

Freehand Sketching

Unit: Media, Equipment, and Reproduction Methods

Problem Area: Freehand Sketching

Lesson: Freehand Sketching

■ **Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

- 1 Summarize freehand sketching procedures.
- 2 Practice freehand sketching techniques.

■ **Resources.** The following resources may be useful in teaching this lesson:

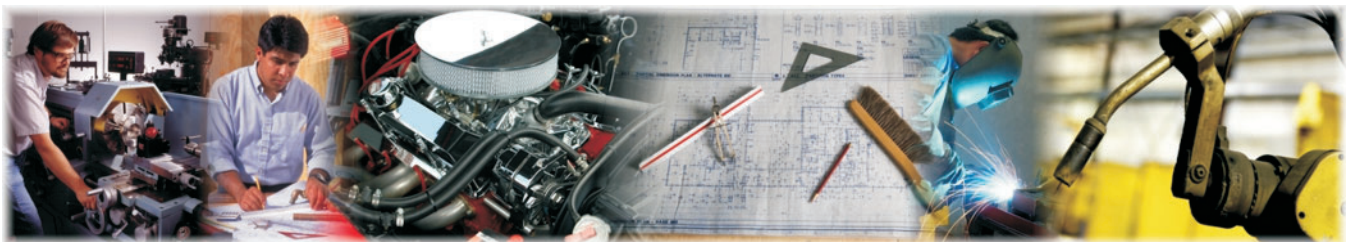
E-unit(s) corresponding to this lesson plan. CAERT, Inc. <http://www.mycaert.com>.

“Design Handbook: Engineering Drawing and Sketching,” *MIT OpenCourseware*. Accessed Aug. 6, 2018. https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing-i-spring-2009/related-resources/drawing_and_sketching/.

“Drawing Circles in Perspective: How to Draw Circles and Ellipses in Correct Perspective,” *How to Draw Step by Step Drawing Tutorials.com*. Accessed Aug. 6, 2018. <https://www.drawinghowtodraw.com/stepbystepdrawinglessons/2014/01/drawing-circles-in-perspective-how-to-draw-circles-and-ellipses-in-correct-perspective/>.

“Freehand Sketching and Rapid Visualization,” *Safari.com*. Accessed Aug. 6, 2018. https://www.safaribooksonline.com/library/view/basic-perspective-drawing/9780470288559/13_chapter09.html.

“How to Draw What You See By Drawing Basic Shapes First,” *How To Draw Step By Step Drawing Tutorials.com*. Accessed Aug. 6, 2018. <http://www.drawinghowtodraw.com/stepbystepdrawinglessons/category/drawing-techniques-methods/>.



“Technical Freehand Sketching,” *Springer.com*. Accessed Aug 6, 2018.
https://www.springer.com/cda/content/document/cda_downloaddocument/9783319038612-c2.pdf?SGWID=0-0-45-1467726-p176399420.

■ **Equipment, Tools, Supplies, and Facilities**

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials

■ **Key Terms.** The following terms are presented in this lesson (shown in bold italics):

- ▶ drawing
- ▶ ellipse
- ▶ freehand sketching
- ▶ mechanical drafting pencil
- ▶ mechanical pencil
- ▶ method
- ▶ parallel lines
- ▶ perpendicular lines
- ▶ perspective
- ▶ technique
- ▶ tracing paper
- ▶ vellum

■ **Interest Approach.** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Freehand sketching skills are important to drafters, designers, engineers, artists, architects, etc. Consider creating some freehand sketches of objects of interest to the students: cell phones, laptops, backpacks, cars, etc. Explain that the very first ideas for these objects were quickly sketched to develop and communicate an idea: “A picture is worth a thousand words.” Then, invite a professional from a design office who uses freehand sketching to explain how they use their sketching skills and share some of their design work with the class. Seeing an initial sketch developed into a product is powerful: a business card, a laptop case, or a living room design.

CONTENT SUMMARY AND TEACHING STRATEGIES

Objective 1: Summarize freehand sketching procedures.

Anticipated Problem: What is freehand sketching? What are freehand sketching procedures? What materials are used to create freehand sketches?

