Design Thinking and Innovation

for Grade 8

Task-book

2022

Task-book

CBSE, New Delhi

Design Thinking and Innovation Curriculum for Grade 8

Contents:

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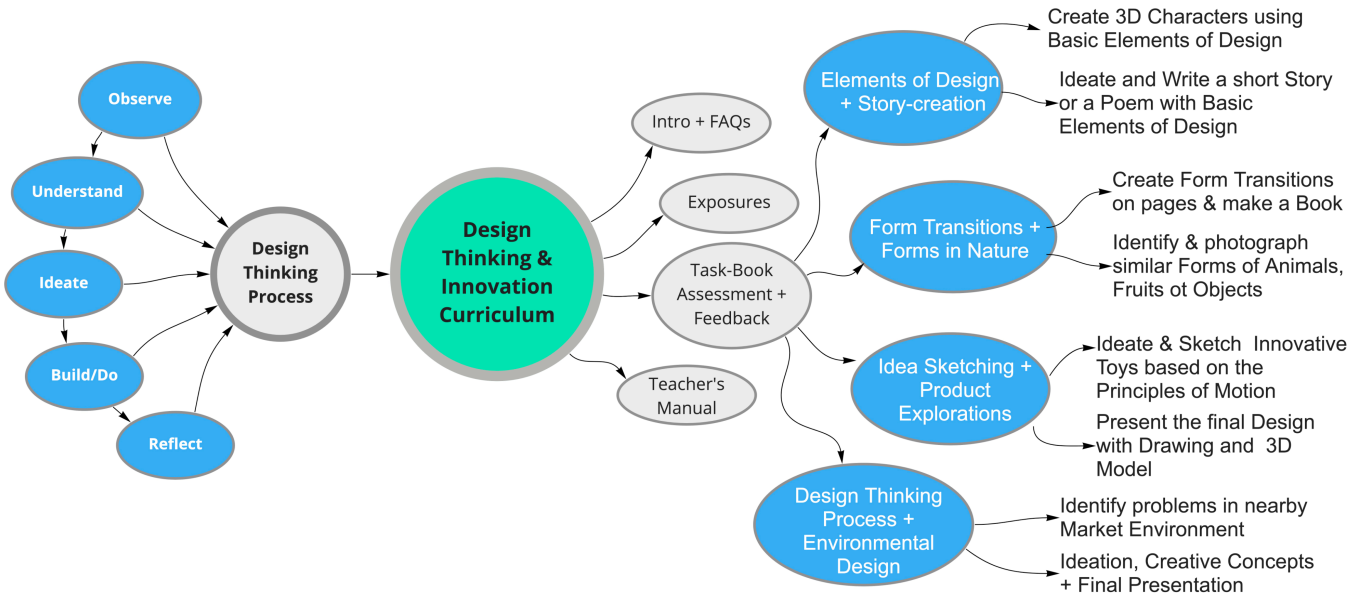


Design Thinking and Innovation Task-book for Grade 8

Introduction:

0.1
What is Design?

"Design is solution to a problem"
-John Maeda, Designer and Teacher

"Essentials of design are- purity, precision, details "
-Prof Sudhakar Nadkarni, Designer and Teacher

"Design is thinking made visual"
-Saul Bass, Graphic Designer

"Design is plan for arranging elements in such a way

-Charles Eames, Designer and Film Maker

"Design is not just what it looks like and feels like.
Design is how it works."
-Steve Jobs, Designer and Businessman

In a nutshell, design is about understanding needs and being sensitive to issues, identifying problems that need to be solved, creating innovative appropriate solutions, considering aspects of sustainability such that it makes a positive difference to life in our universe.

0.2
Who is a Designer?

A designer is a highly creative person who enjoys solving problems. The reason why they enjoy being creative is that they are sensitive to the needs of people and understand the extent of the issues in society. This sensitivity allows a designer to be intuitive and to think of opportunities that enhance the lives of people. It makes them appreciate the intricate aspects of a problem or a situation to help better it through creative designs. (Ref: 2)
Design being an important part of the creative industry has many options for you to pursue, such as Communication/Graphic Design, Product Design, Animation Design, Automobile Design, Architecture Design, Environmental Design, Digital Design, Textile/Fashion Design, and such.
So, if you are looking for something that will give the creative streak in you an outlet and also provide you with innovative problem-solving skills, design may be the option for you.

0.3
What is Design Thinking?

One can understand Design Thinking as a method to solve problems using a process. It is one of the most effective ways to create something new.
A process that first understands users, identifies and analyses a problem or need, and researches relevant information, after which ideas are explored and analyzed, until an appropriate innovative solution to the problem or need is arrived at.

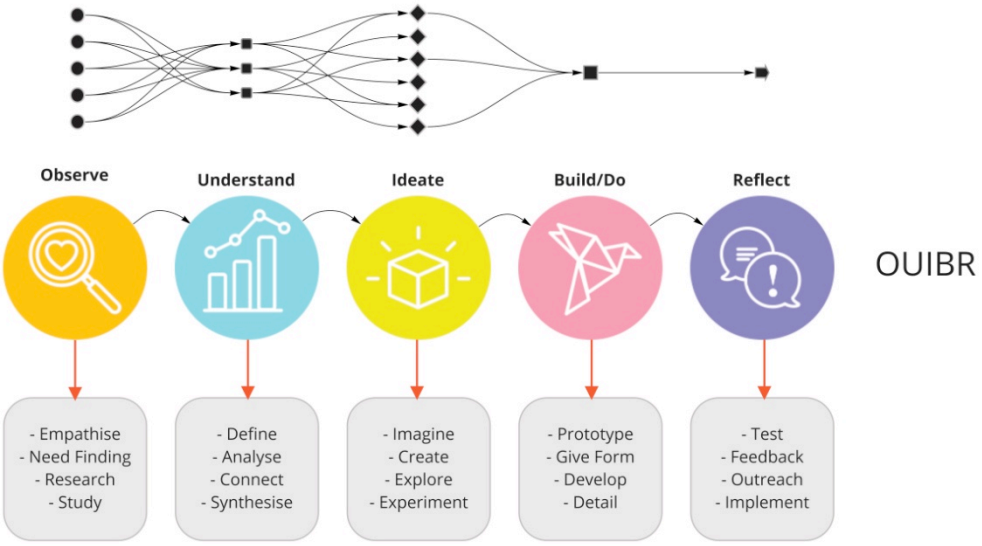
Hence Design Thinking could be viewed as the process that translates an idea into a blueprint for something useful, whether it's a vehicle, a building, a graphic, a service or a system. (Ref: 2)

0.4
Who is a Design Thinker?

A Design Thinker is a person who applies the Design Thinking process to solve problems and find creative innovative solutions in any field or domain. For example, you could apply Design Thinking to solve problems in arts, social sciences, law, medicine, engineering, business, etc. It could even be applied to solve problems at home or in your neighbourhood or in your place of work. Whether it is a simple problem or a complex problem, a design thinker finds creative ways to tackle them.
If everyone could adopt this method to solve problems then we would be moving towards a creative society that finds solutions to many of its problems.

0.5
What is the Design Thinking Process?

It involves the following five phases in the process of solving a problem:
Phase 1. Observe/Empathise/Research,
- The first phase helps you to identify needs and locate issues to be solved through observation and empathy
Phase 2. Understand/Analyse/Define,
- The second phase of the process helps you to understand, define and analyse the problem area
Phase 3. Ideate/Alternate/Create,
- The third phase helps you to come up with several alternate creative innovative solutions to the problem
Phase 4. Build/Prototype/Detail and
- The fourth phase helps you to actualize the solution by building mock-ups, creating scenarios, and then prototyping and detailing
Phase 5. Reflect/Feedback/Implement
- The last fifth phase is to get feedback through evaluation so that the suggestions can be implemented in the final solution



0.6

What is Innovation?

