

# Core Concept: Ideation

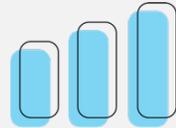
**Engineering Literacy Dimension:** Engineering Practices

**Practice:** Engineering Design

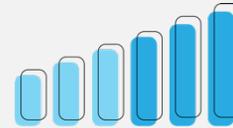
**Overview:** *Ideation* is the process of mentally expanding the set of possible solutions to a design problem in order to generate a large number of ideas, in hopes to then, find a better, and more innovative, resolution. Sophistication in this process requires knowledge related to (a) *divergent thinking and brainstorming techniques*, (b) *convergent thinking methods (including functional decomposition which is the process breaking down the overall function of a device, system, or process into its smaller parts)*, and (c) *employing visual-spatial abilities to convey ideas through sketching*. This core concept is important to Engineering Design as this practice seeks to develop creative and innovative solutions to ill-structured and open-ended problems.

## Performance Goal for High School Learners

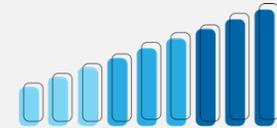
I can successfully generate multiple, innovative ideas through both divergent and convergent thinking processes while communicating and recording ideas in two- and three-dimensional sketches using visual-spatial techniques.



Basic



Proficient



Advanced

### DIVERGENT THINKING & BRAINSTORMING TECHNIQUES

I can explore possible ideas based on previous solutions related to my design problem.

I can propose unconventional ideas based on the context of my design problem.

I can create not only unconventional, but also promising ideas to my solution.

### CONVERGENT THINKING METHODS

I can identify components that are made up by my design problem and possible solutions.

I can analyze and classify the components that are made up by my design problem and possible solutions.

I can organize a hierarchy of the components that are made up by my design problem and possible solutions.

### CONVEYING IDEAS THROUGH SKETCHING (including Spatial Visualization)

I can project three-dimensional products, structures, or system components with rough sketches.

I can describe my ideas of products, structures, or system components in terms of spatial concepts, such as area, volume, distance, translation, rotation, and reflection.

I can develop rough sketches of three-dimensional products, structures, or system components in the process of detailing, recording, and communicating my ideas.