I. Freehand sketching procedures

- A. **Drawing** is a form of visual art in which a person uses various sketching instruments (e.g., compass, computer) to precisely mark paper or another two-dimensional medium. Sketching is a form of drawing, usually preliminary drawings made prior to producing a final work of art or a final technical document. During sketching, the artist, drafter, or designer typically “works out” composition, balance between values, and proportion before a final drawing is produced.
- B. **Freehand sketching** is drawing without the aid of drafting equipment. A freehand sketch is the initial transfer of an idea from an engineer’s abstract thought into a 2D and/or 3D working drawing that incorporates technical drawing symbols and characters. The main goal of a freehand sketch is to illustrate the proportions of an object in relation to its overall shape and size while expressing the general concept. Freehand sketching is a series of straightforward tasks.
 - 1. Task 1: Create a representation of an object or an idea quickly and in a manner that displays and represents the important relationships and elements of the object.
 - 2. Task 2: Sketch lines that are “close enough” to explain the object in the drawing (e.g., exact parallel or square lines is not mandatory during sketching).
 - a. **Parallel lines** are two lines that are always the same distance apart and never touch.
 - b. **Perpendicular lines** are lines that are squared at an angle of 90° to a given line, plane, or surface.
 - 3. Task 3: Make multiple iterations (versions) of the sketch with each version more exact than the last. For beginners, a freehand sketch may require several iterations as ideas are developed and refined: it may be drawn over and over to achieve the correct proportions. Sketches can be produced multiple times until the drawing has its desired result or communicates the object clearly. For multiple iterations, the use of tracing paper is a convenient tool.
 - a. **Tracing paper** is a thin, transparent sheet used to copy an existing image, drawing, sketch, or design by placing the transparent sheet on top of an existing image and drawing over that image’s lines, adding new lines, or deleting lines to improve the sketch.

- b. **Vellum** is a high-quality tracing paper similar to parchment. Today, vellum is made from cotton and wood pulp and is often used to trace designs. Originally, vellum was made from calf's skin.
- 4. Task 4: Select a drawing type or form. Drawing types or forms vary based on the object being drawn and the message or concept the drawing is attempting to convey. Once the object and its message are determined, the drafter or designer selects the best view or angle to display the sketch. Sketching/drawing types typically include:
 - a. Multiviews or perspective drawings
 - b. 3D sketches (such as perspectives)
 - c. Plans, elevations, or sections of the object
- C. Freehand sketch documents are typically produced with simple materials and media: pencil, paper, and an eraser. More advanced freehand sketches use drafting or mechanical pencils and pens. For example:
 - 1. PENCILS AND ERASERS: Any type of pencil can be used, and for experienced sketchers any type of pen may be used. However, a medium or lightweight pencil is useful for sketching, as its lines can be easily erased. Many drafters and designers use mechanical pencils for sketching. A **mechanical pencil** is a graphite drawing tool with replaceable and mechanically extendable lead. A **mechanical drafting pencil** works in the same fashion as a mechanical pencil, however it is able to hold much larger leads than a typical mechanical pencil. A high quality soft eraser leaves few particles and few graphite smears.
 - 2. PAPER: Freehand sketching can be done on any type of paper media. The only caution is that the paper selected is appropriate for the pen or pencil type used. For example:
 - a. Standard bond paper, tracing paper, or vellum papers are common. These papers allow pencil marks to be fully erased. [NOTE: Drafters and designers will select from a range of drafting mediums as they become more experienced.]
 - b. Graph or grid paper is a common choice for beginning sketchers as the grids assist with relative proportions: the evenly spaced grids are used as a scale or size reference. [NOTE: Because the grid lines are printed with blue ink, those lines do not copy on a standard photocopier (e.g., a completed sketch can be photocopied and the blue lines will not “show up”).]

Teaching Strategy: Many techniques can be used to help students master this objective. Use VM-A to illustrate a machine part freehand sketch that includes some notes and technical symbols. Use VM-B to show examples of car, interior, and fashion sketch projects. Use VM-C to show an example of parallel and perpendicular lines used in a freehand sketch. Use VM-D to show a kitchen sketch prepared in perspective drawing. Use VM-E to illustrate examples of freehand tools and materials. Show the students a range of your freehand sketching styles and discuss how your style evolved over time. Then, demonstrate your freehand sketching by drawing an object.

Objective 2: Practice freehand sketching techniques.

Anticipated Problem: What are freehand sketching techniques? What are tips to create excellent freehand sketches?

