

Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing>



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

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## Introduction

### Product Sketching:

Product sketching or Object drawing is essential for the representation of 3D objects.

It is a 2D representation of a 3D object or objects for the purpose of communication of a designer's visualization. It may utilize various media ranging from pencils, pastels to sketch pens, markers and digital media such as photoshop, as elucidated in **Figs: 1, 2 & 3** below.



Fig. 1: A wrist watch case detail in pencil.

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

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Fig. 2: A wrist watch case detail rendered in colour pencils.



Fig. 3: A wrist watch case detail rendered in photoshop.

### What makes for a good product sketching?

- It communicates
- It is proportionate
- It looks three-dimensional
- It resembles the real object or product concept.

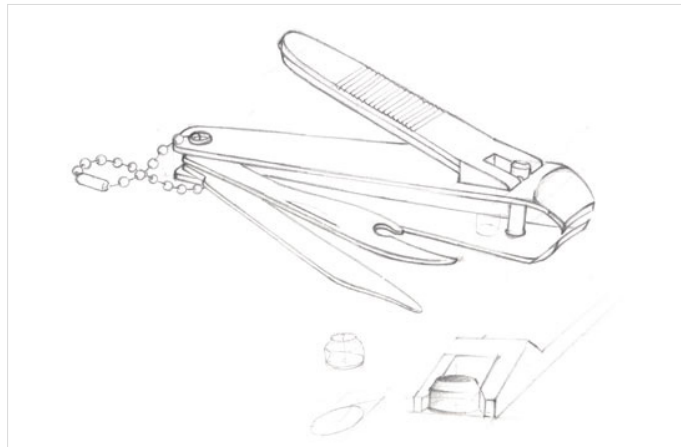


Fig. 4: Notice how this nail cutter is depicted simply, yet efficiently.



Fig. 5: Note the cigarette lighter's transparent body that has been well represented through appropriate highlights.

### 1. Introduction

### 2. Lines

### 3. Perspective

### 4. Shadows

### 5. Highlights

### 6. Object Drawings

### 7. Exploded Views

### 8. videos

### 9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/introduction>

As we take you through the course, you will gradually grasp an understanding of how best you can communicate your ideas through a sketch in the most appropriate way.

### Do-it-yourself:

This do-it-yourself module on Product Sketching will take you through:

- Methods of pencil drawing, through exercises to coordinate eye and hand movements to acquire necessary skills to improve the quality of line drawing
- Drawing in perspective, i.e. one point and two point perspectives
- Drawing by looking at objects in correct perspective and proportions
- Drawing objects from memory with correct perspective and proportions
- Drawing of shadows for objects
- Drawing of highlights for objects

### Note:

Here is a short checklist of the essential tools that you will need to do the Exercises mentioned within the chapters.

(1) **Paper:** Regular A3/ Drawing Sheets.

(2) **Stationery:** Pencils: HB,2B,4B,6B, etc. Soft pencils are preferred. For the latter exercises on object rendering, pencil colours, dry pastels, or crayons will be necessary.

(3) **Posture:** Remember to keep the drawing surface perpendicular to the eyes to ensure correctly proportioned sketches.

1. Introduction

2. Lines

3. Perspective

4. Shadows

5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

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## Lines

The first step towards good sketching is mastering the line. This will lead to good line quality through better mind-body coordination for fluent and confident hand movement when you begin to draw more complex objects, especially in perspective.

### Exercise 1:

Improving line quality and control over the pressure applied while drawing.

### Posture Tip:

Make use of your full hand as well as your body movements to draw the line.

- Draw a straight line across the sheet.
- Draw the next line parallel to the first line and continue this until you complete the page, as in Fig. 6.

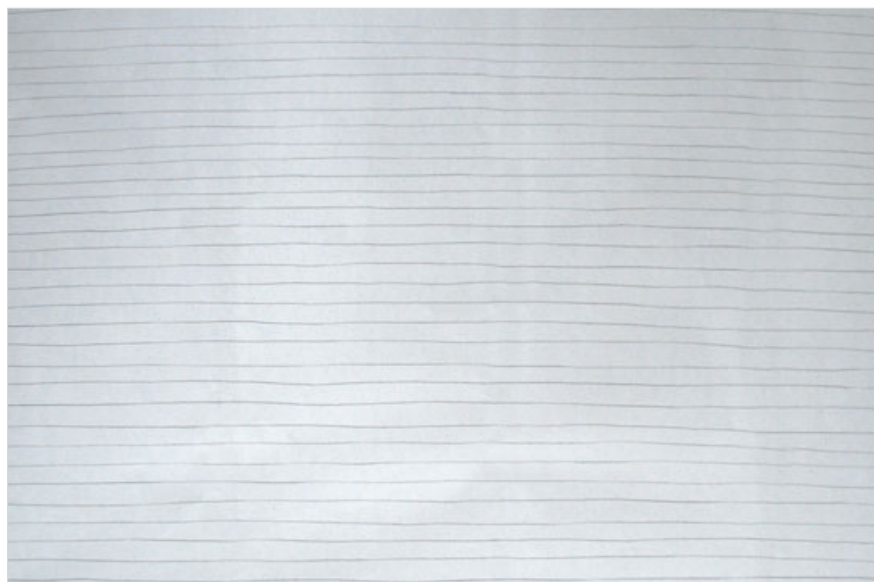


Fig. 6: Straight Horizontal Lines.

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/lines>

- Repeat this exercise as many times till you feel that the quality of your lines have improved. As you grow more confident, try reducing the gap between your lines, as shown in Fig. 7.



Fig. 7: Closely spaced Straight Horizontal Lines.

- The next step would be to practice the same thing with verticals (Refer Fig. 8) and diagonals (Refer Fig. 9).



Fig. 8: Straight Vertical Lines.



Fig. 9: Diagonal Lines.

### 1. Introduction

### 2. Lines

### 3. Perspective

### 4. Shadows

### 5. Highlights

### 6. Object Drawings

### 7. Exploded Views

### 8. videos

### 9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

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IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/lines>

Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

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Source:

<https://www.dsource.in/course/product-drawing/lines>

1. Introduction

2. Lines

3. Perspective

4. Shadows

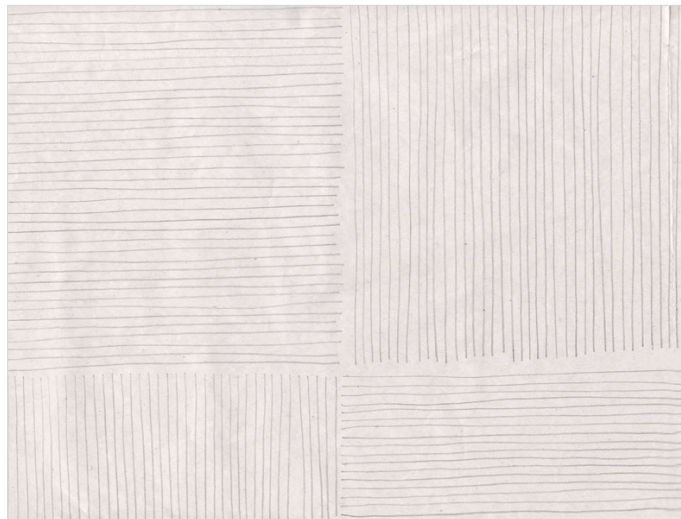
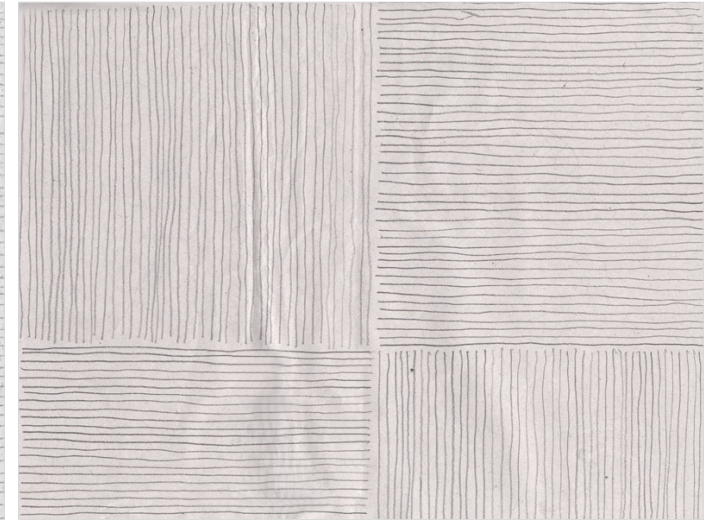
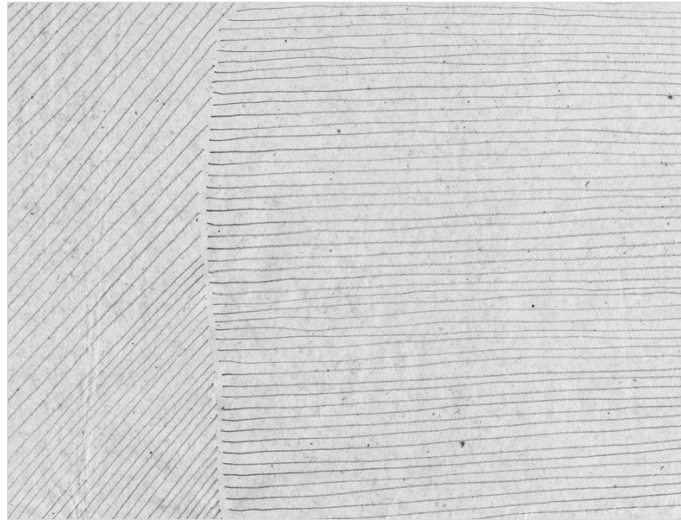
5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details





Design Course

## Product Drawing

Representation of Objects

by

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Source:

<https://www.dsource.in/course/product-drawing/lines>

1. Introduction

2. Lines

3. Perspective

4. Shadows

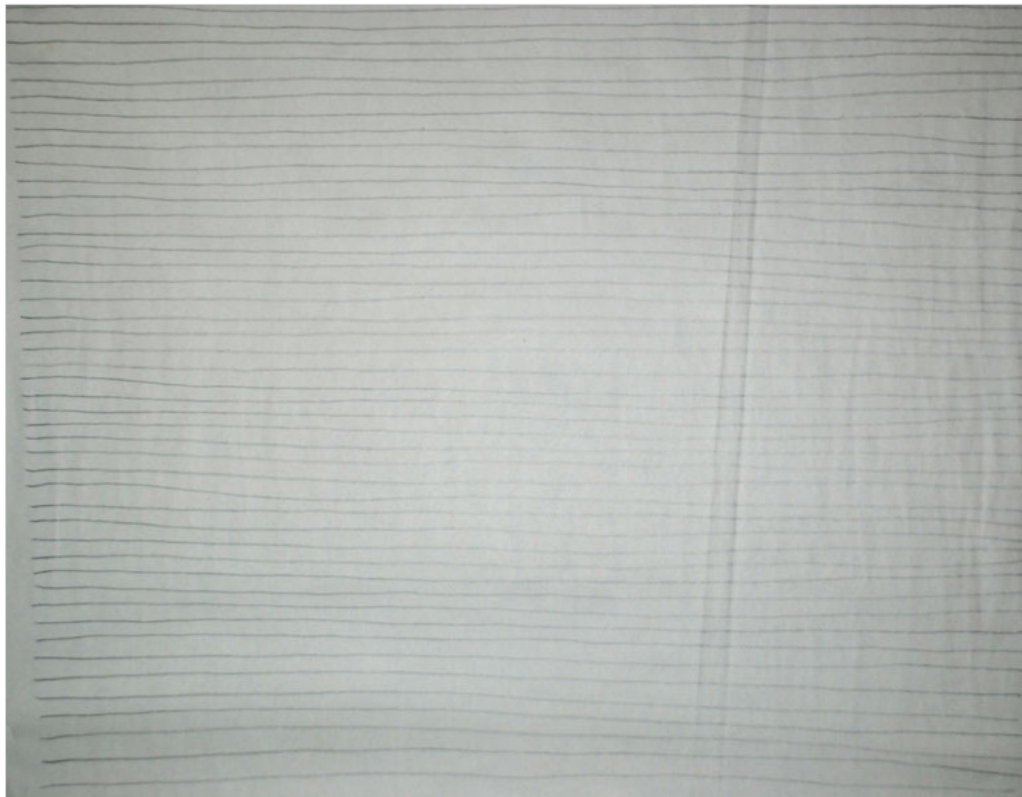
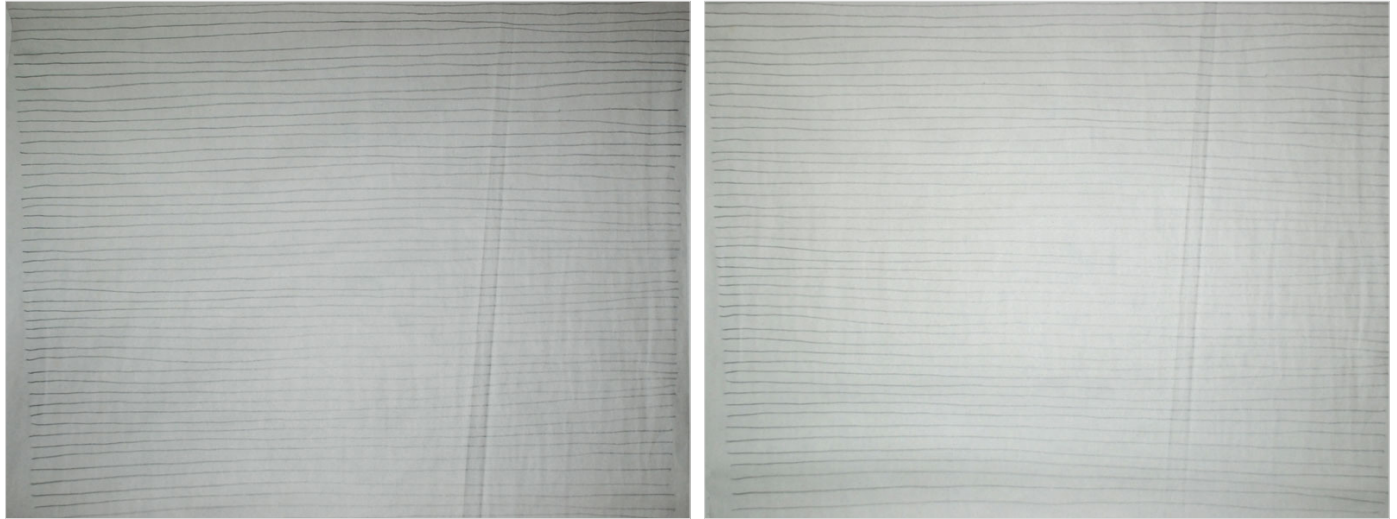
5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details



Design Course

## Product Drawing

Representation of Objects

by

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Source:

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### Exercise 2:

Improving consistency and sense of proportion in the line.

- Repeat the same process mentioned above, but this time, do it with a pattern such as a sinusoidal curve, spring and the like, as shown in Fig 10.



Fig. 10: Pattern Lines.

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

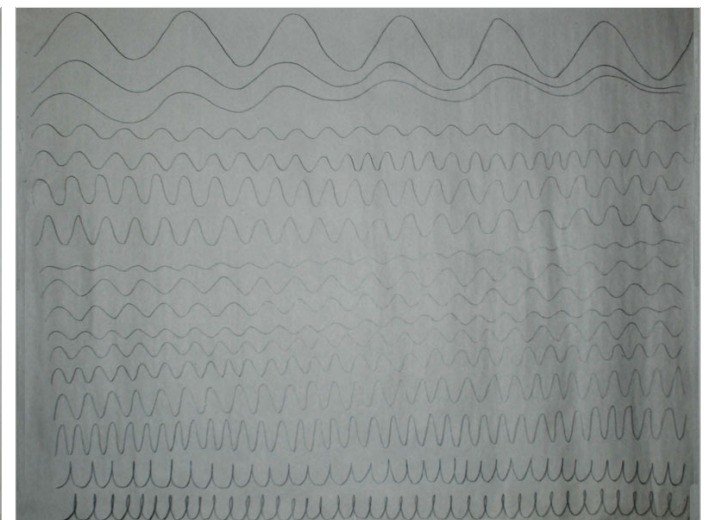
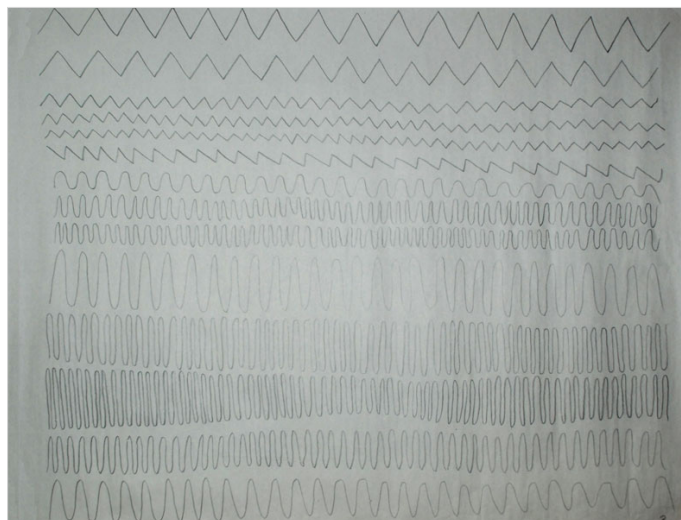
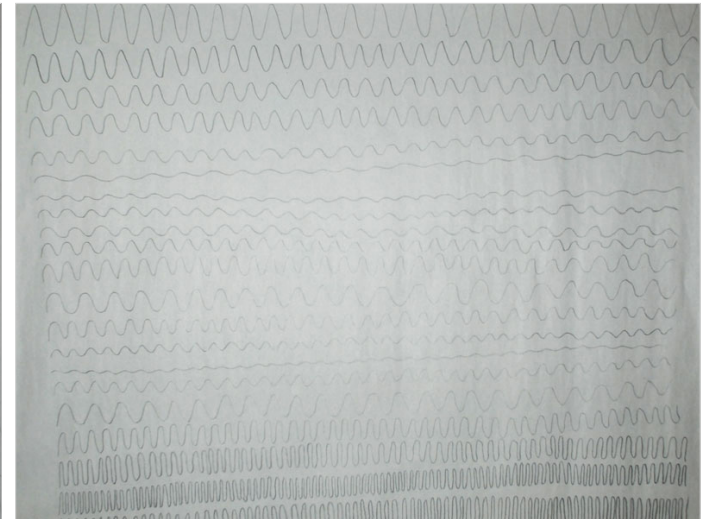
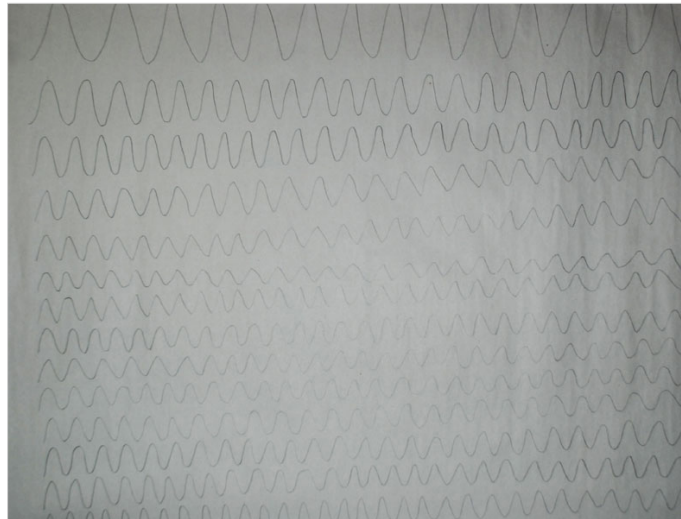
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Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

