



Resources based on Learning Outcomes in Science at Upper primary Stage

**Infographics
Class VIII
(2020-21)**



**Department of Education in Science and Mathematics
National Council of Educational Research and Training
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PREFACE

Over the years, the focus of global educational efforts, particularly under the banner of *Education for All (EFA)*, has shifted significantly. No longer is it enough to simply get children into schools; the concern has moved toward what truly matters—*the quality of education*. This includes not just student enrolment and retention, but also what students actually learn and how they grow in the classroom.

Despite significant progress—highlighted in the *Global Monitoring Report (2015)*—countries like India still face serious challenges in ensuring meaningful learning for all. National assessments such as *ASER* and *NAS* reveal a sobering reality: while children are in school, many are struggling to master basic skills, and the gaps between different regions remain stark.

In the classroom, teachers often find themselves uncertain. What should students be learning? How should learning be assessed? With textbooks commonly used as the sole guide, and assessments limited to the back-of-the-chapter questions, deeper learning often gets overlooked. Local context, diverse teaching styles, and varying student needs are rarely considered, largely because there's no clear framework to do so.

This is where clearly defined *learning outcomes* become essential. They not only provide direction to teachers but also empower parents, school committees, communities, and policymakers to take shared responsibility for the child's learning. Everyone becomes more informed, more accountable, and more engaged.

In response, NCERT developed a detailed document outlining learning outcomes across all subjects for elementary education. These outcomes are carefully aligned with curricular goals and teaching strategies. To complement this, a series of thoughtfully designed infographics have been compiled into this booklet. These resources are meant to help teachers and parents had better understand students' thought processes and learning levels.

We owe this work to the dedication of the Development Committee and the many teachers who contributed their time and insights. NCERT deeply values their efforts. As an institution constantly striving for improvement, we invite readers to share their feedback so that future versions can be even more effective and relevant.

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Dr. Ruchi Verma

(Professor & Coordinator)



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	Learning Outcome	Infographic No.	
1.	Differentiates materials and organisms, such as, natural and human made fibres; contact and non-contact forces; liquids as electrical conductors and insulators; plant and animal cells; viviparous and oviparous animals, on the basis of their properties, structure and functions.	Sc0801	3
2.	Classifies materials and organisms based on properties/characteristics, e.g., metals and non-metals; kharif and rabi crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.	Sc0802	4
3.	Conducts simple investigations to seek answers to queries e.g., What are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth.	Sc0803	5
4.	Relates processes and phenomenon with causes, e.g., smog formation with the presence of pollutants in air; deterioration of monuments with acid rain, etc.	Sc0804	6
5.	Explains processes and phenomenon with causes, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.	Sc0805	7
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	purposes; increasing/ reducing friction; challenging myths and taboos regarding adolescence, etc.		
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A. Introduction

National Education Policy (NEP) 2020 lays particular emphasis on the development of the creative potential of each individual and believes that education must develop not only cognitive capacities, but also social, ethical, and emotional capacities and dispositions. Learning outcomes at elementary stage developed by NCERT is already in public domain. This is in consonance with most of the above mentioned characteristics. The document is expected to support and facilitate integrated and holistic learning approaches to achieve learning outcomes. Learners need to develop competencies in academic settings which they can use in real life contexts even after they leave the school. These competency based learning outcomes have been shared widely for their utilisation by the educationists, parents and students. Despite of wide sharing, it was observed that teachers, learners and parents were not really acquainted to take these learning outcomes in the teaching learning process.

Learning outcomes at upper primary stage includes competencies which the learners are expected to develop by the end of class VIII. With regard to NCERT's mandate also in consonance with the MHRD's communication, the learning outcomes related material including Infographics/posters/presentations, online teacher training courses for teachers of each grade, explaining their subject wise learning outcomes, in byte sized videos, extra resources based on LOs such as workbooks/worksheets/quizzes/etc. for each subject of each class and 10 items each to measure each learning outcome of each class in at-least two levels of proficiency are in the process of development at upper primary stage.

In this direction, the present report contains infographics, based on learning outcomes at upper primary stage which have been developed to meet the objective of the programme. In all 44 infographics have been designed one each for each Learning Outcome for classes VI, VII and VIII.

Specific Objectives:

- To develop Infographics/posters explaining each Learning Outcomes for each class that communicates to all stakeholders (student, teacher, parent, community) in a simple manner (classes VI, VII and VIII).

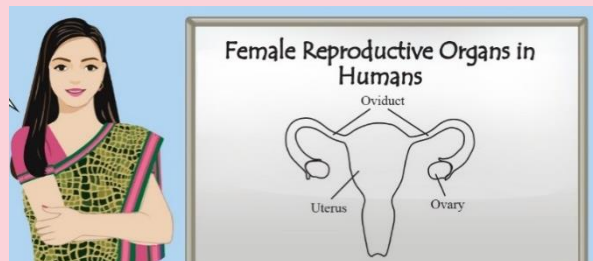
Methodology:

- Development of Infographics/posters explaining each Learning Outcomes in Science for classes VI, VII, VIII.
- Review of Infographics/posters/presentations explaining each Learning Outcomes in Science for classes VI, VII and VIII with the help of subject experts.
- Finalisation of Infographics/posters/presentations based on Learning Outcomes.

