Infographics based on Learning Outcomes in Science at Elementary Stage

Class VI
(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.

Department of Education in Science and Mathematics

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ACKNOWLEDGEMENTS

This regards to acknowledge all the respected people who helped throughout the completion of the task making the endeavor a success.

I express my kind gratitude to Professor Sunita Farkya, Head of the department for her constant considerate guidance, valuable suggestions and support.

I am thankful to all the Team members for their continuous support.

I pay my sincere gratitude to resource persons Dr. sarita Kumar, Associate Professor, Acharya Narendra Dev College University of Delhi; Dr. Preeti Khanna, Resource Person, National Association for the Blinds, New Delhi; Dr Ravijot Sandhu, PGT (Chemistry), Peshwa road, Navyug school, New Delhi; Ms. Charu Maini, Vice-Principal, DAV Public School, Uppal's Southend, Gurugram; Ms. Ritika Ananad, Vice-Principal, St. Marks Senior Secondary Public School, Meera Bagh, New Delhi; Ms Meenambika Menon, Head, Senior School, Shivnadir School, Noida for their valuable contribution in the development and finalisation of infographics.

I would also like to thank Ms. Riya Bhatia, JPF and APC office for their help and Co-operation.

Dr. Ruchi Verma

(Professor & Coordinator)

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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 classeses VI, VII and VIII.

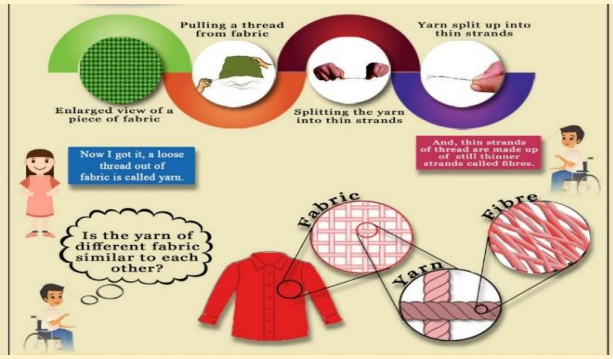
Specific Objectives:

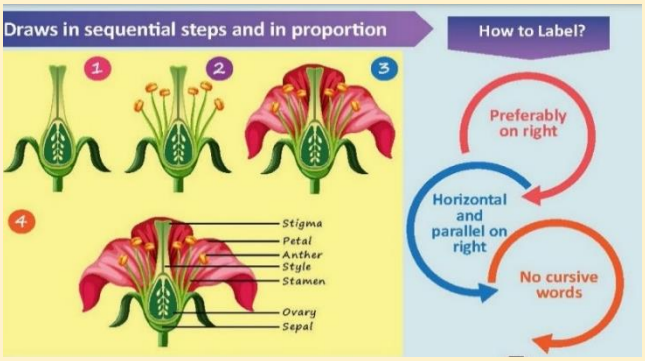
- To develop Infographics/posters explaining each Learning Outcomes for each class that communicates to all stakeholders (student, teacher, parent, community) in a simple manner (classes VI,VII and VIII).

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

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Learning Outcomes at the Elementary stage: Science (Class VI)

Identifies materials and organisms on the basis of observable features

Sc0601

Explores surroundings | Shares findings | Poses questions and finds answers | Analyses Data | Draws inferences/Makes generalisations

Mohit and Jyoti went on vacation to many places of interest

One road trip took them to river Ganga in RISHIKESH.

They observed many kinds of trees on Himalayas-oaks, pines and deodar.

Fun with Parents

They clicked pictures and later drew them as they were different from the trees near their homes in plains.

One road trip took them to RAJASTHAN

They collected different kinds of cactus plants from this trip.

They moved on camels through hot desert.

Another trip took them to LEH LADAKH

Mohit wondered whether these were cows with more hair! The locals informed that Yak had long hair to keep them warm.

Jyoti was excited to see white coloured yak too. She started thinking and reading about different features of different animals.

Fun in Classroom

Mohit and Jyoti were excited to share their observation and experience with their teacher and friends. They had created their science album with different animals having different features.

