the importance of mindfulness . Refer B.1.

2. Kindness and Affection

This is a discussion activity which helps the children to relate to values like Kindness and Affection .
Refer B.2. Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Home

Assignment which helps to enhance skills like imaginative and creative skills of students. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the core approach – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The core values being considered are Oneness, Mindfulness and Kindness along with sub values such as Love and Affection.

The unit also provides the scope to develop the following skills in the students like imaginative and creative skills.

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion on why the moon is going around the earth, why is it not going away from earth? This gives an opportunity to introduce gravity to children. Teacher can explain that gravity is not only felt on earth's surface but also everywhere in the universe. Every body attracts every other body but the force of attraction may depend upon their masses and the distance between them. This helps children to understand that there is an underlying connection between every object in this universe. This will inculcate a feeling of oneness in their minds.

B. Activities:

B.1. This is a demonstration cum discussion activity. Teacher can demonstrate this in the class.

- Make sure you are doing this experiment over a large bucket or outside as water will spill.
- Poke a hole in a paper cup at the bottom of the cup
- Fill the cup with water but keep your finger over the hole
- Take your finger off the hole and observe what happens to the water. It should pour out in a nice steady stream. If not, re-poke the hole and refill the cup with water
- Fill the cup again and hold your finger over the hole. This time, you are going to drop the cup and let go of the hole at the same time and observe what will happen to the water! Make sure the cup falls into a large bucket or onto the grass.

It can be observed that when you drop the cup the water no longer sprays out the side of the cup. When you just held the cup and let your finger off the hole, the water was pulled down by gravity and thus water pressure pushes it out the hole. When you drop the cup and water together, the cup and water begin falling at the same speed, and are

actually weightless as they fall. Hence there was no water pressure on the cup as it falls because both the water and the cup were moving at the same speed.

This activity demonstrates that all freely falling bodies are accelerated in the same manner and same speed regardless of their size or mass. It can be related to our daily life. Irrespective of who you are and how great you are, nature has no discrimination. Even the mighty elephant will fall down if a wrong step is made. Everybody is treated equally by nature. What matters is your mindfulness. Mindfulness is an important virtue that helps one to be conscious of what we are doing and to avoid such sudden falls in life.

Things needed: One paper cup, water and a bucket.

B.2. This is a discussion activity that helps children to understand Newton's law of gravitation and factors affecting gravitational force between two bodies. While discussing this teacher can explain the formula for the force of gravity derived from Newton's law of gravitation. From the formula it is clear that as the masses of the bodies increase the force of gravity increases. Similarly, when the distance between the bodies increases the gravitational force decreases.

This law helps us to understand an important concept in life. We find some people more attractive than others. It may not be because of their appearance or financial status, but due to their actions. People who treat others with kindness, affection and love are mostly respected and loved by others, just like the bodies with larger masses. Teacher can try to inculcate in the minds of children these values which are adored and appreciated by most people. Another interesting aspect is that we always get attached to people who always keep less distance from us. In this era of technology, physical distance is irrelevant. We always love those who try to keep in touch with us and always remember us. This teaches an important lesson that we should give priority to our personal relations and try to nurture our friendships.

V. Assignments

C.1. Home Assignment.

The children can be asked to prepare an essay on how the world will be without gravity. This activity helps to enhance their imagination and creativity.

Resources

References:

- NCERT Class IX Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Work and Energy	<p>Core Values Considered: Humility, Hard work and Focus</p> <p>Other Sub Values: Determination</p> <p>Life Skills: like critical thinking skills and scientific inference skills.</p>	<ol style="list-style-type: none"> 1. This is a demonstration cum discussion activity that helps the children to understand the importance of inner peace and relaxation. Refer B.1. 2. This is a demonstration which teaches the importance facing life with courage and confidence. Refer B.2. 3. Home assignment that helps the children+E11 to enhance their scientific temperament and logical thinking skills.. Refer.C.1.

Materials / Resources needed

- 1) A heavy object like a rock or a box, A rubber or tennis ball.
- 2) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter elaborates on work, its relation to energy, different forms of energy and the law of conservation of energy.

The points of discussion are

- the scientific concept of work and its definition.
- calculate work done by a force and the meaning of negative and positive work.
- relation between work and energy.
- the various forms of energy like kinetic and potential energy and the law of conservation of energy.
- the concept of power.
- in real life, we do hard work, but it becomes fruitful when we move forward with determination and focus.
- as one goes higher and higher in life the impact of the fall also will be very high. It can be compared to increase in potential energy as height increases which results in increase in the velocity when we fall down and touch the ground. The importance and necessity of humility can be highlighted to children in this context.

