

Draw Bots

WHAT: Draw Bots are drawing robots made out of a DC hobby motor, battery pack and art supplies. The robot is brought to life by completing a simple circuit between the battery and the motor.

ELEMENTARY CHALLENGE:

Use the materials provided to design your own Draw Bot.

CAN YOUR BOT DRAW:

- Dotted lines?
- Straight lines?
- In circles?



MIDDLE/HIGH SCHOOL CHALLENGE:

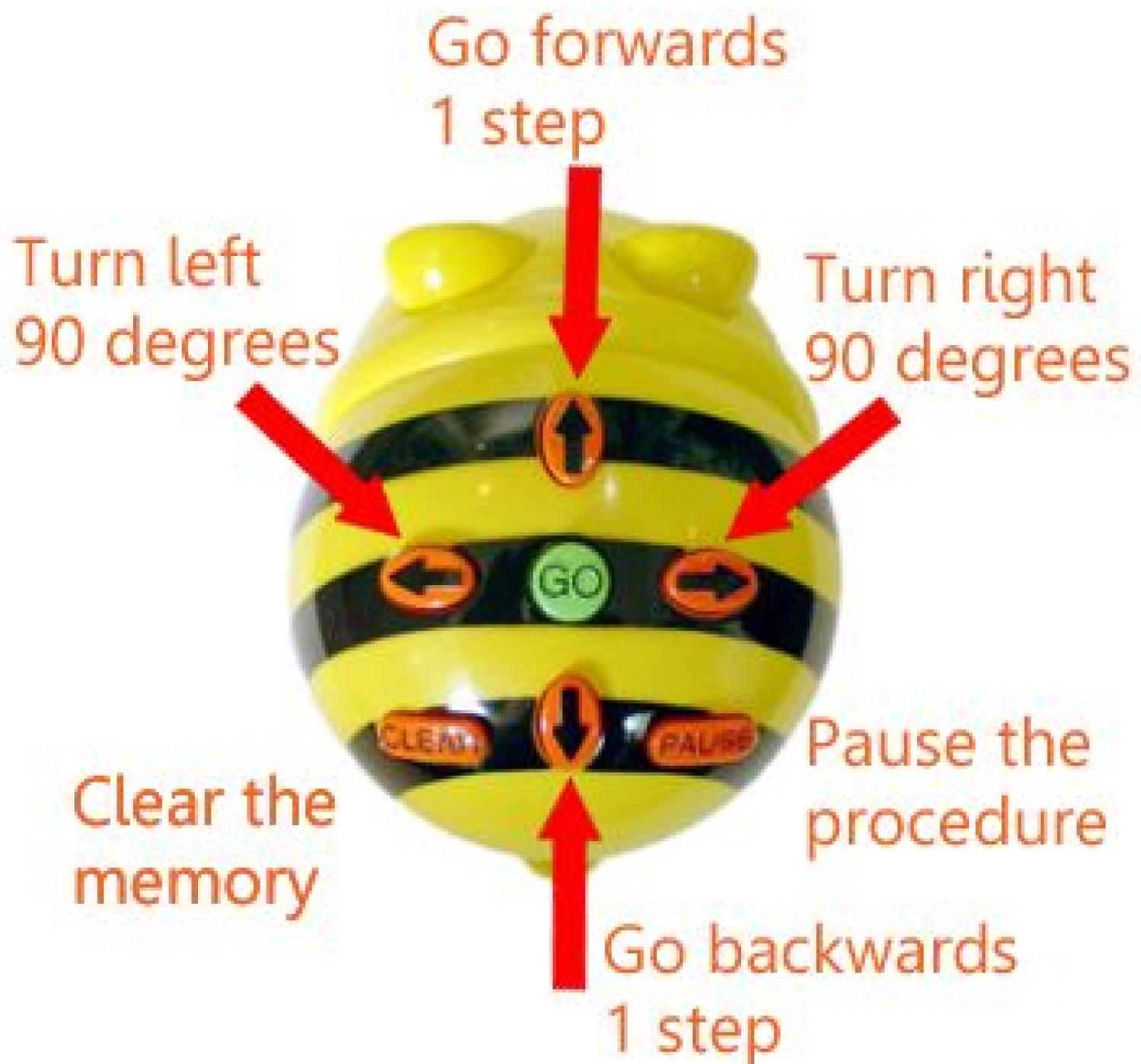
Use the materials provided to design and redesign your own Draw Bot and chart the impact of the different variables.

