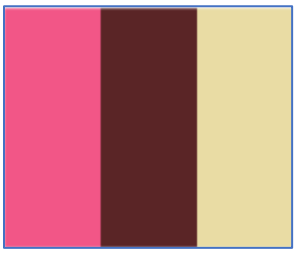
# PLASM CAD 3D MODELING PROJECTS: UNIT 1



## PROJECT 01 - COLOR BAR

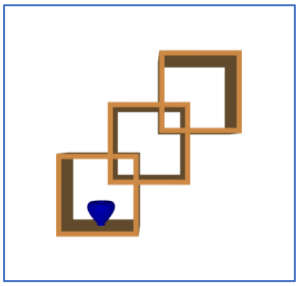
Create a color bar using the COLORBAR() command.

This exercise allows students to play with the different premade colors (such as STRAWBERRY, CHOCOLATE, VANILLA shown here). When they learn RGB colors (Project 9) and for-loops in Section 19, they can generate any color and gradation.

## PROJECT 02 - QUILTING

Imitate a quilt design using TRIANGLE() and QUAD().

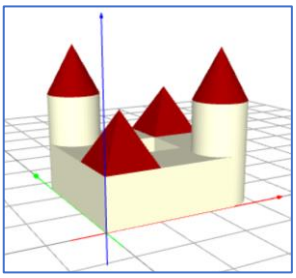
Start with one simple quilt square. Future designs can include complex designs created with UNION(), SUBTRACT(), SUBTRACT() used to resolve ambiguous colors, more sophisticated transformations MOVE(), ROTATE() etc., For-loops can be used to repeat patterns (Section 18-20).



## PROJECT 03 - SHADOW BOX

Create a shadow box by using the PRISM() command.

If students use TRIANGLE(), QUAD(), or BOX(), they can place the objects anywhere on the XY plane. Future projects can use MOVE() and ROTATE(), or 3D shapes and more sophisticated transformations learned in Section 8 onward.



## PROJECT 04 - CASTLES

Build a toy castle using CASTLE1(), CASTLE2(), etc.

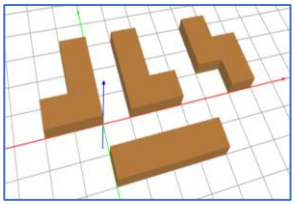
This project practices the COPY() and MOVE() command. Castle components are premade, so students just need to move them into place. Future projects could include pieces designed by the students.

## PROJECT 05 - JEWELRY

Create a piece of jewelry by using the PRISM() command.

Students can create any two-dimensional object using all previously learned commands, then extrude the object using the PRISM() command. The file can be exported as an STL file and printed on a 3D printer. Future projects can include 3D shapes and more sophisticated transformations.

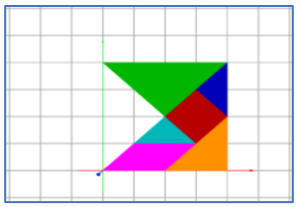
# PLASM CAD 3D MODELING PROJECTS: UNIT 2



## PROJECT 06 - PUZZLE

Create a solvable puzzle using 2D shapes extruded with the PRISM() command, and moved into position using ROTATE() and MOVE().

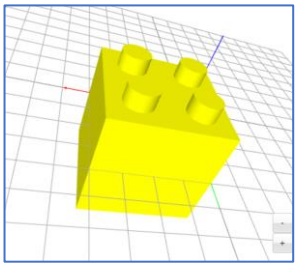
This sample uses Tetris shapes, but any shapes can be used. See Project 14 for a similar project with 3D shapes.



## PROJECT 07 - TANGRAMS

Assemble a tangram using the ROTATE() and MOVE() commands.

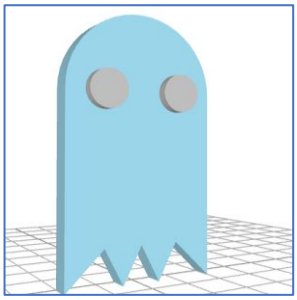
The tangram pieces are premade. The transformations needed to place the pieces range from simple to complex.



## PROJECT 08 - INTERLOCKING BRICKS

Construct an interlocking construction brick using Constructive Solid Geometry.

This is the first truly 3D project. The components are simple: CYLINDER() or CYL(), and cubes and rectangular prisms created using various commands. Students should pay attention to clearances, so that the blocks really interlock. Models made of multiple blocks will be more challenging.