Unit 11
Work and Energy
Humility, Hard work and Focus

I. Introduction

The term ‘work’ used in our day-to-day life is different from the scientific concept of work. Work and energy are closely related to each other. Work can also be defined as the transfer of energy. This chapter elaborates on work, its relation to energy, different forms of energy and the law of conservation of energy.

Teacher gets an opportunity to highlight the values like humility, hard work and focus through this chapter. In physics work is said to be done only if the object gets displaced. In real life, we do hard work, but it becomes fruitful when we move forward with determination and focus. For success in life, hard work, focus on goal and determination are essential. While explaining potential and kinetic energy, teacher can touch upon the importance of humility. One should always remain humble even if one is successful in life, so that a downfall will not create a huge impact.

The core values focused upon are *Humility, Hard work and Focus* along with sub values such as *Determination*.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Comprehend the scientific concept of work and its definition.
- Learn to calculate work done by a force and the meaning of negative and positive work.
- Understand the relation between work and energy.
- Know about the various forms of energy like kinetic and potential energy and the law of conservation of energy.
- Understand the concept of power.
- Realise that in real life, we do hard work, but it becomes fruitful when we move forward with determination and focus.
- Appreciate the fact that as one goes higher and higher in life the impact of the fall also will be very high. It can be compared to increase in potential energy as height

which results in increase in the velocity when we fall down and touch the ground. The importance and necessity of humility can be highlighted to children in this context.

III. Process & Action Plan

This chapter helps the teacher to explain the importance of humility in life. As one becomes more and more successful there is a tendency to become arrogant. But one should not forget that this arrogance will make your fall more and more painful. Teacher can highlight the fact that most successful people are also very humble.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. *Refer A*

B. Carry out the varied **activities in class (given below) in the sequence specified.**

1. Hardwork, Focus and Determination

This is a demonstration cum discussion which helps to inculcate values like Hardwork, Focus & Determination Refer B.1.

2. Humility

This is an experimental demonstration which helps the children to relate to value like Humility . Refer B.2.

C. Aid generalization of the concepts learnt, through **assignments (given below).**

1.Home Assignment which helps to enhance critical thinking skills and scientific inference skills of students. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the core approach – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The core values being considered are Humility, Hard work and Focus along with sub values such as Determination .

The unit also provides the scope to develop the following skills in the students like critical thinking skills and scientific inference skills.

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion about the difference in the of work in daily life and in science.

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B. Activities:

B.1. This is a demonstration cum discussion activity. Teacher can ask a student to push a wall in the classroom with maximum force. Now ask him to push a heavy box or rock so that it moves. In the first case scientifically, no work is done where as in the second case work is said to be done as the object moves. Teacher can correlate these two cases to real life. In the first case, even if you are doing hard work it is not considered as a fruitful work because the object did not move. In the second case though the effort was less, the object moved rendering the effort to be fruitful.

Children should be told about the importance of doing hard work with focus and determination. Unless they focus and move ahead in life, their hard work is in vain. Proper planning and setting milestones are important in achieving goals in life.

Things needed: A heavy object like a rock or a box.

B.2. This is another demonstration activity which the teacher can do in the classroom. Drop a ball from different heights and ask the children to observe the impact caused on the ball while hitting the ground. It can be observed that as the height from which the ball is dropped increases, the impact on hitting the ground also increases since the kinetic energy is more. This can be related to the saying ‘The higher up, greater the fall’. Teacher can elaborate that as you go higher and higher in the ladder of success the impact of a fall is also harder. The importance of humility can be highlighted to children in this context. One should always remain humble even if one is successful in life, so that a downfall will not create a huge impact.

Things needed: A rubber or tennis ball.

V. Assignments

C.1. Home Assignment.

The children can be asked to prepare a list of activities in our daily life or in our household where one form of energy is converted to another form. This assignment will help to improve the critical thinking skills and scientific inference skills of the children.

Resources

References:

- NCERT Class IX Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Sound	<p>Core Values Considered: Kindness, Respect, Inner peace and Harmony</p> <p>Other Sub Values: Affection.</p> <p>Life Skills: like observation skills and concentration power.</p>	<ol style="list-style-type: none"> 1. This is a demonstration cum discussion which helps to understand the importance of inner peace and harmony. Refer B.1. 2. This is a demonstration which helps the children to relate to values like kindness, love and affection . Refer B.2. 3. Class Assignment which helps to enhance the concentration power and observation skills of the children. Refer.C.1.

