

Device Holder Design Worksheet

Understanding the Problem

Design Brief:

A written plan that identifies a problem to be solved, its criteria and constraints.


Create a Device Holder Faceplate to be 3D printed that interlocks with a wooden stand.

For yourself.

For an adult in your home.

As a gift.

What is your why?

 _____

Criteria:

The things that a design needs in order to be successful.

- ☐ A good 3D model, to be printed on classroom 3D printers so the design must consider **four** colors could be printed.
- ☐ Must have the correct size _____ for wooden stand.
- ☐ Design must consider _____ placement. We want to allow space for the device to _____ on the wooden stand.

Constraints:

Limitations on the design. A limit, such as appearance, budget, space, materials, or human capital in the design process.

- ☐ _____ inches wide at the slots and below
- ☐ Faceplate is _____ inches thick.
- ☐ Height is _____ inches minimum, _____ inches maximum.
- ☐ The design must “_____ -up” the space.
- ☐ Add and remove material and increments of _____ inches.
- ☐ If letters are completely removed, a _____ font must be used.
- ☐ _____ must be _____, either filleted corners, material added or material removed.
- ☐ _____

Brainstorming - Research, Investigate, Imagine

Check out the examples in the classroom. Based on what you see, what are three things you like or want to apply to your design?

Investigate - Learn about what others have done, explore possible materials or processes you could use for your design

Observations, Interviews, visual research, and experiments!

1. _____

2. _____

3. _____

Create 4 thumbnail sketches

Imagine - Come up with different ways to solve the problem. Use your creativity to think of lots of ideas that could work.

Thumbnail Sketch:
Usually small, simple, and with just enough detail to convey a concept.

Plan

Detailed Sketch: A freehand technical sketch that provides detailed information about the object such as annotations (notes), dimensions, and shading.

Annotations: Notes placed on an engineering sketch to clarify the viewer's understanding of the object or objects drawn.

Proportion: The relation between one object and another or between one size and another.

Drawing Key

Base .25"

Add Material .05"

Add More Material .10"

Remove Some Material .05"

Remove ALL Material

Does your plan meet the requirements?

Criteria:

- ☐ Must have the correct size slots for the wooden stand.
- ☐ Design must consider device placement, we want to allow space for the device to sit on the wooden stand.
- ☐ Printed on classroom 3D printers so the design must consider four colors that can be printed.

Constraints:

- ☐ 3½ inches wide at the slots and below.
- ☐ Height is a minimum of 4 inches, maximum of 6 inches.
- ☐ Add or remove material in .05 inch increments
- ☐ Edge must be modified (rounded, added, or partly removed)
- ☐ Design must "fill-up" space.
- ☐ If letters are completely removed, a stencil font must be used

Complete the Design Summative in Google Classroom

Engineering Design Process - Design

1 - Beginning	2 - Developing	3 - Proficient	4 - Excelling
<p><i>Understanding the Problem</i></p> <p><input type="checkbox"/> No research documented</p> <p><i>Brainstorm</i></p> <p><input type="checkbox"/> Only one idea is generated or thumbnail sketches show no relevance to the problem, missing the criteria and constraints.</p> <p><i>Plan</i></p> <p><input type="checkbox"/> A detailed sketch is vague, missing critical information.</p> <p><input type="checkbox"/> Dimensions are incorrect and the plan is unclear to all, including those not familiar with the problem.</p>	<p><i>Understanding the Problem</i></p> <p><input type="checkbox"/> Criteria and constraints are partly defined.</p> <p><i>Brainstorm</i></p> <p><input type="checkbox"/> Only one observation of others' designs is documented.</p> <p><input type="checkbox"/> Multiple thumbnail sketches are produced, addressing some but not all criteria and constraints.</p> <p><i>Plan</i></p> <p><input type="checkbox"/> A detailed sketch is created but has incorrect dimensions or is unclear, missing one of the criteria or constraints.</p> <p><input type="checkbox"/> The plan may be unclear to someone not familiar with the problem.</p>	<p><i>Understanding the Problem</i></p> <p><input type="checkbox"/> Criteria and constraints are clearly defined.</p> <p><i>Brainstorm</i></p> <p><input type="checkbox"/> Multiple observations of others' designs are documented.</p> <p><input type="checkbox"/> Multiple ideas are generated and communicated through thumbnail sketches, addressing all criteria and constraints.</p> <p><i>Plan</i></p> <p><input type="checkbox"/> A detailed sketch is created including correct dimensions, annotations.</p> <p><input type="checkbox"/> The plan meets all criteria and constraints, and includes clearly defined steps for completing the design.</p>	<p><i>Understanding the Problem</i></p> <p><input type="checkbox"/> Criteria and constraints are clearly defined.</p> <p><i>Brainstorm</i></p> <p><input type="checkbox"/> Observations of others' designs are documented <i>with the intention to include strong aspects from those designs.</i></p> <p><input type="checkbox"/> Multiple ideas are generated and communicated through thumbnail sketches, addressing all criteria and constraints, and <i>are clear enough to be understood by all.</i></p> <p><i>Plan</i></p> <p><input type="checkbox"/> A detailed sketch is created including correct dimensions, annotations, and <i>is clear enough to be understood by all.</i></p> <p><input type="checkbox"/> The plan meets all criteria and constraints, and includes clearly defined steps for completing the design, and <i>is clear enough to be understood by all.</i></p>