

# Maker Sprint:

## Sketching Real-World Objects



**No safety considerations**



**Objectives**

### **Affective Objectives**

- Collaboration: Values equal participation from all members of the team
- Feedback: Processes feedback and makes modifications accordingly
- Self-direction: Identifies and revises personal goals and works towards achieving them
- Iteration: Revises judgments and changes behavior in light of new evidence
- Resolving conflict: Proposes a compromise or solution to a problem and works to achieve it

### **Skill Objectives**

- Make observations of real-world objects
- Identify 3D shapes within real-world objects
- Represent 3D shapes and objects through sketching
- Combine 3D shapes to make accurate representations of real-world objects
- Use a variety of tools (e.g., pencils, sharpie markers) to create sketches of real-world objects

## Cognitive Objectives

### Mapped to the Texas Essential Knowledge & Skills (TEKS) for 3rd Grade

**Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

- apply mathematics to problems arising in everyday life, society, and the workplace;
- use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution and evaluating the problem-solving process and the reasonableness of the solution;
- select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
- communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
- create and use representations to organize, record, and communicate mathematical ideas;
- analyze mathematical relationships to connect and communicate mathematical ideas; and
- display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

**Geometry and measurement.** The student applies mathematical process standards to analyze attributes of two-dimensional geometric figures to develop generalizations about their properties. The student is expected to:

- classify and sort two- and three-dimensional figures, including cones, cylinders, spheres, triangular and rectangular prisms, and cubes, based on attributes using formal geometric language;
- use attributes to recognize rhombuses, parallelograms, trapezoids, rectangles, and squares as examples of quadrilaterals and draw examples of quadrilaterals that do not belong to any of these subcategories;
- determine the area of rectangles with whole number side lengths in problems using multiplication related to the number of rows times the number of unit squares in each row;
- decompose composite figures formed by rectangles into non-overlapping rectangles to determine the area of the original figure using the additive property of area; and
- decompose two congruent two-dimensional figures into parts with equal areas and express the area of each part as a unit fraction of the whole and recognize that equal shares of identical wholes need not have the same shape.

**Artistic foundations: observation and perception.** The student develops and expands visual literacy skills using critical thinking, imagination, and the senses to observe and explore the world by learning about, understanding, and applying the elements of art, principles of design, and expressive qualities. The student uses what the student sees, knows, and has experienced as sources for examining, understanding, and creating artworks. The student is expected to:

- explore ideas from life experiences about self, peers, family, school, or community and from the imagination as sources for original works of art



# Explore: Building & Sketching a 3D Object

## Goals

- Engage students in a self-directed process of building an object and sketching a representation of that object
- Connect to students' prior knowledge about sketching and 3D shapes

## Tools & Materials

- Legos
- Paper
- Sharpie Markers

## Length of Activity

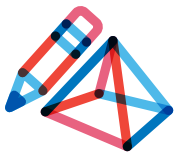
- 30 minutes

## Process

- Students should work in small groups during this activity
  - Introduce students to Legos and ask them to examine/discuss the shapes that are available to them to build
  - Ask students to brainstorm objects they could make with the available Lego shapes
  - Challenge students to build one of the objects they brainstormed using Legos
  - Ask students to share the objects they built with their group members and select one object to sketch
  - Have students complete a blind contour drawing of the Lego object
  - Ask students to sketch at least two versions of the object they selected
  - Ask students to share their sketches with their group members and get feedback
  - Based on feedback from their group, each student should choose one of their sketches to improve upon
  - Clean up

## Anticipating Stuck Spots

- Students may not consider themselves to be good at sketching. Remind students sketching is low stakes and there is no wrong way to sketch.
- Students may struggle to translate their observation into a sketch. Encourage students to persist and get started even if their sketches are not perfect.
- Develop a procedure for selecting Legos and returning them to the correct place.
- Develop a procedure for students to share in an organized way.
- Develop a procedure for students to give and accept feedback (e.g. I like, I wish, I wonder)
- Students may struggle using the Sharpie markers (e.g., tips may bleed). Help students practice putting the correct amount of pressure on the tip of the Sharpie.