Innovation involves the implementation of something new and replacing or reframing the existing mindset. It is about translating a concept, idea, thought, or invention into artefacts and services that create value in life. It is the process of transforming ideas into commercial reality. Innovation plays a major role in society. It helps us cater to the needs of people that arise from constant physical and emotional changes. It helps identify the crucial applications of technology and scientific inventions.

As compared to Innovation, Invention happens once in a while. However, each Invention may produce millions of Innovative Products – like the invention of the Wheel has produced and continues to produce Innovative Products for the benefit of mankind. Innovation is in how an invention can be used to solve problems. Hence, Design pursues Creativity of Innovation.

1.9

What is the overall vision and aims of the Design Thinking and Innovation Curriculum?

The overall vision of the DT&I curriculum is to be able to instill the following in the students:

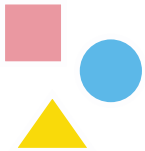
• Explore student's **sensory** abilities, **cognitive** abilities and **social** abilities

• Create awareness in the students through **observation**, **discovery**, **analysis**, **experience**, **collaboration** and **reflection**

• Nurture their **curiosity** and enhance their **explorative** abilities

• Foster **creativity** and **innovation** in students

• Identify **problems** and be able to find **solutions** + Apply **Design Thinking** process and methods to **solve** various **problems**



• Learn the fundamentals/essentials of the **creative design discipline**

In addition, DT&I will promote socially responsible practice through enlightening the students with ways to solve problems within the Sustainable Development Goals as mentioned by the United Nations. The course also helps students derive culturally-rooted understanding of design from information documented under the Indian Knowledge Systems.

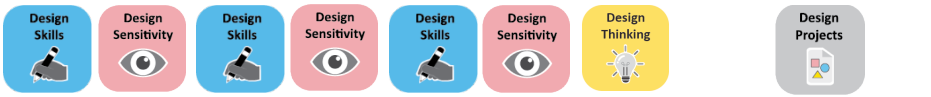
References:

Reference 1: https://dsource.in/resource/quotes
Reference 2: http://designindia.net/institutions/design-information/design-questions

Design Thinking and Innovation Task-book for Grade 8

Overview:

0.7
Modules for grade 6 / 7 / 8



Elements of Design + Story-creation	Exploring Form Transitions + Discover Forms in Environment	Sketching for Ideation + Creative Exploration of Product Concepts	Design Thinking Process	Environment Design Project

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0.8
Overall Vision for grade 6 / 7 / 8

- Explore Sensories
- Create Awareness and a sense of Discovery
- Nurture Curiosity and Creative Explorations
- Experience of Problem-solving and Reflection upon what they did

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0.9
Overall Learning Objectives

- Introduction to Elements of Design and Story-creation
- Observe and Discover Forms in Environment and Explore Form Transitions
- Fundamentals of Sketching and Product Concepts Explorations
- Fundamentals of Design Thinking Process

0.10
Additional Competencies

- Enhance Observation Skills
- Improve Sensitivity to Design
- Improve Communication and Presentation skills

0.11
Matching SDG Goals

Design Thinking and Innovation Task-book for Grade 8

Overview continued:

0.12
Grading

Grade Awarded	Grade	Points
Outstanding	O!	10 (or Extra Points)
Above Excellent	A1	10
Excellent	A2	9
Above Proficient	B1	8
Proficient	B2	7
Above Promising	C1	6
Promising	C2	5
Above Developing	D1	4
Developing	D2	3
Above Beginning	E1	2
Beginning	E2	1

0.13
Assessment

• Define the criteria for assessment for the Modules
(mentioning the factors for grading/assessment preferably on a Matrix)

Beginning FF-EF-EE 0.0-0.1-0.2	Developing DE-DD 0.3-0.4	Promising CD-CC 0.5-0.6	Proficient BC-BB 0.7-0.8	Excellent AB-AA 0.9-1.0
Criteria 1	Criteria 1	Criteria 1	Criteria 1	Criteria 1
. . . .	Criteria 2	Criteria 2	Criteria 2	Criteria 2
. . . .	. . . .	Criteria 3	Criteria 3	Criteria 3
. . . .	. . . .	. . . .	. . . .	. . . .
			. . . .	. . . .

Grade for the Task = Grade/Points (Marks)
Credits for the Module = Sum of Grades for all the Tasks / Total credits for the Module

0.14
Validation/Feedback

• The task done needs to be validated with feedback from both students as well as teachers (so that this can become an input for making changes for the next year)

0.15
References

• References are mentioned at the end of each task
• As much as possible, these should be made accessible to both students and teachers

0.16
Exhibition/Presentation

• As most of the design tasks have a visual output, the class is encouraged to put up the tasks as an exhibition (for a short period) in the classroom/in common areas of the school or as a group presentation for others in the school to see.

1.0 **Module 1**

Introduction to Elements for Design and Story-creation

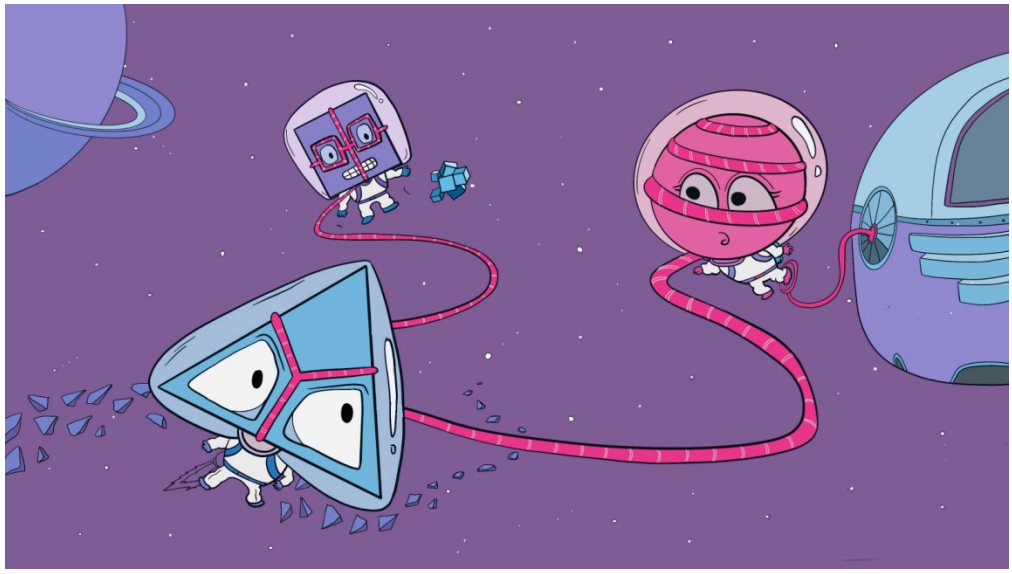
(2 hours at school, done in groups of 3-4 + 1 hour at home done individually)

Exposure 1	- Fundamentals and Elements of Design
Exposure 2	- Elements of Story/Narratives (Types, forms, structure)
1.1 **Task 1a** (at School)	- Create 3 Dimensional expressive Characters using Basic Shapes/Forms of the Elements of Design
1.2 **Task 1b** (at Home)	- create and write a short Story or a Poem with the Basic Design Elements
Final Output	- Presentation of 3D Models of the Characters + the Scenario/Story setting - Write-up of the Story or Poem + Visual of the Sketch/Illustration

1.0 **Module 1:**

Introduction to Elements for Design and Story-creation

(2 hours at school + 1 hour at home)



Introduction

Introduction to Elements for Design, Game Design and Story-creation

- This Module introduces the basic Elements of Design in terms of shapes – Circle, Square, and Triangle and aspects of Story Creation.

The students will learn about these subjects by exploring two tasks, one at school and the other at home.

- The first task done in school is to create **3 Dimensional expressive characters** out of their imagination, using the basic elements of design.
- The students are encouraged to create a scenario with an environment for a group activity by these characters.