II. Freehand sketching techniques

- A. A **technique** is the process of carrying out a particular task, especially the execution or performance of an artistic work or a scientific procedure. The main goal of freehand sketching for drafting and design tasks and projects is to convey the main design features, elements, and proportions of the subject matter. As such, drafters and designers need to incorporate artistic techniques into their sketches as well as technical drawing skills including: perspective for 3D imaging, ratio and proportion, and being aware of scale. **Perspective** is an image as perceived by the eye. In many design offices it is important to be able to create quick freehand sketches of an idea especially when working and discussing that idea with others: colleagues, supervisors, and clients. Freehand sketching requires practice to develop accurate drawings that are in proportion. Specific freehand sketching techniques include the following expectations:
1. The ability to create accurate straight, curved, and parallel lines.
 2. A degree of freedom (imperfections) as compared to a hard line or mechanical drawing. Over time, a drafter or designer develops a personal drawing style and method. A **method** is a procedure or process for accomplishing or approaching a task or project. A method usually includes some systematic or established processes or procedures.
- B. **STRAIGHT LINES:** Producing straight lines in a freehand sketch can be difficult especially as a person typically moves their wrist to draw. However, moving the wrist tends to create arched lines rather than straight lines. Tips to drawing straight lines include:
1. Tip #1: Move the whole arm and hand in a straight direction focusing on a straight path from the elbow or shoulder.
 2. Tip #2: Move in a single motion from the line's begin-point to its end-point to creates a continuous straight line.
 3. Tip #3: Create long lines in several segments. [NOTE: This technique is helpful to beginning freehand sketchers.]
 4. Tip #4: Use a reference. A reference may include the edge of the paper or points created along a path for the straight line (e.g., by noting the begin- and end-points). Guide the drawing hand along the path with another finger trailing along the paper edge or points.
- C. **PARALLEL LINES:** Producing parallel lines in a freehand sketch can be difficult especially as a person typically moves or twists their wrist to draw which results in curved lines. Tips to drawing parallel lines include:
1. Tip #1: Create points, as guides, at the begin- and end-points of a line before the line is sketched.

2. Tip #2: Use parts of the pencil as a quick ruler. Points can be notated at each end so that the parallel distance is equal for two lines. With practice, visually noting the location of these points allows parallel lines to be sketched.
- D. CIRCLES, ARCS, AND ELLIPSES: An **ellipse** is a geometric shape that results from viewing a circular shape in perspective, or from a different vantage point: an ellipse is an oval. Tips to drawing circles, arcs, and ellipses include:
1. Tip #1: Use the box method. To use the box method to freehand sketch a circle, lightly sketch a box around the diameter of the circle. The four sides are the tangent-edges of the circle and each centerline of the four sides is noted as a point. Then, four arcs are equally drawn from each centerline on the box sides: from the top to the right side, from the right side to the bottom, from the bottom to the left side, and finally, from the left side to the top.
 2. Tip #2: Use a type of box method that creates a center point and center lines that run horizontal and vertical at equal distances. Lines are then sketched perpendicular to each other and at equal lengths from the center point. Once the four points are noted, equal arcs can be sketched from one point to the next (similar to the box method) resulting in a full circle.
 3. Tip #3: Use the “hand-as-compass” method. The natural joints of the hand or elbow can be used as a guide for drawing larger circles. Joints are used as pivot points, just like a compass. An arm can be used as a compass to draw a curved line by turning or rotating the arm while keeping the elbow joint in one position while drawing. Then, the location in which the pencil is held can be adjusted to create a specific length. [NOTE: A circle viewed in perspective is an ellipse: it is a distortion of an object that is circular in shape. An ellipse may be sketched in the same manner as a circle by noting which dimension looks longer or shorter: the height or the length. Then, lightly sketching in the center point and the perpendicular lines that run horizontal or vertical and drawing in the appropriate arcs creates the ellipse.]
- E. PAPER: Take advantage of translucent paper when learning to freehand sketch. Quick edits can be made to a sketch by placing a translucent sheet on top of the original sketch, and then tracing a new sketch to more exact dimensions and ratios. Using tracing paper is an excellent way to practice freehand sketching skills.

Teaching Strategy: *Many techniques can be used to help students master this objective. Use VM–F to review drawing a circle in perspective. Assign LS–A to have the students create a series of freehand sketches using techniques learned in this lesson.*

Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the ends of chapters in the textbook may also be used in the Review/Summary.

- **Application.** Use the included visual master(s) and lab sheet(s) to apply the information presented in the lesson.
- **Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.
- **Answers to Sample Test:**

Part One: Matching

1. d
2. f
3. e
4. b
5. a
6. c

Part Two: Completion

1. points (or dots)
2. compass
3. tracing paper
4. proportions
5. lines
6. perpendicular

Part Three: Short Answer

Answers will vary and would be similar to the following description of using the box method for freehand sketching a circle, arc, or ellipse. To draw a circle using the box method, lightly sketch a box around the diameter of the circle. The four sides are the tangent-edges of the circle and each centerline of the four sides is noted as a point. Then, four arcs are equally drawn from each centerline on the box sides: from the top to the right side, from the right side to the bottom, from the bottom to the left side, and finally, from the left side to the top.

Freehand Sketching

► Part One: Matching

Instructions: Match the term with the correct definition.

- | | |
|-----------------------|----------------------|
| a. drawing | d. mechanical pencil |
| b. ellipse | e. parallel lines |
| c. freehand sketching | f. tracing paper |

- _____ 1. A graphite drawing tool with replaceable and mechanically extendable lead
- _____ 2. A thin, transparent sheet used to copy an existing image, drawing, sketch, or design by placing the transparent sheet on top of an existing image and drawing over that image's lines, adding new lines, or deleting lines to improve the sketch
- _____ 3. Two lines that are always the same distance apart and never touch
- _____ 4. A geometric shape that results from viewing a circular shape in perspective, or from a different vantage point
- _____ 5. A form of visual art in which a person uses various sketching instruments (e.g., compass, computer) to precisely mark paper or another two-dimensional medium
- _____ 6. Drawing without the aid of drafting equipment

► Part Two: Completion

Instructions: Provide the word or words to complete the following statements.