Trees in mountain had conical shape with sloping branches. Some of the trees had needle like leaves. Sir, my father told me it helps the snow to slide off easily.

Camels were so tall and had a hump. Their feet were padded. Sir, why did they have a hump?

Camels store fat in their hump.

We observed that Yak had thick fur to protect them from cold. Do all the animals in mountain region have thick fur?

Sir, why do animals have different features?

The presence of specific features and habits, enables a plant or an animal to live in a particular habitat. These are called adaptations.

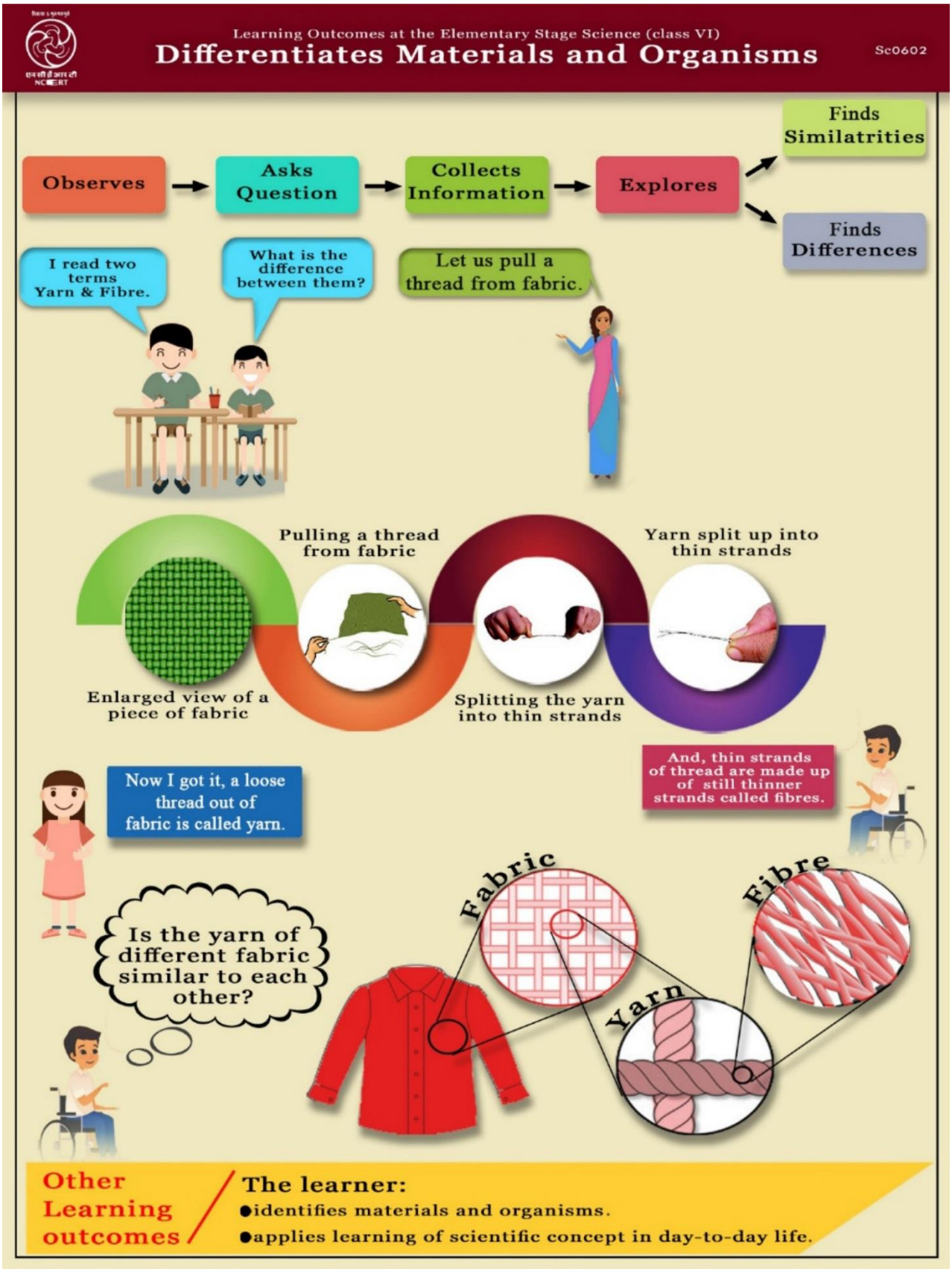
Let's play SCIENCE GAME Tittled- "East or West, Home is the Best"
UUNCH-NEECH