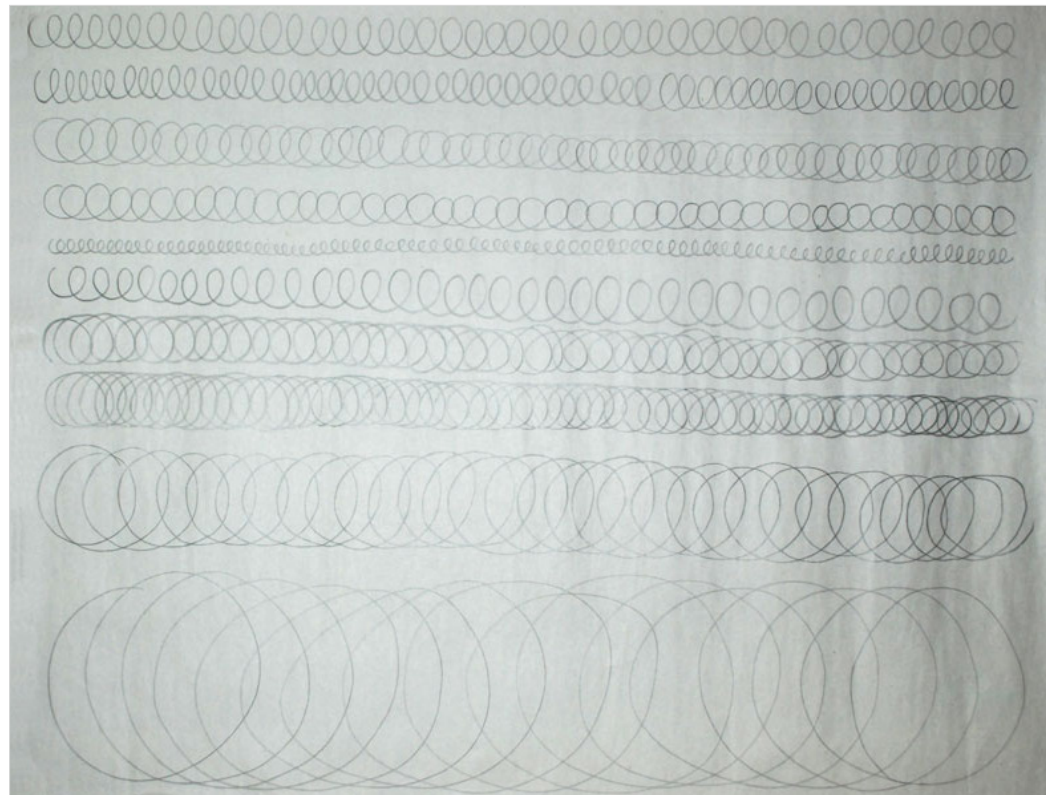
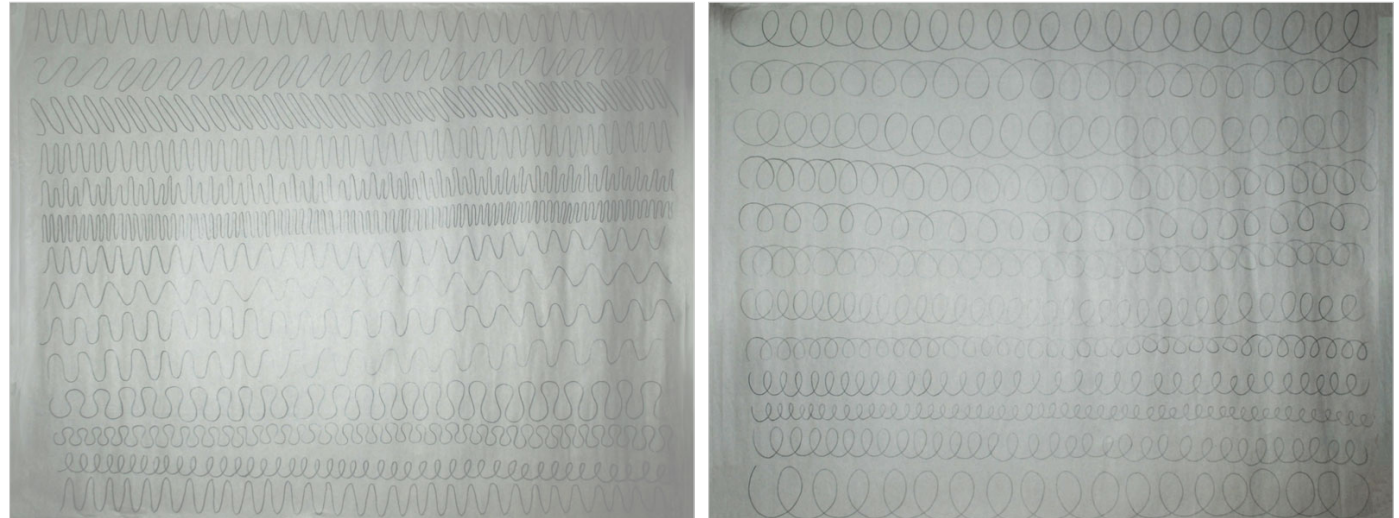
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

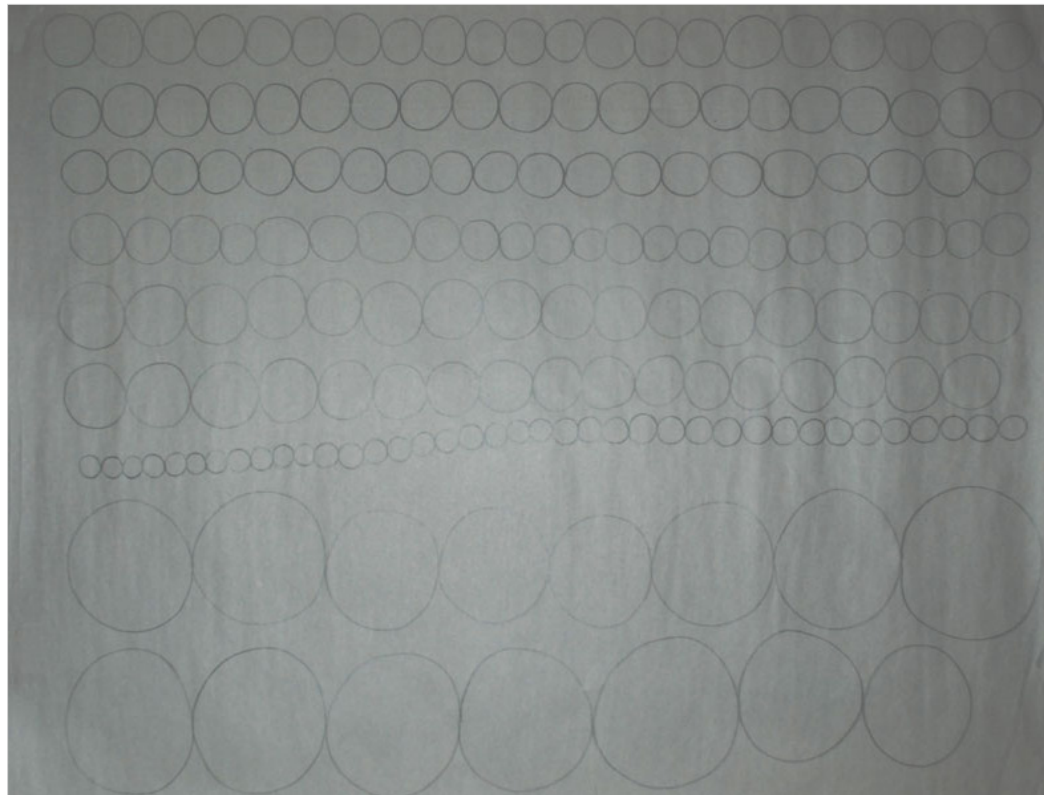
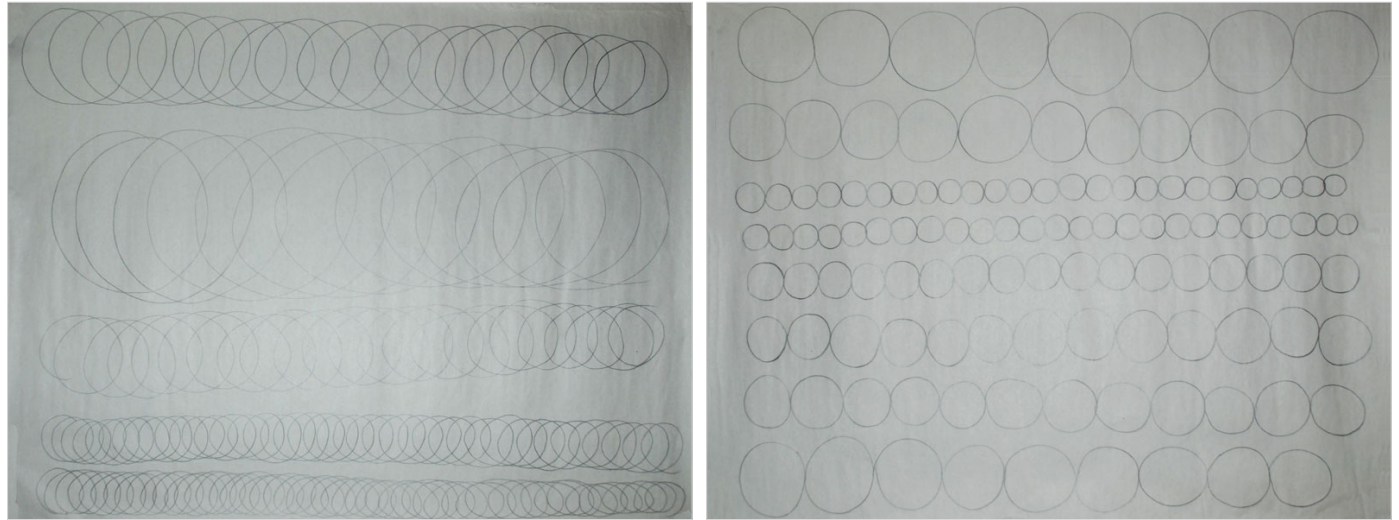
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

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Source:

<https://www.dsource.in/course/product-drawing/perspective>

## Perspective

Understanding perspective is essential to be able to represent three-dimensional objects with correct proportions, which are more realistic and 'true' to the eye. One basic difference between isometric product drawings and product sketching is the visual effect of depth that is achieved through foreshortening.

### What is foreshortening?

Foreshortening is distortion due to perspective when an object appears compressed when seen from any particular viewpoint.

### What is Vanishing Point (VP)?

Due to foreshortening, if we were to extend these lines of taper, there would appear a point where these lines seem to emerge from, this point is called the vanishing point (VP), as elucidated in Fig. 11.

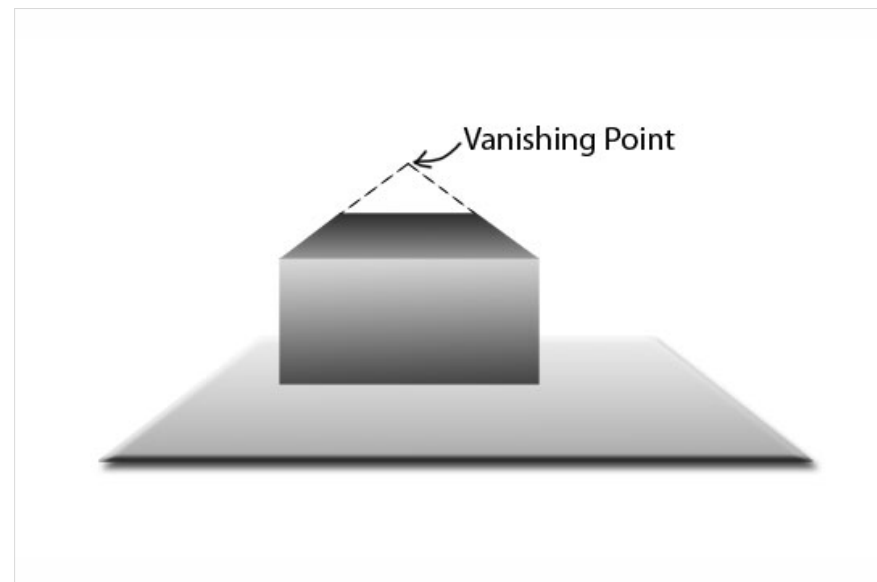


Fig. 11: Foreshortening and Vanishing Point.

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

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IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/perspective>

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

For more clarity on the vanishing point, hold an object in front of your eyes, and gradually move it away towards your left and then to your right, up and then down and notice that beyond your cone of vision, this object vanishes. This perimeter region, beyond which the object vanishes from your view, is where the vanishing points lie.

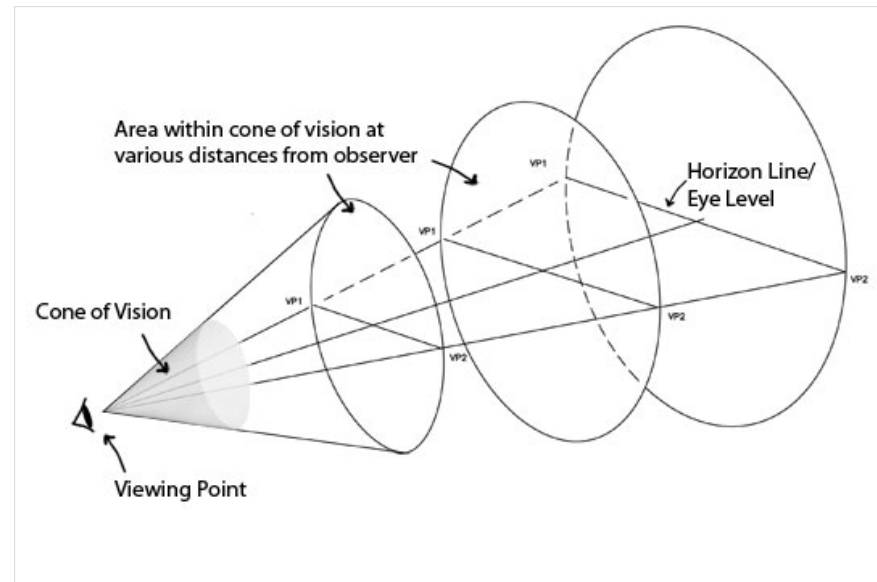


Fig. 12: Vanishing Points (VP) with respect to Eye Level or Horizon and the Cone of vision.

### One and Two Point Perspectives:

One and Two Point Perspectives make use of one and two vanishing points respectively.

### One Point Perspective:

In One Point Perspective, also known as Parallel Perspective, the object is directly in front of the observer and not at an angle such that its primary surface is parallel to the imaginary frame of view or picture plane.

Mostly adopted to draw spaces, such as interiors of a room or buildings on a street, one will notice that the objects diminish in size, perpendicularly into the paper towards this single vanishing point.

Design Course

## Product Drawing

Representation of Objects

by

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IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/perspective>

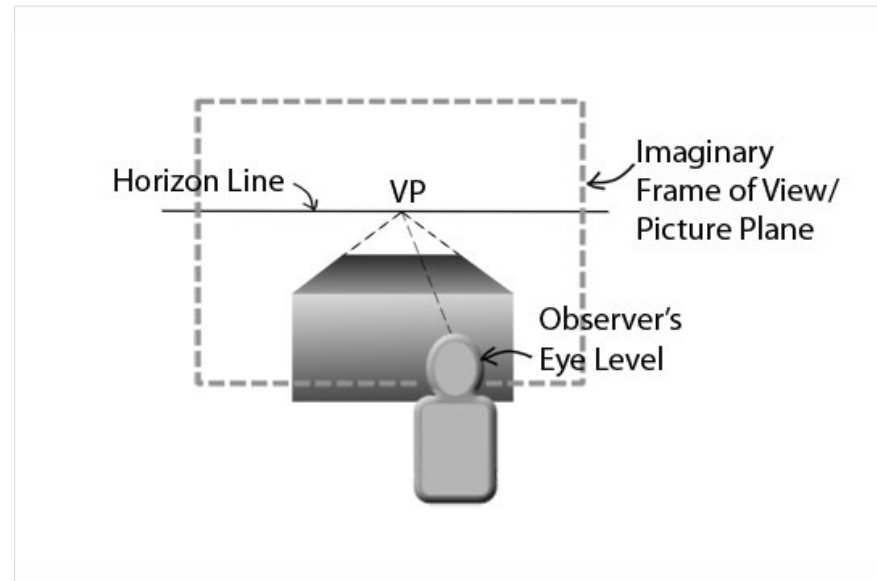


Fig. 13: One Point Perspective.

### Exercise 3:

One Point Perspective:

- Assuming a horizon and a single vanishing point, draw a cube in One Point Perspective.

### Two Point Perspective:

Two Point Perspectives, i.e. perspectives drawn considering two vanishing points are mostly adopted for object drawing. Designers adopt Two Point perspectives for most of their 3D representation.

### 1. Introduction

### 2. Lines

### 3. Perspective

### 4. Shadows

### 5. Highlights

### 6. Object Drawings

### 7. Exploded Views

### 8. videos

### 9. Contact Details



Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/perspective>

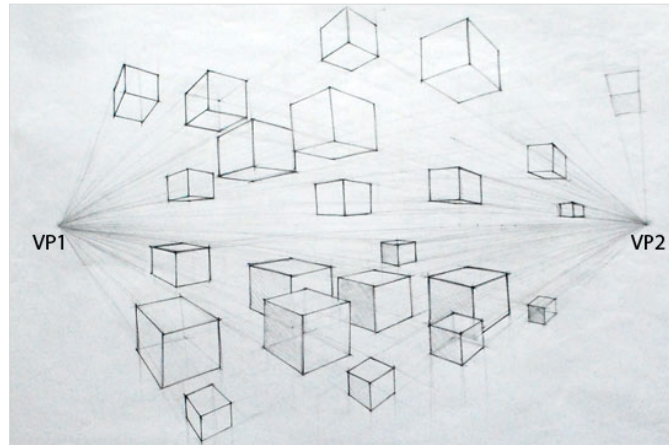
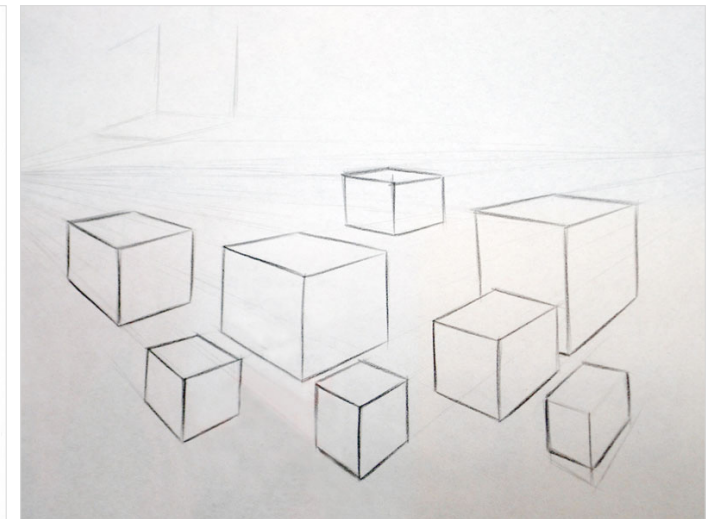
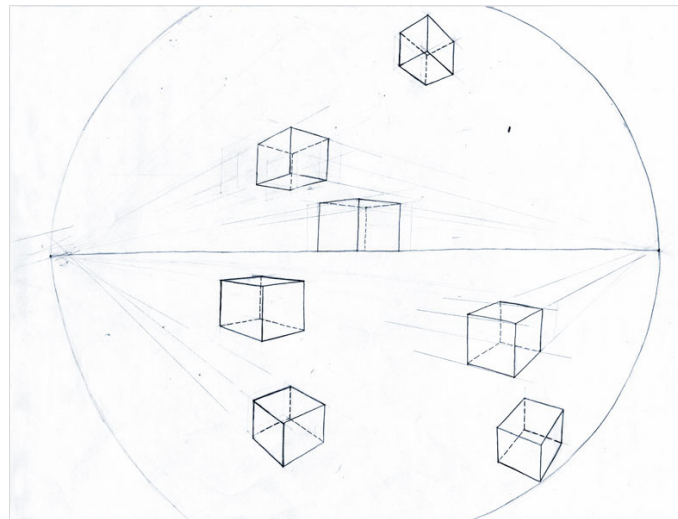


Fig. 14: Cubes in space in Two Point Perspective.

Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

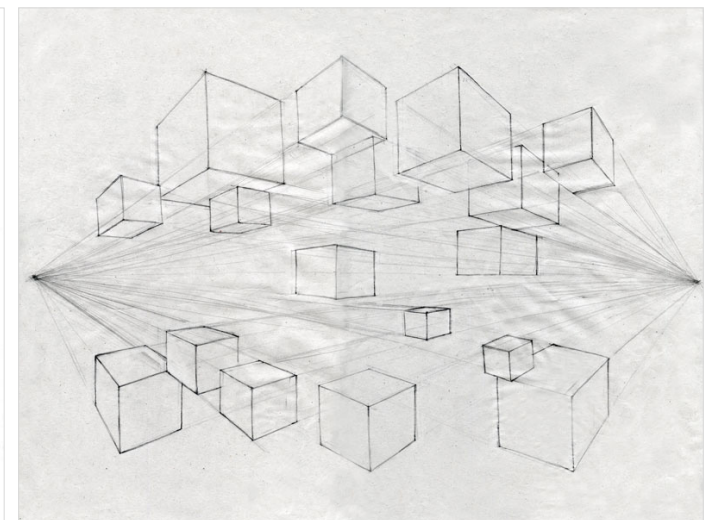
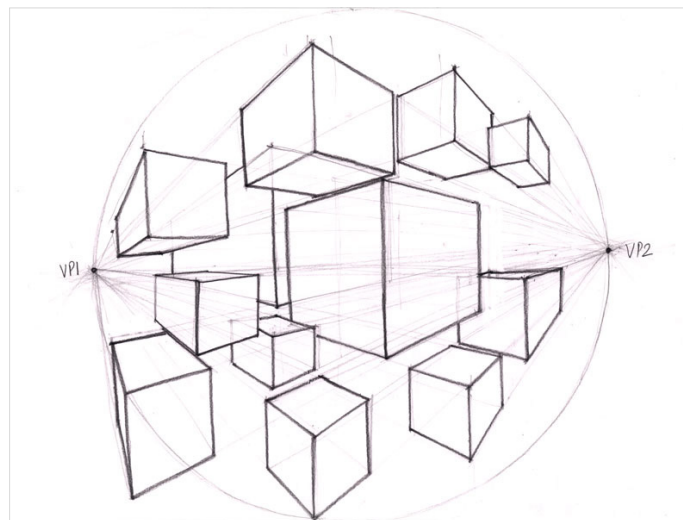
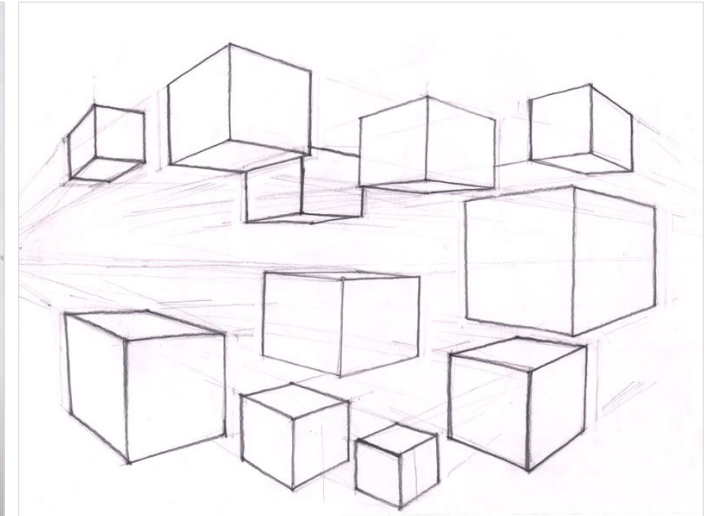
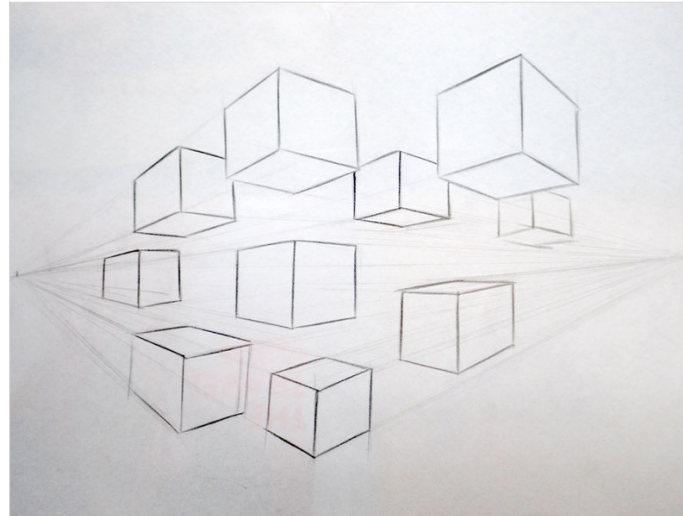
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<https://www.dsource.in/course/product-drawing/perspective>



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

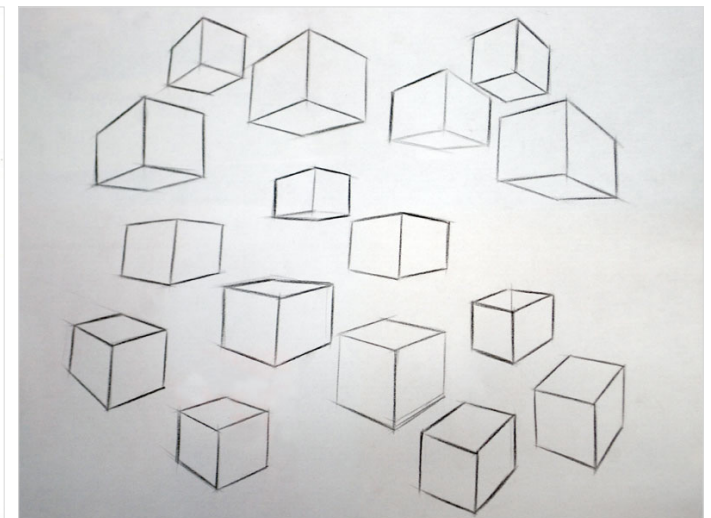
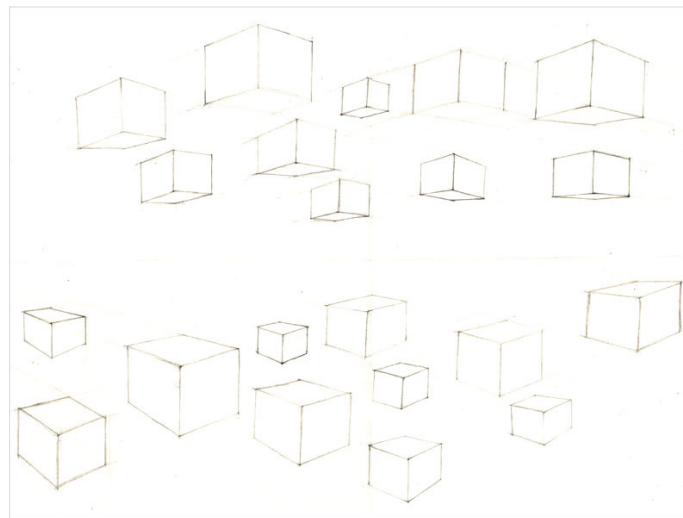
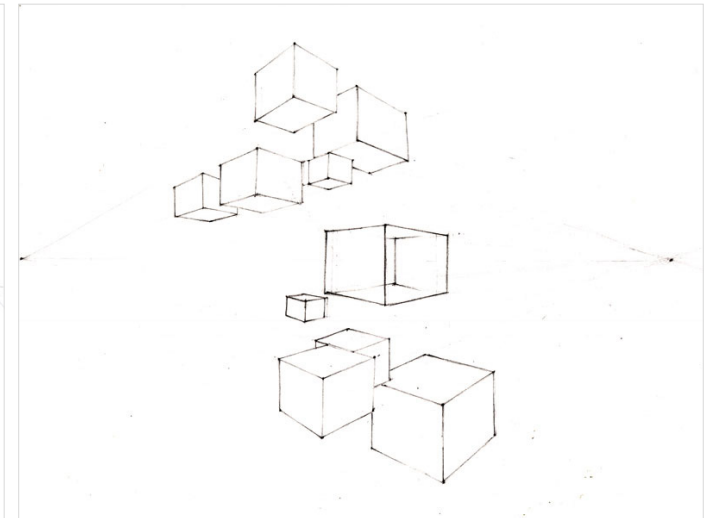
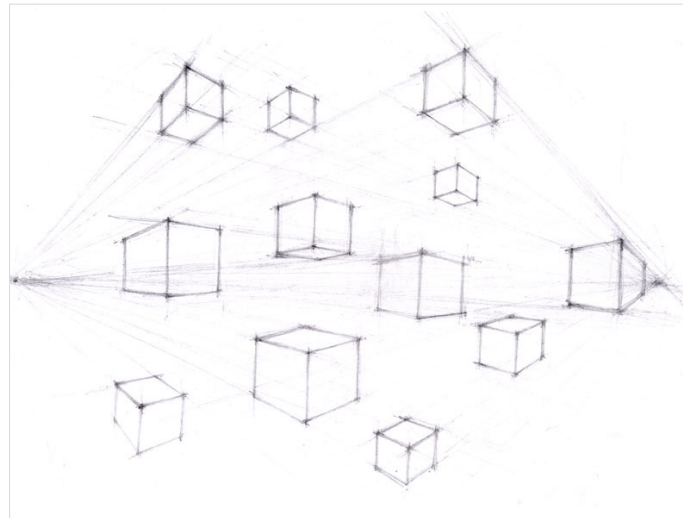
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<https://www.dsource.in/course/product-drawing/perspective>



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/perspective>

### Exercise 4:

Cubes in Two Point Perspective:

- Assume a horizon and two vanishing points, as discussed above.
- Extending lines from these points, draw various cubes in space in Two Point Perspective.

### Note:

Distortions such as circles becoming ellipses for example, occur when represented in perspective.

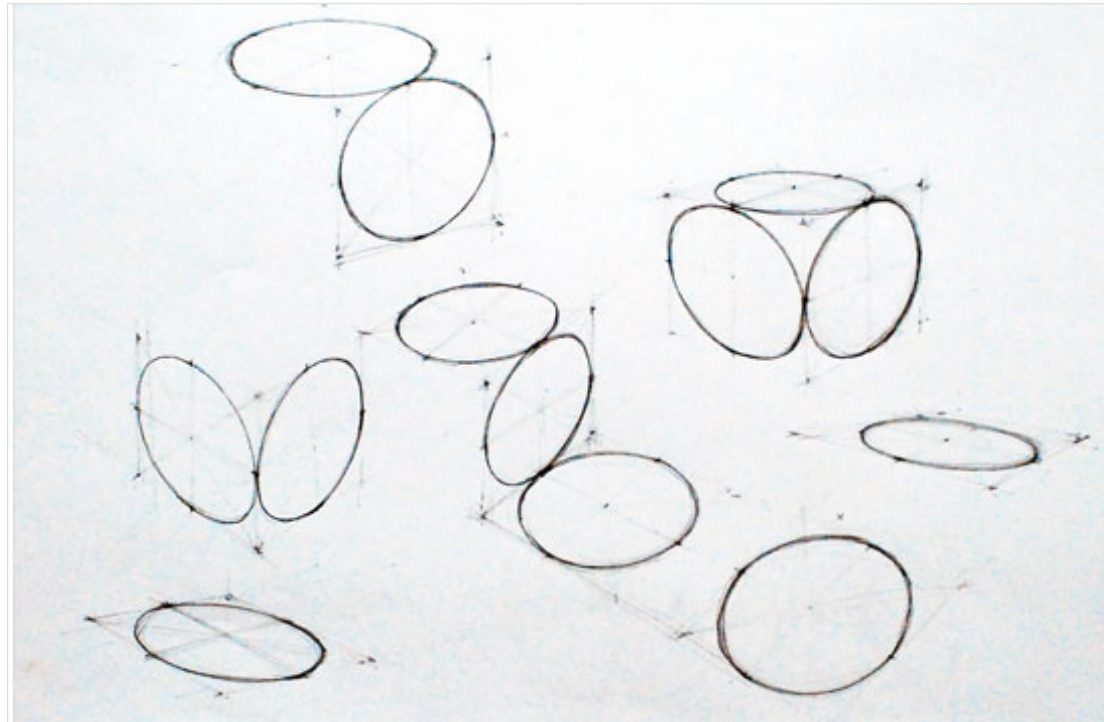


Fig. 15: Circles in Perspective.

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

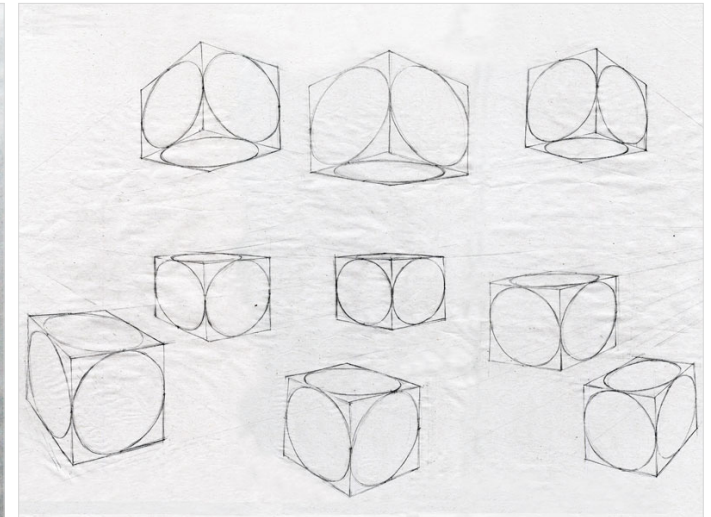
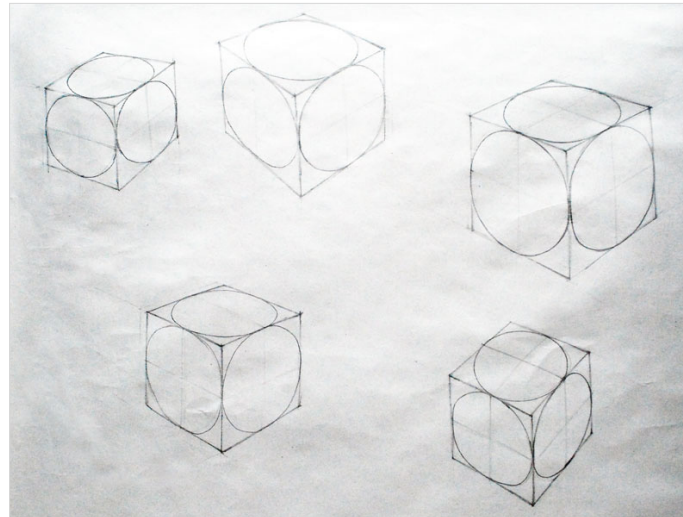
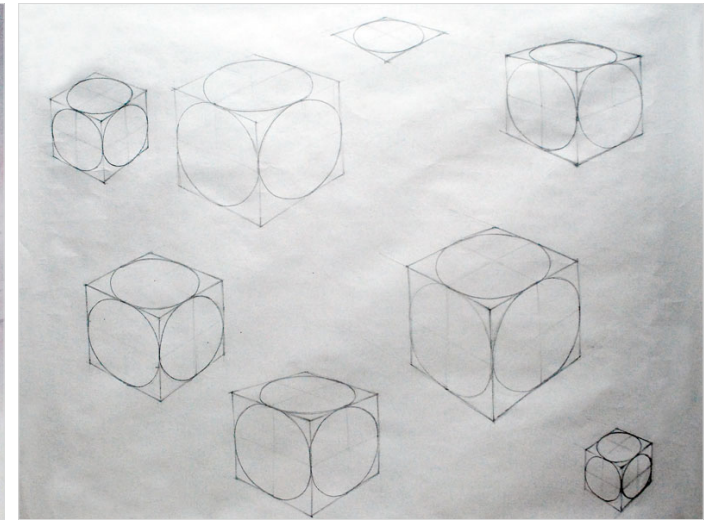
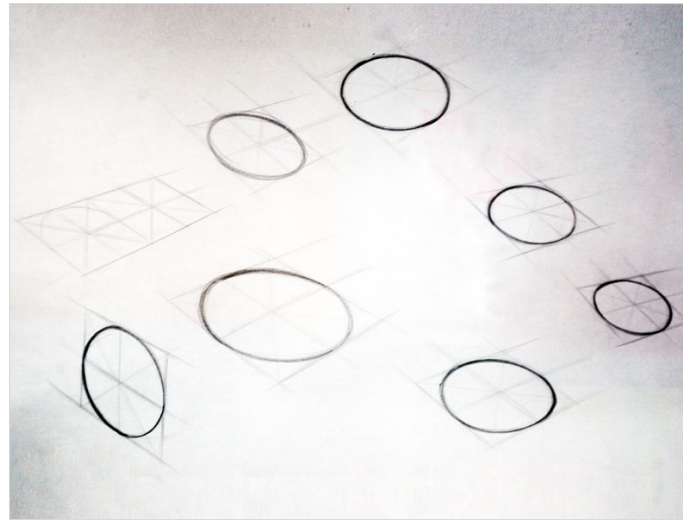
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Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/perspective>

### Exercise 5:

Circles in Two Point Perspective:

- Now draw circles onto those various cubes in space drawn by you.
- Note how the circles get an elliptical profile when in perspective.

### Exercise 6:

Treasure Box in Two Point Perspective:

- As you get a hang of the circles and cubes in perspective, try drawing objects that are predominantly combinations of these.
- Draw these Treasure Boxes to begin with. Notice the ellipsoidal reference lines along the edges of the cube, to correctly draw the open lid.

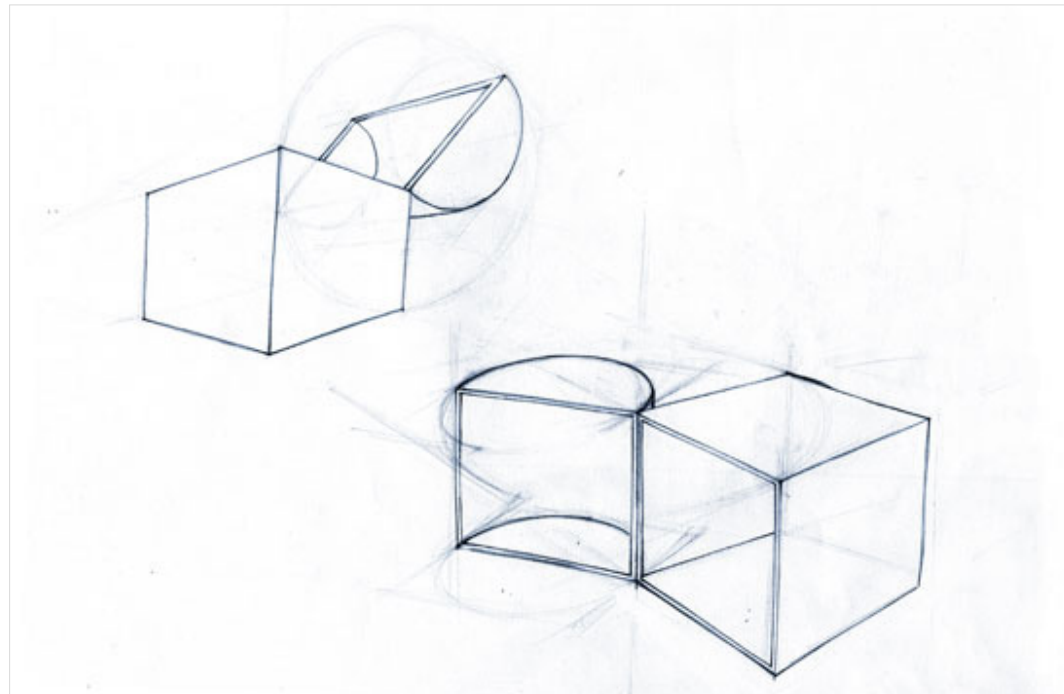


Fig. 16: Treasure Box in Two Point Perspective.

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

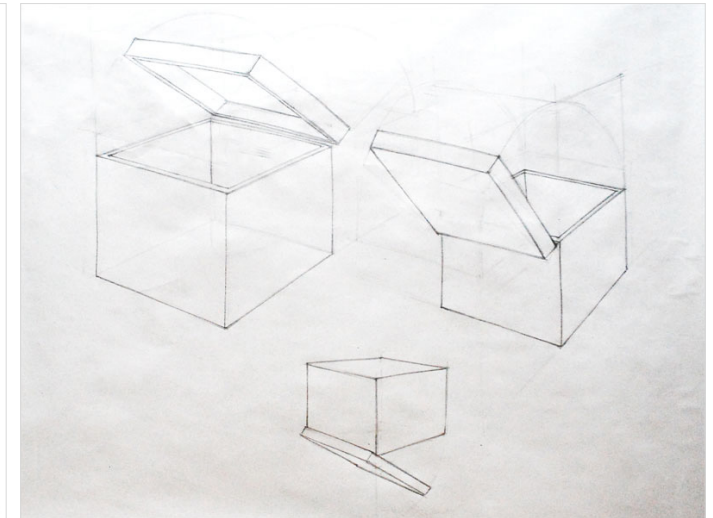
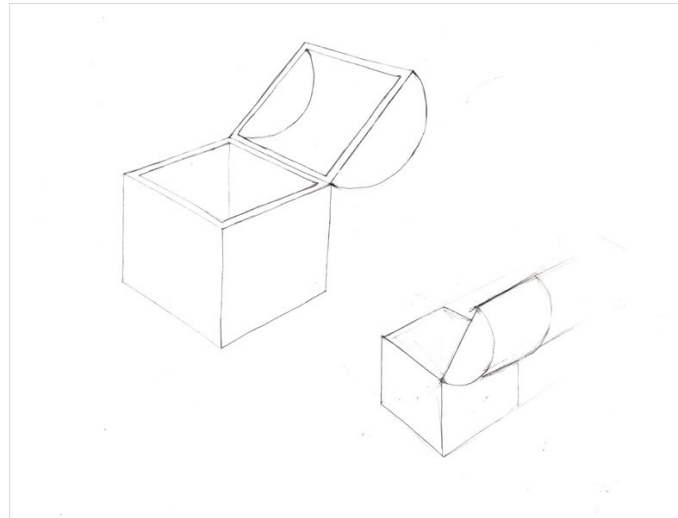
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<https://www.dsource.in/course/product-drawing/perspective>

Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

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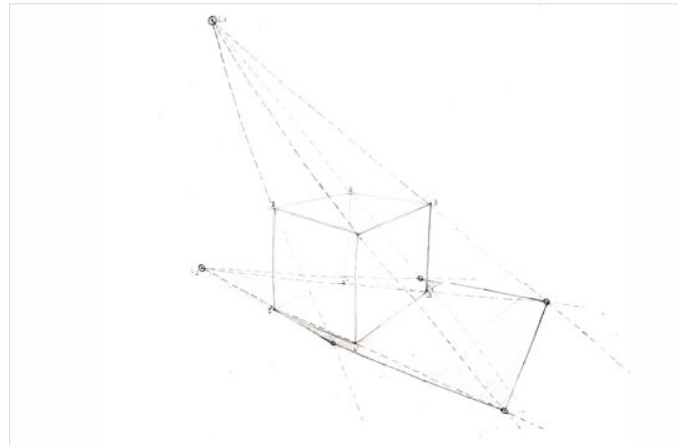
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

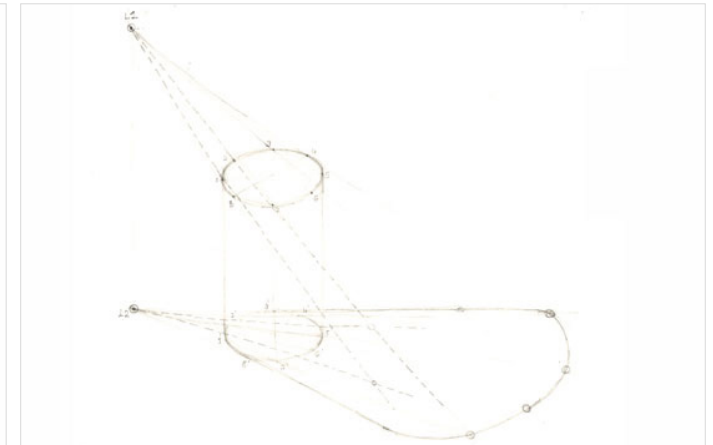
## Shadows

Shadows help make your sketches 'pop-up' from their backgrounds, and seem more real. It is important to understand light in order to understand shadows. It is best to begin with shadows of objects with single light sources.