1. To draw a straight line freehand, one technique is to create a series of _____ as guides at the beginning and end of a line before sketching.
2. An arm can be used as a _____ to draw a curved line by turning or rotating the arm while keeping the elbow joint in one position while drawing.



3. Vellum is a high-quality, translucent _____ similar to parchment.
4. For design and drafting tasks, main goal of freehand sketching is to convey the main design features, elements, and _____ of the subject matter.
5. Freehand sketching techniques include the ability to create accurate straight, curved, and parallel _____.
6. Lines that are squared or _____ are at an angle of 90° to a given line, plane, or surface.

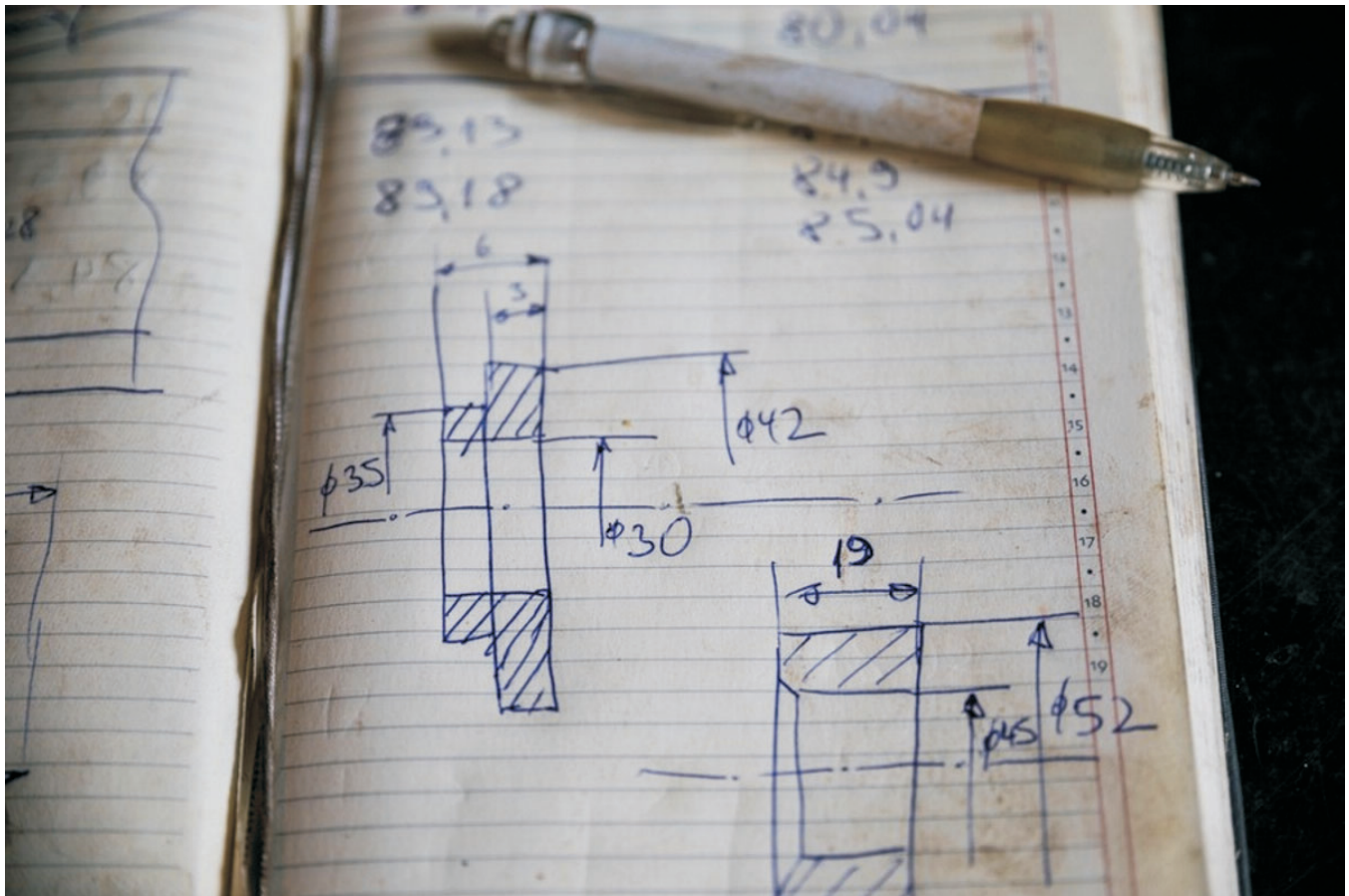
► **Part Three: Short Answer**

Instructions: Answer the following.

