	INDIAN SCHOOL AL WADI AL KABIR	
Class: IX	**Department: SCIENCE 2024 – 25** **SUBJECT: DESIGN THINKING & INNOVATION**	**Date of submission:12.02.2025**
Worksheet No: 6,7& 8 **WITH ANSWERS**	**MODULE 6,7 & 8: Fundamentals of 3D, Introduction to Understanding and Analysis of Problem, Design Project with focus on Products and emphasis on Problem Analysis and Mappings.**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC: IX A TO I**	**ROLL NO.**

MULTIPLE CHOICE QUESTIONS

1. What does the term "3D" stand for in the context of design and modeling?

a) Digital Design
b) Three Dimensions
c) Technical Design
d) Two-Dimensional Design

2. Which of the following is a key characteristic of a 3D object?

a) It has only length and width.
b) It can be viewed from multiple angles.
c) It is always static and unchangeable.
d) It can only be seen from the front view.

3.What is the primary difference between 2D and 3D design?

a) 3D design uses only color schemes, while 2D design focuses on shapes.
b) 3D design has depth in addition to height and width, unlike 2D design.
c) 2D design involves textures, while 3D design does not.
d) 2D design uses advanced technology, whereas 3D design is more manual.

4.What is the first step in the Design Thinking process?

a) Prototyping
b) Defining the problem
c) Ideation
d) Empathy and understanding the problem

5. Which of the following is most important when analyzing a problem in Design Thinking?

a) Generating solutions quickly
b) Understanding the root causes of the problem
c) Focusing on technology
d) Avoiding feedback from others

6. Why is it essential to define the problem clearly in the Design Thinking process?

a) To quickly move to the prototyping stage
b) To create a clear understanding of the issue that needs to be solved
c) To focus only on the final solution
d) To reduce the number of team members needed

7. Which question is most likely to be asked during the analysis phase of problem-solving?

a) How can we build the best prototype?
b) What are the specific challenges people are facing?
c) How much will this solution cost?
d) What is the most creative solution?

8. What role does data play in analyzing a problem during Design Thinking?

a) Data is irrelevant in problem analysis.
b) Data is used to understand the impact and extent of the problem.
c) Data is only used for generating ideas.
d) Data is only used for testing the final prototype.

9. What is a "problem statement" in the Design Thinking process?

a) A list of all possible solutions
b) A clear and concise description of the problem to be solved
c) A summary of the steps to create a prototype
d) A list of stakeholders involved in the process

10. Why is it important to ask the right questions when defining a problem?

a) To make the problem seem simpler than it is
b) To gather relevant information and understand the real issue

c) To focus only on technology
d) To quickly find the first solution that comes to mind

11. What is the first step in a design project when focusing on products?

a) Brainstorming ideas
b) Problem analysis
c) Prototyping
d) Testing the product

12. What is the purpose of creating a problem map during the design thinking process?

a) To visualize all possible solutions to the problem
b) To identify and categorize the core problems that need to be solved
c) To sketch the final product
d) To test the functionality of the design

13. In the context of product design, which of the following is a key aspect of "mapping"?

a) Determining which materials to use
b) Understanding user journeys and experiences
c) Choosing the manufacturing location
d) Sketching the product's final shape

14. What should a designer do after completing the problem analysis phase?

a) Jump straight into product testing
b) Ideate and generate potential solutions to the problem
c) Focus on the marketing strategy
d) Start creating the prototype without further research

15. What is the significance of "mapping user experiences" in the design process?

a) It helps to identify which user features should be removed
b) It aids in understanding how users interact with the product and what problems they encounter
c) It focuses only on the physical aspects of the product
d) It highlights the product's cost-effectiveness

DESCRIPTIVE TYPE QUESTIONS

1. Explain the five types of platonic solids and draw the total development of any platonic solid.

2. Observe any 4 3D objects at home and write their features like shape/form, colours, textures, symmetry, softness/hardness, usefulness, expression, material, recyclability, cost, etc.

3.Note down on a timeline starting from morning till evening the sequence of the activities done on weekend.

4. Draw a layout of your bedroom which includes the doors, windows etc.

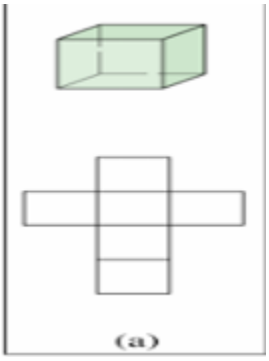
5. Choose one particular 3D object in your classroom and redesign the object, and write the challenges you faced during the redesigning.