The simplest way to trace a shadow is to draw straight lines starting from the assumed source of light/lights to the edges or corner most points of your product, extending it beyond to fall onto the surface or ground on which the product is kept. In case of complex objects, shadows may be cast onto the same product surface and follow the profile of the surface. Thus, shadows also enhance the overall sketch giving more information of the surface it falls on, be it the ground, or on itself.



**Fig. 17:** Observe how the shadows have been traced from the end points of the cube and cylinder in these cases.



**Fig. 18:** Observe how the shadows have been traced from the end points of the cube and cylinder in these cases.



Design Course

## Product Drawing

Representation of Objects

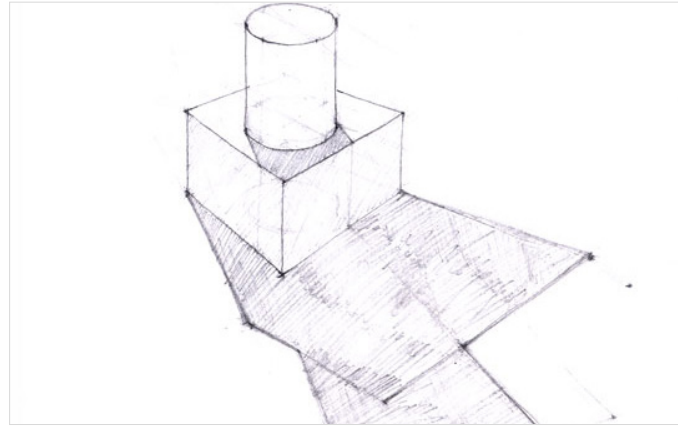
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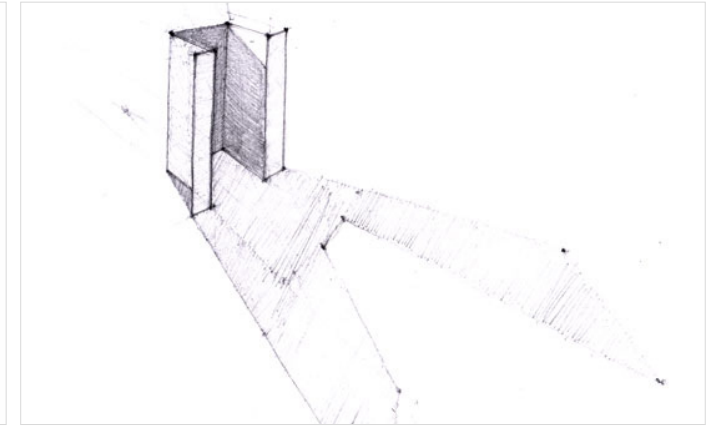
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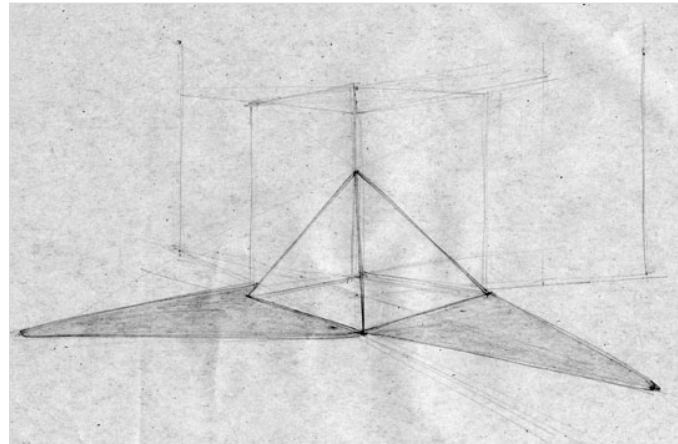
**Fig. 19:** Observe how the shadows have been traced from the end points of the cube and cylinder in these cases.



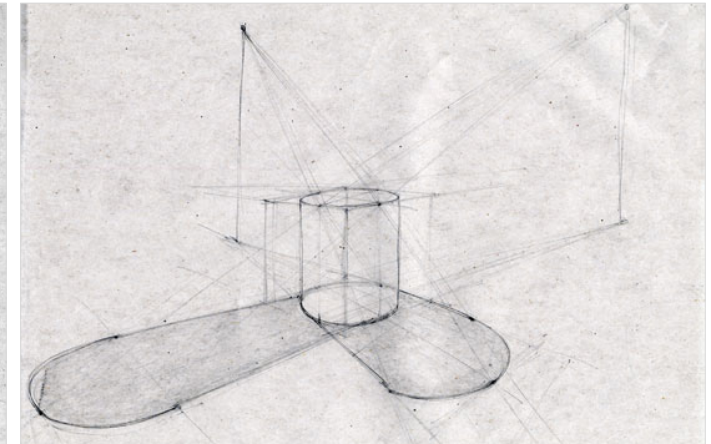
**Fig. 20:** Observe how the shadows have been traced from the end points of the cube and cylinder in these cases.

**Note:**

You could also try the same method for more than one source of light.



**Fig. 21:** Note the shadow trace for this pyramid and cylinder.



**Fig. 22:** Note the shadow trace for this pyramid and cylinder.

**Exercise 7:**

Tracing Shadows

- Assume a light source above eye-level and draw the shadow of a cube, taking references from aforementioned examples.

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

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1. Introduction

2. Lines

3. Perspective

4. Shadows

5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details

## Highlights

Highlights are used to grab attention or create focal points for the observer by virtue of the reflections. They also help define form without one having to filling in or fleshing out the whole thing. They are the brightest spots on the object as light reflects most here.

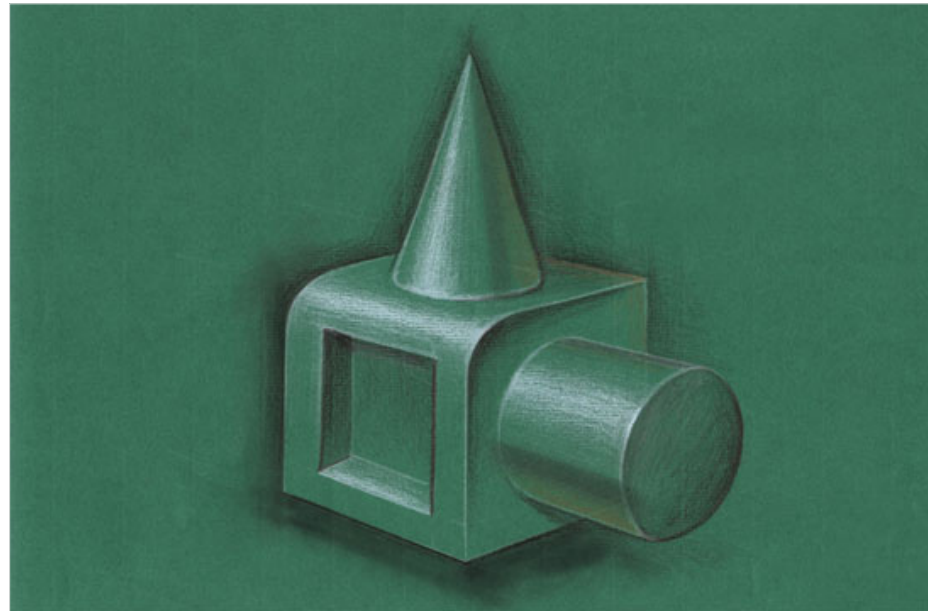


Fig. 23: Notice the variation in fillets that give cues of the edge profiles.

### Principles:

The general principles that one can adopt for highlights are:

- Sharper the edge, lesser the width of the highlight (marked as 'w' in Fig: 24 below).
- Bigger fillets have wider highlights.
- Highlight fades on either side.
- Chamfer edge picks up the light on the surface.
- Highlights on glossy surface is brighter.
- Highlights on matt surface is dull.

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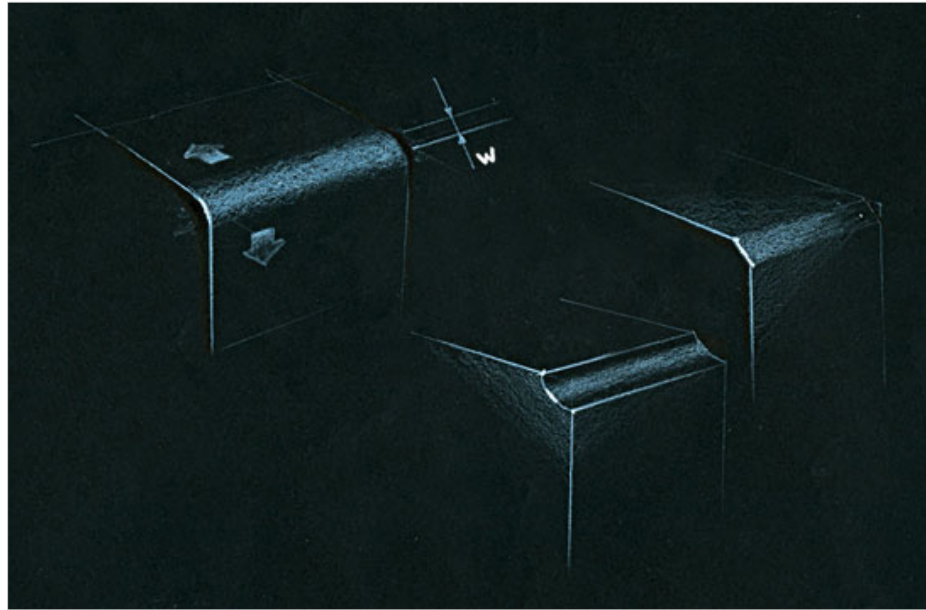
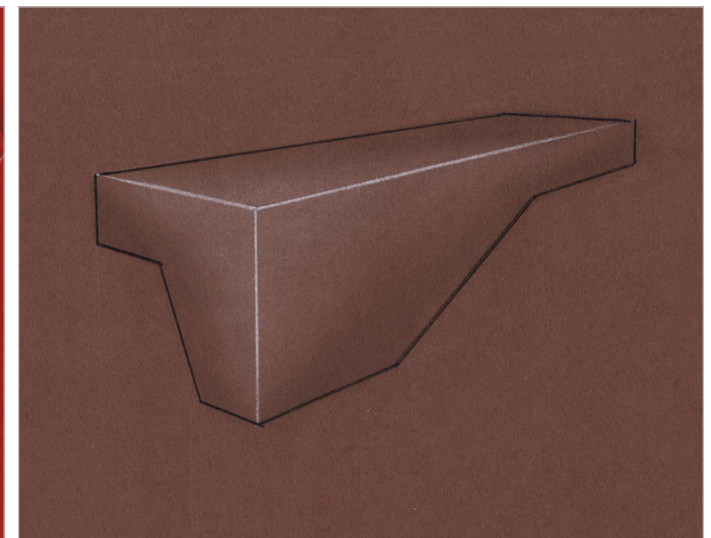
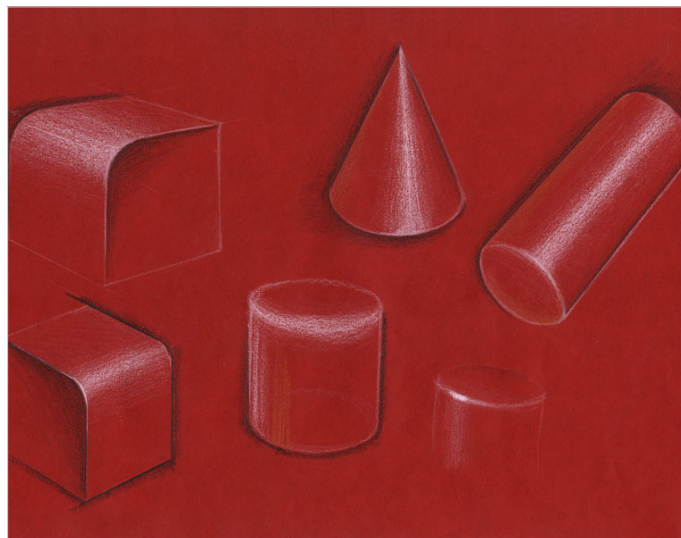


Fig. 24: Basic Highlight Techniques.

Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

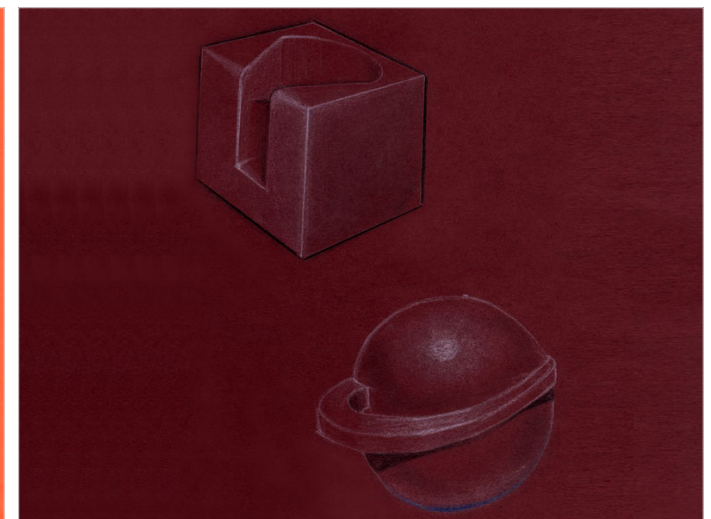
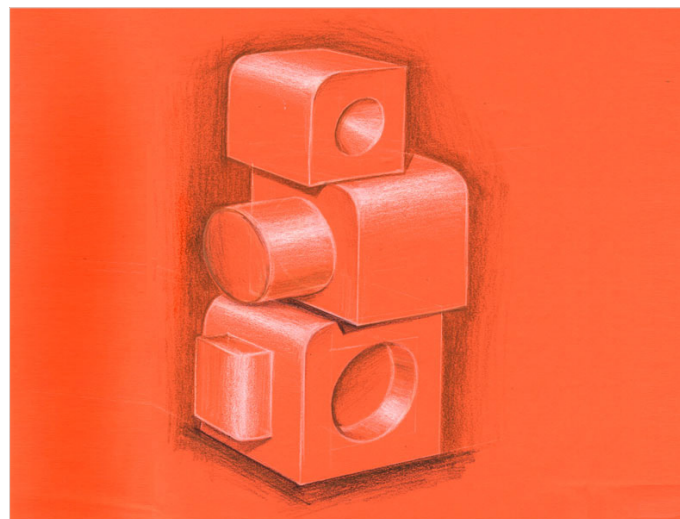
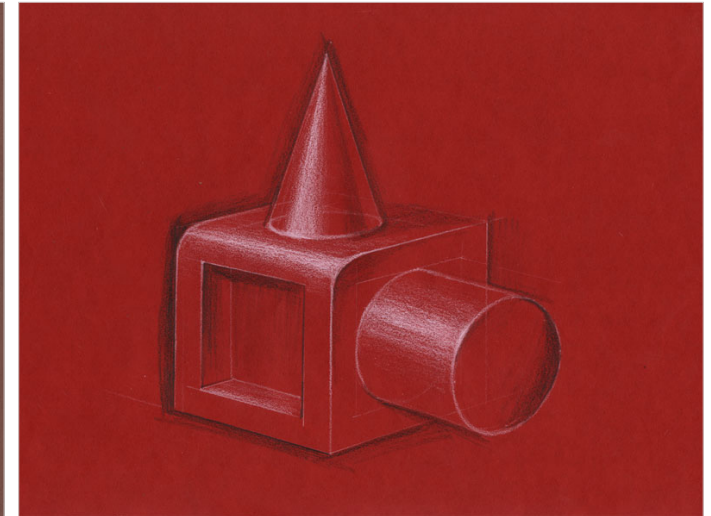
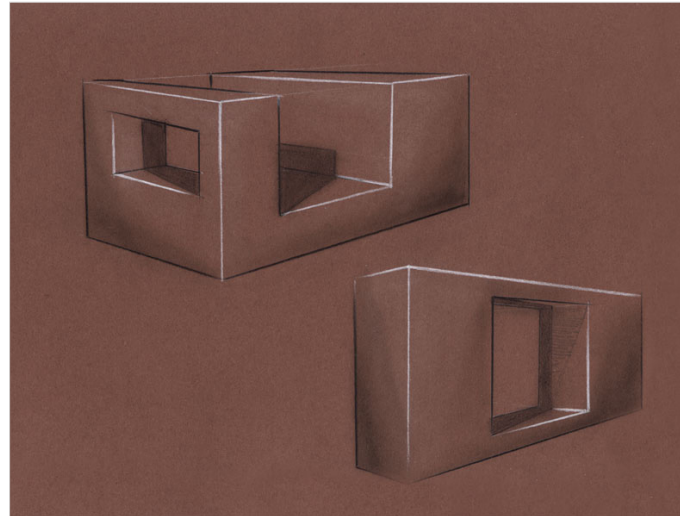
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

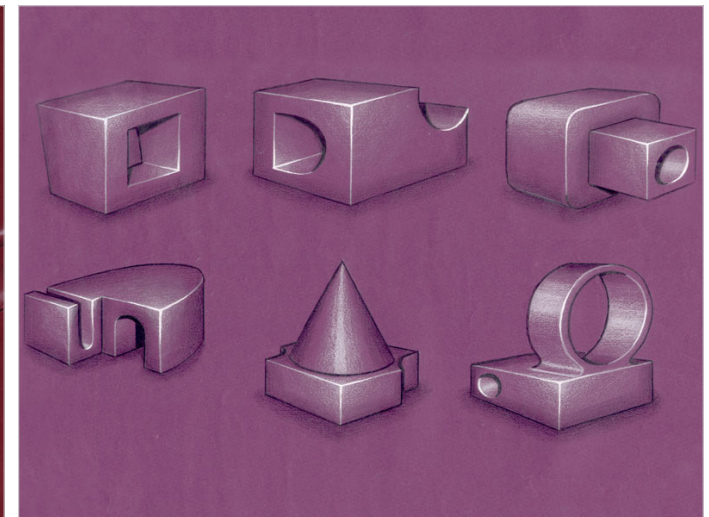
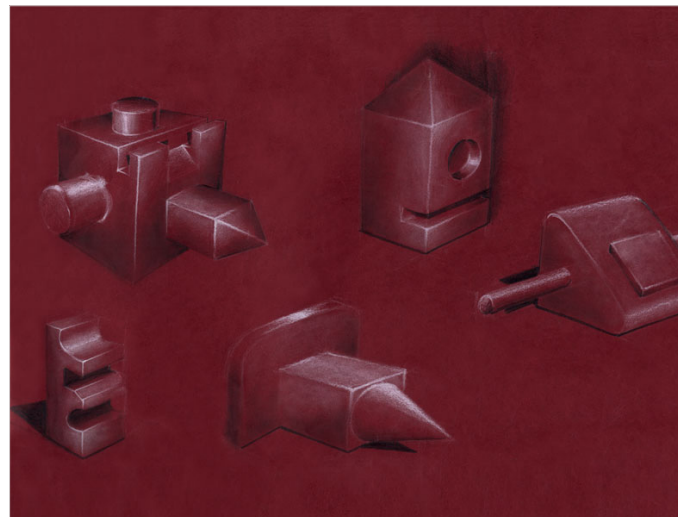
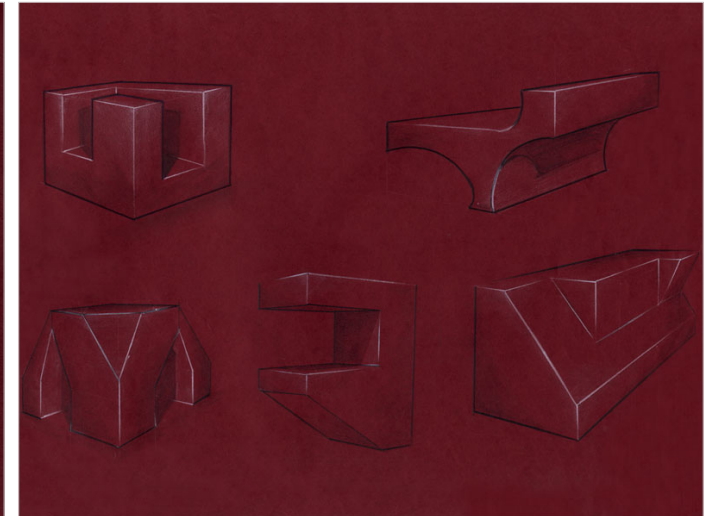
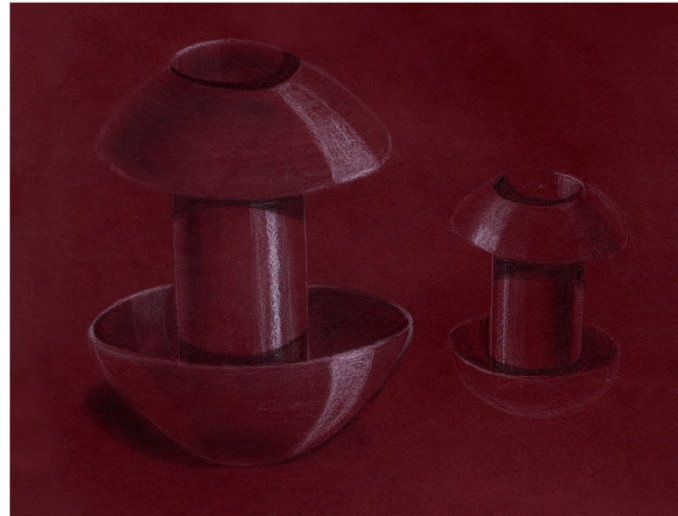
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

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Representation of Objects

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### Exercise 8:

Highlights on Simple Forms:

- Apply the rules discussed above to draw various basic forms, taking cues from the aforementioned examples.