Materials / Resources needed

- 1) Some rubber bands.
- 2) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter deals with study of the production and propagation of sound, and the characteristic properties of sound wave.

The points of discussion are

- how sound is produced and propagated.
- the characteristics of sound waves like frequency, amplitude and speed.
- the properties of sound like loudness, pitch and quality.
- how echoes are produced and the factors favouring it.
- the various applications of reflection of sound and ultrasound.
- just like vibrations of objects give out energy, the vibrations in our body can also generate energy which can be streamlined in the positive direction to attain inner peace, by activities like meditation and yoga.
- Just like sound gets reflected and produces echo, our actions are reflected back on us. Hence children can be urged to be kind and loving to others; which they can expect back from others.

Unit 12**Sound****Kindness, Respect, Inner peace and Harmony****I. Introduction**

We hear so many sounds around us in everyday life. Sound is produced by vibration of different objects and requires a medium to propagate. This chapter deals with study of the production and propagation of sound, and the characteristic properties of sound wave.

Teacher gets an opportunity to inculcate values like kindness and love and also highlight the importance of inner peace and harmony through this chapter. Just like vibrations of objects give out energy, the vibrations in our body can also generate energy which can be streamlined in the positive direction to attain inner peace, by activities like meditation and yoga. Teacher can also point out the fact that our life is our own echo. Just like sound gets reflected and produces echo, our actions are reflected back on us. Children should be urged to nurture love and kindness in their hearts, in order to get back the same.

The core values focused upon are Kindness, Respect, Inner peace and Harmony along with sub values such as Affection.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Explain how sound is produced and propagated.
- Know about the characteristics of sound waves like frequency, amplitude and speed.
- Describe the properties of sound like loudness, pitch and quality.
- Know how echoes are produced and the factors favouring it.
- Learn about the various applications of reflection of sound and ultrasound.
- Realise that just like vibrations of objects give out energy, the vibrations in our body can also generate energy which can be streamlined in the positive direction to attain inner peace, by activities like meditation and yoga.

- Realise that like sound gets reflected and produces echo, our actions are reflected back on us. Hence children can be urged to be kind and loving to others; which they can expect back from others.

III. Process & Action Plan

Inspiration is one of the greatest gifts that a teacher can give his/ her students. The influence of a teacher can go beyond academic limits. A teacher can take the role of a life coach by instilling values in children. This chapter gives an opportunity to stress the importance of kindness and respect in our life.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. Refer *A*



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Inner peace and harmony

This is a demonstration cum discussion which helps to understand the importance of inner peace and harmony. Refer B.1.

2. Kindness, love and affection

This is a demonstration which helps the children to relate to values like kindness, love and affection. Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1.Class Assignment which helps to enhance the concentration power and observation skills of the children. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The core values being considered are *Kindness, Respect, Inner peace and Harmony* along with sub values such as *Affection*.

The unit also provides the scope to develop the following skills in the students like *observation skills and concentration power*.

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion about the various sounds we hear in our daily life and their impacts on us. Some sounds are pleasant while some others are irritating. Encourage the students to name sounds which are pleasant to them (and why), and which are unpleasant, and record these on a table or chart.

B. Activities:

B.1. This is a simple activity which the teacher can demonstrate or ask the students to try, that helps to illustrate that sound is produced by vibrations.

- Loosely stretch a rubber band between your thumb and forefinger, and ask students to predict what will happen when you pluck it.
- Then have students try plucking their own rubber bands and recording the results.
- Ask the students to record their observations.

It can be observed that a plucked rubber band vibrates when plucked, thereby making a sound. Encourage students to experiment with their rubber bands to try to produce different kinds of sounds.

It becomes clear that anything that vibrates causes energy in some form. If we close our eyes and concentrate on the sound of our heart beat or the movement of our lungs while we breathe we can feel an energy inside our body. Every cell in our body undergoes vibrations that creates tremendous energy. If we can identify and strengthen this positive energy then we can attain inner peace and harmony. Meditation and yoga are methods to achieve this. Children can be urged to strengthen their mental power and thus achieve inner peace and harmony which leads to mental health.

Things needed: Some rubber bands.

B.2. This is a discussion activity on echo. Teacher can discuss how sound bounces off surfaces.

- In what types of rooms do you hear echoes when you speak (i.e., large, small, classroom)?
- What rooms in your house do you tend to hear echoes best?
- Why does the sound not continue to reflect off surfaces in a room?
- If possible teacher can take the students to a large hall or auditorium in the school where echoes can be heard and demonstrate it.