The developed Infographics/posters may be produced in large scale for their dissemination in schools or online mode. Further, the materials will be disseminated through e-pathshala and NROER. Also such materials can be used in MOOCs, DIKSHA, besides during various training programmes of NCERT.



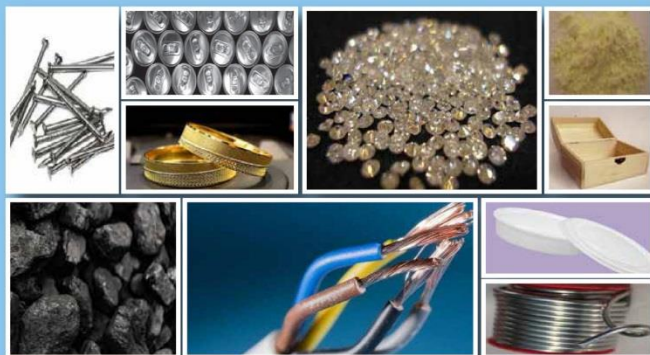
B. Infographics



<p>Biodegradable waste is converted to compost</p> <p>Wet Waste</p> <p>(Left over Food, Fruit and Veggie Peels, Horticulture Waste and Fallen Leaves)</p>	<p>Non-Biodegradable waste is sent to recycling plant</p> <p>Dry Waste</p> <p>(Cardboard, Aluminium Foil, Paper, Plastic Bottle, Polythene)</p>	<p>Hazardous waste is treated before sending to incineration plant</p> <p>Domestic Hazardous Waste</p> <p>(Expired Medicines, Cell, Paints, Cosmetics)</p>
Segregate Waste at Source		



Differentiates Materials and Organisms



There are so many objects made from various materials. Is the nature of all the material same?

You can differentiate materials on the basis of their properties. For example, Iron and Coal have different properties.

How are they different? Let us explore.

METALS	NON-METALS	METALS	NON-METALS
LUSTROUS (shiny surface)		DUCTILITY (ability to be drawn into wires)	
 Lustrous Iron Bar	 Coal Not Lustrous	 Ductile Iron wire	 Solid Coal Not Ductile
SONOROUS (produces ringing sounds)		HEAT CONDUCTIVITY (ability to conduct heat)	
 Sonorous Iron Bar hitting the floor	 Coal hitting the floor Not Sonorous	 Rise in temperature Good Conductor	 No rise in temperature Poor Conductor
MALLEABILITY (can be beaten into thin sheets)		ELECTRICAL CONDUCTIVITY (ability to conduct electricity)	
 Malleable Iron Bar Transforms into sheet	 Solid Coal Not Malleable Coal Powder	 Lights up Good Conductor	 Doesn't light up Poor Conductor

On the basis of these properties, I can differentiate between metals and non-metals.

Find out whether aluminium is a metal or non-metal?

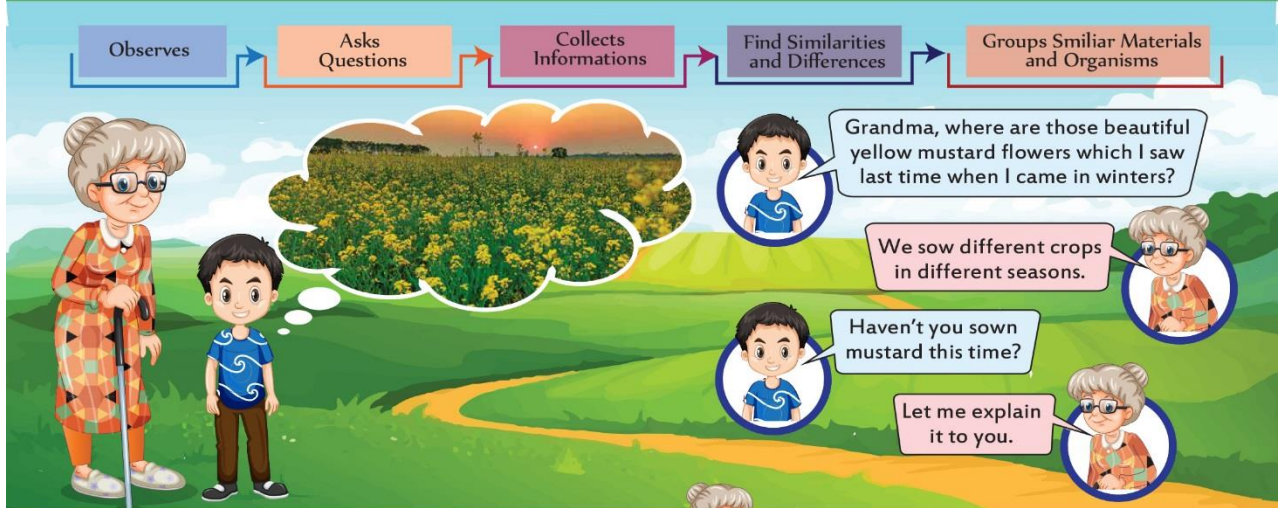
Other Learning Outcomes

The learner:

- classifies materials, organisms and processes based on properties/characteristics.
- applies learning of scientific concepts in day-to-day life.