Students refer to page 53 of Handbook on Understanding Science through Activities, Games and Toys for detailed rules of the game.

https://ncert.nic.in/pdf/publication/otherpublications/HUSTAG.pdf

Other Learning Outcomes

The learner
- exhibits creativity in designing, planning, making use of available resources, etc.

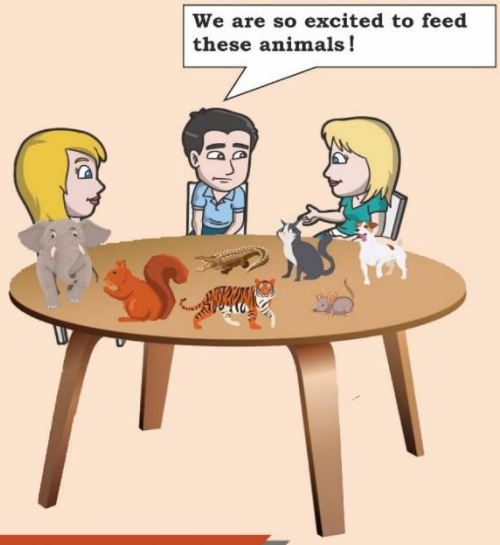

Learning Outcomes at the Elementary Stage Science (class VI)
Differentiates Materials and Organisms
Sc0602
Observes
Asks Question
Collects Information
Explores
Finds Similatrities
Finds Differences
I read two terms Yarn & Fibre.
What is the difference between them?
Let us pull a thread from fabric.
Pulling a thread from fabric
Yarn split up into thin strands
Enlarged view of a piece of fabric
Splitting the yarn into thin strands
Now I got it, a loose thread out of fabric is called yarn.
And, thin strands of thread are made up of still thinner strands called fibres.
Is the yarn of different fabric similar to each other?
Fabric
Fibre
Yarn
Other Learning outcomes
The learner:
identifies materials and organisms.
applies learning of scientific concept in day-to-day life.

Learning Outcome at the Elementary Stage: Science (Class VI)

Classifies materials, organisms and processes based on observable properties

Sc0603

Observes | Asks Questions | Collects information | Finds similarities and differences | Groups similar materials & organisms



Animals classified on the basis of their eating habits

Herbivorous Animals	Carnivorous Animals	Omnivorous Animals

Other Learning Outcomes

The Learner

- identifies materials and organisms.
- differentiates materials and organisms.

Learning Outcomes at the Elementary Stage Science (class VI)

Conducts simple investigations to seek answers to queries

Sc0604

1. Asks Questions
2. Plans and Performs Activities/ Experiments/ Surveys/Field Trips/ Records Observations
3. Takes repeated observations to reproduce results
4. Analyses the observations & findings
5. Communicates and discusses the conclusions with peers

In ancient times, people travelled to far-off places using sea route. to find direction, they used compass needle which always points towards the north direction.

Isn't compass needle a small magnet? Does it mean that a magnet always aligns in a particular direction?

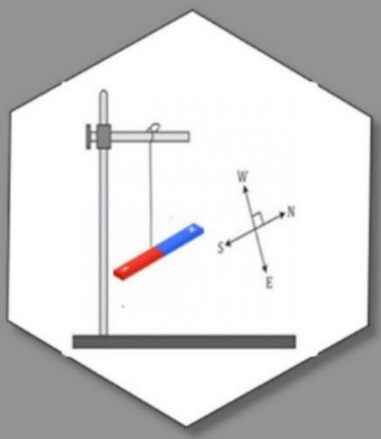
Let us Investigate...