In this context teacher can narrate a small story given below:

“Once a son and his father was walking on the mountains. Suddenly the son falls and hurts himself and screams. He cried loudly, “Ahh Its paining.”. To his surprise he heard a voice from somewhere in the mountain, shouting back, “ Ahh Its paining”. The son shouted again in anger and pain, “Who the hell are you?”. The voice replied the same way, “Who the hell are you?” Angered at the response the son shouted, “Coward”. Soon came the reply, “Coward”. The son turned to his father and asked what is happening. Then father smiled and asked the son to pay attention and then screamed to the mountain, “I admire you”. The reply came “ I admire you”. He then shouted again “You are a champion”. The voice replied, “ You are a champion”. The boy was surprised.

The father explained. “People call this echo, but really this is life. It gives you back everything you say or do. Our life is our echo. It is a reflection of our actions. If you want love in your life create love in your heart. If you want others to be kind to you, be kind to them”.

This story will help the teacher to sow the seeds of kindness, love and affection in the minds of the children.

V. Assignments

C.1. Class Assignment.

Hearing allows us to communicate with others and to navigate our world. Invite students to experience a heightened awareness of all the important sounds around them with a sound walk through several areas of your school, such as the hallway, cafeteria, library, and playground. Ask students to pay attention to all the different sounds they hear along the way. Then have members of the class compare their experiences. Next, have pairs of students take turns observing the sounds in different areas of your classroom or school more closely. Ask one student in each pair — “the listener” — to close his or her eyes (or put on a blindfold) and describe all the sounds that he or she hears to the other student, who will record them. (You may want to monitor blindfolded students closely, or ask student pairs to choose a location and sit before the listener is blindfolded.) Encourage students to use rich, descriptive language in their

observations. This activity helps to increase the concentration power and observation skills of the children.

Resources

References:

- NCERT Class IX Science Textbook.
- Assignment courtesy:

<https://www.scholastic.com/teachers/articles/teaching-content/science-sound>

Topic	Values / Life skills integrated & imbibed	Activities
Why do we fall ill ?	<p>Core Values considered: Health, Hygiene and Cleanliness</p> <p>Other Sub Values: Gratitude and Respect</p> <p>Life Skills: Individual and Collective Responsibility.</p>	<ol style="list-style-type: none"> 1. In order to understand the importance of awareness and self discipline children can be asked to prepare their own family medical history recoed. 2. To understand the value of cleanliness and hygiene, the creation of a personal Health Card by all children and the analysis of all heath cards of all students can help understand the conditions under which these diseases were caused. 3. Preparing a Vaccination schedule can help understand the collective and individual responsibility for eradicating the various diseases. 4. Preparing charts for exhibition on diseases, their causes, symptoms and cures can help gain awareness and better understanding of keeping their surroundings clean. 5. Write an essay on the ailments suffered in the childhood and how your parents with the help of Doctors, helped you tide over it.This activity will help gratitude towards their parents.

Materials / Resources needed

Pen, Pencil, Eraser, Scale, Chart papers, printouts, multimedia and internet wherever required

NCERT text books of Class IX

Description (of the points of discussion)

In this chapter we learn about the importance of health, hygiene, prevention and treatment of various diseases along with appreciation of good health and the factors that contribute to it.

- To learn about the significance of health.
- To understand personal and community hygiene issues, both of which matter for health
- To learn about various infectious and non-infectious disease, acute and chronic diseases and their causes.
- To study about the means of spread of various diseases.
- To understand the principles, treatment and prevention.
- To ensure hygienic practices and cleanliness to be maintained for a disease free environment.
- To learn all about immunization drives, prescribed by WHO which inculcates the value of individual and collective responsibility.
- To inculcate the values of Gratitude and Respect, but understanding the value of care given by their parents, when they are afflicted by ailments.

Unit 13**Why do we fall ill?****Awareness, Self- discipline, Hygiene, Cleanliness, Gratitude, Individual and Collective Responsibility****I. Introduction**

“Health is Wealth” is an adage we all have heard at some point of time or the other. It is a very relevant statement for all times to come. If we have health, then we can enjoy all other things in life.

The word ‘Disease’ can be broken up into two words, ‘Dis’ and ‘Ease’ i.e., when a body or mind is not at ease due to some ailment or the other. With the advancement in science, we have learnt that diseases can be of various types like infectious and non-infectious diseases, acute (short-term) and chronic (long term) diseases, viral or bacterial diseases etc.. In the course of studying this chapter we will learn about different diseases and their causes, how they spread, principles of prevention and treatment.

