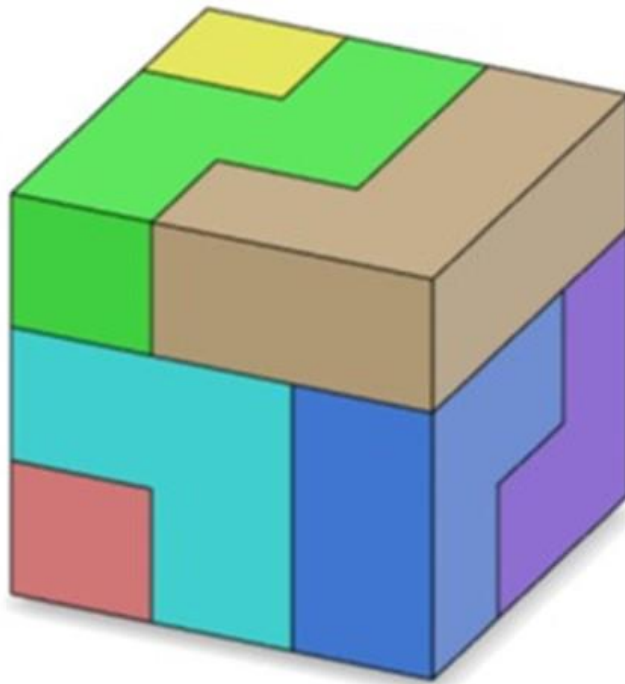


# DESIGN PROJECTS

STUDENT GUIDE



## PUZZLE CUBE

## DESCRIPTION

Welcome to the Design Projects Student Guide! The focus of this project is a Puzzle Cube, a 3D-printed, interlocking puzzle that challenges you to think critically about design, assembly, and problem-solving.

This guide contains information regarding Design Intent, DFAM (Design for Additive Manufacturing), and Design Tips to keep in mind for each part.

For a video demonstration of the design approach, detailed dimensions, and step-by-step instructions, see the links in the **Additional Resources** section below.

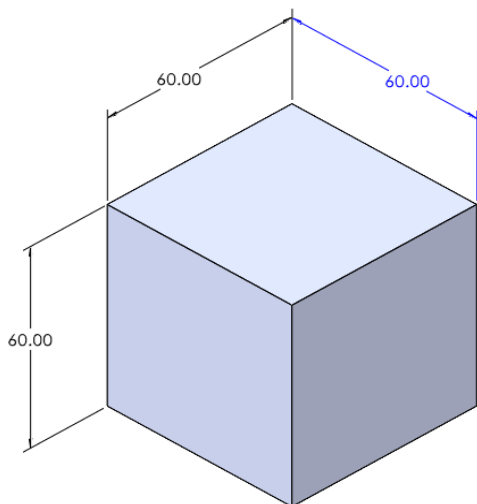
## PROJECT TASKS

1. Create the overall block in CAD.
2. Split the overall block into 27 small blocks.
3. Combine those small blocks into at least 5 interlocking pieces.
4. Re-assemble the pieces in CAD.
5. 3D Print or manufacture the pieces.
6. Assemble the physical pieces and challenge others to do the same.

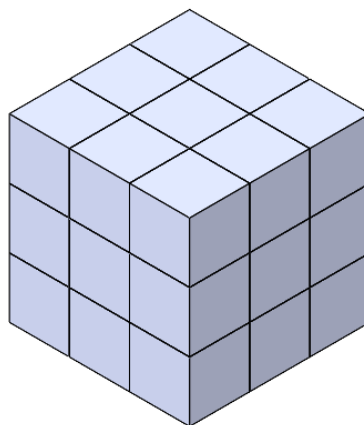
## ADDITIONAL RESOURCES

- [LINK TO DOCUMENTS](#)
- [LINK TO YOUTUBE VIDEO](#)
- [LINK TO STEP-BY-STEP](#)