- The second task done at home is to **create and write a short story with the basic design elements** – circles, squares and triangles as characters in the story + Draw a sketch/illustration to go with your story.

Aim of the Module

Aim of the Module:

This Module introduces students (Grade 8) to the Elements of Design through basic shapes as well as understanding the basics of creating their own stories. It should create an interest in this field, nurture their sense of curiosity and motivate them to explore and discover this area.

The students will become sensitive to using forms as building blocks and being able to create a story on their own will take them through the process of using their imagination and creativity.

This knowledge can be applied in many fields of design, media and the performing arts.

Place:

Task 1a, Task 1b - done at both school and at home

Task 1a, Task 1b -

Grouping:

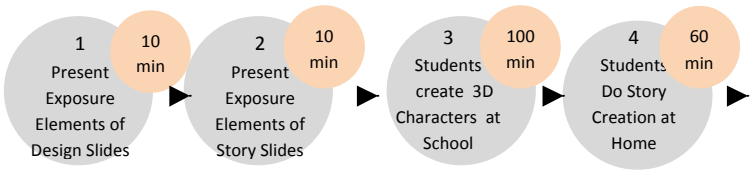
Class tasks are done in groups of 3-4 and Home tasks are individually

- / -

Equipment:

Sketchbooks for sketching and taking notes, Students need access to normal paper, drawing paper, Chart Paper, Scissors, Pencils and Clay.

Task Sequence:



Exposures:

Exposure 1: Elements of Design – Circle, Square and Triangle and their characteristics (expressions, associations) in 12 slides
Exposure 2: Elements of Story /Narratives (Types, forms, structure) in 12 Slide

Design Thinking & Innovation Process involvement:

This task involves the following phases of the DT&I Process:
Phase 1. Observe/Empathise/Research (who, how and what of character)
Phase 2. Understand/Analyse/Define (characteristics of character)
Phase 3. Ideate/Alternate/Create (creative alternatives to the character)
Phase 4. Build/Prototype/Detail (making or drawing the character & creating the story)
Phase 5. Evaluate/Reflect/Implement (feedback from others)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While designing your character and solving this task, do think of gender equality and reduced inequalities between characters.

Task 1:

Task 1 = 1a + 1b:
School Hours: 2, Home hours: 1

1.1 **Task 1a:**

Task 1a:
School hours: 2, Done in groups of 3-4

Topic title:

Create 3 Dimensional expressive Characters using Basic Forms of the Elements of Design:

The basic elements of Design (Circle, Square and Triangle) have their own characteristics. For example, the Circle is soft and smooth, a Square is rigid and solid and a Triangle is active and playful. In this task, you'll build expressive three-dimensional characters out of the basic elements.

1. Make 3 Dimensional expressive characters out of the basic elements of Circle, Square and Triangle
2. Make use of Chart paper / thick drawing paper (around 270 GSM) or Clay
3. You could add life characteristics to the basic forms. (For example eyes, tail, etc.)
4. Name them and Colour them
5. You could use multiple numbers of these elements, vary their size, change their orientation and overlap them
6. You could make them look like they are part of the same family
7. Create a scenario or a story for these characters doing a group activity

Output 1a: Presentation of 3D Models of the characters + the Scenario/Story setting

1.2 **Task 1b:**

Task 1b:
Home hours: 1, Done individually

Topic title:

Create and Write a Short Story or Poem with the Basic Elements of Design:

The second task done at home is to **create and write a short Story or a Poem with the basic design elements** – circles, squares and triangles as characters in the story. Do remember that the circle is soft and smooth, a square is rigid and solid and a triangle is active and playful.

1. write a short story or a Poem about it in around 150 words
2. **Draw a sketch/illustration** to go with your story
3. Draw this on an A4 size paper and you can make use of colours

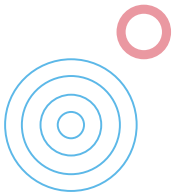
Output 1b: Write-up of the Story or Poem + the Visual of the Sketch/Illustration

Reflection:

Questions to ponder:

- Could the 3D Characters be done using sustainable materials?
- Can the Characters be used for creating multiple stories?
- Can you further work on characters and make a finished 3D prototype?
- Can the Story or the Poem that you wrote be enacted as a play with your friends?

Assessment:



Assessment Criteria (Task 1a + 1b) – Assess yourself:

- 3D Character Design and Construction: Characters are original, creatively designed, and capture the essence of the elements of Design through basic shapes. (Group Assessment, Task 1a)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- The Characters was demonstrated and presented well so that it could be understood clearly (Group Assessment, Task 1a)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Collaboration and Scenario Building: Clear evidence of original, creative ideas throughout the task. All characters showed a lot of expression and emotion and the scenario was well created. (Group Assessment, Task 1a)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- The Imaginary Story/Poem about the characters was original, creative and well represented the basic elements of design. (Individual Assessment, Task 1b)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

Other References:

Other suggested References:

1. Using Elements of Design in Designed by Apple, short film 1min 30 sec
https://www.youtube.com/watch?v=XjgoZua3BoY
2. The Elements of Design/Theory
https://www.youtube.com/watch?v=01ZoynsM7Vw
3. Elements of Story
https://www.youtube.com/watch?v=1M0pFLXegG0

2.0 Module 2

Exploring Form Transitions for Moving Images + Discovery of Forms in Environment

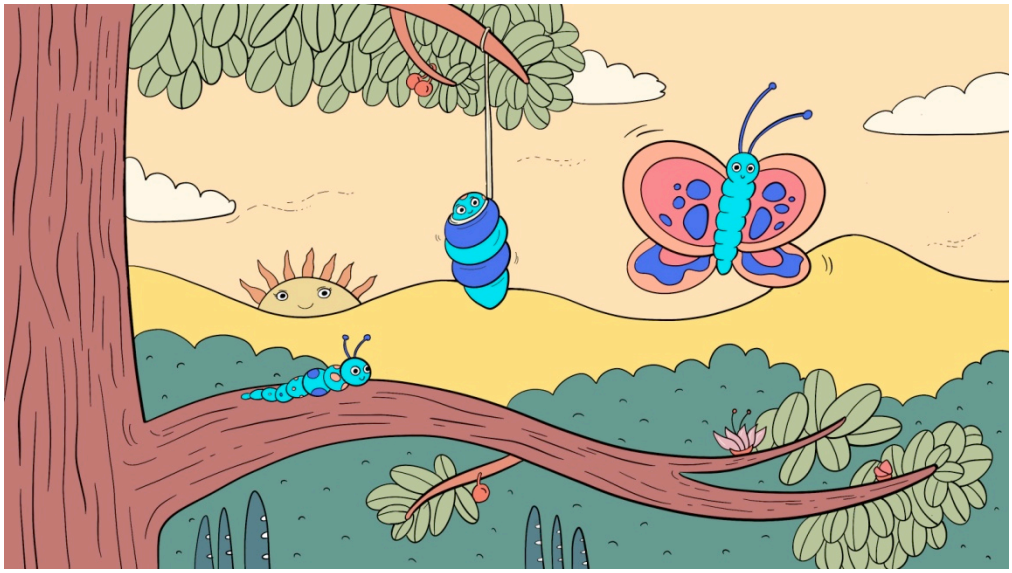
(2 hours at school, done in groups of 3-4 + 1 hour at home)

Exposure 1	- Fundamentals/basics of Form Transitions
Exposure 2	- Forms and patterns in environment and man-made objects
2.1 **Task 2a** (at School)	- Create an interesting book with transitions/changes in shapes from one page to another page
2.2 **Task 2b** (at Home)	- Document through photography/sketching: similar class or family of animals/plants/fruits or objects
Final Output	- Present the design of the page transitions in your book to the whole class - Photos of similar class of animals/plants/fruits or objects

2.0 **Module 2:**

Exploring Form Transitions + Forms in Environment

(2 hours at school + 1 hour at home)



Introduction

Introduction to Exploring Form Transitions and Discovering Forms in the Environment

- This Module is about exploring shape/form transitions from one to another. This is also one of the basic principles of animation design. It is meant as a brief exposure to this creative field and makes the students sensitive to changes in shape and form.
- The students will use paper cutouts or soft clay and look at the transformation of form from one to another. For example, they could start with a triangle and in 5 steps change it to a circle or start with a rose and in 5 steps change its form to a sunflower. By discovering the in-between shapes or forms, the students will begin to become sensitive to changes in shape and its transformation. This task is done at school.
- The students could string the transformation of forms on a string, spin it or make a flipbook and watch the transformation of form. By doing this, the shapes get animated and they can experience the foundations in the field of animation.
- In the next exercise to be done at home, the students will document through photography/sketching any one of these - examples of symmetry, pattern and texture in natural environment as well as in man made environment.