Our recent experiences with this world-wide pandemic has taught us how a small virus can bring the whole world to a standstill, affecting our economies, lives and so on. The best way to keep ourselves healthy would be to develop hygienic habits, have safe and good health practices, prevent infectious diseases, take up immunisation drives and of course last but not the least take medical help when we do fall sick.

“Prevention is better than cure”, as the adage goes, sets the tone to encourage the children through activities, which will help them lead, a healthy and happy life.. A strong and healthy young generation will ensure a strong and growing nation.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value-based goals:

- To learn about the significance of health.
- To understand personal and community hygiene issues, both of which matter for health
- To learn about various infectious and non-infectious diseases, acute and chronic diseases and their causes.
- To study about the means of spread of various diseases.
- To understand the principles and treatment and prevention.

- To ensure hygienic practices and cleanliness to be maintained for a disease-free environment.
- To learn all about immunization drives, prescribed by the WHO which inculcates the value of individual and collective responsibility.
- To inculcate the values of Gratitude and Respect, along with understanding the value of care given by their parents, when they are afflicted by ailments.

III. Process & Action Plan

Health is a state of complete physical, mental and Social well-being and not merely an absence of disease or infirmity. Any change from the normal state that causes discomfort or disability or impairs the health is called disease. Diseases can be caused due to various factors and therefore it becomes very important to analyse and study them. The understanding of the causes and the remedies and our actions teach us various life skills which help us overcome the diseases.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context through activity:

Children can undertake a study of various types of diseases and how these diseases help in the long run to develop immunity in the body



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Self- discipline

Create your own family medical history record book
Ref. B1

2. Cleanliness and Hygiene

Every child will create a Health card and after everyone creates it an analysis of the same can be done to understand the importance of cleanliness. Ref B2

3. Individual and Collective responsibility

Vaccination schedule taken by every child.
Ref B3



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Awareness

Charts for exhibition on diseases, their causes, symptoms and cures.
Ref C1

2. Gratitude

An essay on the ailments suffered since childhood and how it was overcome.
Ref C2

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – of **Research and Understanding** the values embedded in the topic.

The core values being considered are **Health, Hygiene and Cleanliness** along with other sub-values like **Gratitude** and **Respect**.

The unit also provides the scope to develop the life skills of **Individual** and **Collective responsibility** and understanding things in depth.

IV. Activities & Related Discussion

A. All living organisms fall ill at some time or the other due to various environmental factors, but the human body has the amazing ability to fight these diseases and develop self-immunity towards them. In many cases we have to take the help of medical science to overcome these diseases in order to have a healthy life.

Therefore, the study of diseases, their causing agents, symptoms, modes of spread, will help the child to understand the health environment better.

B1. It is important for every child to know about his/her family medical history, as it can warn them about any major impending problems and help them to choose a healthy life style to reduce the incidence of such diseases. As children unravel and learn about their family history, they will realize the importance of inculcating the value of self-discipline in themselves, esp. if there is family history of diabetes, heart attacks etc. The onset of which can be controlled by having self-discipline in food and exercise.

FAMILY MEDICAL HISTORY RECORD				
Name of Diseases	Maternal side		Paternal side	
	Relation	Disease and age of occurrence	Relation	Disease and age of occurrence
Heart Disease				
Asthma				
Blood pressure				
Diabetes				
Skin diseases				
Kidney related				
Arthritis				
Cancer				
Allergies to Medication				
Surgeries				

B2: Cleanliness and hygiene are two important values, the importance of which can be learnt through this activity. As children prepare their own health report card, which will contain details of the diseases they have suffered in the past and understand and discuss the reason for the same, a clear picture of how unhygienic habits and lack of cleanliness can cause diseases will emerge in front of them. This activity of identifying infectious and acute diseases suffered and the analysis of its cause can make them understand the importance of maintaining the Five 5's.

1. Protect the water source; Boil and store water safely.
2. Wash hands before preparing and taking food;
3. Always cover the food and control the flies
4. Clean vegetables and fruits before use
5. Proper drainage system and treatment of water

HEALTH RECORD CARD

Name of Diseases	Name of the Child	Date of Birth	Blood Group
	Name of family Doctor and Contact no		
Chronic			
Asthma			
Diabetes			
Skin diseases			
Non – chronic			
Typhoid			
Jaundice			
Malaria			
Chicken Pox			

In case, a child finds out that he / she has got Typhoid or Jaundice / Hepatitis, they should find out the reason for it. Was it because of having food or water from street side or some other reason?

If a child has got malaria, was it because of stagnant water either inside or outside the house which led to the breeding of mosquitoes and hence the disease?

