Dimensions, Perspectives, & Measurement

v3.0

Kid Spark Basics | Curriculum Packet

Overview:

In this lesson, students will learn how Kid Spark engineering materials can be used to determine the dimensions of different objects. Then, students will work in teams to create a simple measuring device to determine the dimensions of several objects in the room.

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Learning Objectives & NGSS Alignment:

- Define length, depth, and height.
- Understand what objects look like from different perspectives.
- Determine an object's dimensions (in metric units) using Kid Spark engineering materials.
- Create a simple measuring device.

Scientific/Engineering Practice - Using mathematics

Crosscutting Concept - Scale, proportion, and quantity

Activity Time:
60 Minutes

Targeted Grade Level:
2 - 8

Student Grouping:
Teams of 2

Additional Lesson Materials:
- Teacher Lesson Plan
- Student Engineering Workbook

Kid Spark STEM Lab:
STEM Pathways

Note: *Two teams can share the engineering materials from one lab.*

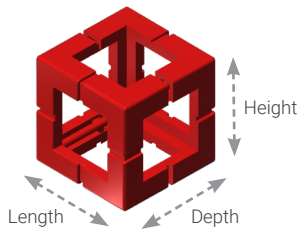
Convergent Learning Activity:

1. **Exploring Length, Depth, and Height**

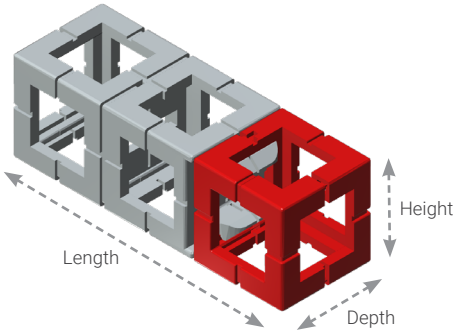
All objects that exist in physical space have three dimensions: **length** (how long an object is), **depth** (how deep an object is), and **height** (how tall an object is). Whether a given dimension of an object is classified as the length, depth, or height is determined by the perspective from which it is viewed and measured.

In the examples shown below, each object has three dimensions. In example 1, the block is a cube. This means each dimension of the block is equal, regardless of the orientation of the block or perspective from which the block is viewed. In examples 2 and 3, the objects are identical, but the orientation of the objects are different. This means the dimensions will also be different.

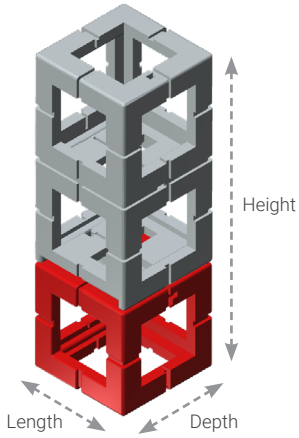
Instructions: Assemble the following objects and then determine the dimensions (in number of openings) of each example below. *Example: The red block is 1 opening in length.*