Describe the box method of drawing circles, arcs, and ellipses.

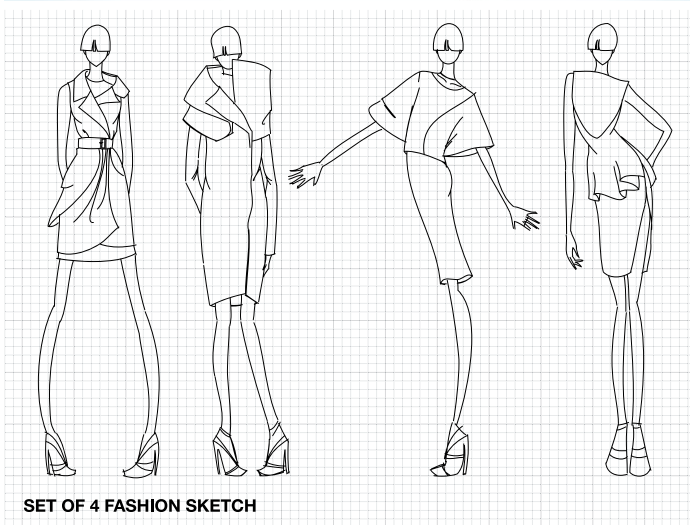
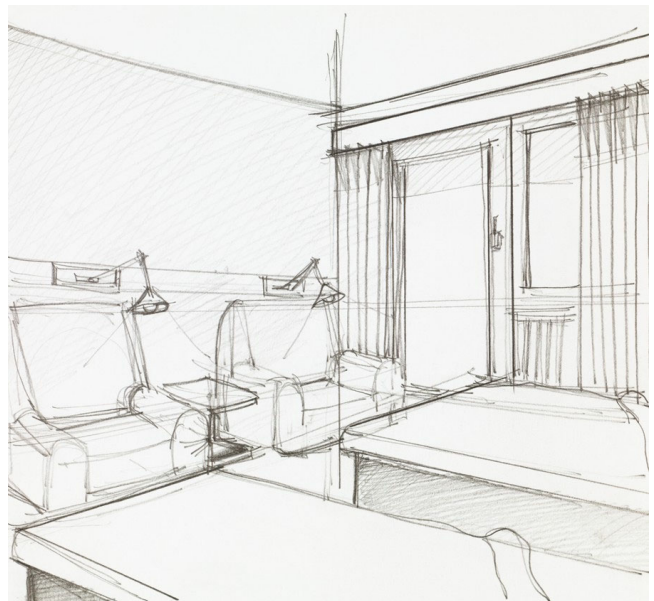
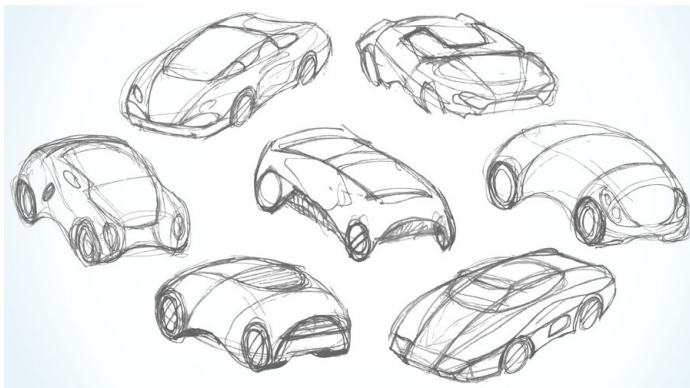
FREEHAND SKETCH: MACHINE PART

A freehand sketch is the initial transfer of an idea from an engineer's abstract thought into a 2D and/or 3D working drawing that incorporates technical drawing symbols and characters.