### Note:

One can use highlights to great advantage for representing transparent and translucent objects.

### Examples:



1. Introduction

2. Lines

3. Perspective

4. Shadows

5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details

Design Course

## Product Drawing

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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details



Design Course

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### Exercise 9:

Highlights on Transparent and Translucent Objects:

- Take up everyday objects such as a drinking glass or bottle, and using a white colour pencil (or crayon/ white pen, depending on necessity), try to achieve maximum effect with minimum touches through accurate highlights.



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## Product Drawing

Representation of Objects  
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

## Object Drawings

Proportionate, well-defined sketches and renders communicate best. Pencil sketches done using good shade, shadow and highlight techniques or renderings in crayons, dry pastels, etc. are highly effective visualization tools for the designer.

Well thought of angles of view of the product, that gives maximum information about it, and covers most details are ideal. At times, you could also opt for more than one view, depending on your product, so as to communicate all aspects of your concept well.

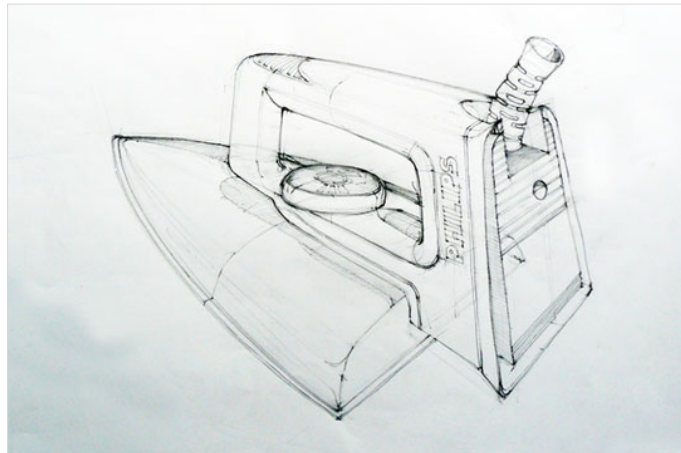


Fig. 25: Notice how multiple view sketches help grasp all details of this electric iron.

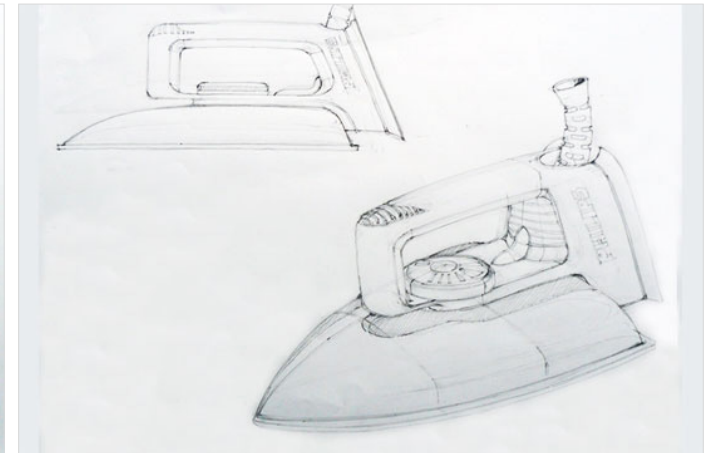


Fig. 26: Notice how multiple view sketches help grasp all details of this electric iron.

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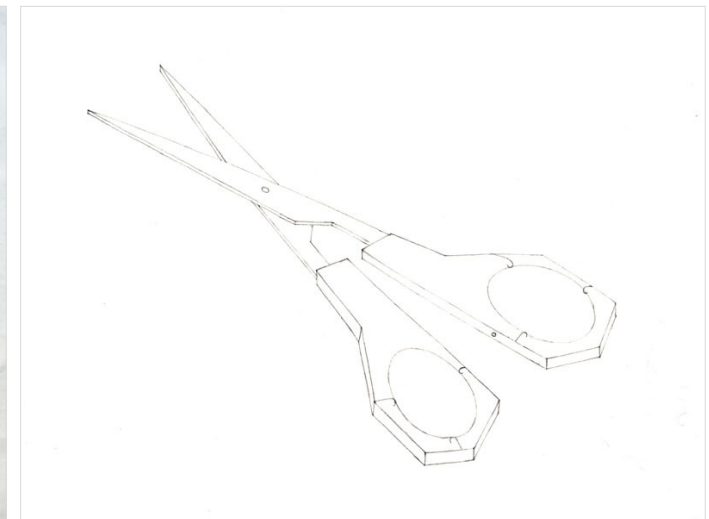
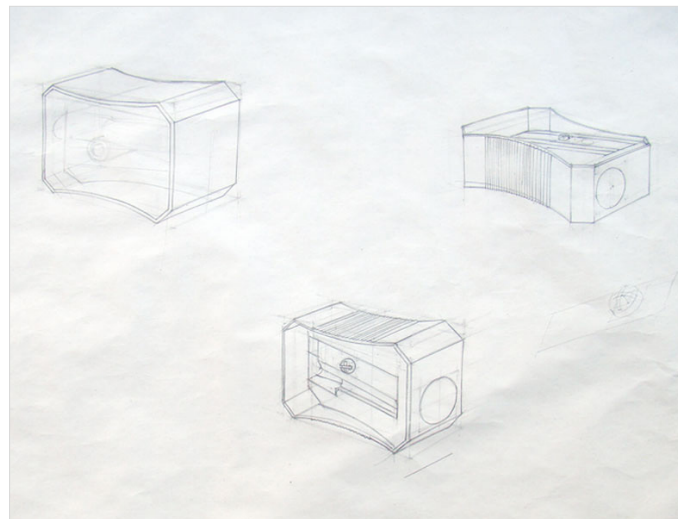
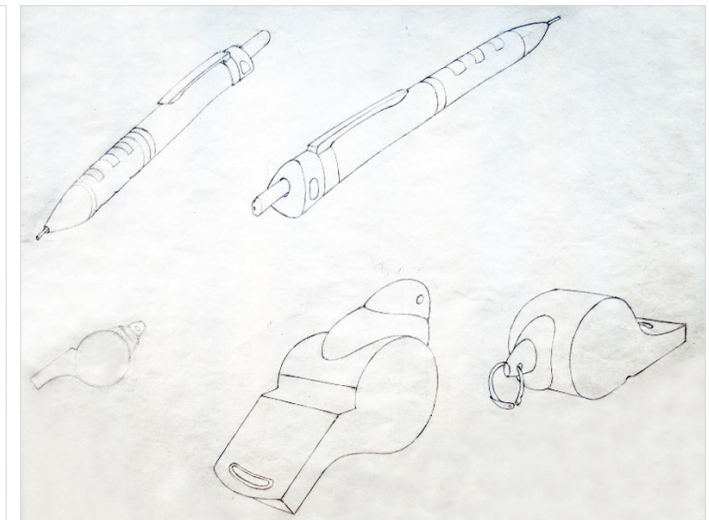
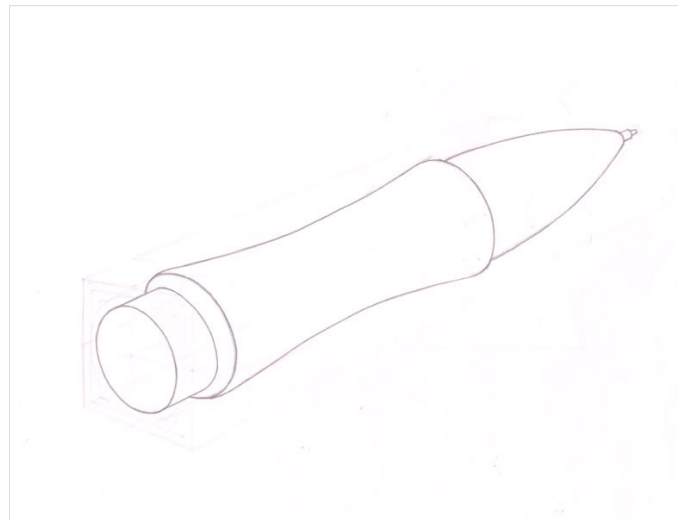
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Examples:



1. Introduction

2. Lines

3. Perspective

4. Shadows

5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details

Design Course

## Product Drawing

Representation of Objects

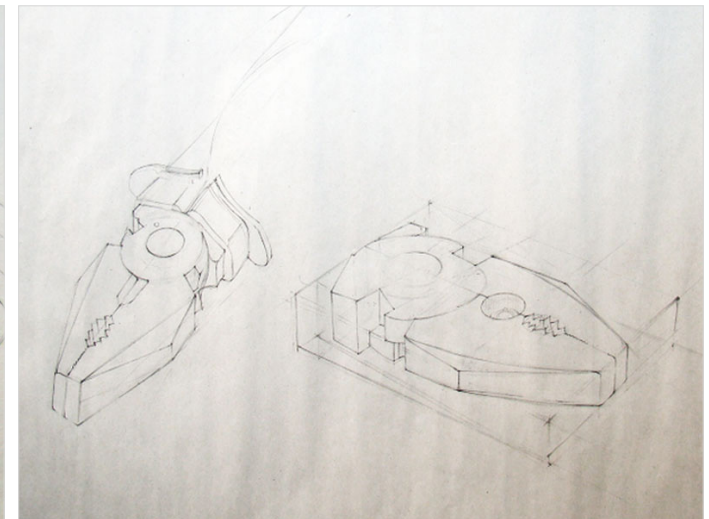
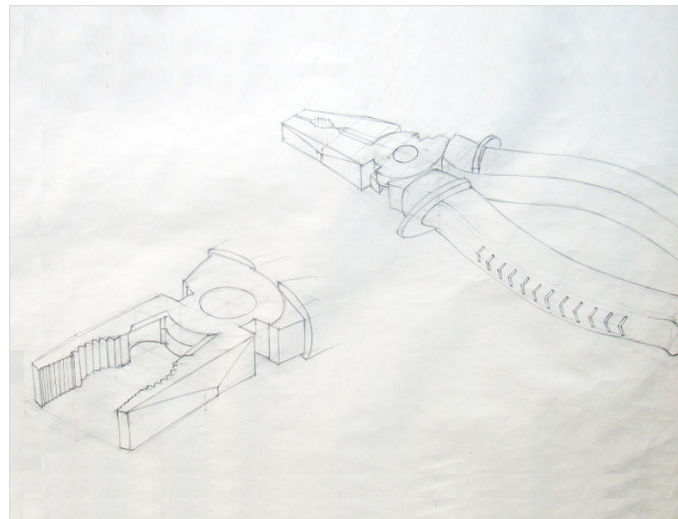
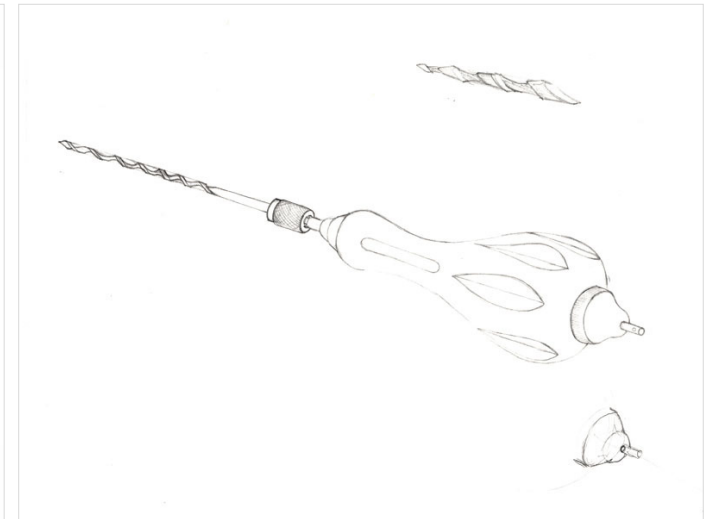
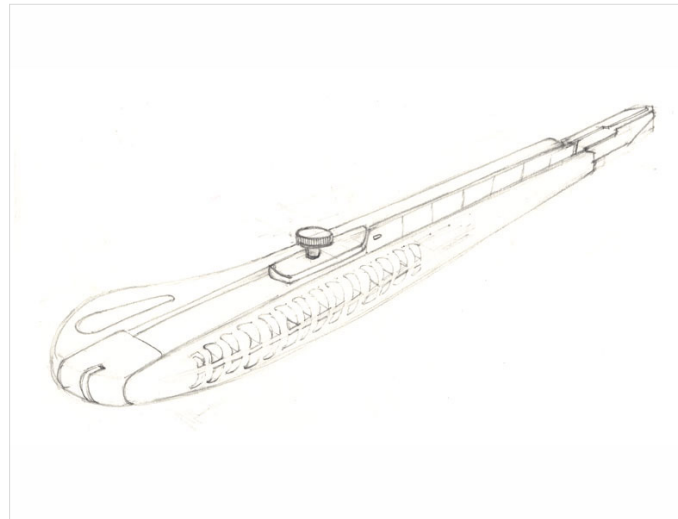
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

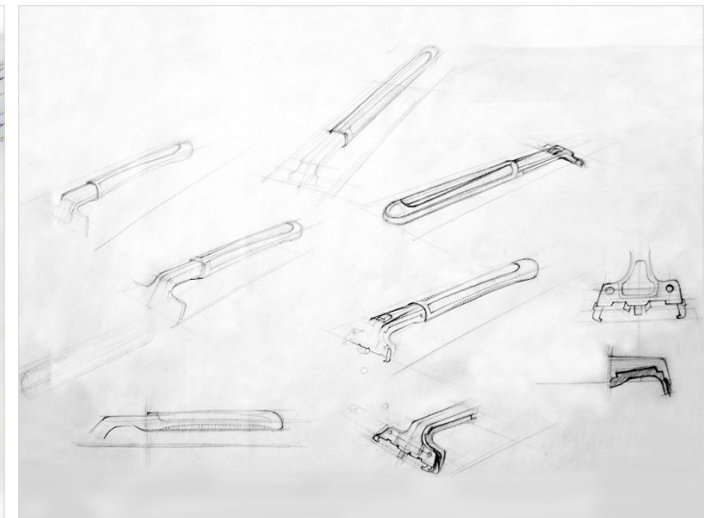
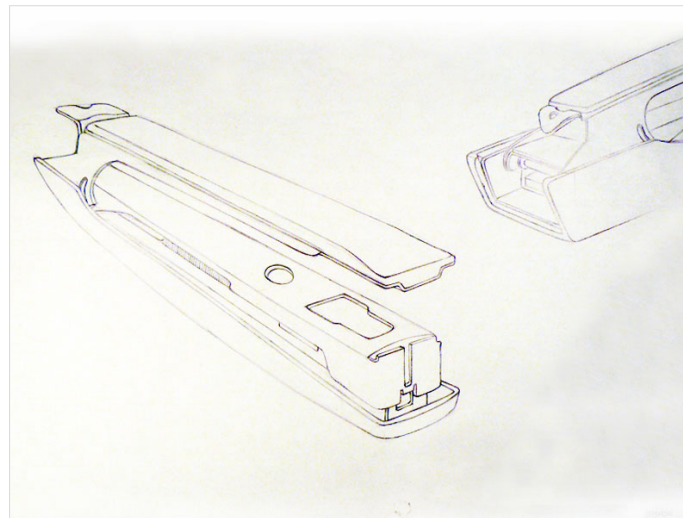
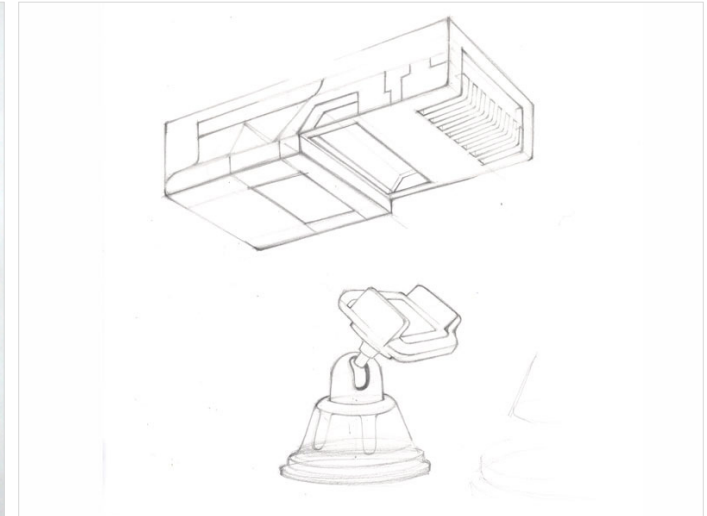
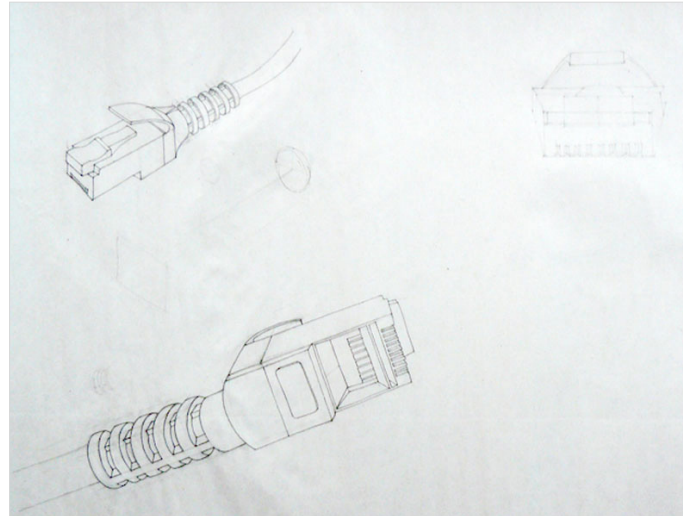
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