Example 1



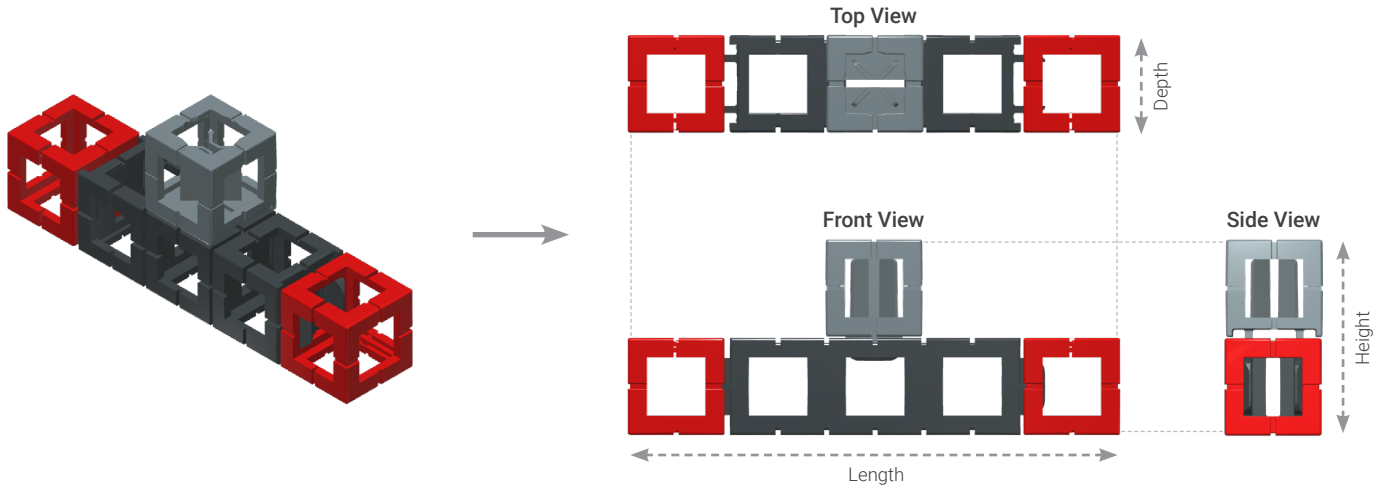
Example 2



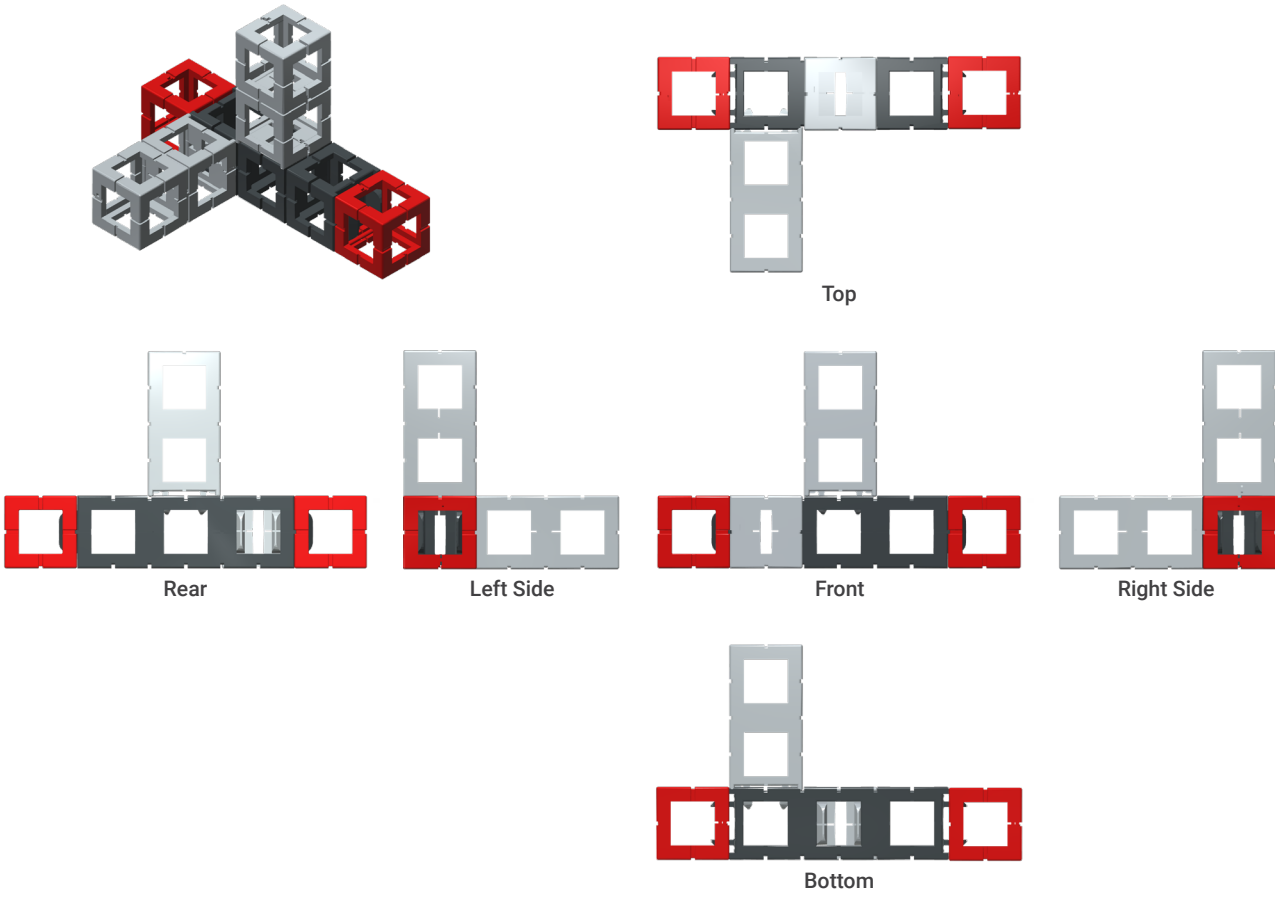
Example 3

2. Exploring Orthographic Projections

It is important to be able to understand what objects look like from different perspectives. An orthographic projection is a means of representing three-dimensional objects in two dimensions. The primary views included in most orthographic projections will include a front view, side view, and top view. These views will give the length, depth, and height of an object.

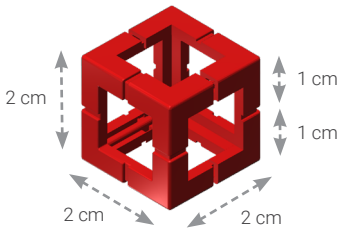


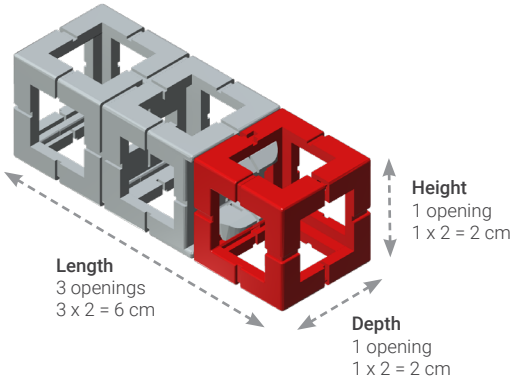
