BlocksCAD

The following *Intro Series* lessons are designed to introduce specific BlocksCAD tools and coding concepts. All encourage organized program development, spatial reasoning, number sense, and problem solving.

Table of Contents

Translation

Snowman

A great first BlocksCAD build! Translate shapes along one axis to create a snowman, then embellish it using translations along multiple axes.

Caterpillar
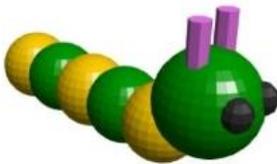
Use the translate block, color block, and basic shapes to create a simple caterpillar.

Cube Corners
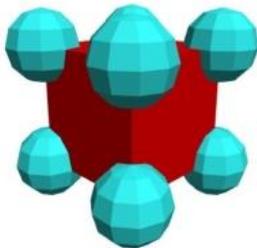
Look for symmetrical patterns of translation to put spheres at the corners of a centered cube.

Robot

Translate different 3D shapes to create a basic robot model. Add features using rotations and more translations.

Top

Adjust the height and radii of cylinder blocks to create this simple spinning top!

Olympic Rings
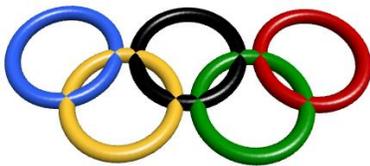
This lesson introduces students to the torus and requires them to strategically change the four parameters for this shape. Once the five rings are translated into place, they can be printed to make a keychain.

Rotation

Spiky Ball
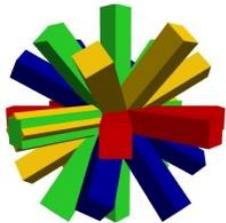
Break down creating the complicated spiky ball by first creating a flat star shape, then duplicating and rotating that star.

Spiky Hair
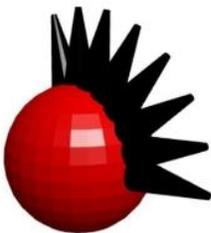
Practice rotation to make a head with a mohawk. Look for patterns in your rotation angles and examine the importance of order of operations with translations and rotations.

Table

A deceptively tricky rotation project that emphasizes axis of rotation decisions. Be sure to center those table leg cylinders!

Torus Cage
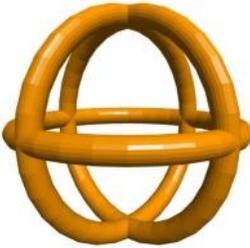
An excellent first rotation project, requiring rotation in more than one axis.

Figure

Learn to combine rotation and translation by making stick figures. Range from simple to very complicated.

Flower

Combine rotation and translation to make a flower. Look for patterns in your rotation angles.

Difference

Cube Cage

Figure out what shapes you need to subtract away to create this cube cage.

Apple

Simple introduction to using the difference block to make an indentation in a sphere. Students will also learn how to make a cone from a cylinder to make the stem.

Cage Toy
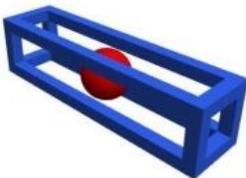
Always fun to print, create a cube cage with a sphere in it. Be careful that the sphere doesn't touch the cube cage!

Cup

A classic difference project, with many variations. Adding handles adds to the challenge.

Name Tag

A great first difference project that is easily customizable. Add a torus to create a keychain!

Earphone Holder

Use the difference block to subtract shapes and text from a surface to build a functional headphones holder.

Shoelace Badge

Design and engrave a badge that can be printed and attached to a shoe.

Heart Pendant

Design and build heart pendant from scratch. The 6th-8th grade version of the instructions providse fewer hints than the 3rd-5th version.

Hamburger
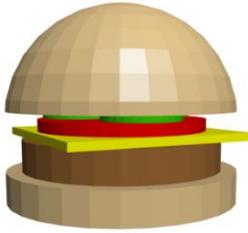
Students will create and stack different shapes to create the toppings on a hamburger. They will need to strategically use a difference block in order to create the rounded top of the bun.

Dice

A more advanced difference project that requires organized translation in all three dimensions as students place small spheres to be subtracted away from the white cube.

Tower of Hanoi
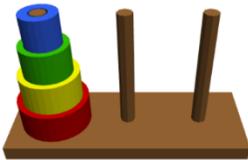
Students can make a virtual model or printable design of the famous Tower of Hanoi logic puzzle. Students will strategically use the difference block so that their pieces fit on the rods.

Coin Cube

Create a ship-in-a-bottle-esque coin cube for a penny. Use variables to create a cube that is quickly customizable for a coin of any radius.

Dough Cutter

Another advanced difference project that is easiest using the scale and sides block. This is a simple and fun project to print.

Calendar Cubes

Design and build 'calendar cubes' that can be printed and then arranged to display any calendar date.

Scale/Sides

Cheese
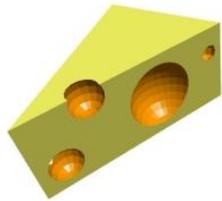
Scale a 3-sided cylinder to make a good wedge, then add holes.