Aim of the Module

Aim of the Module:

This Module introduces students (Grade 8) to Form Transition for creating moving images as well as documentation of Forms in the Environment. It should create an interest in this field, nurture their sense of curiosity and motivate them to explore and discover this area. The students will become sensitive to changes in form and get to know that this knowledge can be applied in product, communication and animation design.

Place:

Task 2a, Task 2b, Task 2c - done at both school and at home

Equipment:

Smart Mobile phone with Camera, Sketchbooks for sketching and taking notes, Students need access to normal paper, drawing paper, scissors, pencils and clay.

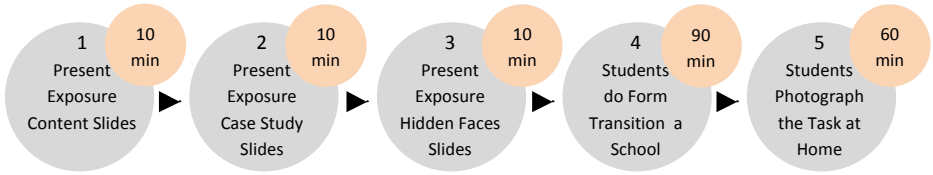
Grouping:

Class tasks are done in groups of 3-4 and Home tasks are individually

Exposures

Exposure 1: Fundamentals/basics of Form Transitions through a slide show
Exposure 2: Forms and patterns in the environment and man-made objects as a slide show

Task Sequence:



Design Thinking & Innovation Process involvement:

This task involves the following phases of the DT&I Process:
Phase 1. Observe/Empathise/Research (discovering where and what of forms)
Phase 2. Understand/Analyse/Define (identify how of forms)
Phase 3. Ideate/Alternate/Create (exploring form variations)
Phase 4. Build/Prototype/Detail (making or documenting of forms)
Phase 5. Evaluate/Reflect/Implement (presentation & feedback from others)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. All forms of life on our earth and its environment are important and we have to empathise and respect this. You could think of this while solving this challenge.

Task 2:

Task 2 = 2a + 2b + 2c:
School Hours: 2, Home hours: 1

2.1 **Task 2a:**

Task 2a:
School hours: 2, Done in groups of 3-4

Topic title:

Exploring Transitions in Shapes and Forms:

Create an interesting book with 10 transitions/changes in shapes or forms from one page to another page using paper of size 21 cm x 21 cm
You can make the book interesting by having an element of surprise that reveals something unexpected when you turn the pages. The main task is to create a transition/change between shapes that are on adjacent pages.

The transitions could be any of the following:
A. It could be the shape of the pages, which changes from page to page
B. It could be a shape that is stuck on a page, which changes from page to page
C. It could be the drawing on the page, which continues, into the other page
D. It could be a cutout in the page, which could reveal something about the next page

1. Ideate as a group on different possibilities
2. You could also look for inspiration from nature (for example, from a Tadpole to a Frog, from a Caterpillar to a Butterfly, Energy from Sun to Plants, from a Bud to a Flower, from a Seed to a Tree, etc.)
3. Or it could be transformation of numbers, alphabets, Shape of objects, parts to a complete Object, etc.
4. Try out your ideas first on rough papers of size 21 cms by 21 cms
5. Turn the pages and see how you can improve the transitions/changes in shape from page to page
6. You could make use of Cut-outs, Text and Drawings
7. You could colour the shapes and the pages
8. Once you are satisfied with your idea, make it using thicker paper (170 gsm)
9. Bind or clip the pages it to make the book

Output 2a: Present the design of the different pages of your book to the whole class.

2.3 **Task 2b:**

Task 2b
Home hours: 1, Done individually

Topic title:

Discovering Forms in the Environment

Document any one of these topics through photography. You need to make a selection of 6 photos. Make use of the camera on your mobile:
A. Similar class of animals/ plants /fruits (for example – family of Cats, Dogs, Palms, Orange/Lime,)
B. Similar class of Objects (for example – Locks, Doors, Fence)

1. Shoot at least 3 alternatives for each of them and select what you feel is the best one out of them.
2. Your selection should have 6 final photos.
3. Make sure the lighting is sufficient and the subject is composed properly.
4. Look for visual similarity in the animals/plants/fruits or objects that you captured on photo
5. This task is done at home and from the surrounding environment

Output 2c: Selected Photos are arranged in a sequence

Reflection

Have I understood and Questions to ponder:

- Which other instances are important for form transitions?
- Will you look for inspiration of shapes, colours, textures, structures and principles from your environment/nature?
- Can you start identifying different types of trees, birds and insects?
- How do forms change subtly within a family of living beings?

Assessment:

Assessment Criteria (Task 2a + 2b + 2c) – Assess yourself:

- The student is able to create a book with 10 transitions/changes in shapes or forms from one page to another page. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- The transition/change between shapes on adjacent pages are interesting and unexpected (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Sensitivity towards new forms by transitions: Displays heightened sensitivity to changes in shape and form and creation of new forms by transitions/changes. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Discovering Forms in Nature: Is able to document through photography easily identifiable similar class of animals/ plants /fruits/objects from the environment. (Individual task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

3.0 **Module 3**

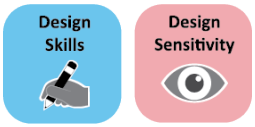
Sketching for Ideas + Product Explorations

(2 hours at school, done in groups of 3-4 + 1 hour at home, done individually)

Exposure 1	**-** Idea Sketching by Scientists and Designers
Exposure 2	**-** Film on 'Powers of Ten' based on the 1957 book Cosmic View
Exposure 3	**-** Product Design creative Ideas for Scissors or Cycles
3.1 **Task 3a** (at School)	- Sketch different Ideas for an Innovative Playful Toy based on the Principles of Motion
3.2 **Task 3b** (at Home)	- Turn your final concept sketch into a Presentation Drawing and a 3 Dimensional Model
Final Output	- Finished sketch/drawing of the final idea along with the model - Presentation in Class

3.0 **Module 3:**

Sketching for Ideation + Exploration of Product Ideas



(2 hours at school + 1 hour at home)

Introduction

Introduction to Sketching for Ideation and Creative Exploration of Product Ideas or Concepts

- The initial part of the Module is to expose school students (Grade 8) to the basics of sketching for ideation. The emphasis of sketching is mainly for representation of different ideas or concepts as visual representations. The easiest and simple way is to take a pencil and sketch ideas or concepts on a sheet of paper. The sketching becomes an extension of thinking with the output as visual representations.
- The second part of the Module is to try out several variations of ideas or concepts. In the process of design, it is important to think of several alternative solutions to a given problem. This way one has the option of choosing the best alternative.

Aim of the Module

Aim of the Module:

This Module introduces students (Grade 8) to Sketching for Ideation along with exploring creative variations in Product Forms. It should create an interest in this field, nurture their sense of curiosity and motivate them to explore and discover this area. The students will become sensitive to creating creative variations and understand its significance for creative alternate concepts for Design.