This will help children to understand the importance of keeping their surroundings clean and learn the value of cleanliness and hygiene.

The activity B3, given below can be kept as a reference as it is purely academic oriented. Teachers may find it useful to bring in the organized health care programs among children and create an awareness in parents.

B3. The collective responsibility of eradicating certain diseases like Polio, Measles etc in all countries has been taken up by the respective governments, but every citizen of the country needs to be aware of it and be a part of it to truly eradicate many of the diseases from the face of the earth. Children between the time that they are born and till the age of five tend to fall sick quite frequently due to their low immunity levels. Maximum number of vaccinations given are also in this age group. Children usually develop a fever after vaccination and telling them about how their parents took care of them during such times can develop a sense of gratitude towards their parents. It is important that every child knows their vaccination history. By asking their parents they can fill up the vaccination schedule chart by noting down which all vaccinations they have been given in childhood, which will in future prepare them to be more responsible individuals. Vaccination is an individual responsibility as well as a collective responsibility by the local health departments, hospitals or Doctors, in order to create a healthier Nation.

VACCINATION SCHEDULE

Age	Vaccine	Yes	No
0- 2 Weeks	BCG Oral Polio Vaccine – 1st Dose Hepatitis B Vaccine – 1st Dose		
6– 8 Weeks	DPT – 1st Dose		
	Oral Polio Vaccine – 2nd Dose		
	Hepatitis B Vaccine – 2nd Dose		
12 – 14 weeks	DPT - 2nd Dose		
	Oral Polio Vaccine – 3rd Dose		
18 – 20 Weeks	Oral Polio Vaccine – 4th Dose		
	DPT - 3rd Dose		
6 – 9 Months	Hepatitis B Vaccine – 3rd Dose		
	Oral Polio Vaccine – 5th Dose		
8 – 9 Months	Measles Vaccine		
15 – 18 Months	MMR (Measles , Mumps, Rubella)		
	DPT - 1st booster dose		
	Oral Polio Vaccine – 6th Dose		
4 – 6 Years	Oral Polio Vaccine – 7th Dose		
	DPT - 2nd booster dose		
10 Years	TT (Tetanus) – 3rd Booster dose		
	Hepatitis B Vaccine – 3rd Dose booster dose		
15 – 16 Years	TT (Tetanus) – 4th Booster dose		

V. Assignments

C1. Let every child create one chart on one disease for e.g.: Malaria- mentioning causative agents, whether it is viral, bacterial, infectious, non-infectious, chronic or acute, its modes of transmissions, its symptoms and cure, thus covering the study of many diseases. These charts can be put up in the class rooms to share their knowledge, thus creating a better understanding of the subject.

C2. Write an essay on the ailments suffered by the child from the time he or she was born till the current age and how the parents and the society took care of them and helped them tide over the crisis. Recording the events will help children to understand the love and care their parents have bestowed up them in order to bring them up as healthy individuals, inculcating the value of love and respect naturally in them.

Resources

References:

Resources for Teachers:

Book: NCERT Class IX Science text book

Topic	Values / Life skills integrated & imbibed	Activities
Natural Resources	<p>Core Values Considered: Interdependence, Gratitude and Responsibility</p> <p>Other Sub Values: Environmental Awareness.</p> <p>Life Skills: like communication and presentation skills, scientific inference skill</p>	<ol style="list-style-type: none"> 1. This is a brainstorming session and essay writing activity which helps to understand the importance of Interdependence and Gratitude. Refer B.1. 2. This is a demonstration which helps the children to relate to values like Environmental awareness and Responsibility . Refer B.2. 3. Home Assignment of PowerPoint presentation making which helps to enhance communication and presentation skills of students. Refer.C.1.

Materials / Resources needed

- 1) 2 thermometers, a glass jar and an open place with sunlight.
- 2) NCERT text books of Class IX.
- 3) Computer and Audio Visual Facility to show a power point presentation in the class.

Description (of the points of discussion)

This chapter gives an overview on natural resources like air, water and soil and about the various nutrient cycles that keep the balance of nature that helps to sustain life.

The points of discussion are

- the various natural resources that sustain life on earth.
- how winds and rains are caused.
- how the nutrients are recycled in the biosphere.
- Realise our responsibility to conserve our natural resources for a sustainable future and also to avoid polluting it.
- how we are dependent on the nature for our survival and hence feel the gratitude towards mother earth.