Instructions: Using engineering materials, assemble a simple object such as the one pictured below. Then, rotate the object and observe what it looks like from different perspectives. *Note: Do not disassemble your object as it will be used in the following section.*



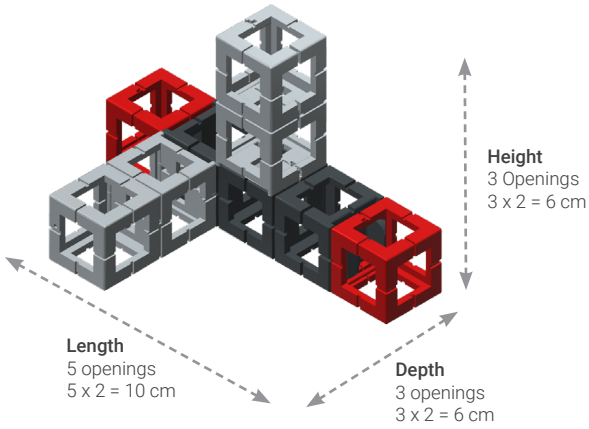
3. Measuring In Metric Units

Kid Spark engineering materials are designed in metric units of measurement. This means it is easy to determine the dimensions of an object or design. Simply count the number of openings and multiply by two to determine dimensions in metric centimeters. On most engineering materials, there is a center mark in the middle of an opening that represents one centimeter.