ANSWER KEY – MULTIPLE CHOICE QUESTIONS	
1	b) Three-dimensions
2	b) It can be viewed from multiple angles.
3	b) 3D design has depth in addition to height and width, unlike 2D design.
4	d) Empathy and understanding the problem
5	b) Understanding the root causes of the problem
6	b) To create a clear understanding of the issue that needs to be solved
7	b) What are the specific challenges people are facing?
8.	b) Data is used to understand the impact and extent of the problem.
9	b) A clear and concise description of the problem to be solved
10	b) To gather relevant information and understand the real issue

11	b) Problem analysis
12	b) To identify and categorize the core problems that need to be solved
13	b) Understanding user journeys and experiences
14	b) Ideate and generate potential solutions to the problem
15	b) It aids in understanding how users interact with the product and what problems they encounter

SOLUTIONS FOR DESCRIPTIVE TYPE QUESTIONS

1. The cube, the octahedron, the tetrahedron, the icosahedron, and the dodecahedron – are known as platonic solids.



Total development of cube

2. **Glass Vase**

- **Shape/Form**: Cylindrical with a flared top.
- **Colors**: Clear, with a slight tint of blue or green, depending on the glass type.
- **Textures**: Smooth surface, sometimes with intricate patterns or engravings.
- **Symmetry**: Symmetrical along its vertical axis.
- **Softness/Hardness**: Hard and fragile.
- **Usefulness**: Holds flowers, can be used as a decorative item.
- **Expression**: Elegant, minimalistic.
- **Material**: Glass.
- **Recyclability**: Fully recyclable.

- **Cost**: Varies, depending on size, design, and brand. Could be inexpensive to moderately priced.

 Wooden Chair

- **Shape/Form**: Rectangular seat with four legs and a supportive backrest.
- **Colors**: Natural wood tones like brown, beige, or dark mahogany.
- **Textures**: Smooth finish but may have visible wood grain patterns.
- **Symmetry**: Symmetrical, with a mirror image of legs and seat.
- **Softness/Hardness**: Hard, with a slight comfort from cushion if present.
- **Usefulness**: Provides seating.
- **Expression**: Sturdy, rustic, or contemporary depending on the design.
- **Material**: Wood (could be solid wood or a composite material).
- **Recyclability**: Wood is biodegradable and recyclable, but treated finishes or cushions may complicate this.
- **Cost**: Moderate to high, depending on quality and design.

 Plastic Storage Bin

- **Shape/Form**: Rectangular or square with a lid.
- **Colors**: Commonly blue, green, or transparent.
- **Textures**: Smooth but can have raised patterns or ridges for durability.
- **Symmetry**: Symmetrical, with four even sides and a uniform lid.
- **Softness/Hardness**: Rigid and hard.
- **Usefulness**: Used for organizing or storing items.
- **Expression**: Practical, utilitarian.
- **Material**: Plastic (often polyethylene or polypropylene).
- **Recyclability**: Depends on the plastic type, but most plastic bins are recyclable.
- **Cost**: Inexpensive, usually cheap unless custom-designed.

 Metal Spoon

- **Shape/Form**: Curved bowl with a handle.
- **Colors**: Silver, metallic gray, or chrome-plated.
- **Textures**: Smooth on the bowl, slightly textured or engraved handle in some designs.
- **Symmetry**: Bilateral symmetry, where one half mirrors the other.
- **Softness/Hardness**: Hard and solid.
- **Usefulness**: Used for eating, cooking, or serving.
- **Expression**: Practical, simple, and functional.
- **Material**: Stainless steel or other metals like aluminum.
- **Recyclability**: Highly recyclable.
- **Cost**: Low to moderate, based on quality and design.

3**. Saturday: Weekend Day Timeline**

7:00 AM - 8:00 AM

- **Wake up & Morning Routine**
  - Wake up, stretch, make the bed, brush teeth, wash face, and get dressed.

8:00 AM - 9:00 AM

- **Breakfast**
  - Prepare and enjoy a leisurely breakfast (e.g., eggs, toast, fruit, coffee/tea).

9:00 AM - 10:30 AM

- **Exercise or Outdoor Activity**
  - Go for a walk, jog, or do a workout (yoga, gym session, or a home workout).

10:30 AM - 12:00 PM

- **Personal Project or Hobby Time**
  - Spend time on a hobby like reading, painting, writing, playing an instrument, or any personal project.

12:00 PM - 1:00 PM

- **Lunch**
  - Prepare and enjoy lunch. This might be something simple, or perhaps you try out a new recipe!

1:00 PM - 2:30 PM

- **Errands/Chores**
  - Run errands, grocery shopping, laundry, or cleaning the house.

2:30 PM - 4:00 PM

- **Relax or Social Time**
  - Relax with a TV show, movie, or video games. Alternatively, catch up with friends or family, either in person or via calls/messages.

4:00 PM - 5:00 PM

- **Outdoor Fun/Exploration**
  - Go for a walk in the park, visit a museum, or explore a nearby area.

5:00 PM - 6:30 PM

- **Prepare for Dinner & Relax**
  - Cook dinner, listen to music, or unwind by doing something low-key like reading or chatting with family.

6:30 PM - 8:00 PM

- **Dinner**
  - Sit down for dinner, enjoy a nice meal, and perhaps watch a show or have some downtime.