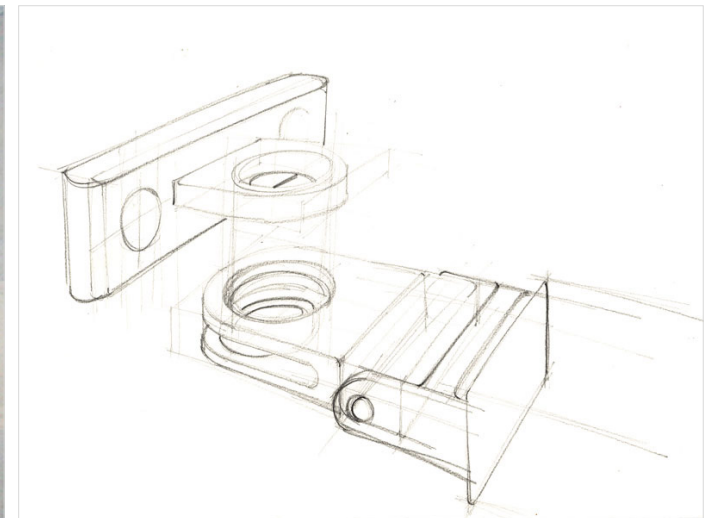
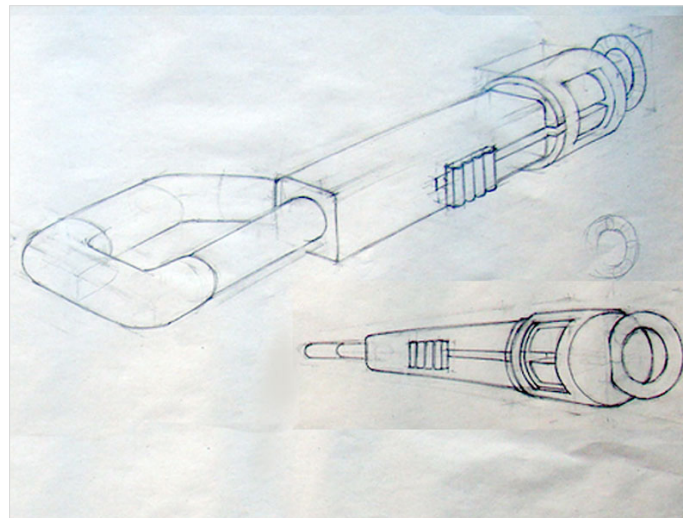
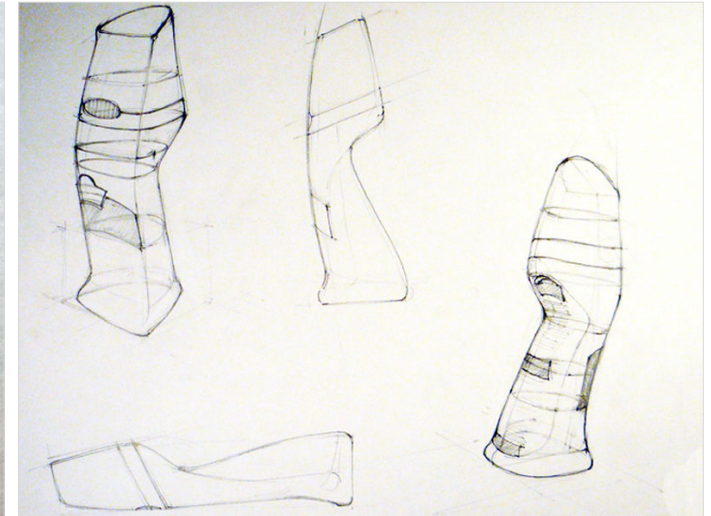
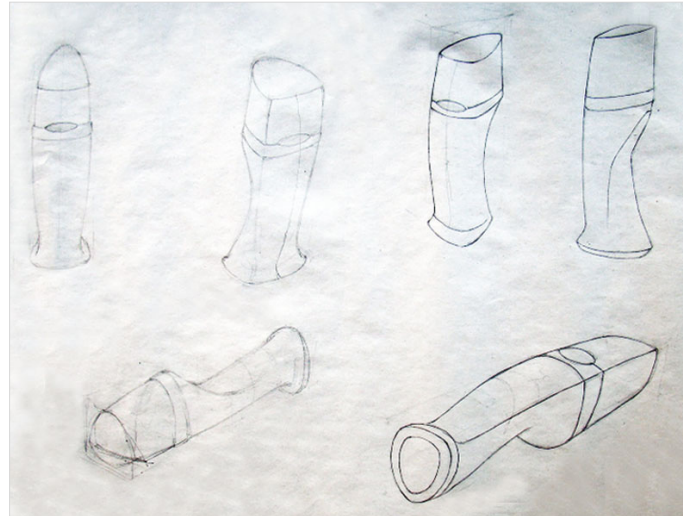
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

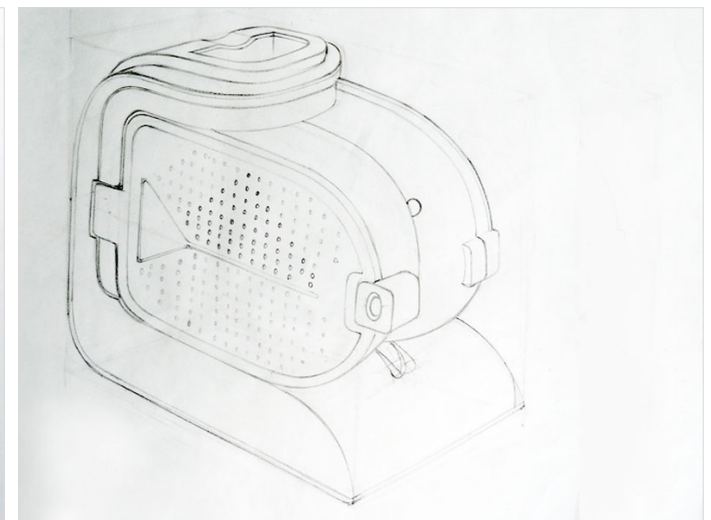
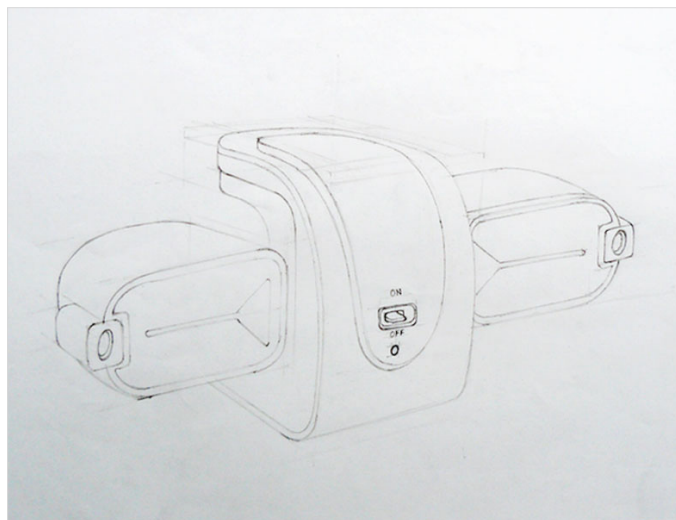
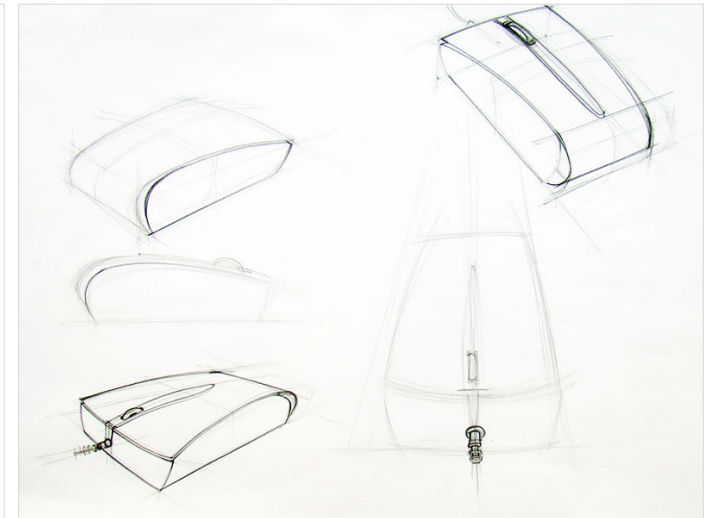
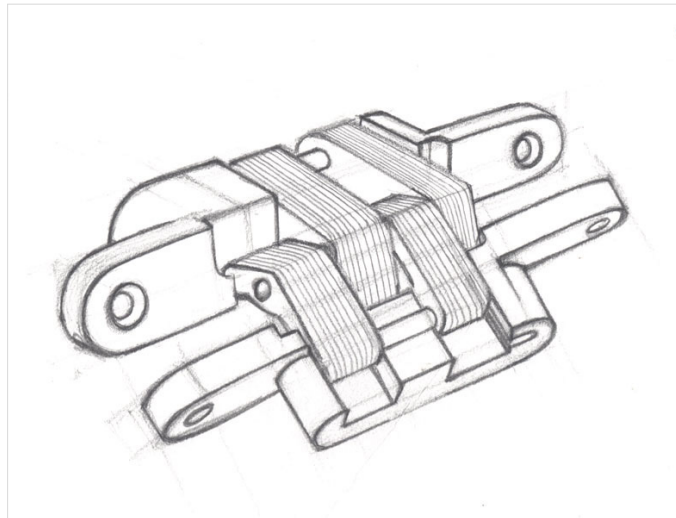
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details



Design Course

## Product Drawing

Representation of Objects

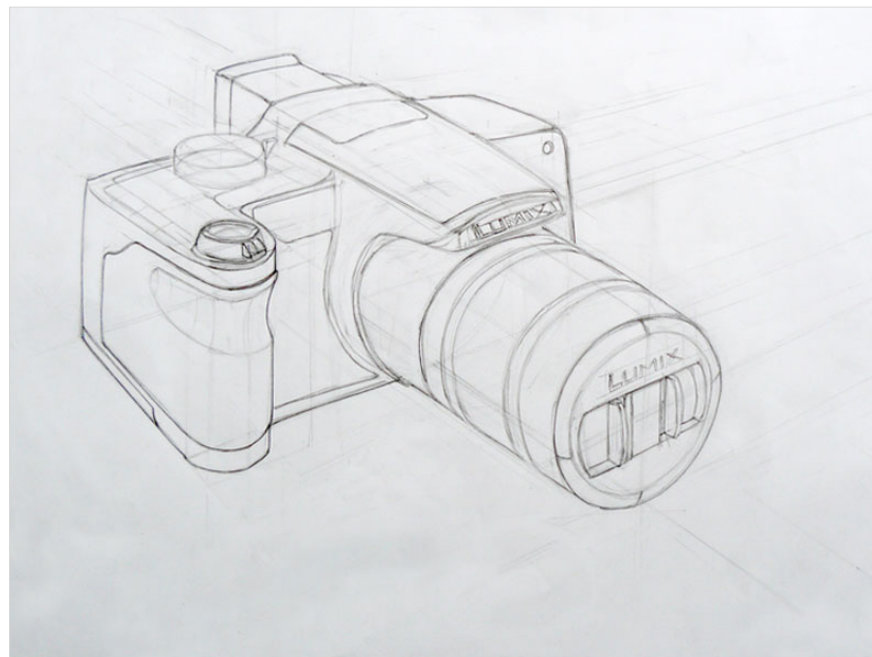
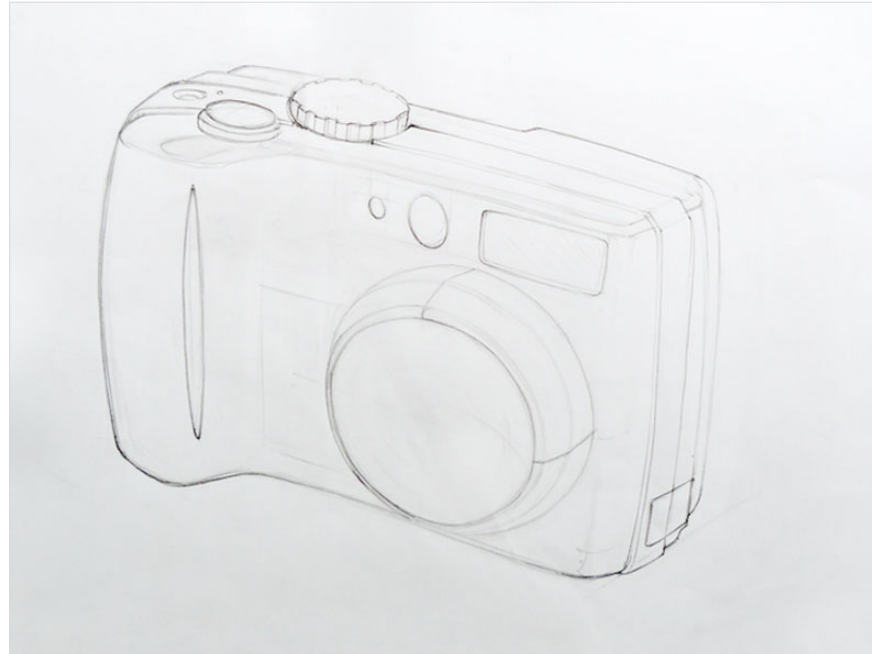
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1. Introduction

2. Lines

3. Perspective

4. Shadows

5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details

Design Course

## Product Drawing

Representation of Objects

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### Exercise 10:

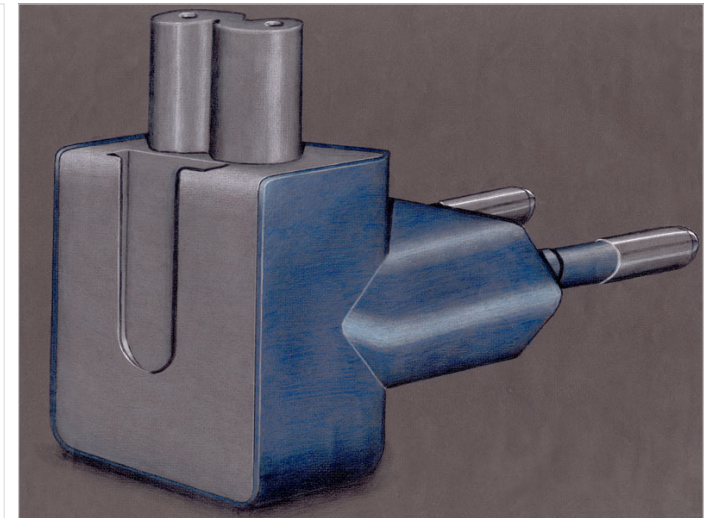
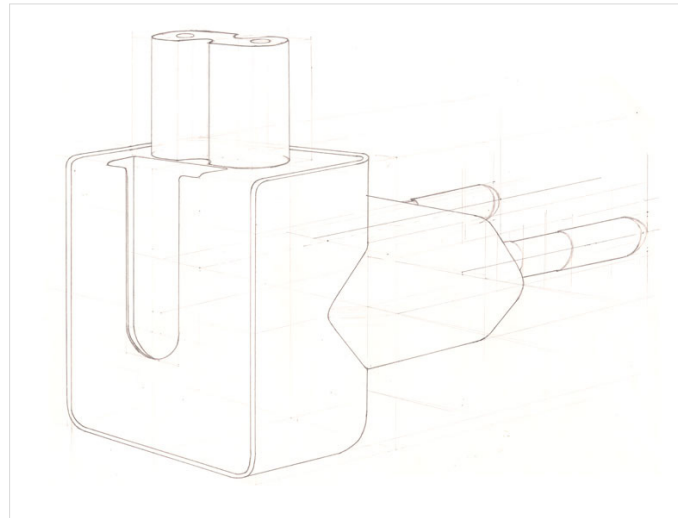
Object Sketching:

- Take a simple object around you, say like a stapler and decide a relatively good angle, and sketch it in perspective, applying the basics you've learnt earlier.

### Note:

Utilizing all the concepts discussed in the earlier chapters of this course, such as shadows, highlights, and the concepts of perspective, one can create very convincing product sketches and renders.

### Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details



Design Course

## Product Drawing

Representation of Objects

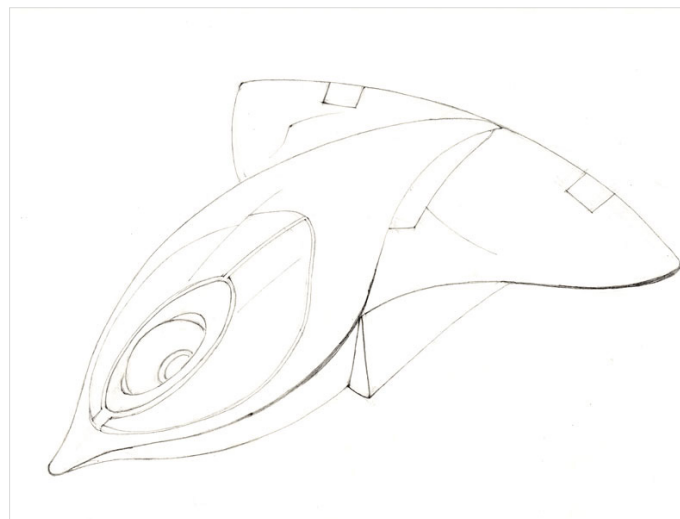
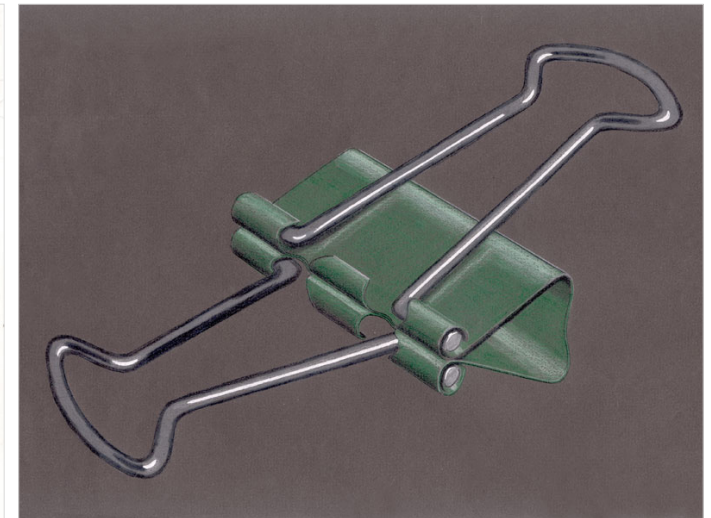
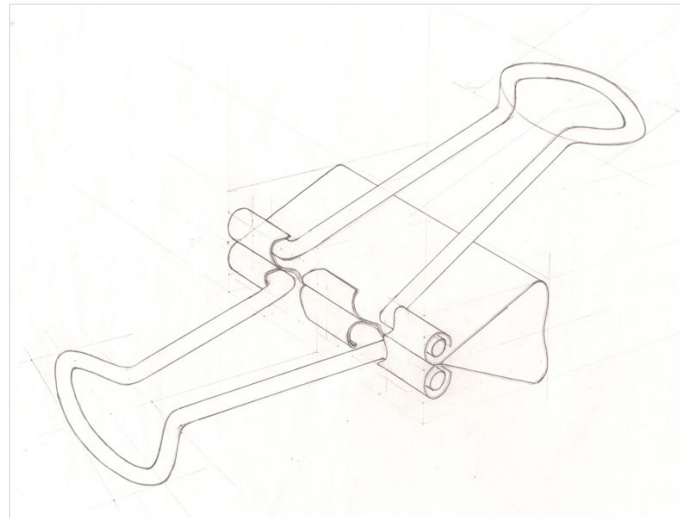
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

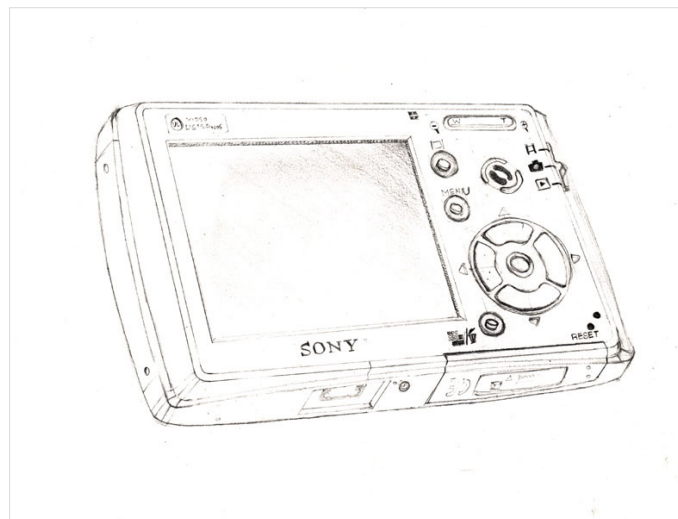
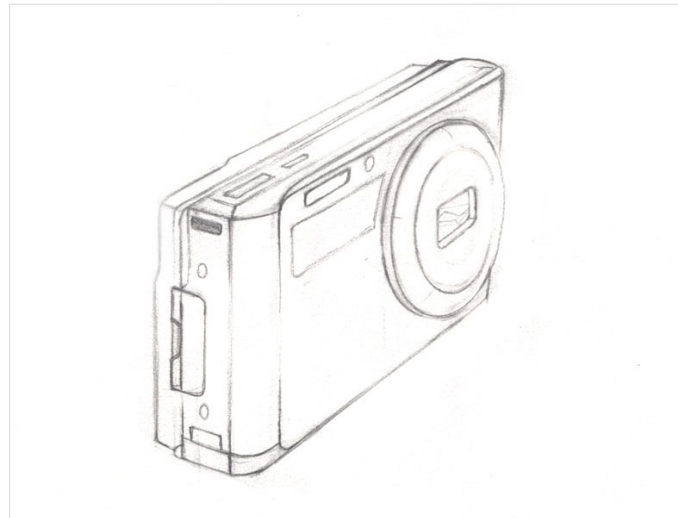
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

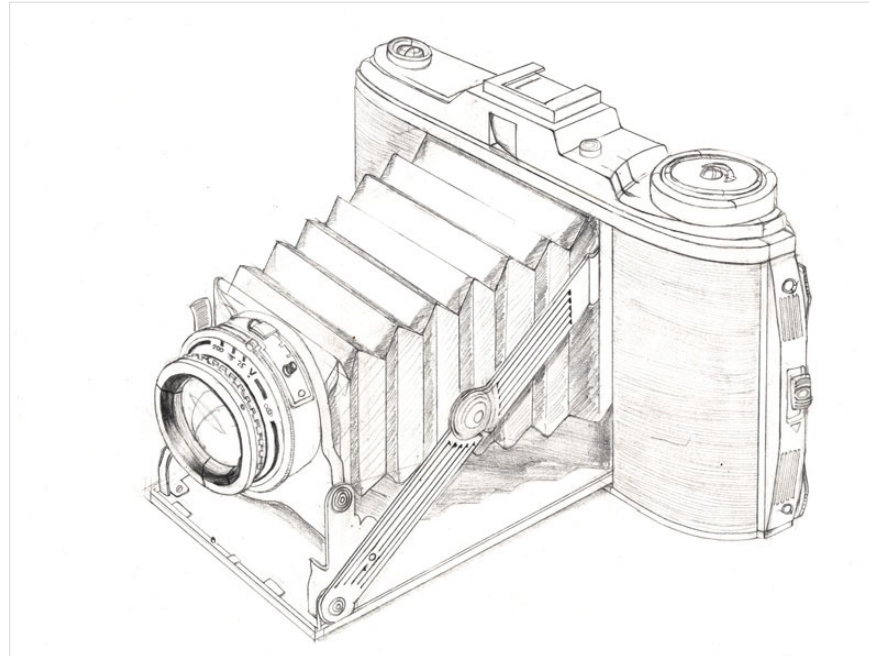
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

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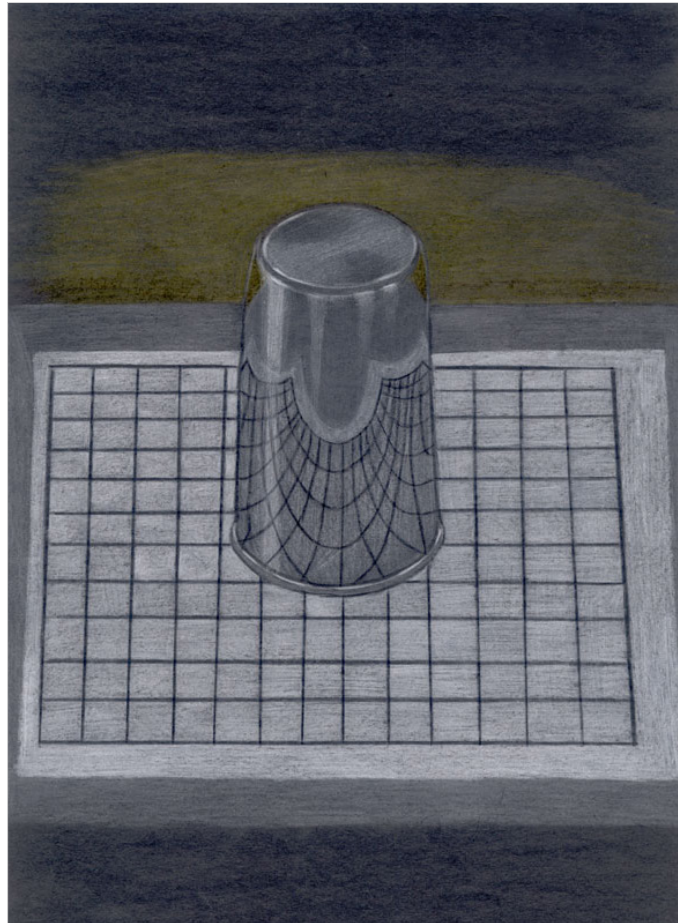
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For rendering, one good technique is to select a base colour that comprises most part of the product's body. This allows you to just play with the shadows and highlights, instead of bothering about the fill. Also observe how a reflection on an object will follow the contours of that object.

Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

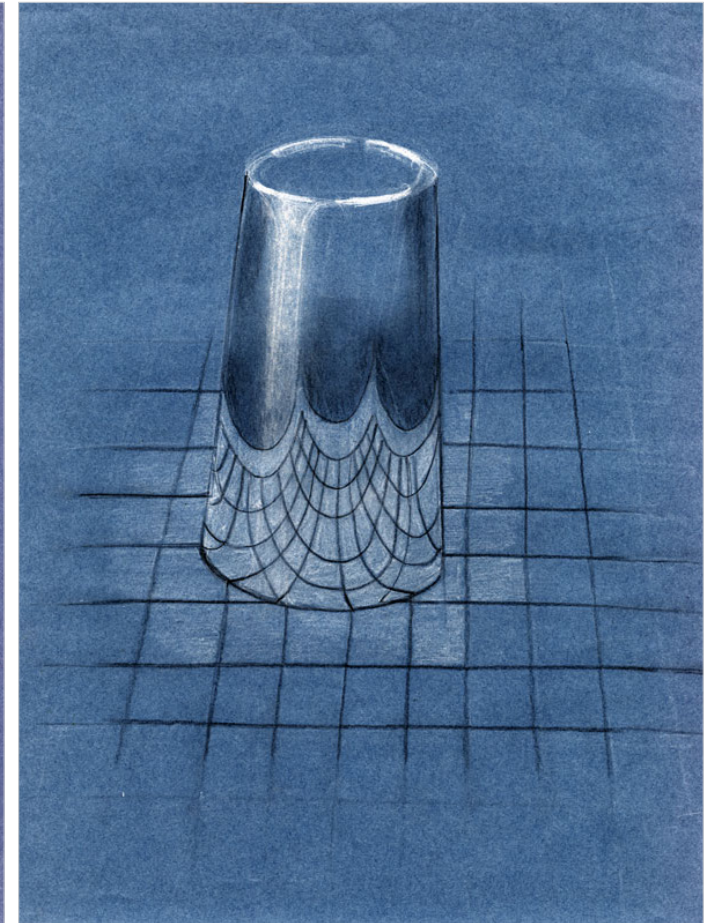
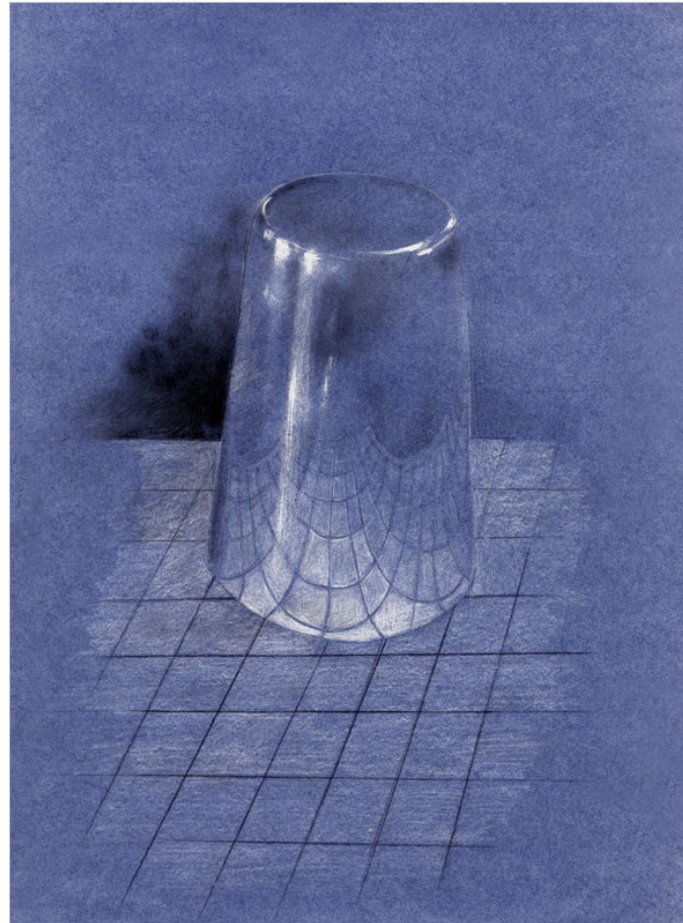
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

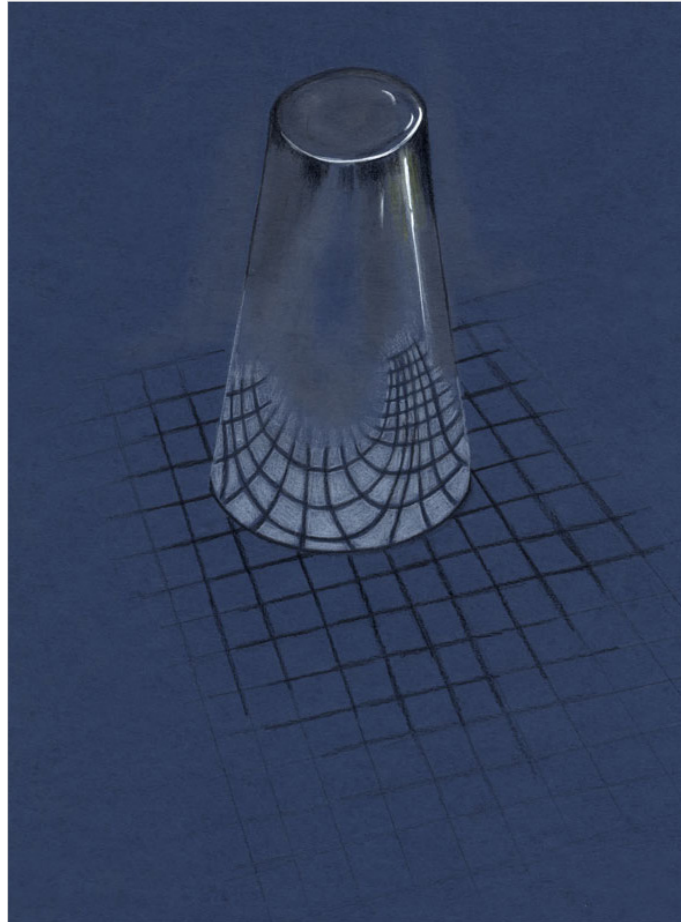
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details



Design Course

## Product Drawing

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### Exercise 11:

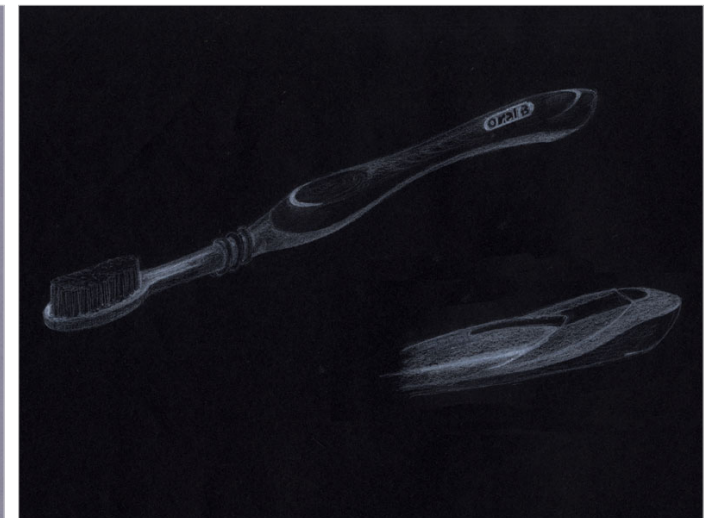
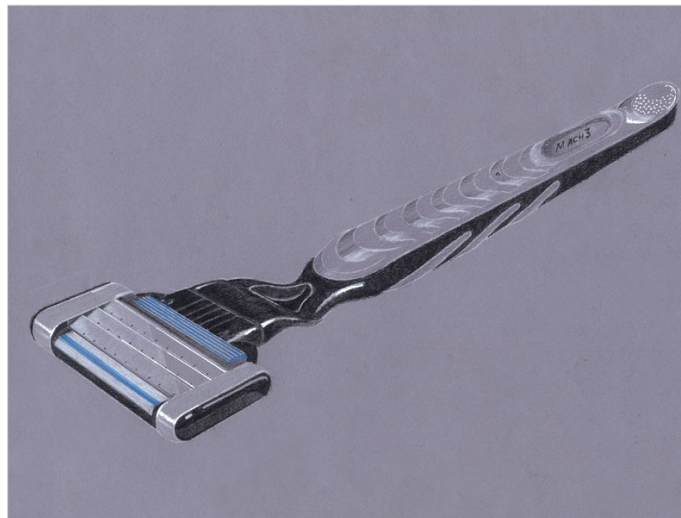
Reflections on Objects:

- Take a graph sheet and place a steel drinking glass on it, upside down and observe how the lines of the graph translate into curves when reflecting on the cylindrical surface.
- Sketch and render the same, as accurately as you can.

### Note:

Good Product Rendering requires both practice and skill. Here is a variety of renders also done by the students at Industrial Design Centre, IIT Bombay.

### Examples:



1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

Prof. K. Ramachandran

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/object-drawings>

1. Introduction

2. Lines

3. Perspective

4. Shadows

5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details





Design Course

## Product Drawing

Representation of Objects

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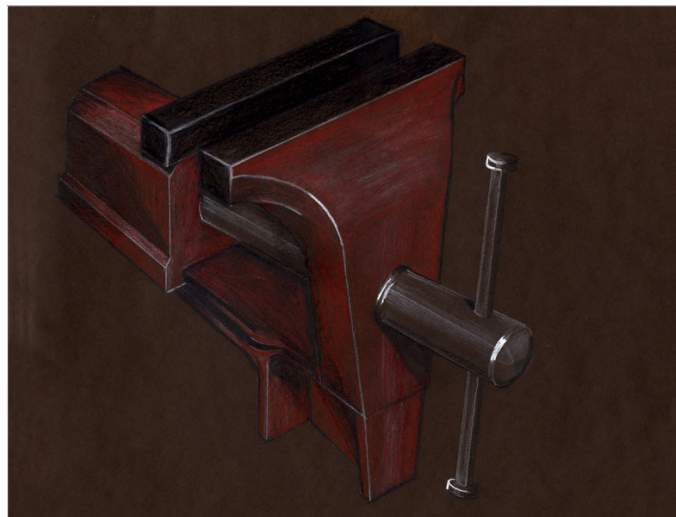
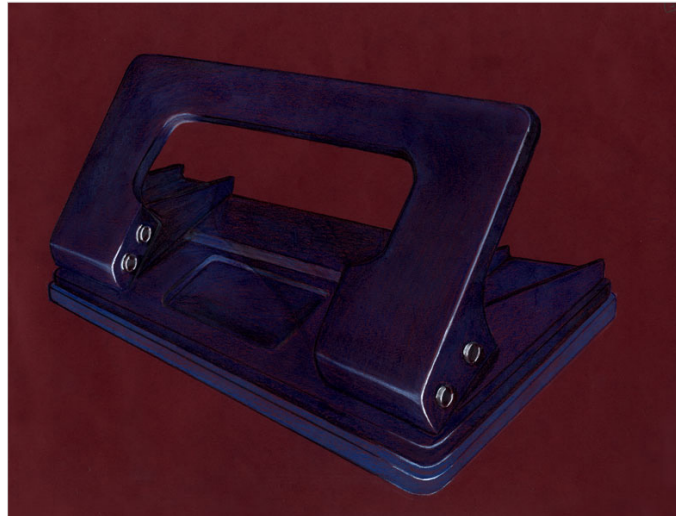
Prof. K. Ramachandran

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-drawing/object-drawings>

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details



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## Product Drawing

Representation of Objects

by

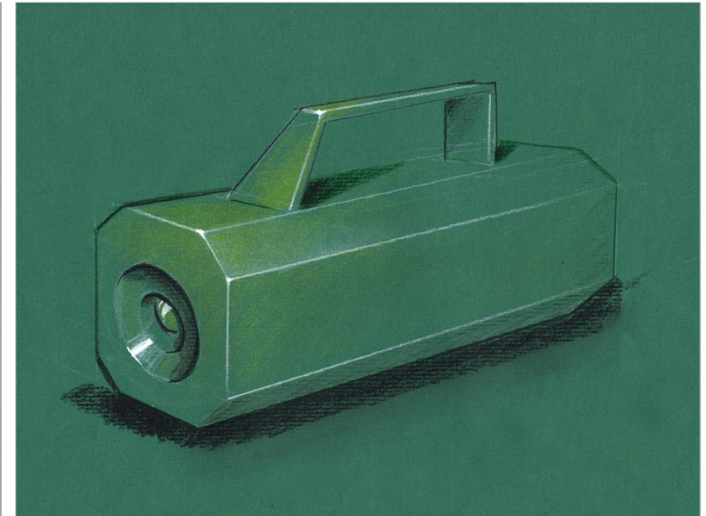
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details



Design Course

## Product Drawing

Representation of Objects

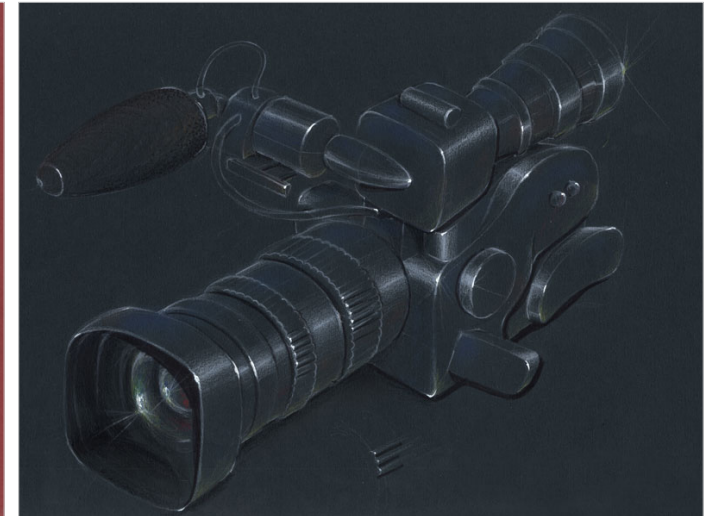
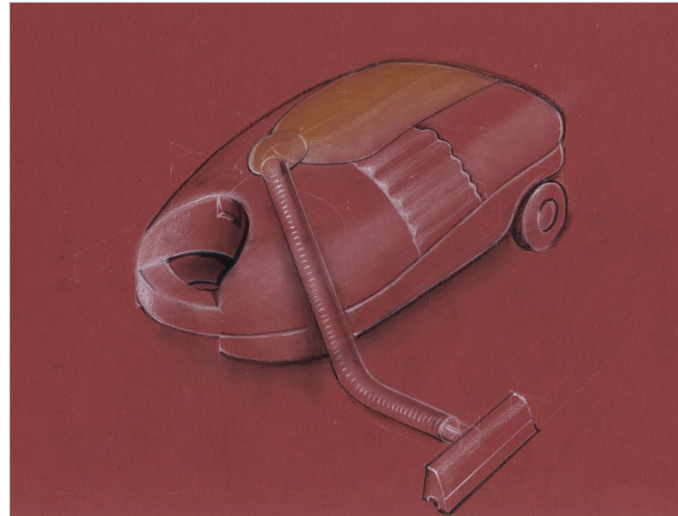
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

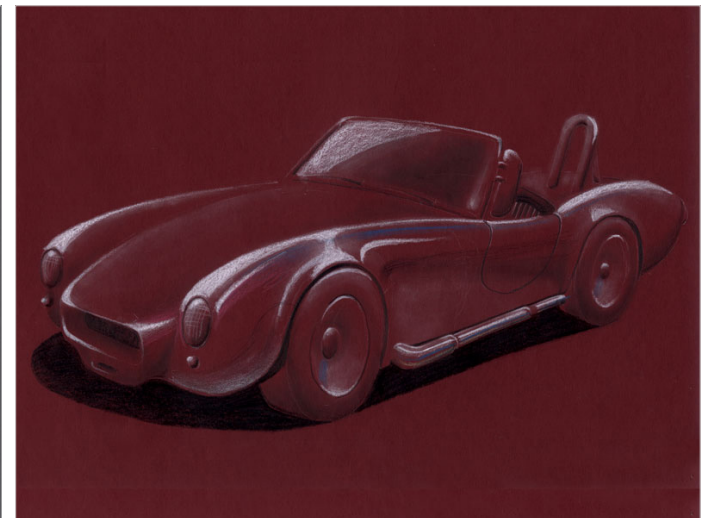
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

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### Exercise 12:

Object Rendering:

- Gradually, take up more complex objects for rendering that demand greater detailing such as varied textures or materials, as elucidated by the examples above.

### Exercise 13:

Memory Object Drawing and Rendering:

- The final challenge is to be able to accomplish convincing renders without any visual references.
- Begin with simpler objects like a bottle or drinking glass and graduate to complex ones, such as a camera or mobile phone.
- This will give you the confidence to draw relatively detailed objects from your own imagination.

1. Introduction

2. Lines

3. Perspective

4. Shadows

5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details

Design Course

## Product Drawing

Representation of Objects

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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

## Exploded Views

It is good to have an idea about exploded views as they come in handy while detailing out various parts of your product concepts, and communicating as to how they connect to become a single entity. They represent the relationship or order of assembly and contain all details of the product's component parts.

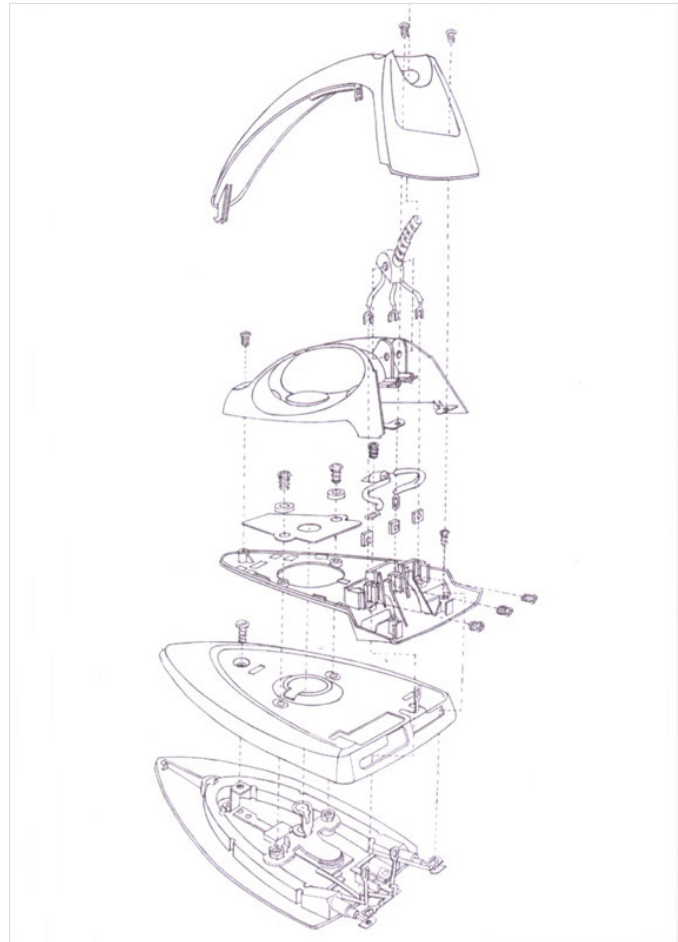


Fig. 27: Notice the dotted lines that trace the exact location of parts.