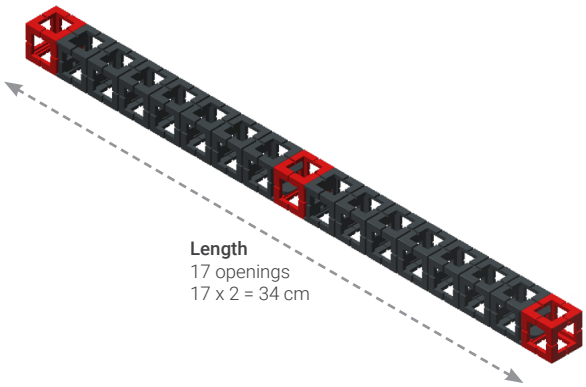


Instructions: Determine the dimensions (length, depth, height) of the simple object you created in Section 2.



Divergent Learning Activity:

1. **Instructions:** Create a "measuring stick" and use it to determine the dimensions of various objects in the classroom. The length of the measuring stick can be determined by each team.

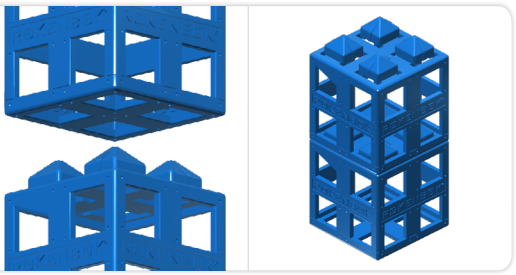


Building Basics

The following tips will be helpful when using Kid Spark engineering materials.

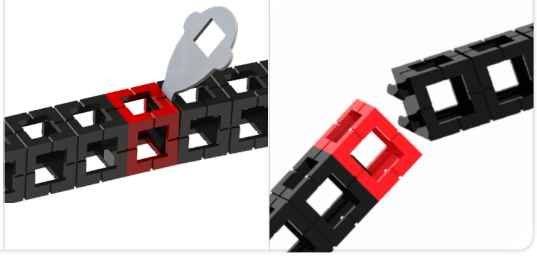
Connecting/Separating ROK Blocks:

ROK Blocks use a friction-fit, pyramid and opening system to connect. Simply press pyramids into openings to connect. To separate blocks, pull apart.



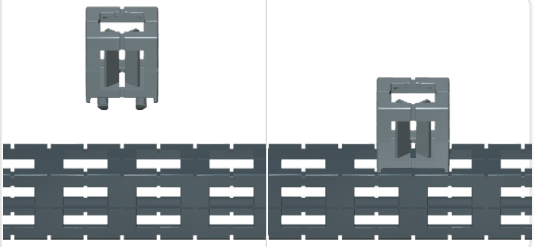
Connecting/Disconnect Smaller Engineering Materials:

Smaller engineering materials use a tab and opening system to connect. Angle one tab into the opening, and then snap into place. To disconnect, insert key into the engineered slot and twist.



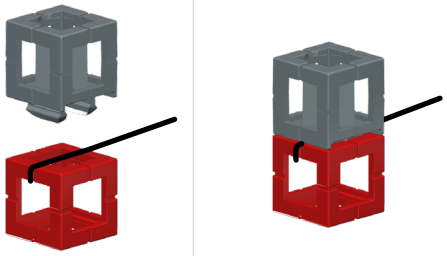
Snapping Across Openings:

Materials can be snapped directly into openings or across openings to provide structural support to a design. This will also allow certain designs to function correctly.



Attaching String:

In some instances, string may be needed in a design. Lay string across the opening and snap any component with tabs or pyramids into that opening. Be sure that the tabs are perpendicular to the string to create a tight fit.



Measuring:

The outside dimensions of a basic connector block are 2 cm on each edge. This means the length, depth, and height are each 2 cm. To determine the size of a project or build in centimeters, simply count the number of openings and multiply by two. Repeat this process for length, depth, and height.