Cheese Plate
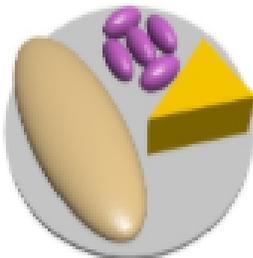
Students will practice using the sides and scale transformations to create food to arrange on a cheese plate.

Hull

Round Corners
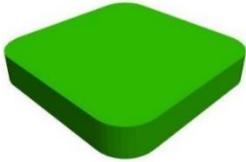
An easy first hull project. Figure out what shapes to use for the corners, move them into place, and hull them.

Popsicle

Use the hull block to connect a rectangle and a torus. Then use your creative design skills to make some iconic popsicles!

Scraper
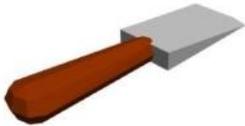
A challenging hull project. Both the handle and the blade are hulled.

Intersection

Boat
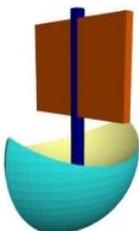
Learn intersection by making this boat hull, and finish it off with sails, flags, etc.

Two-letters
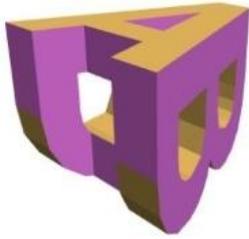
Intersect two letters to create a shape that shows a different letter depending on which side you view.

Variables

Any-Size Box
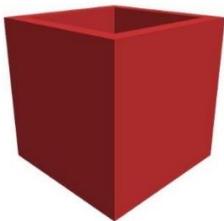
Introduce variables by building this box with adjustable length and width. For a challenge, add variables to control the depth and wall thickness.

Loops

Line of Cubes
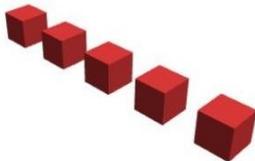
Learn to use loops with translation by copying the different cube patterns in the instructions. Simple to challenging.

Staircase
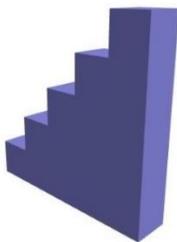
Followup to 'Line of Cubes'. Use loops to make more complicated patterns in which the loop variable is used both in translation and in the cube.

Ring of Cubes
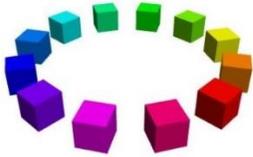
Learn to use loops with rotation by creating a ring of cubes, then alter it to create other neat patterns.

Birthday Cake

Students build a cake and translate one candle into place on the perimeter. They will then use a loop to iterate rotation around the origin in order to place any number of candles around the outside.

Snowflake
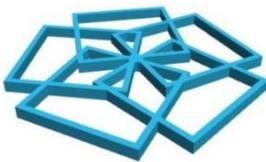
Follow-up to 'Ring of Cubes' which walks through how to create variables to control how many shapes are in the ring. Adjust shapes and variables to make snowflakes.

Modules

Build Your Own Pizza

Introduce modules and variables to younger students. They will work with pre-built modules to size and top pizzas!

Spider
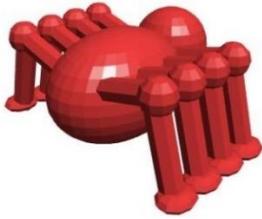
Introduction to Modules. Create a spider leg, then make a module of it so you can create many more copies easily.

# Warmup, Summary, and Group Projects

Design a House

Students interact with a pre-built logic block that lets them select a house type which they can then adorn and decorate with their own shapes.

Decode a Model

Write pseudocode (instructions) to create two simple given models, then compare with the actual model code.

Treasure Map
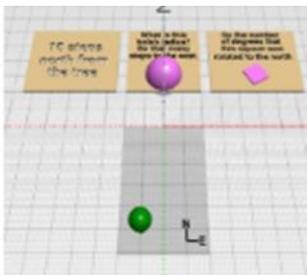
Follow a series of clues and instructions that reveal the location of treasure on a map. Build a treasure and place it where it belongs!

Class Party
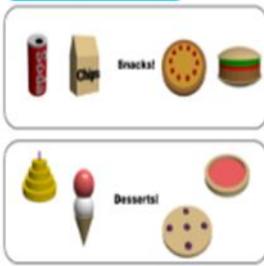
Group free-build project. Everyone picks a different party model to build.

Group Puzzle
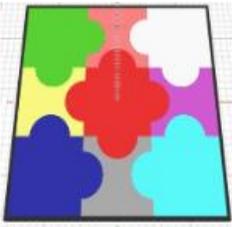
Work in groups of 2 or 3 to design the puzzle pieces needed to fill in certain puzzles.

Build with One
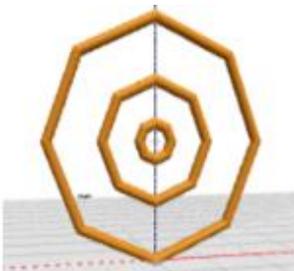
Build simple models that only use one 3D shape to try to match a picture. A great way to help introduce or reinforce the 3D shape properties.

Table Engineering

Students will create a table using three different methods to compare transformations. It is ideal for a review or assessment of early building skills. *Assessment chart included in lesson plan.