Let's take a bar magnet.
Let's tie a thread from the middle and suspend the magnet from a wooden stand. Wait for it to come to rest.

Now mark two points on the ground to show the position of the ends the magnet and draw a line joining these two points.

Now rotate the magnet gently in one direction and wait for it to come at rest. Let's observe if it is along the drawn line.

Again rotate the magnet in another direction and let it come to rest. Does it again rest along the line?



Oh! The magnet always comes to rest in the same direction.

A freely suspended magnet always aligns in N-S direction. The end of the magnet that points towards geographic North is called North Pole of the magnet. The other end that points towards the geographic South is called the South Pole of the magnet.

If we put a magnet on a table, will it align in same N - S direction?

Another query ..to find answer for!!

Other Learning outcomes

The learner:

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

Learning Outcomes at the Elementary stage: Science (VI)

RELATES PROCESSES & PHENOMENON WITH CAUSES

Identifies the problem | Poses questions | Tries to find answers | Relates with possible causes | Tries to find solutins

How can I keep my eyes healthy?

One of the ways is to improve your diet.

But why these food items?

Because they are rich in Vitamin A.

How does deficiency of vitamin A affect our eyes?

Poor vision, night blindness, sometimes complete loss of vision.

I want to be an athelete. What should i eat to keep my bones stronger?

Diet makes our bones stronger.

But why these food items?

Because they are rich source of vitamin D.

How does deficiency of vitamin D affect our body?

Vitamin D helps in absorpation of calcium in our body. Calcium makes our bones stronger.

Our body also prepares vitamin D in presence of the sunlight.

Deficiency of vitamin C causes scurvy.

Let us find out food items rich in vitamin C.

Other learning outcomes	The learner • explains processes and phenomenon with causes. • applies learning of scientific concepts in day to day life.

Learning Outcomes at the Elementary stage: Science (Class VI)

Sc0606

Explains Processes and Phenomenon

Observes | Investigates | Records Observations | Concludes

Curious about shadows? Let us explore !

While going to school, Rani notices her shadow. It is long and in the opposite direction to the sun.

In school, her teacher explains that only opaque objects form shadow but perfectly transparent objects do not form shadow.

A story telling session at school made Rani realize that shadows can be interesting and can be formed by using our fingures.

Size and direction of shadow changes with the direction of the source of light.

In the PT period when the sun is overhead she observes that her shadow is very small.

While going back home she notices that the direction of her shadow has changed. The direction of the sun has also changed

In the dark, Rani can not see her shadow.

Only opaque objects form a shadow because they obstruct the path of light.

Rani performs an activity with her friends and concludes.

Shadow is always formed on a screen (e.g. ground, wall etc.)

Other Learning Outcomes

The learner
- conducts simple investigations to seek answers to queries.
- applies learning of scientific concepts in day-to-day life.

Learning Outcomes at the Elementary Stage: Science (class VI)

Measures Physical Quantities And Expresses in SI units

Sc0607

Measurement is the process of comparing a physical quantity with its standard.

World-wide accepted set of standard units of measurements is known as *the international system of units (SI units).*

- **Identifies the physical quantity to be measured**
- **Chooses the measuring instrument**
- **Measures and records observation**

- The SI unit of length is is a **metre.**
- 1 metre (m) =100 centimetre (cm)
- 1 centimetre =10 milimetre (mm)
- 1 kilometre (km) =1000 metre (m)

The distance between the two consecutive long marks is 1 cm.

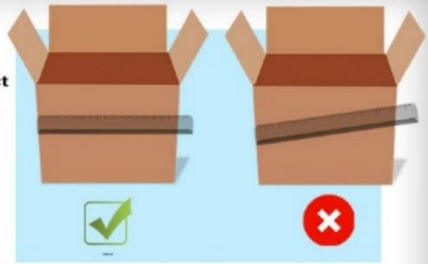
These small divisions show 1mm. 1 mm is the least distance that this scale can measure.

Let us measure the width of a box

While measuring, keep one end of the scale at the edge of the side to be measured and note the position of the other edge.