Place:

Task 3a, Task 3b – done at School and Task 3C done at Home

Equipment:

Smart Mobile phone with Camera, Sketchbooks for sketching and taking notes, Students need access to normal paper, Drawing paper, Chart paper, Sticks, Soft aluminum wires, Scissors, Pencils and Clay.

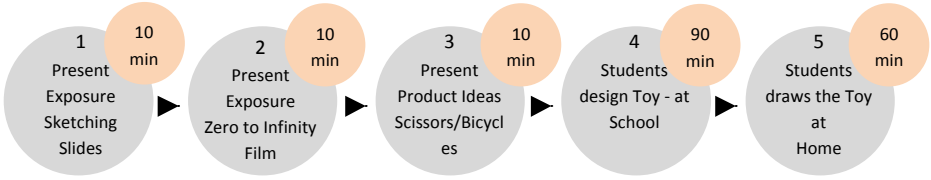
Grouping:

Class tasks are done in groups of 3-4 and Home tasks are individually

Exposures:

Exposure 1: Sideshow (12 in no.) on Idea Sketching by Scientists and Designers
Exposure 2: Film on 'Powers of Ten' based on the 1957 book Cosmic View by Dutch educator Kees Boeke: https://www.youtube.com/watch?v=44cv416bKP4
Exposure 3: Product Design creative Ideas for Scissors or Cycles

Task Sequence:



DT&I Process involvement:

This task involves the following phases of the Design Thinking Process:
Phase 1. Observe/Empathise/Research (How, why and what of plants/pens/pencils)
Phase 2. Understand/Analyse/Define (understand the characteristics of plants/pens/pencils)
Phase 3. Ideate/Alternate/Create (sketch & explore alternate concepts)
Phase 4. Build/Prototype/Detail (build and make a prototype of hybrid plant/pen/pencil)
Phase 5. Evaluate/Reflect/Implement (presentation & feedback from others)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. It brings in concern for life on land. In addition, your solutions could make use of sustainable materials.

Task 3:

Task 3 = 3a + 3b + 3c:
School Hours: 2, Home hours: 1

3.1 **Task 3a:**

Task 3a:
School hours: 2, Done in groups of 3-4

Topic title:

Sketch different Ideas for an Innovative Playful Toy based on Principles of Motion

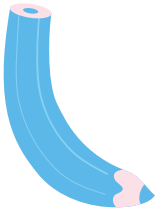
Toys are fun objects to play with. The challenge is to design a toy based on the principles of motion. It could be to experience any of these – linear motion, rotatory motion or oscillatory motion
Tips: Balls pushed up and comes down? Rotating wheels of different sizes? Wind chimes in motion? Winding tops with colour illusions?

1. Write down different names for Toys in our culture (at least a dozen)
2. Write-down the characteristics that make an object into a toy
3. Discuss principles of Motion and how it could be used to make objects move, wobble, rotate, spin, swing, go up and down, etc.
4. Ideate on the different possibilities of using motion to make an object move in an interesting and unusual manner so that it could be engaging
5. Sketch different ideas to use these principles for making an innovative toy. (Each member of the group ideates and sketches 3 to 4 alternatives of toy possibilities)
6. You could make use of sustainable materials in the design of these Toys
7. Look at all the ideas that your group has, and group them in similar categories. If they are different from one another, keep them as a different category. Discuss on how you might be able to combine ideas or take forward one of the ideas.

Output 3a: Alternative Sketches of the Toy

3.2 **Task 3b:**

Task 3b:
Home hours: 1, Done individually



Topic Title:

Convert your final concept sketch into a Drawing

You might be able to combine ideas or take forward one of the ideas. The aim is to represent your final idea/concept as best as you can.
1. Make a drawing or a neat sketch of your idea on A4 size drawing paper using 0.5mm ink pen and colour it using colour pencils
2. Mention the different parts of your concept and mention the materials used.
3. Give a name to your final concept
4. Make use of clay (or other sustainable materials) to make a 3D model of your final idea (optional)
5. Take a photograph of both your final sketch as well as your final model
6. You can also describe in a few words how your concept can be used

Output 3b: Finished sketch/drawing of the final idea along with the model

Reflection:

Questions to ponder:

- What design thinking principles were used?
- Did your knowledge from Physics help in this design task?
- Can you use quick sketching as a means of trying out alternate concepts?
- Will you start a sketchbook that you can carry with you to document ideas and your thoughts?

Assessment:

Assessment Criteria (Task 3a + 3b) - Assess yourself:

- Have detailed understanding of the concept of Toy and was able to Identify its characteristics. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Created a sketch clearly showcasing the understanding of the design process and is able to use the basics of sketching for ideation. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Displayed heightened sensitivity to creating variations and to understand its significance for creative alternate concepts for Design. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Made a clear representation of the final idea with a short suitable explanation of its features. (Individual task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

Other References:

Other suggested References:

1. Design Idea Sketching:
https://www.youtube.com/watch?v=71vvkT2aaUQ
https://www.youtube.com/watch?v=4UwPiwbmj_8

2. Film on variety of Tops by Charles and Ray Eames
https://www.youtube.com/watch?v=UJ-VFMymEiE

4.0 **Module 4**

Introduction to Design Thinking Process and Environmental Design Project

(6 hours at school, done in groups of 3-4 + 3 hour at home, done individually)

Exposure 1	- What is the Design Thinking Process
Exposure 2	- How to use Sticky notes to Categorise information + how to do mind-mapping
Exposure 3	- Design Case Study using Design Thinking process

4.1 **Task 4a** (at School)	- Identify Problems in nearby Market Environment
4.2 **Task 4b** (at School)	- Ideation and Creative Options and short-listing of concepts
4.2 **Task 4b** (at Home)	- Creating Scenarios, Design mock-ups and detailing
4.2 **Task 4b** (at School)	- Final Design Solution Presentation

Final Output	- Prepare a presentation (of 5 minutes duration) to include all the stages of the project

4.0 **Module 4:**

Introduction to Design Thinking Process and Environmental Design Project

(6 hours at school + 3 hours at home)

Introduction

Introduction to Design Thinking Process and Environmental Design Project

- Design Thinking may be seen as a method to solve problems using a process. A process that first understands users, identifies and analyses a problem or need, and research relevant information, after which ideas are explored and analysed, until an appropriate innovative solution to the problem or need is arrived at.
- It involves these five phases – 1. Observe/Empathise/Research, 2. Understand/Analyse/Define, 3. Ideate/Alternate/Create, 4. Build/Prototype/Detail and 5. Evaluate/Reflect/Implement.
- Design Thinking could be viewed as the process that translates an idea into an appropriate useful solution. This could be applied to any field, be it economics, products, services, health, environment and other such areas.

Here you will understand the basics of this design process and apply it to identify and solve problems concerning a neighbourhood market environment.

Aim of the Module

Aim of the Module:

This Module introduces students (Grade 8) to the Design Thinking Process. Using this process, the students will apply its principles and steps to identify, analyse, ideate and find suitable solutions to a problem concerning just outside their school environment. It should create an interest in this field, nurture their sense of curiosity and motivate them to explore and discover this area. The students will understand the basics of the design process and be able to apply it to identifying and solving problems surrounding their immediate environment.

Place: Task 4a, Task 4b, Task 4d at School and Task 4c at Home

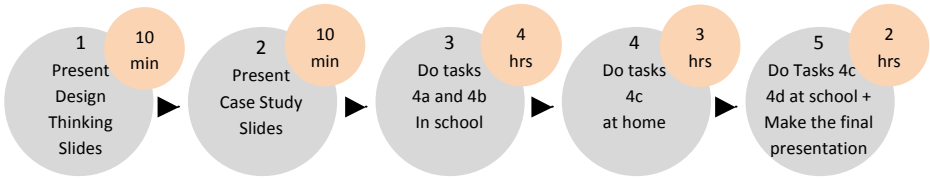
Equipment: Smart Mobile phone with Camera, Sketchbooks for sketching and taking notes, Students need access to normal paper, Drawing paper, Chart paper, Sticks, Soft aluminium wires, Scissors, Pencils and Clay.