Classifies materials, organisms and processes based on properties/characteristics



Kharif Crops	Rabi Crops
Sown in monsoon	Sown in winter
Harvested in September-October	Harvested in April to June

Major Harvest Festivals of India

Harvest Festivals	Region	Month	Crop
Baisakhi	Punjab	April	Wheat and Gram
Holi	North India	March	Wheat and Gram
Onam	Kerala	August-September	Paddy (Rice)
Pongal	Tamil Nadu	January	Paddy (Rice)
Bhogali Bihu	Assam	January	Paddy (Rice)
Poush Parbon	West Bengal	January	Paddy (Rice)

Now, can you make a chart showing examples of two types of crops?

Yes Grandma, I will make one.

Kharif Crops	Rabi Crops
Paddy	Wheat
Soyabean	Gram
Cotton	Mustard

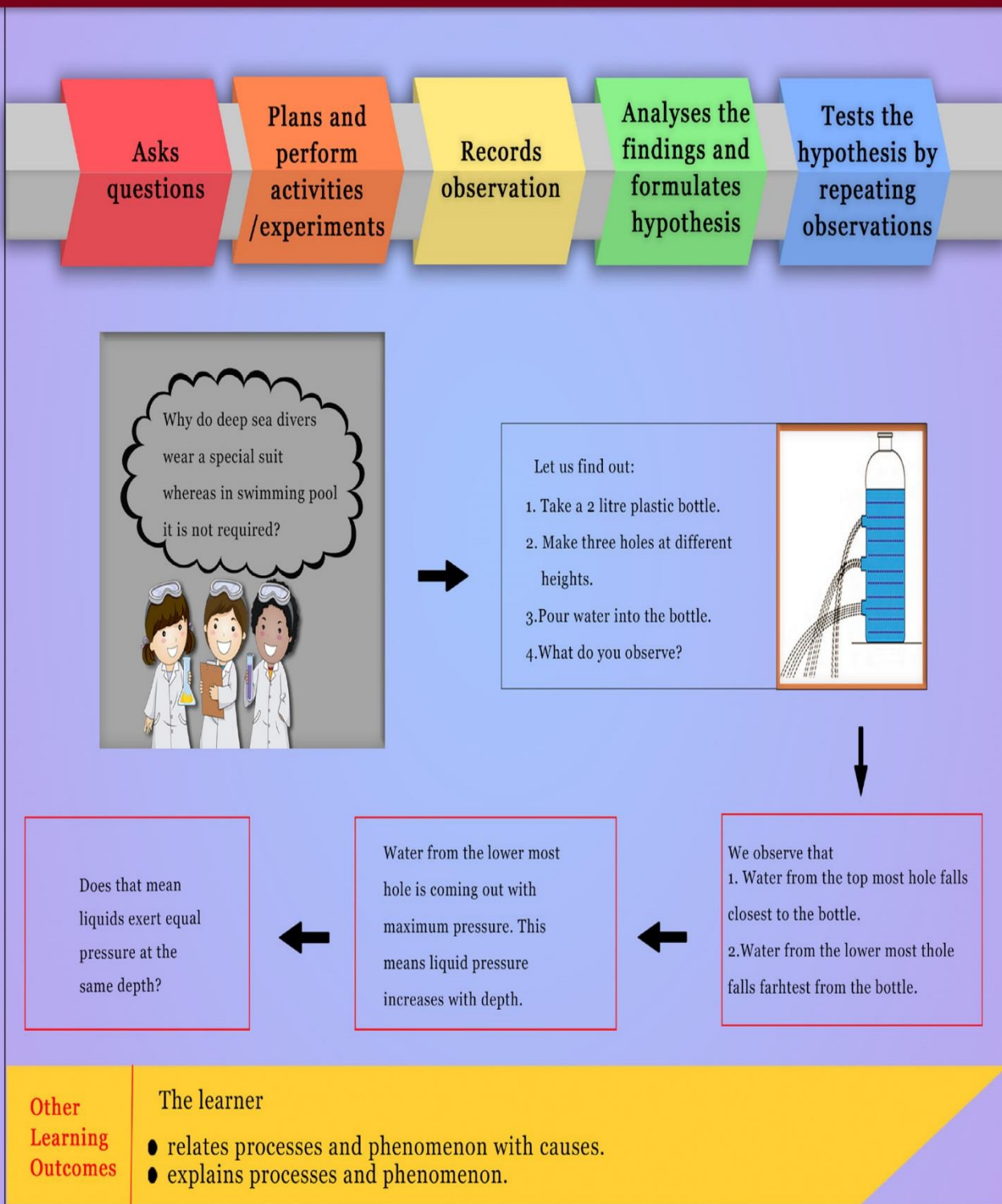
Are there only two types of crops?