1 »

Place the scale in contact with the box along its width as shown in the figure:



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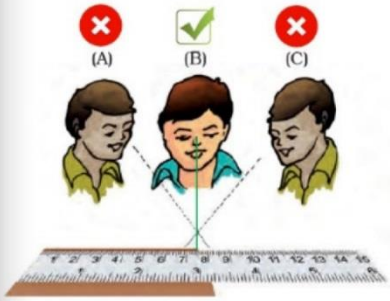

Position your eyes right above the mark to be read for coreect measurement as shown in the figure: Position A and C are incorrect.

3 »

The difference between two readings is the width of the object.
For example :
the width of the box in figure is 15.5cm
15.5 cm =15.5/100 m = 0.155m

TASK

Measure the length of any five objects around you and convert the measurement into SI unit.

Other Learning outcomes

The learner:

- conducts simple investigations to seek answer to queries.

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Learning Outcomes at the Elementary stage: Science (Class VI)

Sc0608

Draws Labelled Diagrams/Flowcharts of Organisms and Processes

Oh! I have to draw diagram of a flower. How should I start?

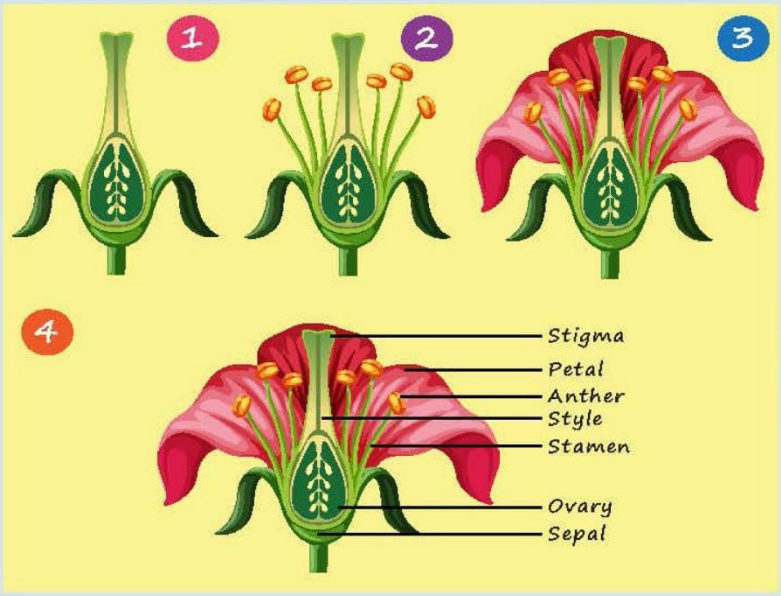
Just take care of the following and draw stepwise!

Drawing Material
- Sharp pencil
- Drawing Sheet

Object to be Drawn
- Observes
- Understands
- Visualizes

- Leave enough space for labelling and title

Draws in sequential steps and in proportion



How to Label?

- Preferably on right
- Horizontal and parallel on right
- No cursive words

Now, Give an appropriate title.

Other Learning Outcomes

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

Learning Outcomes at the Elementary stage: Science (Class VI)

Sc0609

Constructs Models Using Materials from Surroundings and Explains their Working

Identifies the issue/raises questions | **Answers the questions** | **Uses model to verify queries**

My younger brother wants to enjoy beauty of nature, can science help me or do I have to fetch the ladder?

Yesterday, I read about periscope in my science textbook. I think it can help your brother to look beyound the wall.

Oh wow! Please help in constructing the Periscope.

1. Let us start by taking two plane mirrors.

2. Take a rectangular empty box.

3. Make a window which is of the length of the mirror.

4. Make another window at the other end.

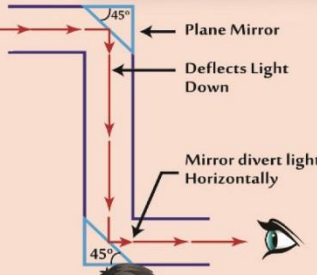
5. Fix a plane mirror at 45° in front of one of the windows in the cardboard box.