Grouping: Class tasks are done in groups of 3-4 and Home tasks are individually

Exposures:

Exposure 1: Side show (12 in no.) What is the Design Thinking Process
Exposure 2: Slide show on how to use Sticky notes to Categorise information + how to do mind-mapping
Exposure 3: Slide show on a Design Case Study using Design Thinking process

Task Sequence:



Design Thinking & Innovation Process involvement:

Task 4 = 4a + 4b + 4c+ 4d:
This task involves all the following phases of the Design Thinking Process:
Phase 1. Observe/Empathize/Research (why and what of outside school environment)
Phase 2. Understand/Analyse/Define (understand how of outside school environment)
Phase 3. Ideate/Alternate/Create (sketch & explore alternate concepts)
Phase 4. Build/Prototype/Detail (developing & detailing of concepts)
Phase 5. Evaluate/Reflect/Implement (presentation & feedback from others)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. Discover positive and negative aspects at the neighbourhood market environment with respect to these SDG goals. You could suggest solutions to overcome the negative aspects.

Task 4:

School Hours: 6, Home hours: 3

Topic: Applying Design Thinking Process in an Environmental Design Project

4.1 **Task 4a:**

Task 4a:
School hours: 2, Done in groups of 3-4

Topic title:

Identify Problems in nearby Market Environment/Premises

1. The first task is to identify issues at the nearby Market environment (could include pathways, carts, stalls, trays, displays, dustbins, counters, other objects, services and facilities)
2. Each group will look at issues connected with one or two of these areas
3. Look at it from different points of view of its users - people (children, elderly, persons with disability, street-vendors, shop-keepers), animals (dogs, cats, birds), etc.
4. You will need to converse with them to find out their difficulties and you might need to look at the market environment from their point of view
5. Observe how they interact with the market environment – mark the places or spaces they use and find out problems faced by them and at the same time note down what is right or good about these
6. Document by taking photographs of your observations
7. Note down your observations in your sketchbook as a table in three columns, one for positives, one for negatives and one for suggestions

Positive aspects/issues	Negative Aspects/issues	Suggest Improvements

8. Rewrite these points on sticky notes and which makes it easy to (1) classify and categorise them into similar categories/groups (ii) rearrange the points within the categories in order of importance and (iii) mark out interconnections/links between the different points
- or instead, you could use the mind-mapping method to (i) arrange the points on different branches, (ii) in order of importance and (iii) see if there are interconnections/links between the different points
9. Photograph your sticky notes arrangement or the mind-mapping exercise
10. Identify/select from these problems that you would like to solve and make a final list of them (at least 5)

Output 4a: Summarise the work you have done less than 5 presentation slides (Problem statement + Photo/sketch documentation + Table + Categorisation/mind-mapping + Final list of solvable problems)

4.2 **Task 4b:**

Task 4b:
School hours: 2, Done in groups of 3-4

Topic title:

Ideation and Creative Options and Short-listing of Concepts

You have understood the problems that need solutions
1. Your group could brainstorm, Ideate on possible solutions and sketch these out
2. and make a list of possible solutions on this matrix of (easy to implement vs difficult to implement on the horizontal axis and low cost vs high cost on the vertical axis)
3. Collate all the good ideas together and short-list them according to their usefulness and ease of implementation
Output 4b: Make a presentation of these in 3 slides (alternate sketches + Matrix + short-listed idea)

4.3 **Task 4c:**

Task 4c:
Home hours: 3, Done individually
School Hours 1, Done in Groups of 3-4

Topic title:

Creating Scenarios, Design mock-ups and detailing

1. Select the best of your solutions/suggestions
2. Create a scenario to demonstrate in 5 steps how to use your selected idea. You can use characters to build the scenario
3. You could also try making a mock-up of your final idea using card-board/easily available materials
4. Detail out the final selected solution: the details could be about its shape/form, materials, listing of advantages/disadvantages and how to implement/maintain
Output 4c: make a presentation of these in 3 slides (scenario + mock-up + details)

4.4 **Task 4d:**

Task 4d:
School Hours 1, Done in Groups of 3-4

Topic title:

Final Design Solution Presentation

Presentation Details of points mentioned above:
Output 4d: Prepare a presentation (of 5 minutes duration) to include all the stages of your project in 12 slides:
a. 5 presentation slides for Task 4a (Title/Problem statement with the names of team members + Photo/sketch documentation + Table + Categorisation/mindmapping + Final list of solvable problems)
b. 3 slides for Task 4b (alternate sketches + Matrix +short-listed idea)
c. 3 slides for Task 4c (scenario + mock-up + details)
d. 1 slide for Full References (Learn how to do references) and Acknowledgments to all who have helped
e. Make a group presentation using your slides in the classroom
f. You could set up an exhibition of these projects in your classroom/exhibition room and invite other staff and students to come and see what you have done

Reflection:

Questions to ponder:

- What are the most interesting phases of the Design Thinking process that you liked?
- Can you apply what you learnt by solving problems just outside your school to other places and situations – starting at your home or neighbourhood?
- Will you share this information on the use of the Design Thinking Process with others – like your friends and cousins?

Assessment:

Assessment Criteria (Task 4a + 4b + 4c + 4d) - Assess yourself:

- Identifies the key elements of 4-5 problems and clearly outlines the objectives in an effective manner with no assistance. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Develops strategies to interact with the school environment that are insightful and use logical reasoning to reach accurate results with no assistance. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Documents 4-5 representations that accurately reflect the problems and aids in solving the problem with no assistance. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

- Displays creative skills to ideate, collate and present 12 slides that reflect the basics of the design process with very innovative solutions. (Group task)

☐ *Beginning* ☐ *Developing* ☐ *Promising* ☐ *Proficient* ☐ *Excellent*

Other References:

Other suggested References:

1. Design Thinking Process - explained with an example: https://www.youtube.com/watch?v=uRtAzzitBmA
2. Design Thinking Framework - a short video: https://www.youtube.com/watch?v=LhQWrHQwYTk

Assessment Criteria:

Module 1.0: Elements of Design, 3D Character Design and Story/Poem Creation

Achievement Levels	**1-2** **BEGINNING**	**3-4** **DEVELOPING**	**5-6** **PROMISING**	**7-8** **PROFICIENT**	**9-10** **EXCELLENT**
Making use of Elements of Design (Group assessment)	Needs to start making use of the Elements of Design.	Elements of Design are just about used.	Elements of Design are used fairly well. They have understood the use of form as building blocks to create the 3D Characters.	Elements of Design are original and constructed well. They seemed motivated to explore form and design.	Elements of Design through basic shapes are original, creatively designed, and fit well with the 3D Characters.
3D Characters Design and Construction (Individual assessment)	Needs to start making a 3D Character beyond the basic outline.	3D Character design is just about complete. Some pieces needs to be completed.	3D Character design is constructed fairly well. They have understood the use of form as building blocks to create the game.	3D Character design is original and constructed well. They seemed motivated to explore form and design.	3D Characyer design is original, creatively designed, and engaging to play the game
Collaboration and Presentation (Group assessment)	Needs to start working on presentation	Most of the group members' voice was monotone and not expressive.	Some storytellers showed a little expression and emotion.	Most of the storytellers' voices showed some expression and emotion and the group worked in collaboration	Clear evidence of original, creative ideas throughout the presentation. All storytellers showed a lot of expression and emotion and the story was well enacted
Story/Poem creation + Visual Illustration (Individual assessment)	Needs to start developing the story/poem along with the visual	Story/Poem + Visual has a weak plot and organization	Story/Poem + Visual has a plot but confusing organization and structure. No supporting are details included.	Story/Poem + Visual has some evidence of original, creative ideas, organization and structure. Few supporting details are included.	Story/Poem + Visual has strong organization and structure with all elements of story writing. Vivid supporting details included.