Other Learning Outcomes

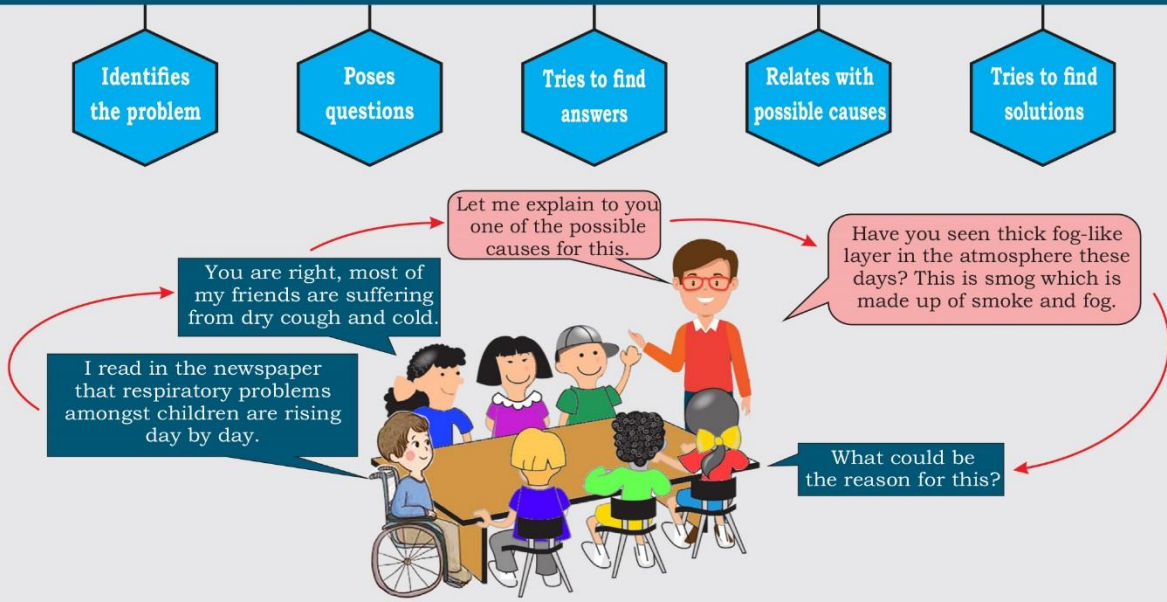
The learner:

- differentiates materials and organisms.
- applies learning of scientific concepts in day-to-day life.

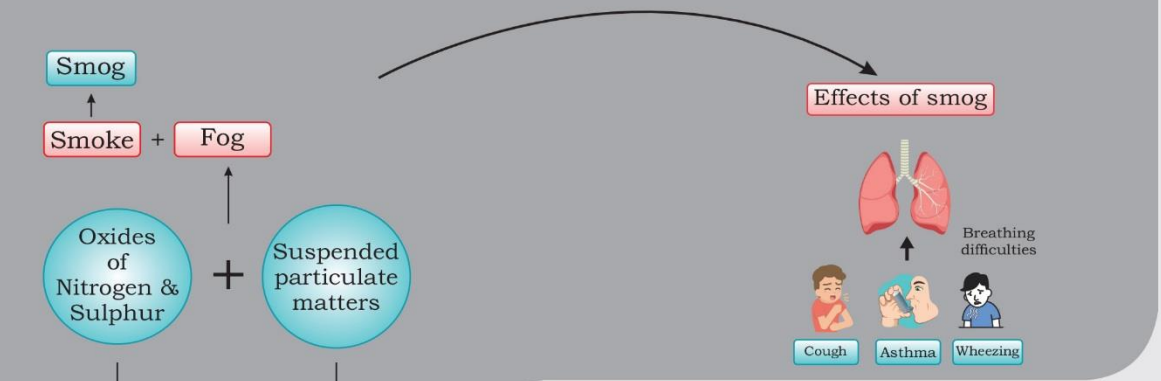
Conducts simple investigations to seek answers to queries



Relate processes and phenomenon with causes



Smog causes breathing difficulties



Task for you
Add more item to the table.

Air Pollutants	Sources	Effects

- What can we do?**
- Car pooling
 - Avoid burning leaves & trash
 - Using public transport
 - Planting trees

Other Learning Outcomes

- The Learner**
- explains processes and phenomena.
 - makes efforts to protect environment.

Explains processes and phenomenon

Observes

Investigates

Conducts Experiments

Records Observations

Concludes

Let us perform an activity. Rub plastic scale on your dry hair and bring it close to pieces of paper.

Oh! scale is attracting pieces of paper. This is so interesting.

When you rubbed comb with your dry hair, it acquired a small charge.

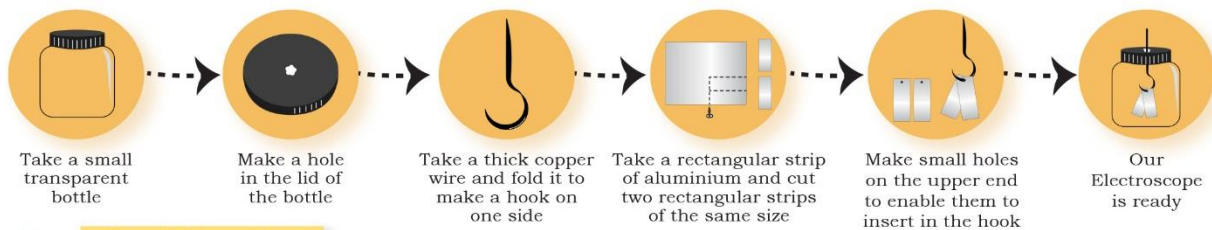
Purvi, my scale has not attracted any piece of paper. Does that mean it is not charged?