6. Paste mirror at 45° angle at other end of the rectangular box.

7. Box ready after fixing both plane mirror.

8. Periscope is ready for use.

Plane Mirror:
These are flat mirrors that reflect images in their normal proportions, reversed from left to right.



Its an interesting device. We should read more about persicope.

Periscope

Wow! beautiful birds, rising Sun, Tree. Now, I can see things outside the window.

A periscope is a device used for viewing objects on the other side of an obstacle.

You are right, let us go to library to learn more about periscope.

Other Learning Outcomes

The learner
- relates processes and phenomenon with causes.
- exhibits creativity in designing, planning, making use of available resources etc.

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Learning Outcomes at the Elementary stage: Science (Class VI)

Applies learning of scientific concepts to day-to-day life

Sc0610

Explores surrounding and poses questions.

Gathers information and find answers through discussion, survey.

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

Spreads awareness through roleplay, creating jingles, poems etc

Noor

We generate so much of garbage in our day-to-day activities!

Venkat

I throw all my garbage into one bin.

Ananya

That's not the proper way of disposal. We must segregate the garbage at source.

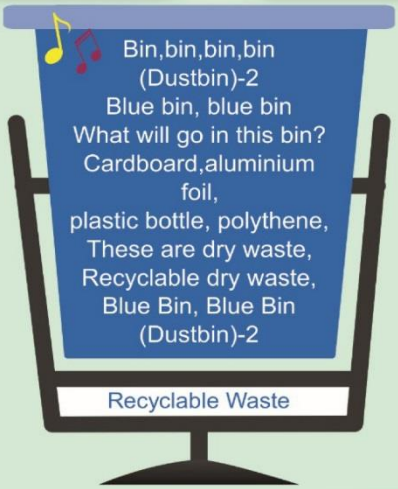
I am curious to know how to segregate garbage?

Jyoti

If you want to know about segregation of waste, listen to this jingle.
Come on, sing along…
Bin,bin,bin,bin
(Dustbin)-2
Green bin, Blue bin
and now we have Black bin.

Let's segregate GARBAGE at home

THINK AND THROW



What can we do to minimize overuse of plastics and deal with garbage?

Create poems, stories, comic strips, hold debates, discussions.

We should reduce the accumulation of garbage in our house and streets and always remember the 4 R's

Dealing with Garbage

REUSE
REDUCE
RECYCLE
REFUSE

Can you think of some more R's…

Spread awareness to segregate garbage at source to your friends and relatives.

Is garbage disposal responsibility only of government ?

Other Learning Outcomes

The learner
- makes efforts to protect environment.

Learning Outcomes at the Elementary Stage: Science (class VI)

Makes Efforts to Protect Environment

Sc0611

Gathers information about environmental problems

Collects information about possible solutions

Takes action to solve environmental problems

How can we solve?

Rethink

Reduce

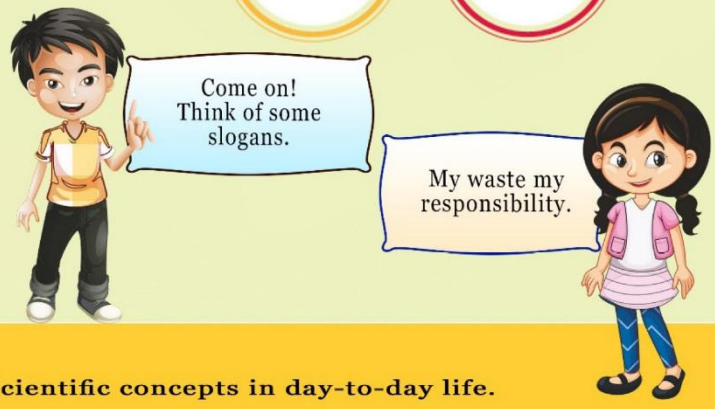
Refuse

Reuse

Repurpose

Sort garbage by making three bins at home/ school

What can I do?