Assessment Criteria:

Module 2.0: Form Transitions + Discovery of Forms in Environment

Achievement Levels	**1-2** **BEGINNING**	**3-4** **DEVELOPING**	**5-6** **PROMISING**	**7-8** **PROFICIENT**	**9-10** **EXCELLENT**
Create a Book (Group task)	The student: Needs to complete creating a Book	The student: Completrs a few pages of the Book	The student: Completes 3-5 pages of the book	The student: Completes 5-7 pages of the book	The students are able to complete all 10 pages of the book
Transitions / changes in shapes and forms (Group task)	Needs to complete creating a transition / change in shape and form	Creates a transition / change in shape and form	Creates 1-2 transition / change in shapes and forms with the middle shape/form one page to another	Creates 3-4 clear transition / change in shapes and forms with the middle shape/form one page to another	Creates transition clearly showcasing the change in shapes and forms with the middle shape/form one page to another
Sensitivity towards new shapes/forms by transitions / changes (Group task)	Displays poor sensitivity to minor changes in shape/form and form and creation of new forms by transitions/changes	Displays very limited sensitivity to minor changes in shape and form and creation of new forms by transitions / changes	Displays average sensitivity to minor changes in shape and form and creation of new forms by transitions / changes	Displays sensitivity to minor changes in shape and form and creation of new forms by transitions / changes	Displays heightened sensitivity to changes in shape and form and creation of new forms by transitions / changes
Discovering Forms in Nature (Individual task)	Is not able to document through photography identifiable forms of similar class of animals / plants / fruits / objects from the environment.	Limited ability to document through photography identifiable forms of similar class of animals / plants / fruits / objects from the environment.	Average ability to document through photography identifiable forms of similar class of animals / plants / fruits / objects from the environment.	Ability to document through photography identifiable forms of similar class of animals / plants / fruits / objects from the environment.	Is able to document through photography easily identifiable forms of similar class of animals / plants / fruits / objects from the environment.

Assessment Criteria:

Module 3.0: Sketching for Ideation + Exploration of Product Ideas for an Innovative Playful Toy based on Principles of Motion

Achievement Levels	**1-2** **BEGINNING**	**3-4** **DEVELOPING**	**5-6** **PROMISING**	**7-8** **PROFICIENT**	**9-10** **EXCELLENT**
Identification of the characteristics of Toys (group task)	The student: Needs to understand the characteristics of toys	The student: Had a rough understanding and idea of the characteristics of toys	The student: Had a fair understanding and idea of the characteristics of toys	The student: Had a good understanding and idea of the characteristics of toys	The student: Possesses a detailed understanding and idea of the characteristics of toys
Use Sketching for Ideation (individual task)	Needs to complete a sketch	Creates few sketches (1) that are limited in design and operation, and the basics of sketching are not clear.	Creates fair number of sketchs (2) for ideation, but lacks attention to detail.	Creates good number of sketches (3) that reveals a fair understanding of the design process and the basics of sketching for ideation.	Creates many sketches (4-5) clearly showcasing the understanding of the design process and is able to use the basics of sketching for ideation
Innovative Toy Design Explorations (Group task)	Needs to start creating variations and to understand its significance for creative alternate concepts for Design.	Displays limited sensitivity to creating variations and to understand its significance for creative alternate concepts for Design.	Displays average sensitivity to creating variations and to understand its significance for creative alternate concepts for Design.	Displays sensitivity to creating variations and to understand its significance for creative alternate concepts for Design.	Displays heightened sensitivity to creating variations and to understand its significance for creative alternate concepts for Design.
Representation of the final Innovative Toy Design using principles of motion (Group task)	Needs to start to represent the final idea	The final idea of the innovative toy design was just about represented through a sketch /drawing	The final idea of the innovative toy design was moderately represented through a sketch /drawing	The final idea of the innovative toy design was fairly represented through a sketch /drawing	The final representation of the innovative toy design idea was very clear and appropriately represented through a sketch /drawing

Assessment Criteria:

Module 4.0: Design Thinking Process and Environmental Design Project

Achievement Levels	**1-2** **BEGINNING**	**3-4** **DEVELOPING**	**5-6** **PROMISING**	**7-8** **PROFICIENT**	**9-10** **EXCELLENT**
Problem/Issue Identification (Group Assessment)	Needs help to identify the key elements of the problem and/or the objectives with a great deal of assistance	Identifies the key elements of a problem and vaguely outlines the objectives with assistance	Identifies the key elements of 2 problems and outlines the objectives with assistance	Identifies the key elements of 3 problems and clearly outlines the objectives in an effective manner with little assistance	Identifies the key elements of 4-5 problems and clearly outlines the objectives in an effective manner with no assistance.
Ideation and Observation (Group Assessment)	Needs a great deal of assistance to interact with the school environment and note down observations	Needs some assistance to interact with the school environment and note down observations	Develops strategies to interact and use logical reasoning to observe and note down observations with assistance	Develops strategies to interact with the school environment and use logical reasoning to reach accurate results with little assistance	Develops strategies to interact with the school environment that are insightful and use logical reasoning to reach accurate results with no assistance
Analysis and Documentation (Individual Assessment)	Needs a great deal of assistance to document a representation that reflects the problem and solution	Documents a representation with assistance that accurately reflects the problem and aids in solving the problem	Documents 2 representations with assistance that accurately reflect the problems and aid in a limited manner in solving the problems	Documents 3 representations that reflect the problems and aid in solving the problems with little assistance.	Documents 4-5 representations that accurately reflect the problems and aids in solving the problem with no assistance
Presentation (Group Assessment)	Needs a lot of assistance to ideate, collate and present 2-3 slides that reflect the basics of design process with limited solutions	Needs some assistance to ideate, collate and present 4-5 slides that reflect the basics of design process with appropriate solutions	Displays average skills to ideate, collate and present 6-8 slides that reflect the basics of design process with appropriate solutions	Displays skills to ideate, collate and present 9-11 slides that reflect the basics of design process with appropriate and innovative solutions	Displays creative skills to ideate, collate and present 12 slides that reflect the basics of design process with very innovative solutions

Student Feedback Form:

NAME	CLASS	MODULE	TASK	ACTIVITY	DATE
Give a rating for each of the statements below: - by placing a tick mark in the corresponding box.					
	INADEQUATE	**FAIR**	**GOOD**	**VERY GOOD**	**EXCEPTIONAL**
Level of effort you put into activity					
Your level of knowledge at the start of the activity					
Your level of knowledge at the end of the activity					
Understanding of exposure slides/video					
	STRONGLY DISAGREE	**DISAGREE**	**NEUTRAL**	**AGREE**	**STRONGLY AGREE**
I enjoyed doing the activity					
I understood the design principles while doing the task					
I liked trying out different creative variations					
I can apply design thinking process to problem solving					
I enjoyed working in collaboration with my group					
Additional Comments:					
What I liked the most: What can be done better:					
What can be Added/Changed:					