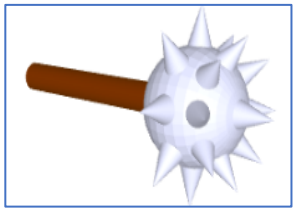


## PROJECT 09 - GAMES

Create a recognizable model of a video game character.

Start with simple shapes. This Project introduces RGB colors [0-255, 0-255, 0-255]. Over 16 million colors can be generated by using values from 0 to 255 for red, green, and blue. Students can look up RGB values on the Internet. For example: a search for light blue returned [173,216,230], used to color this ghost.

COLOR(ghost, [173,216,230])



## PROJECT 10 - FANTASY WEAPONS

Imagine a monster and create a suitable weapon for defense. Alternative suggestions for projects: shields, trophies.

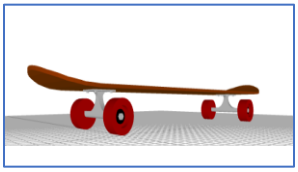
Students practice rotating objects in 3D space to create more complex, decorated shapes. The mace, for example, is covered in rotated cones.

# PLASM CAD 3D MODELING PROJECTS: UNIT 3

## PROJECT 11 - MONSTERS

Model an imaginary monster using 3D shapes and modifications.

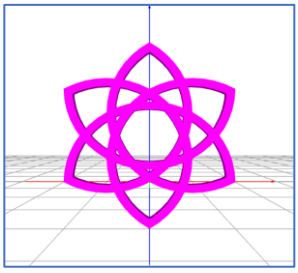
Again, start simple. This is a project that can be revisited and refined. Create galleries of "Monster Art" by exporting the PNG files and printing them on a color printer.



## PROJECT 12 - SPORTS

Model a piece of sports gear.

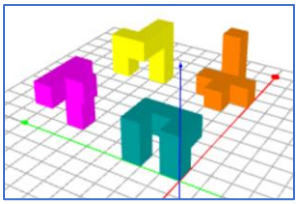
Students learn how to use axial and planar symmetry in Section 12. Students can take advantage of symmetry to simplify the design process.



## PROJECT 13 - CELTIC KNOTS

Create a Celtic knot design with rotational symmetry.

Students use rotational symmetry to create Celtic knot patterns. In Section 18 and 19, they will learn how to rotate the patterns using Python for loops.



## PROJECT 14 - 3D PUZZLE

Create a solvable 3D puzzle using 3D objects.

The best way to build these puzzles is to start in the solved state, then move the pieces apart using ROTATE() and MOVE(). This is a good test of visual-spatial reasoning.

## PROJECT 15 - EVERYDAY THINGS

Create a model of a nearby object.

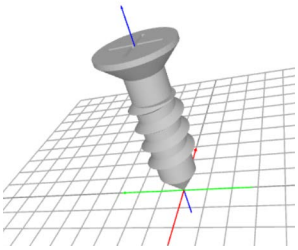
How do we decompose a real object into basic shapes? How are they modified? Which details are needed, and which can be eliminated?

# PLASM CAD 3D MODELING PROJECTS: UNIT 4 AND 5

## PROJECT 16 - FURNITURE

Create a model of a familiar piece of furniture.

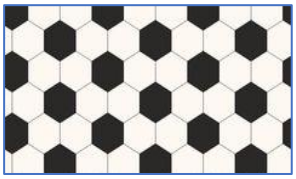
Students are creating a design for a useful object. Emphasis is on proportions that match the use, and dimensions suited to the type of material. Students now know how to use additional parameters, which help to make the shapes more realistic.



## PROJECT 17 - MY OWN HARDWARE STORE

Create a screw, bolt, or set of fasteners.

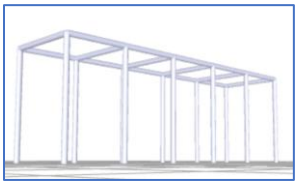
Students are using the SPIRAL command and working with precise measurements.



## PROJECT 18 - FLOORING

Using loops, create a tiling pattern.

Students can practice shapes that require both linear and rotational repetition.



## PROJECT 19 - PLAYGROUND

Create a model of a playground fixture.

Like the Project 16, students must keep in mind proportions that match the use, and dimensions suited to the type of material. Playground equipment includes repeated patterns such as steps and ladders: students can take advantage of the for loop to create these repetitions.

## PROJECT 20 - ARCHITECTURE

Create a model of a piece of architecture.

Like Project 15, students analyze real objects and decompose them into shapes that can be modeled. Start simple, then add details. Use the for loop to generate repeated shapes.

## PROJECT 21 - CHESS

Create a model of a chess piece.

Students practice generating Bezier curves, and creating rotational solids.