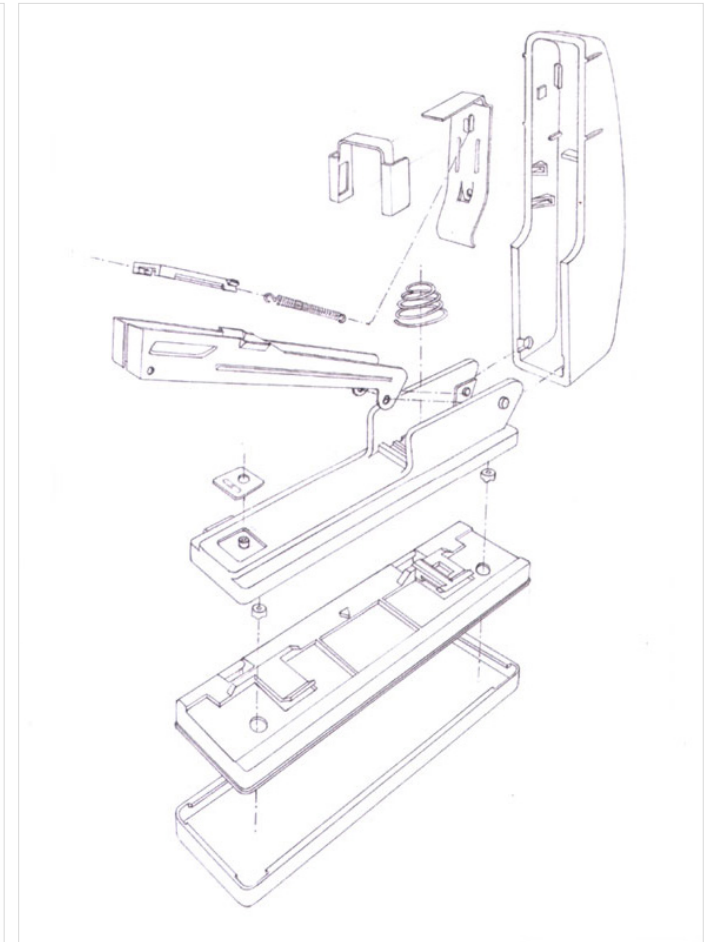


Fig. 28: Notice the dotted lines that trace the exact location of parts.

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## Product Drawing

Representation of Objects

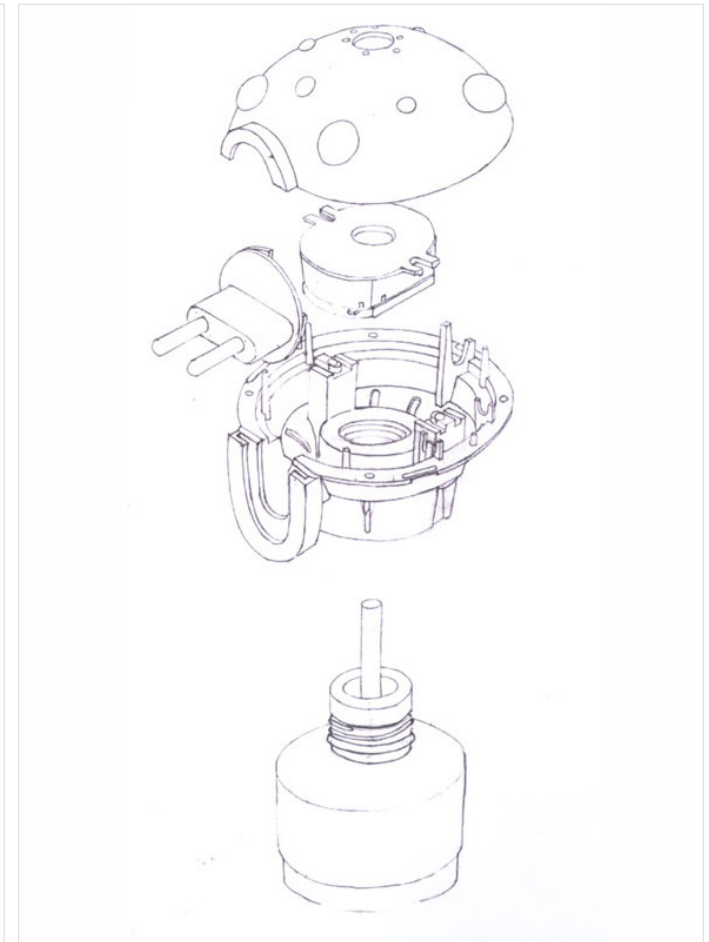
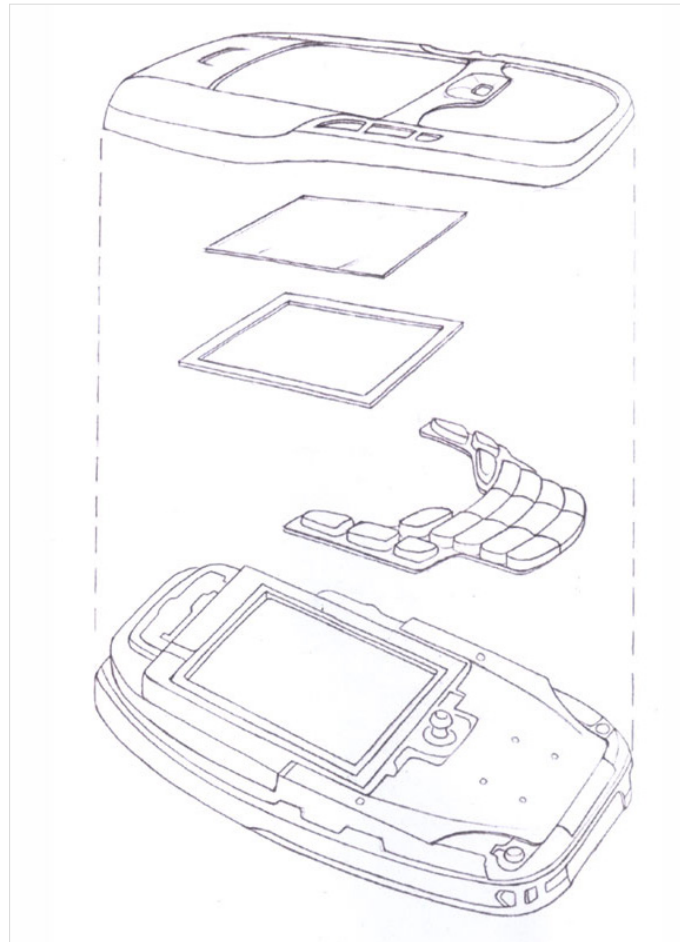
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

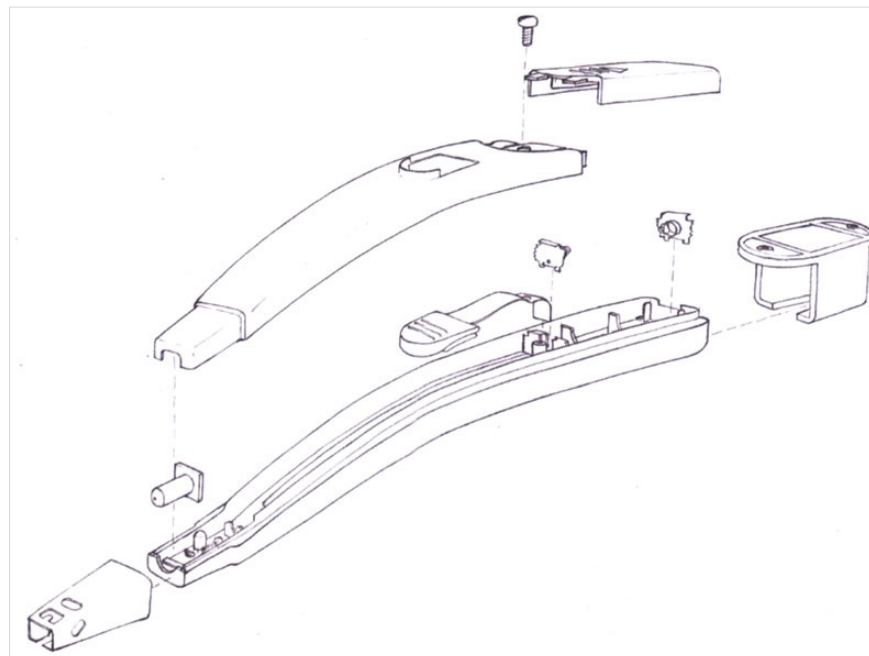
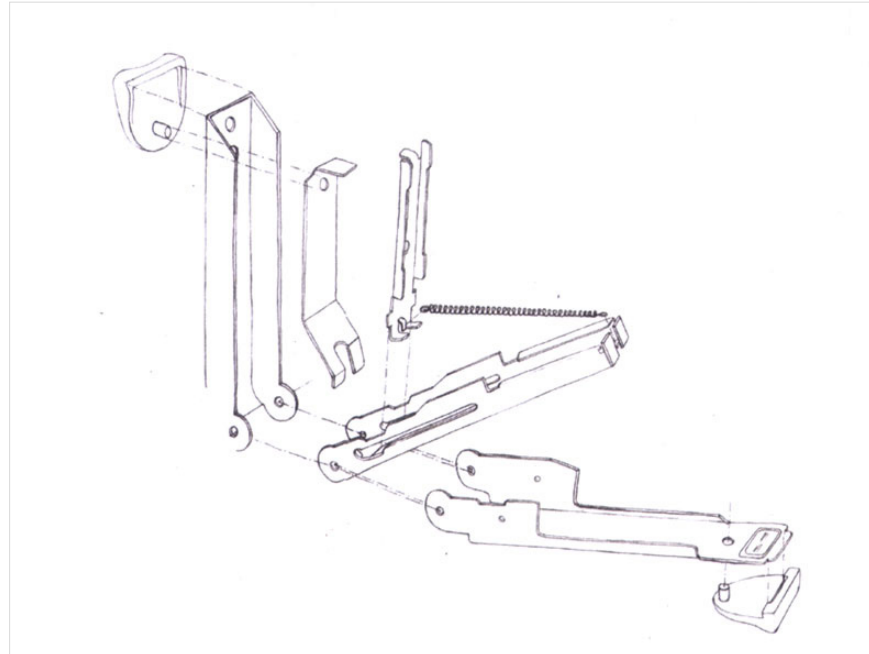
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1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details



Design Course

## Product Drawing

Representation of Objects

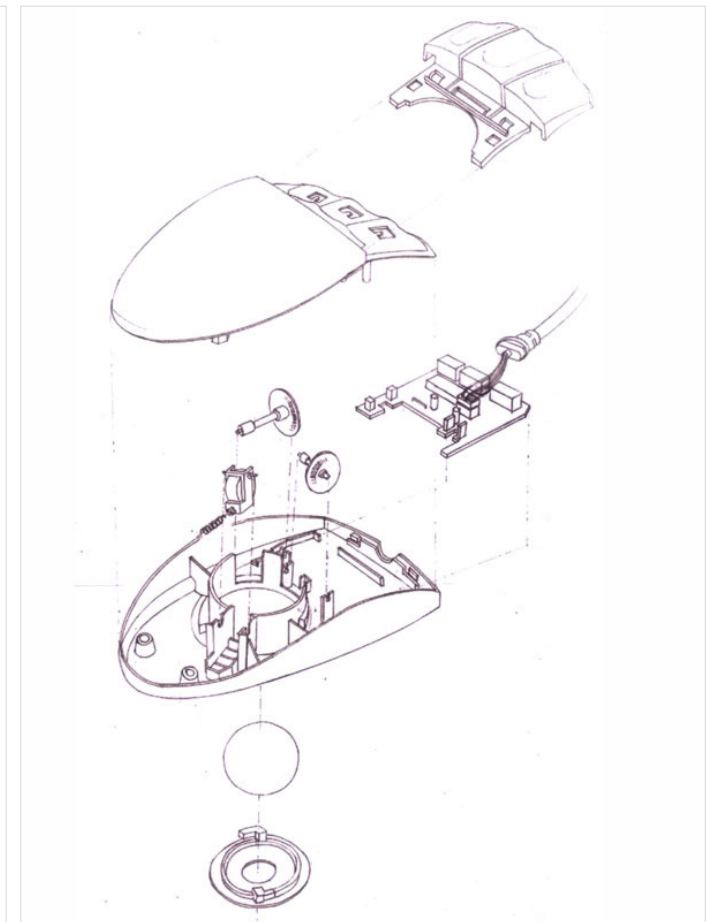
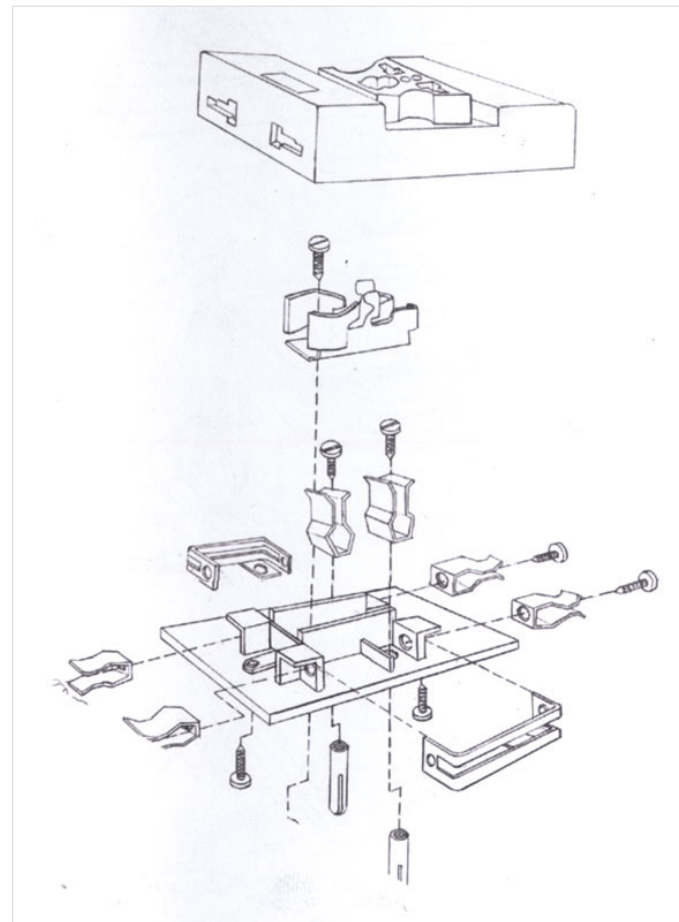
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### Exercise 14:

Exploded views:

- Now, take the same object that you had practiced object sketching with and try out an exploded view sketch for it.
- With practice you can accomplish the same for your own product concepts, out of memory!

*With keen observation, diligent practice and a little bit of perseverance, you can slowly but surely master the art of Product Sketching. Good Luck!*

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

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## Video



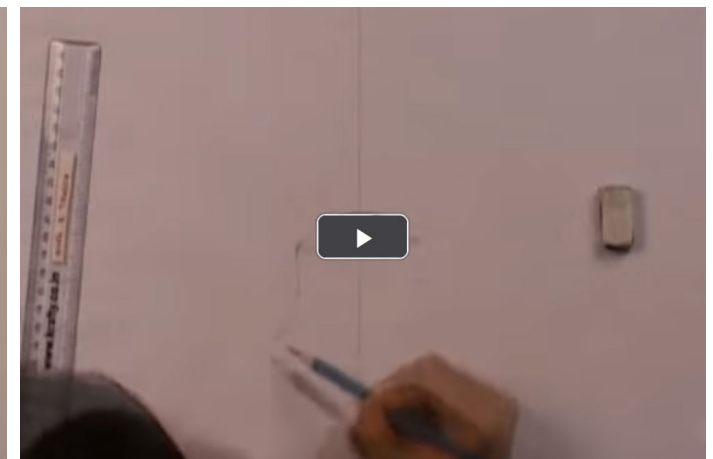
Product Drawing- Making Box



Product Drawing- Making 3d Cube



Product Drawing- Free Hand Lines



Product Drawing- Object Sketch with Light & Shadow Effect

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

by

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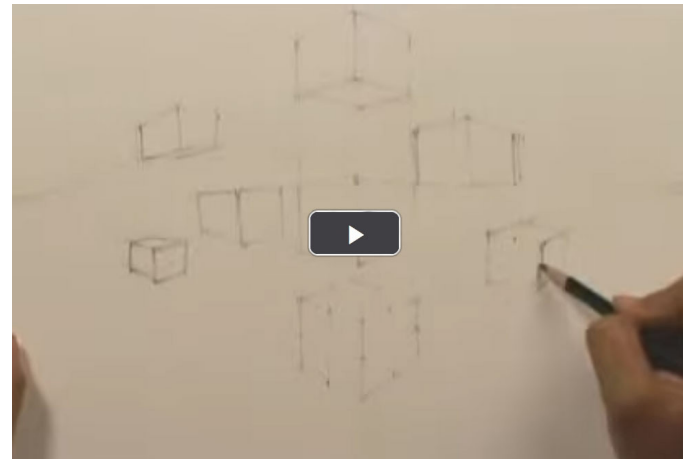
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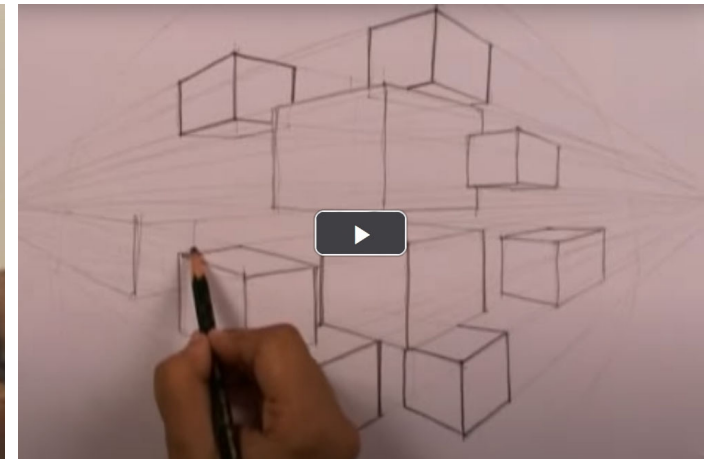
Product Drawing- Object Sketch & Shadow Effect\_01



Product Drawing- Object Sketch & Shadow Effect\_02



Product Drawing\_Circles (drawn on each seen surface of a cube)



Product Drawing\_Cubes (2 Point Perspective)

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

Representation of Objects

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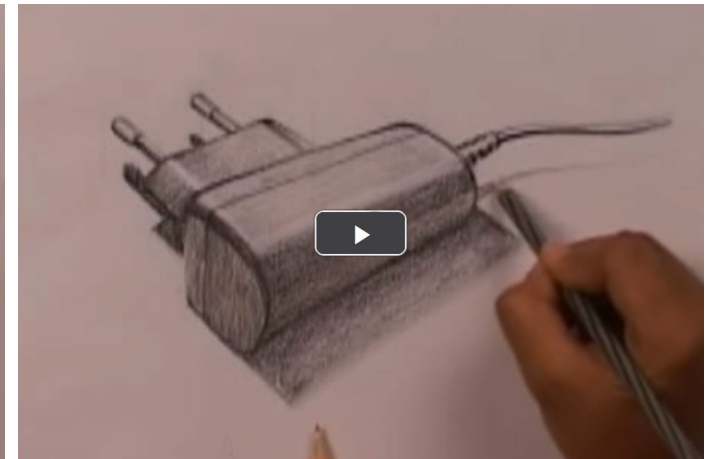
Product Drawing\_01 by Prashasti Sinha



Product Drawing\_02 by Prashasti Sinha



Product Drawing by Ayesha



Object Drawing by Ibyanta

1. Introduction
2. Lines
3. Perspective
4. Shadows
5. Highlights
6. Object Drawings
7. Exploded Views
8. videos
9. Contact Details

Design Course

## Product Drawing

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## Contact Details

This documentation for the course was done by Professor K. Ramachandran, faculty at **IDC, IIT Bombay**.

You can get in touch with him at [ramachandran\[at\]iitb.ac.in](mailto:ramachandran[at]iitb.ac.in)

You can write to the following address regarding suggestions and clarifications:

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Phone: 091-22-2159 6805/ 091-22-2576 7802

Email: [dsource.in\[at\]gmail.com](mailto:dsource.in[at]gmail.com)

1. Introduction

2. Lines

3. Perspective

4. Shadows

5. Highlights

6. Object Drawings

7. Exploded Views

8. videos

9. Contact Details