FREEHAND SKETCHES: CAR, INTERIOR, AND FASHION

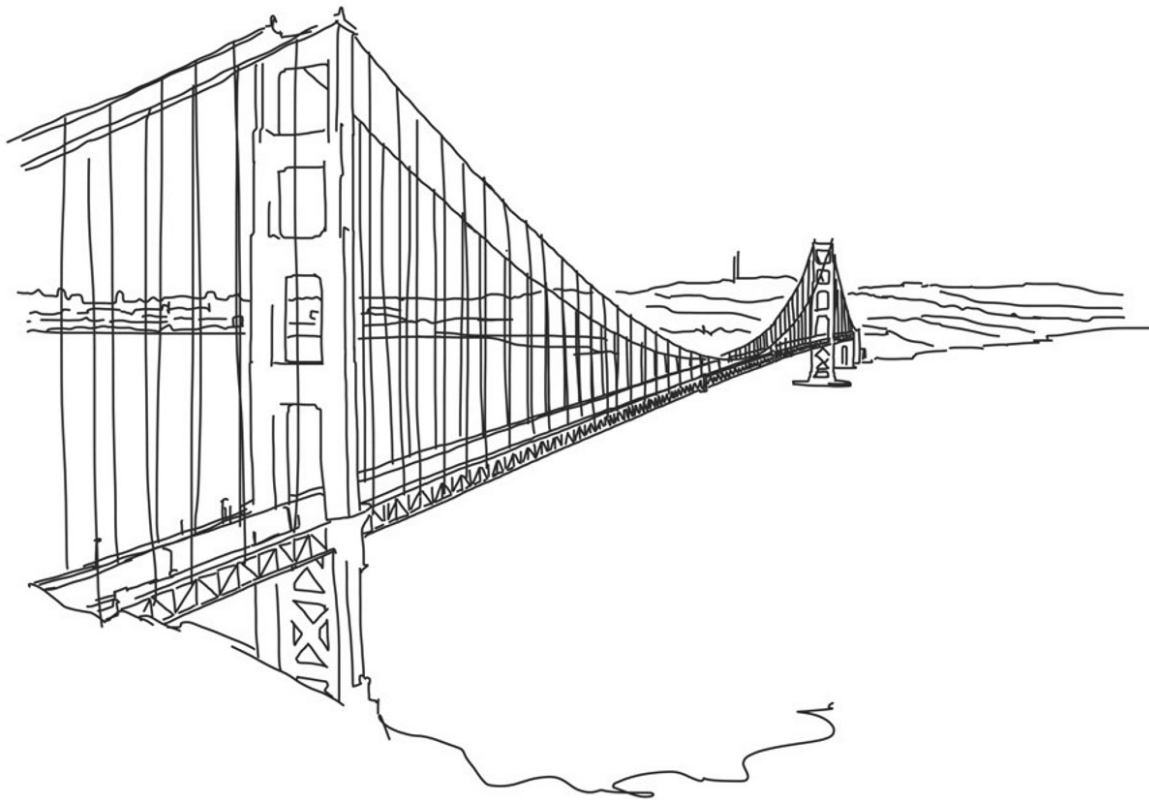
Sketching lines need to be “close enough” to explain the object in the drawing. The use of exact parallel or square lines is not mandatory during sketching.