Other Learning outcomes

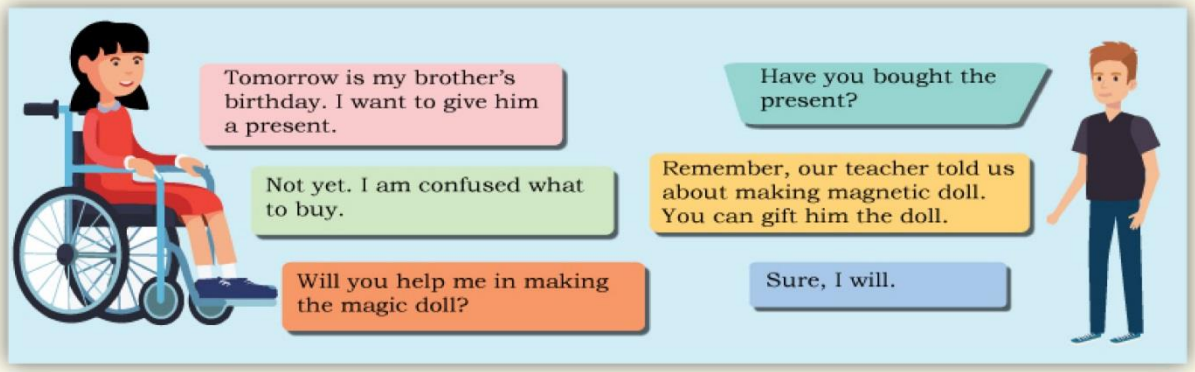
The learner:

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

Learning Outcomes at the Elementary Stage: Science (Class VI)

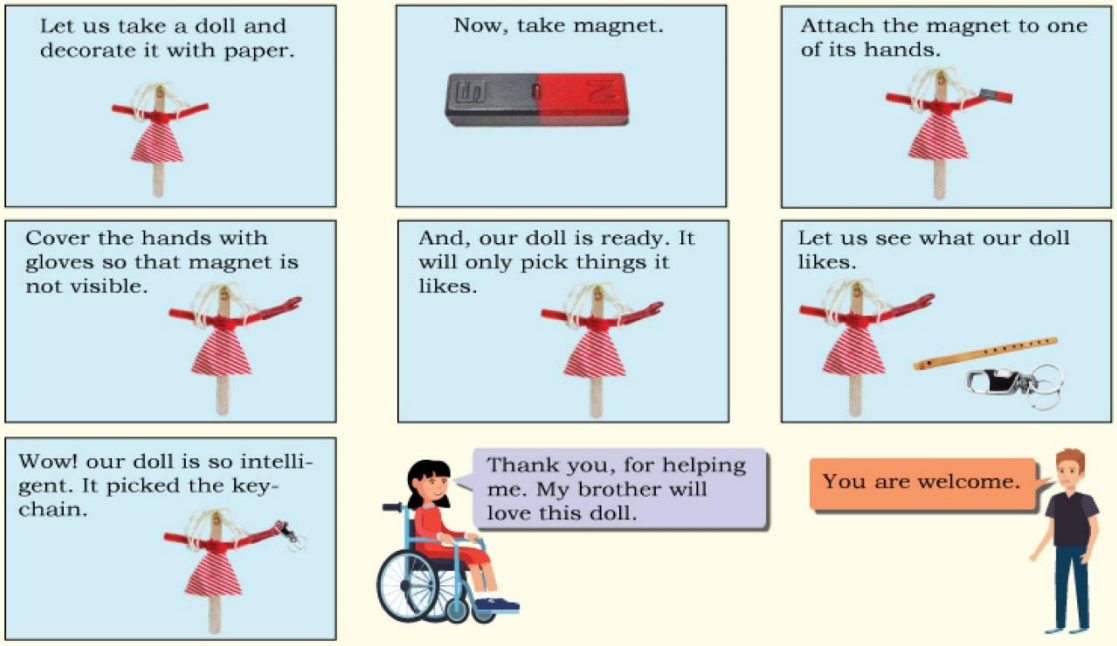
Sc0612

Exhibits creativity in designing, planing, making use of available resources.