Unit 14**Natural Resources****Interdependence, Gratitude and Responsibility****I. Introduction**

Earth is considered to be the only planet in solar system where life survives. The reason for the survival of life on earth can be attributed to the natural resources that support life. This chapter gives an overview on natural resources like air, water and soil and about the various nutrient cycles that keep the balance of nature that helps to sustain life.

This chapter helps the teacher to explain the interdependence between the various forms of life and nature, which helps children to feel grateful to mother earth, who has provided us with all the resources to survive. Teacher can also try to inculcate the feeling of responsibility in the minds of children towards preserving natural resources and use them in a sustainable manner.

The core values focused upon are Interdependence, Gratitude and Responsibility along with sub values such as Environmental Awareness.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Learn about the various natural resources that sustain life on earth.
- Describe how winds and rains are caused.
- Realise how the nutrients are recycled in the biosphere.
- Realise our responsibility to conserve our natural resources for a sustainable future and also to avoid polluting it.
- Understand how we are dependent on the nature for our survival and hence feel the gratitude towards mother earth.

III. Process & Action Plan

Teacher as a life mentor can guide the children through the right path to success. By inculcating values like gratitude and responsibility in the minds of the children, teacher is fulfilling a social responsibility bestowed upon him/her.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. *Refer A*



B. Carry out the varied **activities in class (given below) in the sequence specified.**



1. Interdependence and Gratitude

This is a brainstorming session and essay writing activity which helps to understand the importance of Interdependence and Gratitude . Refer B.1.

2. Environmental awareness and Responsibility

This is a demonstration which helps the children to relate to values like Environmental awareness and Responsibility. Refer B.2.



C. Aid generalization of the concepts learnt, through **assignments (given below).**



1. Home Assignment of PowerPoint presentation making which helps to enhance communication and presentation skills of students. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the core approach – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The core values being considered are Interdependence, Gratitude and Responsibility along with sub values such as Environmental Awareness.

The unit also provides the scope to develop the following skills in the students like communication and presentation skills and also the scientific inference skills.

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion on the various natural resources available to us and how they help to support life on earth. Children can be asked to list down some human activities that creates an imbalance in nature.

B. Activities:

B.1. This is a brainstorming session and essay writing activity. Teacher can initiate a brainstorming session on the ways in which humans are dependent on natural resources. The discussion can elaborate on our dependence on fuels, forests, water bodies etc. Children can be asked to write a short essay on how we are dependent on natural resources for our survival.

This activity will convince children that without natural resources like air, water, soil etc., it is difficult to survive. This will make them understand our dependence on nature and a feeling of gratitude will be inculcated in their minds.

B.2. This activity can be performed outside the classroom where sunlight is available.

- Find a place outside to perform this activity.
- Place two thermometers on the same outdoor surface.
- Cover one of the thermometers with the clear glass jar. This glass jar will act like a greenhouse. The other will be left uncovered.
- Record the starting temperatures from both thermometers.
- Record the temperature from each thermometer every five minutes for a period of at least thirty minutes.

Note anything else that you observe happening in the jar. The children can be asked to prepare a table like that given below, based on their observations.

Time

Temperature Outside

Temperature in Jar

0 minutes

5 minutes

The contributing factors to greenhouse effect like carbon dioxide emission can be discussed in this context. This activity helps to improve the scientific inference skills of students. It also helps them to understand how greenhouse effect is caused and how they can avoid contributing to it. It also contributes to their environmental awareness and feeling of social responsibility.

Things needed: 2 thermometers, a glass jar and an open place with sunlight.

V. Assignments

C.1. Home assignment:

This is an interesting PowerPoint presentation making activity. Students can be asked to prepare a PowerPoint presentation on a case study on any kind of pollution. It should include the problem, the causes and the solutions for the case. For e.g. the case study can be the air pollution in Delhi. Students should explore the causes and possible solutions to the problem. Another one can be the oil spill issue in recent past that harms marine life.

This activity not only helps to improve the communication and presentation skills of children, but also improve their general awareness. It also helps to inculcate a feeling of social responsibility to conserve our natural resources for a sustainable future and also to avoid polluting it.

Resources

References:

- NCERT Class IX Science Textbook.
- Activity B.2. courtesy: www.scienceworld.ca.

Topic	Values / Life skills integrated & imbibed	Activities
Improvement in Food Resources	<p>Core Values Considered: Gratitude, Equality and Care and Share</p> <p>Other Sub Values: Kindness and Selflessness..</p> <p>Life Skills: like observation skills and scientific curiosity.</p>	<ol style="list-style-type: none"> 1. This is an activity which helps to understand the importance of Gratitude. Refer B.1. 2. This is a discussion which helps the children to relate to values like Equality and Caring and Sharing Refer B.2. 3. A dairy farm visit which helps to enhance observation skills and scientific curiosity of students. Refer.C.1.