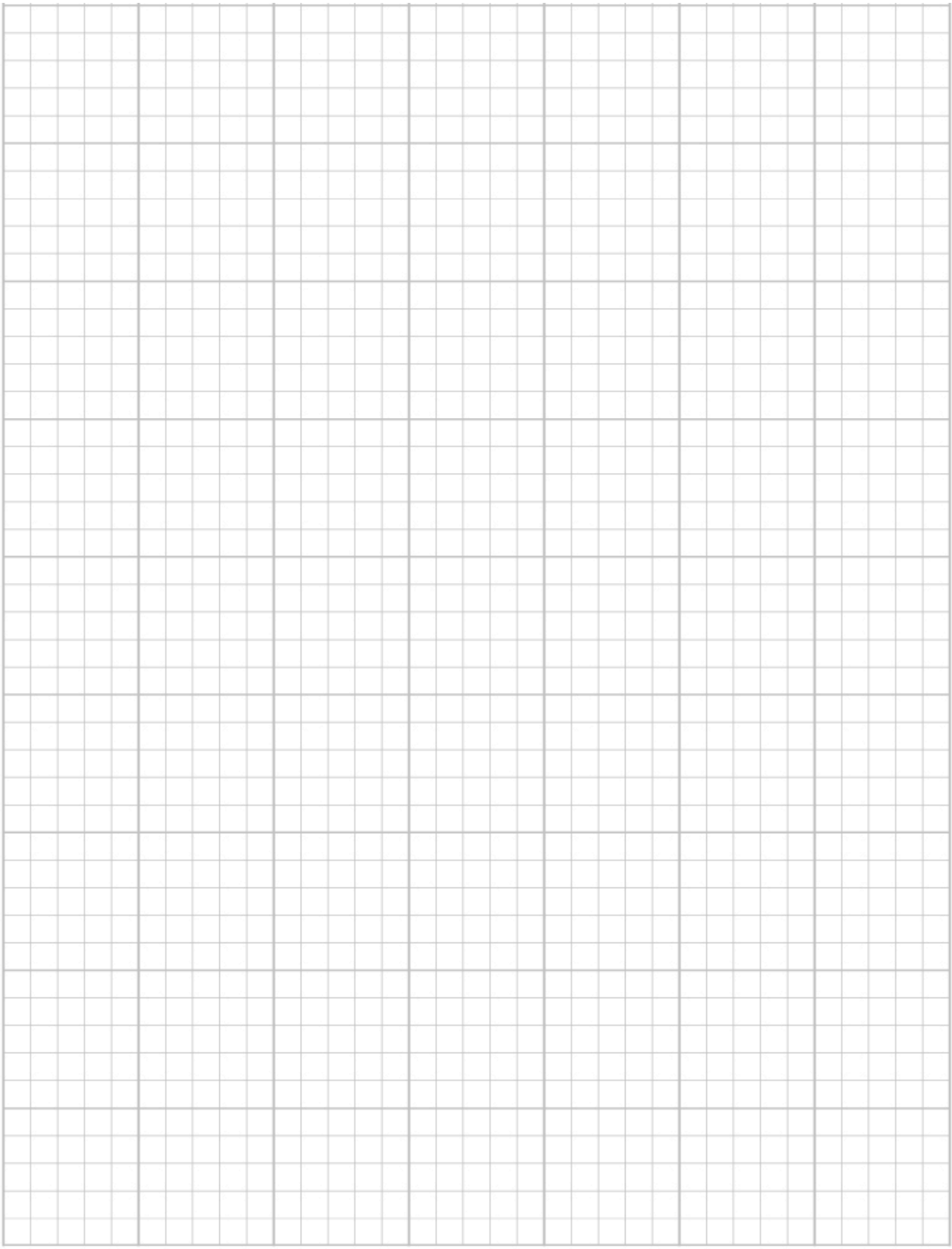
Teacher Feedback Form:

NAME	CLASS	MODULE	TASK	ACTIVITY	DATE

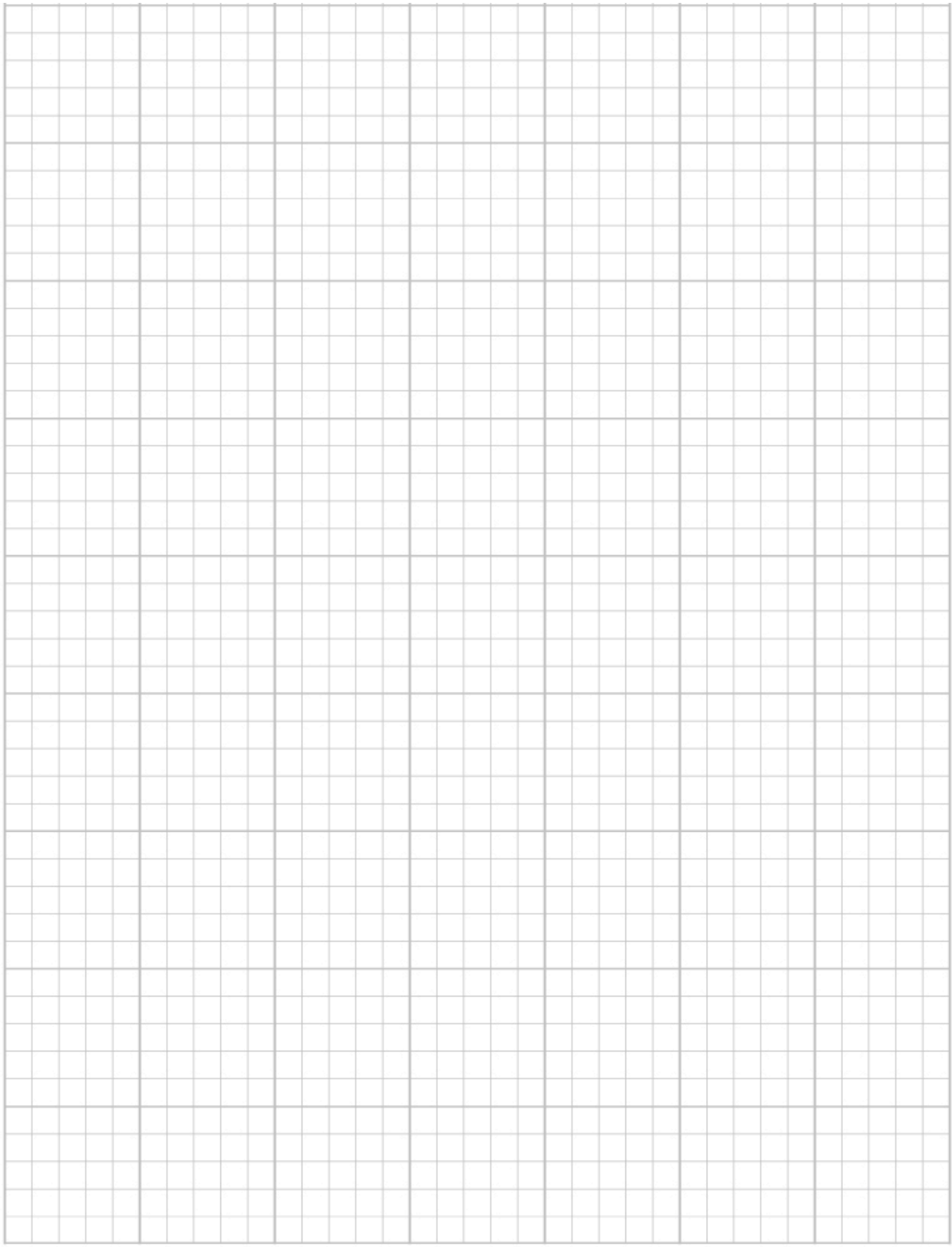
Comments:
- place a tick mark in the corresponding box.

	COMMENTS				
It was easy to deliver the exposure modules:	**STRONGLY DISAGREE**	**DISAGREE**	**NEUTRAL**	**AGREE**	**STRONGLY AGREE**
Your comments:					
It was easy/satisfying/enjoyable to conduct the task activities:	**STRONGLY DISAGREE**	**DISAGREE**	**NEUTRAL**	**AGREE**	**STRONGLY AGREE**
Your comments:					
No issues were faced with regard to assessment of the task:	**STRONGLY DISAGREE**	**DISAGREE**	**NEUTRAL**	**AGREE**	**STRONGLY AGREE**
Your comments					
Common questions posed by the students:					
Suggestions for improving the task or suggestion of another task:					
Other suggestions, if any:					

Grid layout for skecthing and taking notes:



Grid layout for skecthing and taking notes:



Credits

Acknowledgement and Credits:

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Design Thinking and Innovation

for Grade 8

Taskbook

2022

Hope you enjoyed the tasks !!!

CBSE, New Delhi