Materials Required

Doll, Strip of magnet, Key-chain, Flute, Gloves, Plastic Box



Other Learning Outcomes

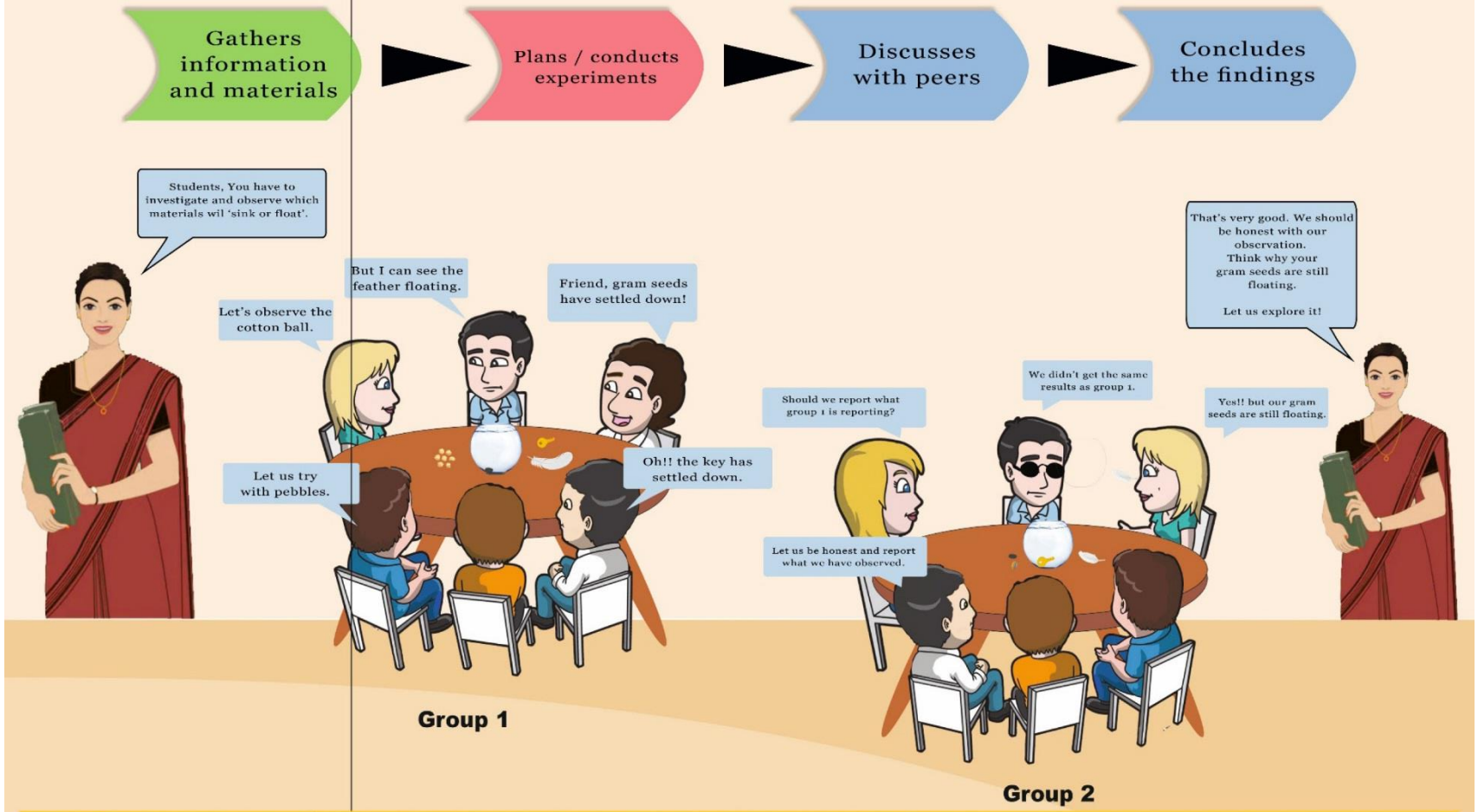
The learner

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

Learning Outcomes at the Elementary Stage: Science (class VI)

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

Sc0613



Other Learning outcomes

The learner:

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

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