# Skill-Build: Sketching 3D Shapes

## Goals

- Students become proficient at sketching real-world objects using 3D shapes
- Students use lines and shading to create 3D shapes
- Students use perspective to situate their 3D shapes in context

## Tools & Materials

- Classroom whiteboard
- Paper
- Sharpie Markers
- Ruler
- Handouts to guide students' practice
- Class set of small whiteboards
- Dry erase markers and

## Length of Activity

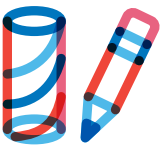
- 30 minutes

## Process

- Students should work in small groups during this activity
  - Have students brainstorm shapes in their groups
  - Have students share out shapes they brainstormed. Record the names of the shapes on the classroom whiteboard
    - Ask for volunteers to sketch the shapes that correspond with the names listed on the whiteboard
    - Use Handout #1 to help students practice sketching 3D shapes. Students should use a ruler to connect the points on this handout
- Use Handout #2 to help students continue practicing to sketch 3D shapes
  - Use Handout #3 to instruct students how to create 3D shapes using shading and perspective
- Pass out personal whiteboards. Ask students to practice sketching 3D shapes through observing 3D objects, including objects with a specific light source casting shadows
- Ask students to use Handout #4 and Sharpie markers to sketch their own 3D shapes
  - Ask students to add shading to their 3D shapes
  - Ask students to sketch the Lego object they sketched during the exploration using the new techniques they learned in this mode

## Anticipating Stuck Spots

- Students may not consider themselves to be good at drawing. Remind students sketching is low stakes and there is no wrong way to sketch.
- Students may struggle with how to turn a 2D shape into a 3D shape. Consider modeling an example from Handouts #1, #2 and #3.
- Students may struggle to understand how to use shading to create 3D shapes. Provide an example using a tennis ball and a light source to demonstrate how shadows work.
- Students may struggle to understand how to use perspective to create 3D shapes. Have students move around an object to view it from different angles (e.g., bird's eye view).
- Remind students to share in an organized way.
- Develop a procedure for passing out and collecting whiteboards and dry erase markers.



# Challenge: Sketching a Real-World Object

## Goals

- Engage students in a self-directed process of identifying an object (e.g., furniture, building, vehicle) and sketching that object.
- Connect to students' new skills of sketching 3D shapes.

## Tools & Materials

- Paper
- Sharpie Markers
- Rulers

## Length of Activity

- 30 minutes

## Process

- Students should work in small groups during this activity
  - Ask students to brainstorm objects in the room that they may want to sketch. Students should then select one object to sketch
  - Ask students to identify the 3D shapes present in the object they selected to sketch
  - Ask students to sketch each 3D shape present in the object independently
  - Ask students to sketch an initial iteration of their object, taking into consideration the size, scale and relationship of each individual 3D shape
    - Ask students to share their sketches with their group members and get feedback
    - Ask students to sketch a new iteration of their object
    - Have students share their sketches with the whole class

## Anticipating Stuck Spots

- Develop a procedure for observation. Encourage students to spend time carefully looking at all the components of an object.
- Students may struggle to translate their observation to a sketch. Encourage students to make multiple quick sketches of a single object to help them arrive at a sketch they like.
- Students may struggle to decompose an object into shapes. Prompt them with questions to help them make those connections.
- Students may struggle to draw shapes to scale. Ask students to use a ruler to measure the size of the various components of an object to get a sense for size and scale.
- Develop a procedure for students to give and accept feedback. Encourage students to use the "I like, I wish, I wonder" framework for sharing their feedback.
- Students may struggle to accept and incorporate feedback into their sketches. Have students restate the feedback they were given in their own words.