Materials / Resources needed

1) NCERT text books of Class IX.

Description (of the points of discussion)

This chapter elaborates on how to increase our agricultural production, the modern scientific methods that can help to increase agricultural yield and also new methods in animal husbandry.

The points of discussion are

- the need to increase the production of food and the different scientific methods to achieve it.
- why production and protection of food crops are important.
- the importance of organic methods of farming.
- the new trends and methods in animal husbandry including cattle farming, poultry farming, fish production and bee keeping.
- our food come from plants and animals and we should be grateful to them.
- a large fraction of the world population are suffering from food scarcity and nutrient deprivation. Children can be urged not to waste food as it is precious and also share it among those who are not fortunate to have it. This helps to inculcate values like equality, kindness, caring and sharing.

Unit 15**Improvement in Food Resources
Gratitude, Equality and Care and Share****I. Introduction**

Everyone knows that food is essential for our survival. But the rise in human population is not matched by any equal increase in food production. This may result in scarcity of food in the near future. The only way to avoid this is to increase the food production by adopting scientific methods in agriculture. This chapter elaborates on how to increase our agricultural production, the modern scientific methods that can help to increase agricultural yield and also new methods in animal husbandry.

Teacher gets an opportunity to explain to children how we are dependent on other living beings like plants and animals for our food. This knowledge of interdependence, can inculcate a feeling of gratitude in their minds towards other beings. Teacher can also urge the children not to waste food items as it is not equally shared in this world. Children should be made aware of the importance of equally sharing the food resources to the whole population in this world. Teacher can urge them to share their resources especially food and care for others.

The core values focused upon are Gratitude, Equality and Care and Share along with sub values such as Kindness and Selflessness.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Realise the need to increase the production of food and the different scientific methods to achieve it.
- Explain why production and protection of food crops are important.
- Learn the importance of organic methods of farming.
- Learn about the new trends and methods in animal husbandry including cattle farming, poultry farming, fish production and bee keeping.

- Realise that our food come from plants and animals and we should be grateful to them.
- Understand that a large fraction of the world population are suffering from food scarcity and nutrient deprivation. Children can be urged not to waste food as it is precious and also share it among those who are not fortunate to have it. This helps to inculcate values like equality, kindness, caring and sharing.

III. Process & Action Plan

The teacher's main role is as a facilitator – there to offer support and advice when needed. Children look upon the teacher as a person whom they can rely on and confide in. This chapter helps the teacher to explain the importance of caring for other fellow beings and sharing of available resources.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart on next page:

A. Introduce the context activity:

Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Gratitude

This is an activity which helps to understand the importance of Gratitude . Refer B.1.

2. Equality and Care and Share

This is a discussion which helps the children to relate to values like Equality and Caring and Sharing Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. A dairy farm visit which helps to enhance observation skills and scientific curiosity of students. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the core approach – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The core values being considered are Gratitude, Equality and Care and Share along with sub values such as Kindness and Selflessness..

The unit also provides the scope to develop the following skills in the students like observation skills and scientific curiosity.

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion about the increase in world population and how inadequate our food production is to cater to the needs of our increasing population. Teacher can show some statistical data to students on this topic.

B. Activities:

B.1. This activity helps children to realize our dependence on other living beings for our food and nutrition requirement. Teacher can ask children to list down the common food items they consume. Let them write down the name of each item and the constituents of each. Then try to find out and list down the sources of their food. It can be understood that all our food comes from plants and animals. This realization helps children to inculcate a feeling of gratitude in their minds.

B.2. Teacher can initiate a discussion on how much food is wasted every day from many of our houses and eatery shops. Teacher can highlight the fact that half of the population in the world are starving and access to food is not available for all. Children should feel that everybody has equal right to food and should realize the importance of sharing the resources that they have with others who are not so privileged.

V. Assignments

C.1. Assignment.

Teacher can decide for the children to visit a nearby dairy farm. The children will be able to get a real-life experience of the various processes involved in the production of milk, which they get every day at their doorstep. This experience will teach them about our dependence on animals and inculcate a feeling of kindness and gratitude to all other living beings. Children can be asked to prepare a write up on their visit and also list out

their learnings from the visit. This activity helps to improve the observation skills and scientific curiosity among children.

Resources

References:

- NCERT Class IX Science Textbook.

SCIENCE

Grade IX

Integration of Values

Teacher's Manual

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