A device which can be used to test whether an object is carrying charge or not is called Electroscopes. We can make an electroscopes on our own.

How can we test the presence of charge?

Let us make an ELECTROSCOPE.

Making an Electroscopes



Now, let the rubbed scale touch the metallic wire.

Oh! The strips are repelling.

There is a transfer of charge from scale to aluminium strips. Can someone tell me why these aluminium foils are moving apart?

Because both the strips are similarly charged.

Well done, Now touch the metallic wire with your hand.

The foil strips come back to the normal position.

Well another task for you, Find out the reason for this.

Other Learning Outcomes

The learner:

- relates processes and phenomenon with causes.
- constructs models using materials from surroundings and explains their working.

Gathers material required for the reaction

Performs reactions

Gathers information about the reaction

Writes the word equation of the reaction

Yesterday I demonstrated an activity. Do all of you remember?

Yes ma'am, when zinc plate was dipped in copper sulphate solution, copper got displaced from the solution and appeared as deposition on zinc plate.

Yes, but how can we represent it in a shorter form?

Yes, so now write the word equation for the reaction on the black board.

By writing it in the form of a word equation.

Zinc + Copper sulphate → Zinc sulphate + Copper

STEPS TO WRITE A WORD EQUATION FOR A CHEMICAL REACTION

1. Identify reactant(s) and product(s) given in a chemical reaction

Given chemical reaction: zinc plate dipped in copper sulphate solution
REACTANTS: Zinc, Copper sulphate
PRODUCTS: Zinc sulphate, Copper

Let us practice some more examples.

Burning of Magnesium ribbon in air

Magnesium + Oxygen → Magnesium oxide

Reaction of Sodium metal with water

Sodium + Water → Sodium hydroxide + Hydrogen

2. Write the name(s) of reactant(s) on left hand side (LHS)

Zinc + Copper sulphate

3. Put symbol of an arrow pointing towards right hand side

Zinc + Copper sulphate →

4. Write the name(s) of product(s) on right hand side (RHS)

Zinc + Copper sulphate → Zinc sulphate + Copper

NOTE: If there are more than one reactant or product, use symbol of addition '+' between the names of reactant or products.

Other Learning Outcomes

The learner

- conducts simple investigations to seek answer to queries.
- relates processes and phenomenon with causes.

Selects appropriate measuring instrument

Uses measuring instrument correctly to measure a physical quantity

Records the measurement using appropriate unit

Draws conclusions

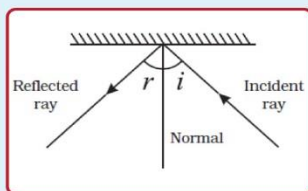
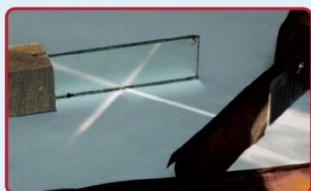


- A mirror can change the direction of a ray of light.
- After striking the mirror, the ray of light is reflected in another direction.
- In which direction the light falling on a mirror is reflected?



Let us try to measure...

- Let us take a white sheet of paper, plane mirror, comb and torch.
- Close all the openings of the comb except one in the middle.
- Place the mirror on white sheet of paper.
- Throw upon it the torch light through the comb opening. After adjusting the comb and torch, we see a ray of light along the paper which strikes the mirror. We also see the reflected ray of light.
- Draw lines showing positions of both these rays on the paper.

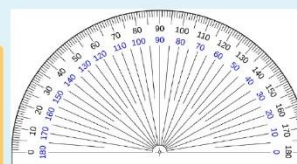


And also draw line perpendicular to the reflecting surface at the point where the incident ray strikes the mirror.

$\angle i$ = Angle of incidence

$\angle r$ = Angle of reflection

- Using a protractor, measure the angle of incidence and angle of reflection in degrees. Record the measurements in the table.
- Repeat the activity several times by changing the value of angle of incidence and angle of reflection record all measurements.



The angle of incidence is always equal to the angle of reflection. This is known as law of reflection.

S. No.	Angle of Incidence ($\angle i$)	Angle of Reflection ($\angle r$)
1.		
2.		
3.		
4.		
5.		

Other Learning Outcomes

The learner:

- draws labelled diagram/flow charts.
- explains processes and phenomenon.