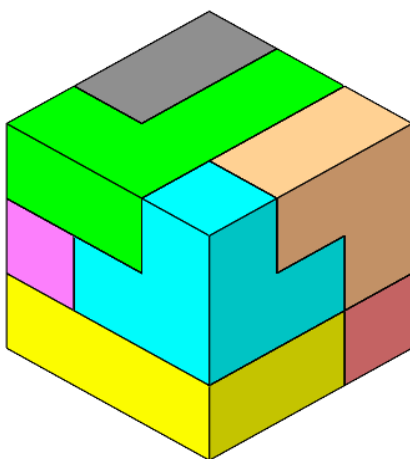
## PUZZLE CUBE COMPONENTS



**"Master Model"  
Cube**



**"Split" Cube**



**Cube Assembly**

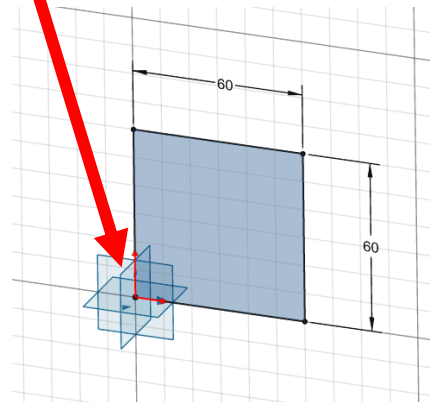
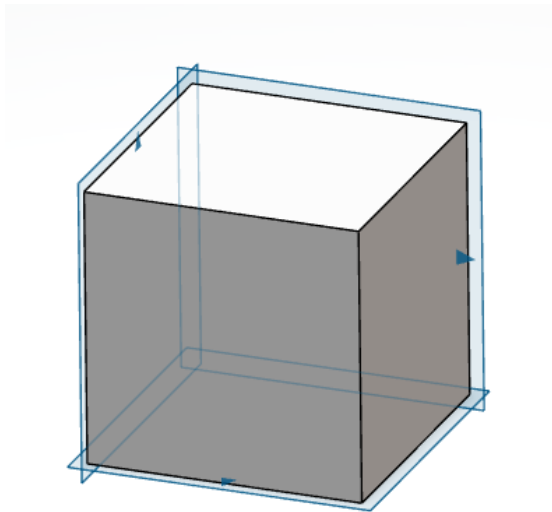
## MASTER MODEL CUBE

### DESIGN INTENT

- 60mm x 60mm x 60mm cube.
- This represents the finished volume of the puzzle cube.
- Sketched and extruded in a way that makes it suitable to be split by reference planes.

### DESIGN TIPS:

- Sketch a 60mm x 60mm square cornered at the Origin.
- Extrude 60mm in one direction to allow you to offset planes in even increments.



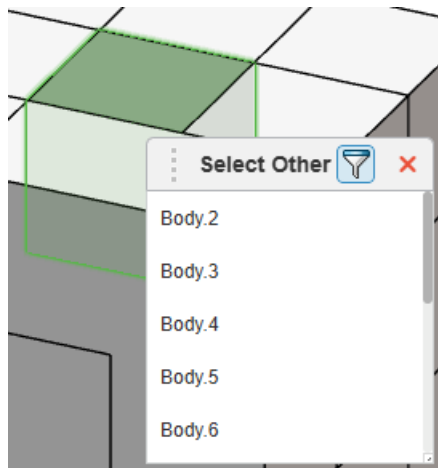
## SPLIT CUBE

### DESIGN INTENT

- Create offset reference planes 20mm apart.
- Split cube into 27 smaller cubes.
- Join the smaller cubes into puzzle pieces.

### DESIGN TIPS:

- Click on a reference plane and choose Plane tool to create a 20mm offset plane.
- Click and hold the mouse button to “Select Other”
- Try to create unique shapes.



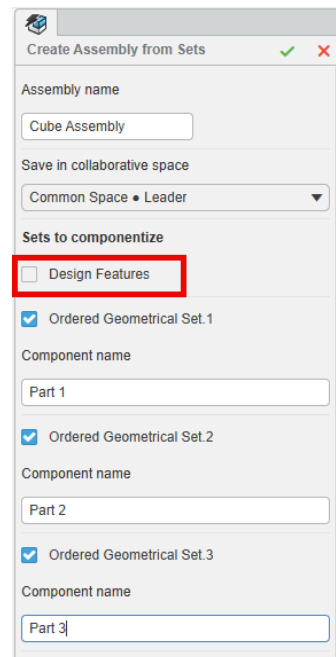
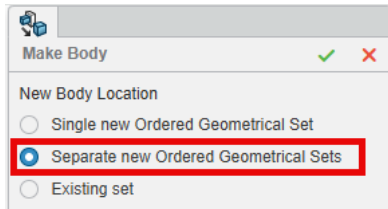
## CUBE ASSEMBLY

### DESIGN INTENT

- Create individual parts from the joined bodies
- Create an assembly of those parts.

### DESIGN TIPS:

- Use “box select” to select all the joined bodies to create **SEPARATE** Ordered Geometrical Sets.
- Use the Create Assembly from Sets tool to create the assembly.
  - Be sure to **UNCHECK** Design Features – this is the entire cube, you don’t want that in the assembly.



## 3D PRINTING

- Export each part as an STL file.
- Nest your parts to print many at one time.
- Orient the parts to minimize the use of support material (see images below).