SET OF 4 FASHION SKETCH

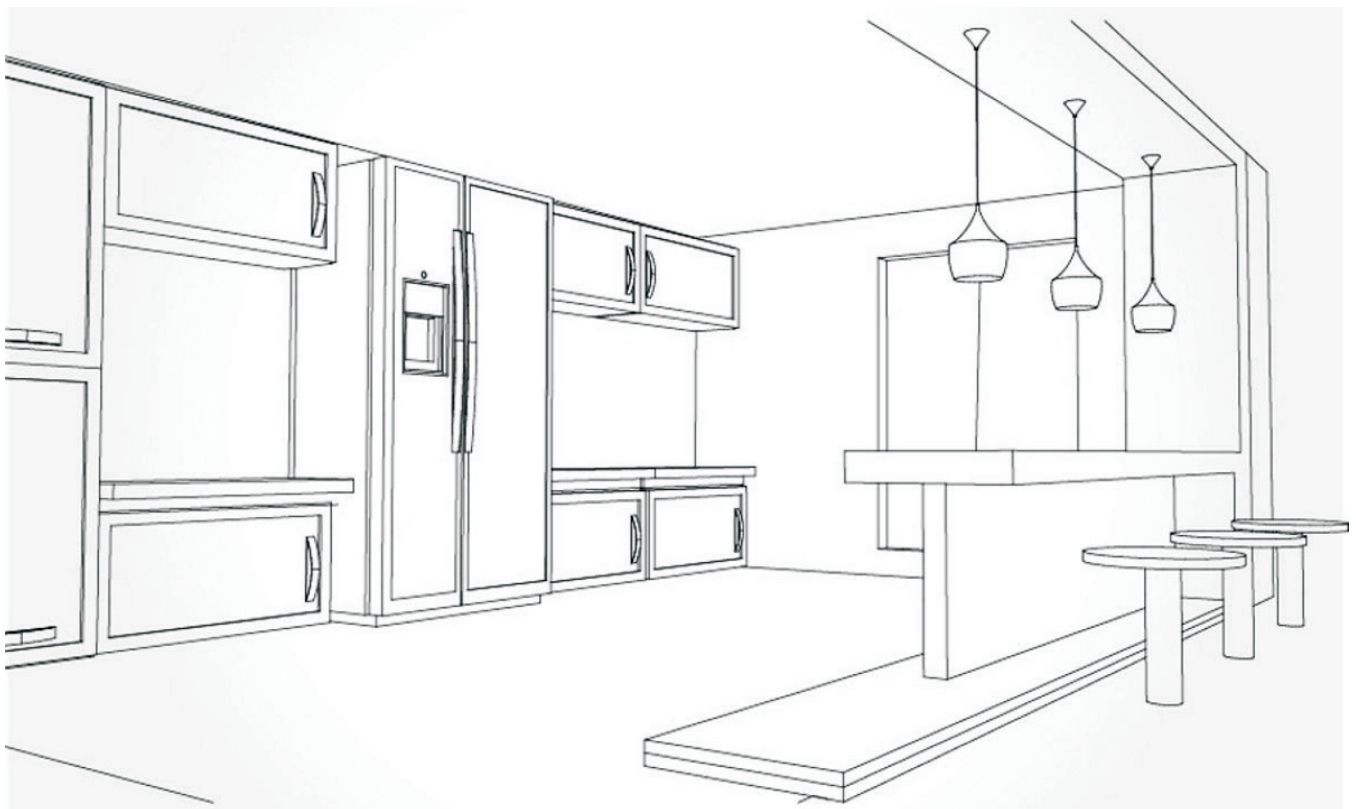
FREEHAND SKETCHING: PARALLEL AND PERPENDICULAR LINES

Freehand sketching is drawing without the aid of drafting equipment. The main goal of a freehand sketch is to illustrate the proportions of an object in relation to its overall shape and size while expressing the general concept. This freehand drawing of the Golden Gate Bridge illustrates the bridge's proportions and shows its overall shape and size.



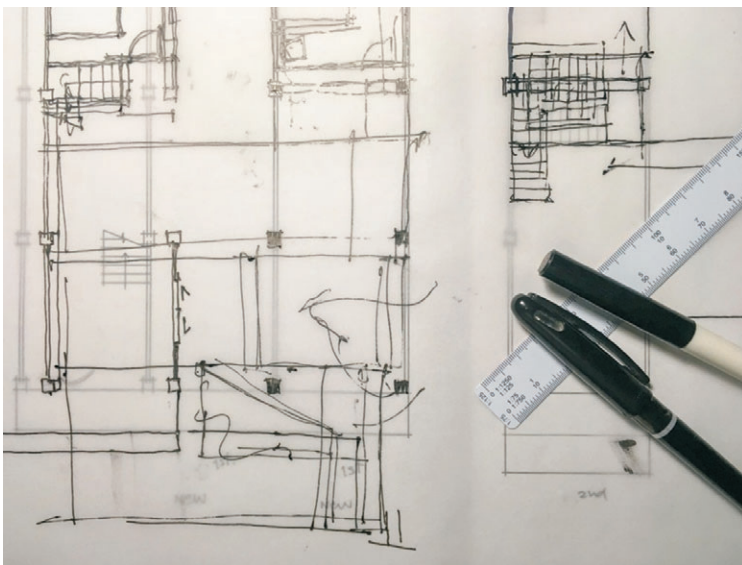
ADVANCED FREEHAND SKETCH: PERSPECTIVE

Drawing types or forms vary based on the object of the drawing—in this case a kitchen—and what the drawing is attempting to convey. Once the object and its message are determined, the drafter or designer selects the best view or angle.



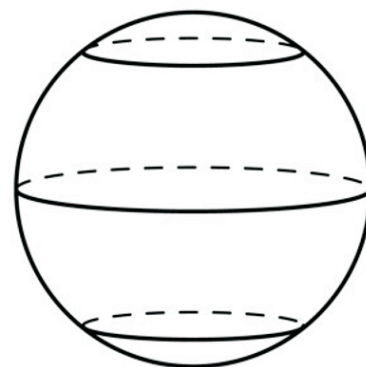
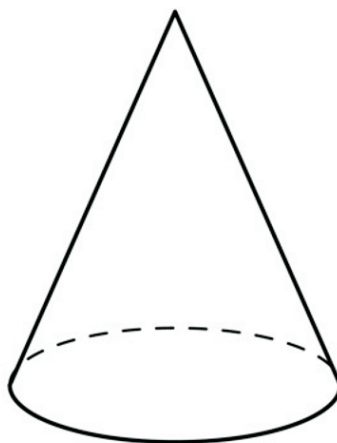
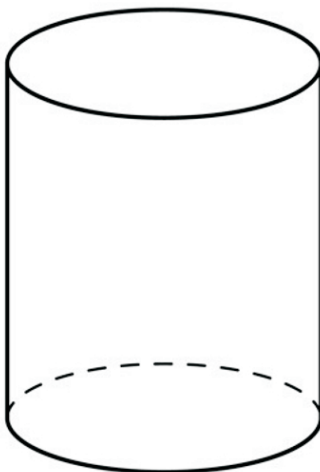
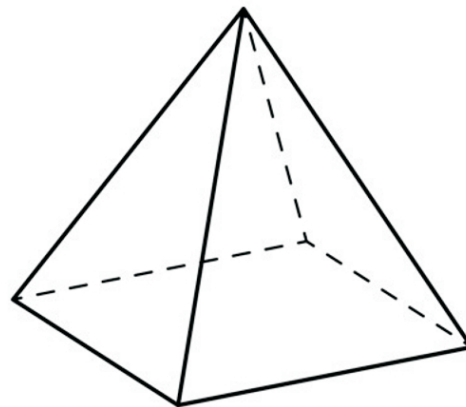
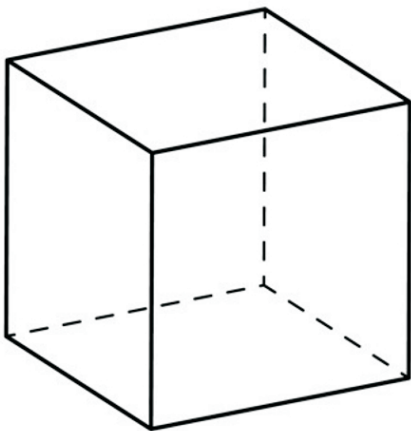
FREEHAND SKETCH TOOLS AND MATERIALS