Prepares slides of onion peel and describes their microscopic features



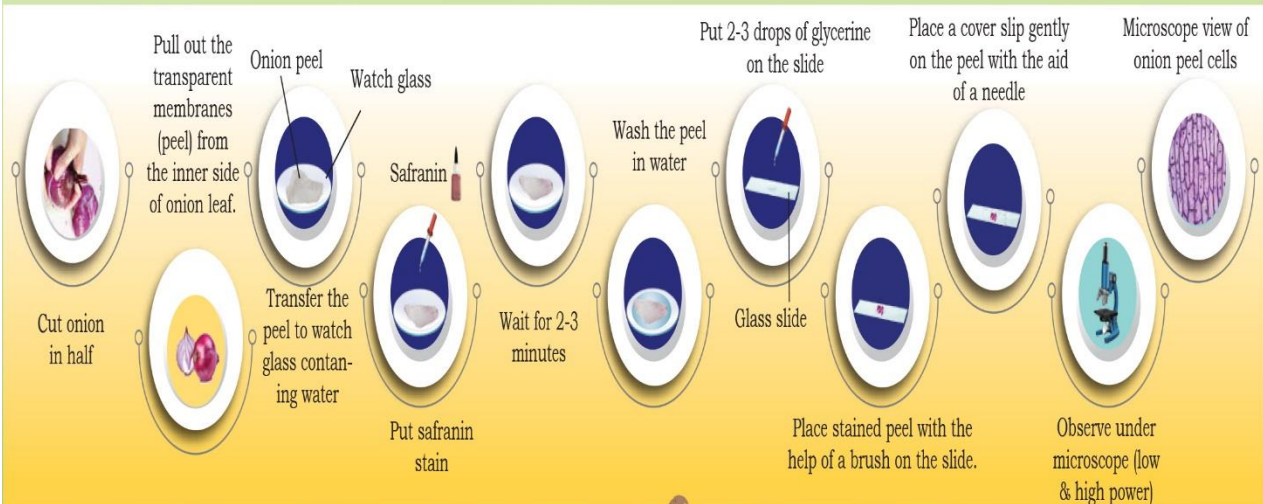
We have learnt that the smallest living part of an organism is a cell.

They are too small to be seen with naked eyes, we need a microscope to observe them. Let us prepare slide of onion peel to see how they look like.

Let us collect the material required.

Material Required

How does a cells look like?
Can we see them?



Cells observed in an onion peel →

Cytoplasm
Nucleus

Can we see animal cells too?

Yes, we can prepare a slide of human cheek cells as well and examine it under a microscope.

Other Learning Outcomes

The learner

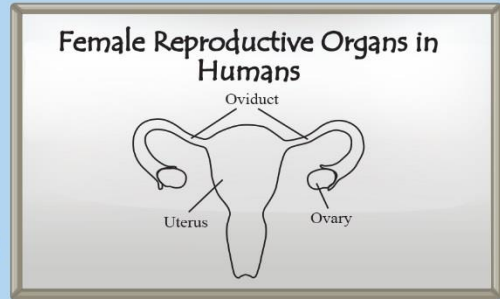
- draws labelled diagrams.

Draws Labelled Diagram/Flow Charts

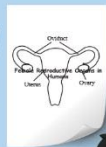


- Observes
- Understands
- Decides Proportions
- Arranges in Sequence
- Draws
- Labels
- Writes a Caption

Children,
Draw the diagram in your notebook.



Looks perfectly alright.



How can I draw this diagram?



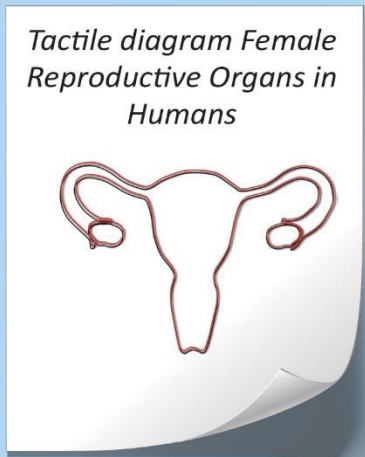
Vihaan

How have I drawn?

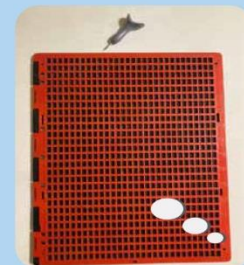
Let me make this diagram accessible for vihaan. I will use 3.0 outliner to make it tactile. It dries easily and can be felt by finger tips.



Vihaan! Now bring your Braille slate and stylus and prepare labels in Braille. We can cut them and use them to label your tactile diagram.



Braille Slate and Stylus



I am very happy. I know that, I can label the diagrams. Ma'am, can we make models?