8:00 PM - 9:30 PM

- **Evening Entertainment**
  - Enjoy some light evening entertainment like watching a movie, playing board games, or chatting with loved ones.

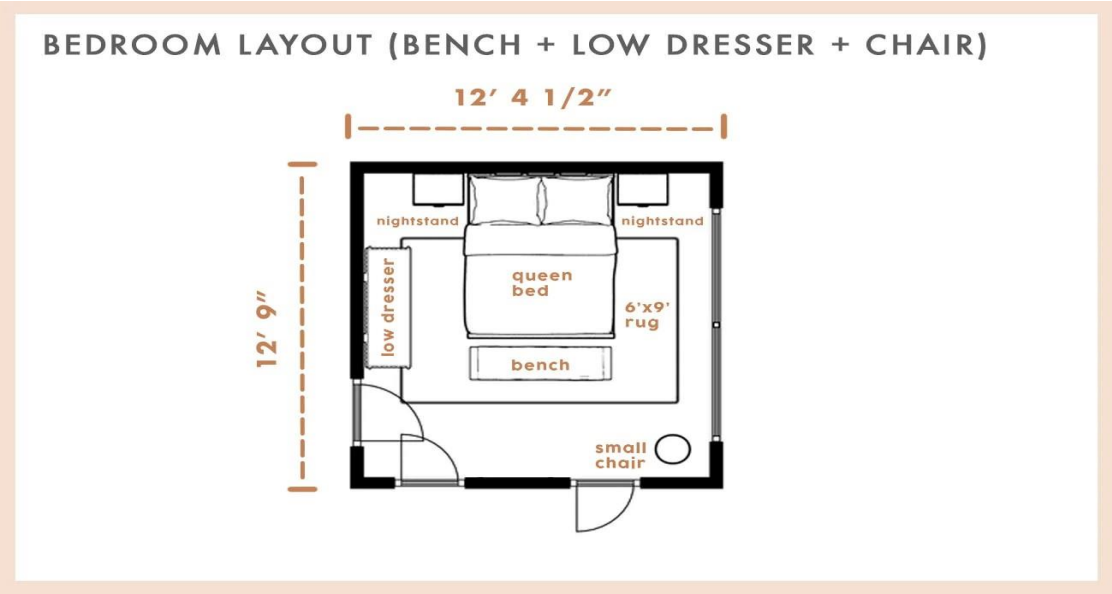
9:30 PM - 10:30 PM

- **Wind Down**
  - Relax before bed, maybe with a cup of tea, light reading, or meditation.

10:30 PM

- **Sleep**
  - Head to bed and get some rest for the next day!

4.



5. Let's say the object I choose is a **classroom chair**—a pretty common yet essential item in any classroom. I'll redesign it to be more ergonomic, comfortable, and multi-functional.

Redesign Concept:

- **Shape**: The chair will still have the traditional seat and backrest, but the backrest will have a **slightly curved ergonomic design** to provide better support for posture. The base will be designed with a **sculpted frame**, making it lightweight yet strong.
- **Materials**: I would use **recycled plastic** for the frame, ensuring it's sturdy but eco-friendly, and a **memory foam cushion** for the seat for extra comfort.
- **Adjustability**: The backrest could be adjustable to different angles, allowing students to find their most comfortable sitting position. The armrests could also be made adjustable and soft for extra comfort.
- **Storage**: Small compartments could be integrated into the back of the chair for students to store their smaller items (like pens or notebooks), keeping the desk area tidy.
- **Wheels**: The chair would be equipped with small, smooth wheels that can lock in place, so students can easily move the chair when necessary, but it will remain stationary during lectures.

Challenges faced during the redesigning

1. **Balancing Comfort and Functionality**:
    - The memory foam cushion is comfortable, but integrating it into a design where it doesn't add too much weight or bulk was a challenge. I had to find a way to ensure the seat was soft yet supported enough for long hours of sitting.
2. **Ergonomics**:
    - Designing a chair that fits everyone perfectly is a tough challenge. Not all students have the same body type, so making sure the backrest was adjustable to various heights and that the chair offered good lumbar support without being uncomfortable for smaller or larger people was difficult.
3. **Material Selection**:
    - Choosing eco-friendly materials while ensuring they are durable enough to withstand the wear and tear of a classroom setting is tricky. Recycled plastic can sometimes lack the strength needed for structural components, so I had to choose carefully where it could be used versus where stronger materials like metal might be required.
4. **Mobility and Stability**:
    - Making the chair mobile but stable was a tricky balancing act. The wheels needed to allow for easy movement, but I also wanted to ensure that when locked, the chair wouldn't wobble or shift under normal use, especially when students are writing or leaning back.
5. **Cost and Production**:
    - Eco-friendly materials and custom features like adjustable armrests and backrests could increase the cost. Finding a way to keep the chair affordable for most classrooms while still offering the desired features was a challenge.

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