Drafting and design freehand sketches can be created on any paper using any pencil or pen. However, some engineers and designers prefer mechanical pencils and pens. Tracing paper is a thin, transparent sheet used to copy an existing image, drawing, sketch, or design by placing the transparent sheet on top of an existing image and drawing over that image's lines, adding new lines, or deleting lines to improve the sketch.



DRAWING CIRCLES IN PERSPECTIVE

An ellipse is a geometric shape that results from viewing a circular shape in perspective, or from a different vantage point: an ellipse is an oval. How many ellipses are viewed from this perspective?



Create Freehand Sketches

Purpose

The purpose of this lab is to practice freehand sketching techniques.

Objectives

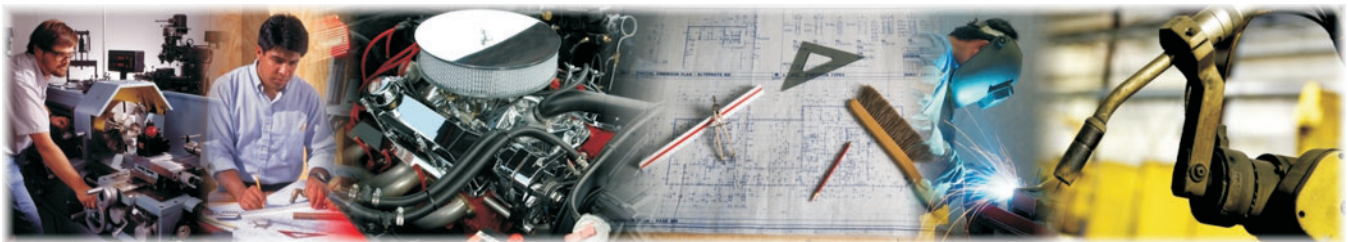
1. Sketch an object using freehand sketching techniques.
2. Improve your original sketch using tracing paper overlays.
3. Create a series of sketches that demonstrate improvement of proportion and detail.

Materials

- ◆ lab sheet
- ◆ device with Internet access
- ◆ drawing board (optional)
- ◆ pencil or mechanical pencil
- ◆ eraser
- ◆ tracing paper

Procedure

1. Create a freehand sketch of an object of your choice or one provided by your instructor. Redraw the object as necessary. Practice different sketching techniques until you are comfortable with the process. [Recommendation: Using tracing paper for this task.]
2. To practice basic freehand sketching technique, watch the video tutorial, “Sketching Tutorial 1—Basic Sketching Techniques,” at <https://www.youtube.com/watch?v=SiToLklthes>. Then, practice holding the pencil or pen and making standard arm and hand movements.



3. Sketch an object.

- a. Roughly sketch the overall size and shape of the object using light lines. These rough lines are used as guides to keep the drawing in proportion.
- b. Locate the main features of the object on the drawing using dots. Place dots at strategic points for each feature: top, bottom, sides, and middle.
- c. Sketch-in each feature using the techniques discussed in this unit. [TIP: Begin with larger, overall features and, after they are located, add-in smaller details.]
- d. Once you are satisfied with the sketch, draw over the sketch with darker lines.
- e. Place another sheet of tracing paper over your first drawing. Improve the proportions and the relationship of its key features. (NOTE: Repeat this step as often as necessary to produce a sketch you are satisfied with.)

4. Collect all your sketch iterations and turn the set of sketches in to your instructor.