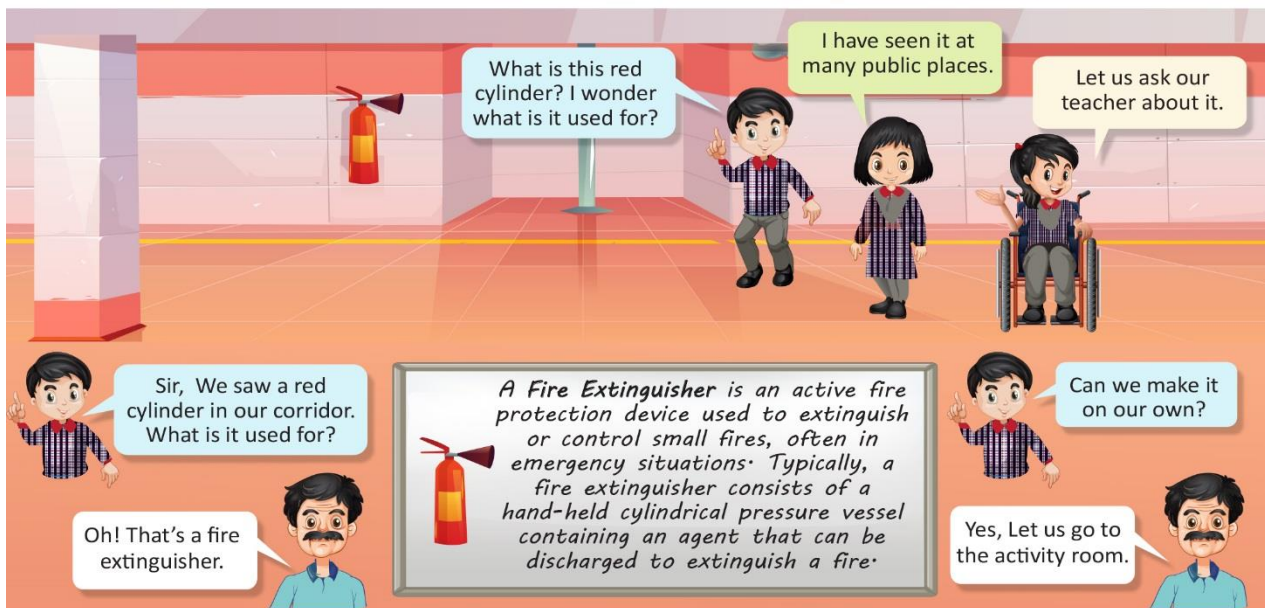
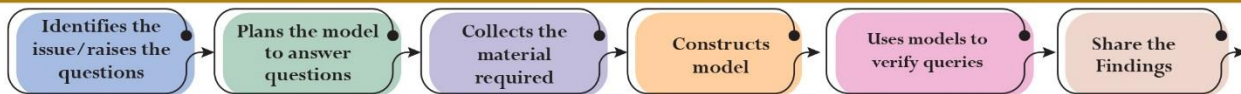


Other Learning Outcomes

The learner

- constructs models using material from surroundings and explain their working.
- exhibits creativity in designing, planning, making use of available resources, etc.

Constructs models using material from surroundings and explain their working



Material Required:

A plastic bottle, Vinegar, tissue paper, baking powder, thread, glue.

 Take a plastic bottle.	 Fill 1/4th of the bottle with vinegar.	 Wrap approximately four spoon baking powder in a tissue paper & fasten it on the bottle with the thread coming out of the lid.	 This is so interesting.
 Fix the thread using glue.	 The tissue paper should be hanging a little above the level of vinegar solution.	 Make a small hole in the bottle above the level of vinegar solution.	 I have seen fire man extinguishing fire with water. Why do we need a fire extinguisher then?
 Light some paper using a matchstick.	 Let the vinegar solution mix with the tissue paper & spray the gas produced through the hole on the fire.	 You will be happy to see that the fire gets extinguished.	 Water is not suitable for fires involving oil and petrol.
			 Why so?
			 Another task for you. I will give you a hint, Water is heavier than oil.

If a fire breaks out in your house or in your neighbourhood, the first thing to do is to call the fire service.

Other Learning Outcomes

The learner:

- explains processes and phenomenon.
- applies learning of scientific concepts in day-to-day life.

Applies Learning of Scientific Concepts in Day-to-Day Life

Explores Surrounding and Poses Questions

Gathers information and finds answers through discussion, survey

Takes action and applies learning of scientific concepts to day to day life

Spreads awareness through role plays, creating jingle, poem etc.



Have you ever seen cows eating garbage?

Can You Imagine the Consequences?

Plastic is not environment friendly.

Burning of plastic releases lots of poisonous fumes into the atmosphere causing air pollution.



The objects of plastic chokes my respiratory system or forms a lining in stomach and can even cause my death.



The poly bags carelessly thrown here and there are responsible for clogging the drains too!



Where does the garbage go after it is collected and what happens to it?

The biodegradable and non-biodegradable waste should be collected separately and disposed off separately.



As responsible citizens, what measures do you suggest to keep public places clean and free of plastic?

Be Fibre Wise



Minimize use of plastic materials eg-Use a steel lunch box.

Do not throw plastic bags in the water bodies or on the road.

Take a cotton carry bag or a jute bag while going for shopping.

Biodegradable waste is converted to compost



Wet Waste

(Left over Food, Fruit and Veggie Peels, Horticulture Waste and Fallen Leaves)

Non-Biodegradable waste is sent to recycling plant



Dry Waste

(Cardboard, Aluminium Foil, Paper, Plastic Bottle, Polythene)

Hazardous waste is treated before sending to incineration plant



Domestic Hazardous Waste

(Expired Medicines, Cell, Paints, Cosmetics)

Segregate Waste at Source

Remember the 5 Rs!

Reduce
Reuse
Recycle
Recover
Refuse

Let us think of some more Rs.

Other Learning Outcomes

The learner:

- makes efforts to protect environment.



Today, I learnt that we are made up of millions of cells. I wonder who was first to see a cell.

You may be surprised to know that cells were first observed in 1665.



The cell was first discovered and named by Robert Hooke.



He made his own microscope and observed a thin slice of dried cork under it.



Cells of dried cork observed by Robert Hooke

He observed honeycomb-like structures in the cork.

He named each unit of honeycomb like structure as a cell which means hollow room.



It is so inspiring! I will read more about it.



Later in 1674, a Dutch scientist Antonie van Leeuwenhoek developed an improved microscope. He observed the living cells of bacteria, other microorganism and red blood cells.

Other Learning outcomes

The learner:

- applies learning of scientific concepts in day-to-day life.

Makes efforts to protect environment

Gathers information about environmental problems

Collects information about possible solutions

Takes action to solve environmental problems



I read in the newspaper recently that the Gangotri glacier in the Himalayas has started melting faster because of global warming.

What is global warming?
Let us read more about it.



Causes of Global Warming



What is Global Warming ?

Carbon dioxide is one of the important components of air. Excess of CO_2 along with other greenhouse gases like methane, nitrous oxide and water vapour absorb sunlight and do not allow heat from the earth to escape into space. As a result, the average temperature of earth's atmosphere is gradually increasing. This is called global warming.

Effects of Global Warming

Melting of glaciers, Rising sea levels, Increased flooding, Forest fires, Disruption of wildlife habitats, Respiratory diseases



I wonder what can we do to save our planet from this threat?



Please do not burn dry leaves. They produce a lot of smoke.

You can put them in a compost pit rather than burning.

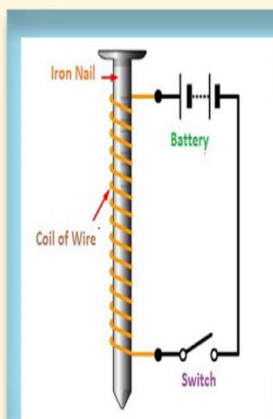
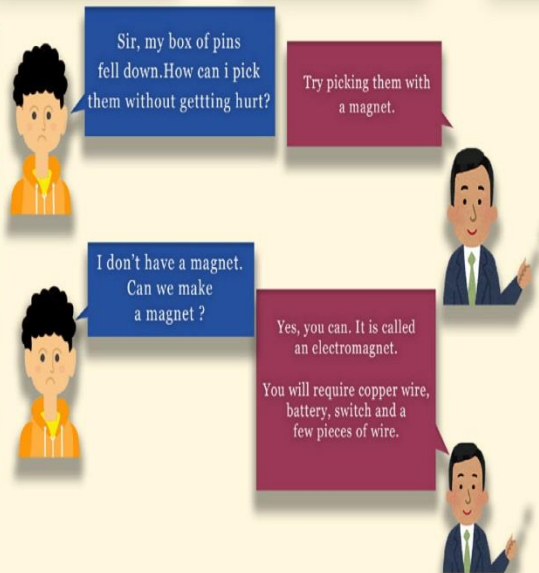


Other Learning Outcomes

The learner

- relates processes and phenomenon with causes.
- applies learning of scientific concepts in day-to-day life.

Exhibits creativity in designing, planning, making use of available resources



When current flows through a conducting wire, the wire behaves like a magnet. In this situation, the wire is called electromagnet. To strengthen the magnet properties, wire is given the shape of coil and a piece of iron is placed inside the coil.

Other Learning outcomes

The learner:

- constructs model using material from surroundings and explain their working.
- applies learning of scientific concepts in day-to-day life.

Exhibit values of honesty, objectivity, cooperation, freedom from fear and prejudices

Observes

Expresses doubts

Discusses & Interprets

Becomes aware

Imbibes values



Sir, why are people blaming my mother for giving birth to a girl child? Is it bad?

That's unjustified. Let me explain it to you.



Teacher, please explain us how are girls different from boys?



As we know, chromosomes are present inside the nucleus of every cell. Human beings have 23 pairs of chromosomes in the nuclei of their cells. A pair of chromosomes out of these are sex chromosomes, X and Y. A female has two X chromosomes, while a male has one X and one Y chromosome.



When a sperm containing X chromosome fertilises the egg, the zygote would have two X chromosomes and develop into a female child. If the sperm contributes a Y chromosome to the egg at fertilisation, the zygote would develop into a male child.



So, it is the work of chromosomes only. Thankyou sir, I will explain it to my parents also.



So, the sex chromosomes of both the parents determines the sex of an unborn baby.

Other Learning Outcomes

The learner

- explains processes and phenomenon.
- applies learning of scientific concepts in day-to-day life.

References:

1. National Education Policy 2020, Ministry of Human Resource Development, Govt. of India
2. National Curriculum Framework for School Education 2023, Ministry of Education, Govt. of India
<https://www.education.gov.in/national-curriculum-framework-school-education-2023>
3. National Curriculum Framework for School Education 2023, NCERT, October 2024, ISBN 978-93-5292-741-8
4. National Curriculum Framework 2005, NCERT, December 2005, ISBN 81-7450-467-2
5. Syllabus for classes at the Elementary Level, Volume 1, NCERT, June 2006, ISBN 81-7450-593-8
6. Science Textbook for class VIII, NCERT, First Edition January 2008, ISBN 978-81-7450-812-6
7. Learning Outcome at the Elementary Stage, April 2017, ISBN 978-93-5007-785-6, pp 86-94
<https://ncert.nic.in/pdf/publication/otherpublications/tilops101.pdf>

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