UNDER WHAT CONDITIONS CAN YOUR BOT DRAW:

- Dotted lines?
- Straight lines?
- In circles?

Bee-Bots

WHAT: The Bee-Bot robot is programmed by pressing the desired buttons and then pressing **go**. Be sure to press **clear** between each program! You can press multiple instructions before pressing go.



Bee Units

WHAT: The Bee-Bot robot is programmed by pressing the desired buttons and then pressing go. **Be sure to press clear between each program!** You can press multiple instructions before pressing go.



ELEMENTARY CHALLENGE:

Calculate the area and perimeter of these two shapes in “Bee Units”.

CAN YOU:

- Use the materials provided (string or pipe cleaners) to determine the length of one “Bee Unit” (one Bee-Bot move forward).
- Calculate the perimeter in Bee Units.
- Calculate the area in Bee Units.

Note: consider where you place the Bee-Bot when you place it on the starting line to calculate the area/perimeter.

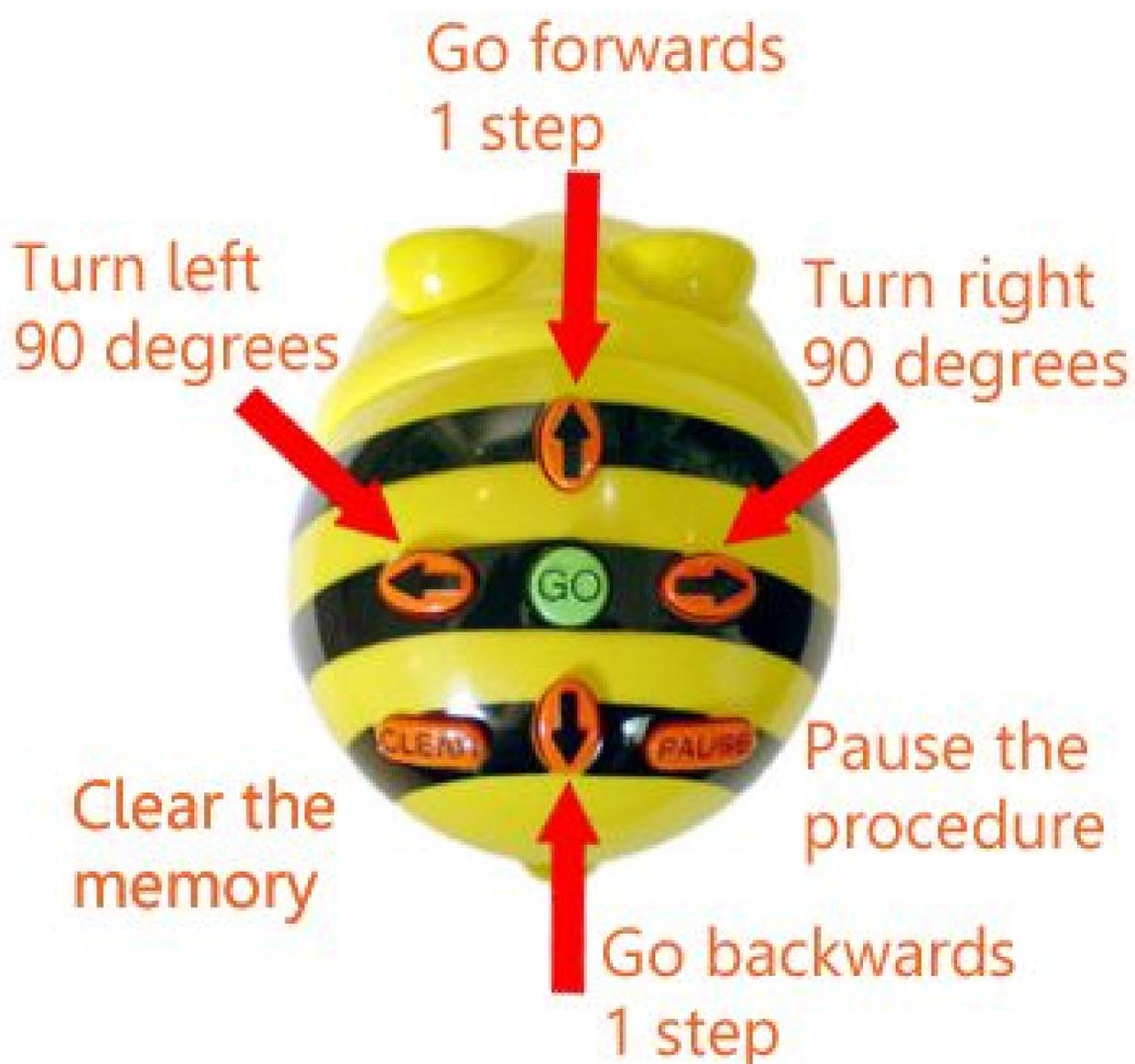
Bee-Bot Rhyming

WHAT: The Bee-Bot robot is programmed by pressing the desired buttons and then pressing **go**. Be sure to press **clear** between each program! You can press multiple instructions before pressing go.

YOUR CHALLENGE:

Pick the card on the top of the deck.

Program the Bee-Bot to move to the correct **Rhyming** word.



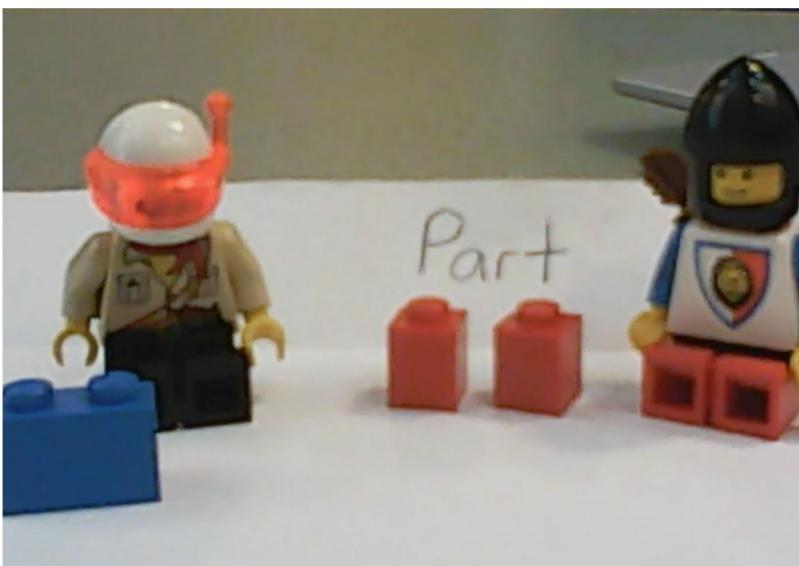
Stop Motion: Hybrid Animals

WHAT: Stop Motion Studio is a stop motion app that allows you to join together many pictures into a movie. The onion skin feature helps you line up your shots to create a smooth animation. The voice recording feature even lets you narrate the story once you're done filming.

YOUR CHALLENGE: Develop your own "hybrid" animal: a mash up of two real animals. What would your animal look like? What would it eat? What would its habitat look like?

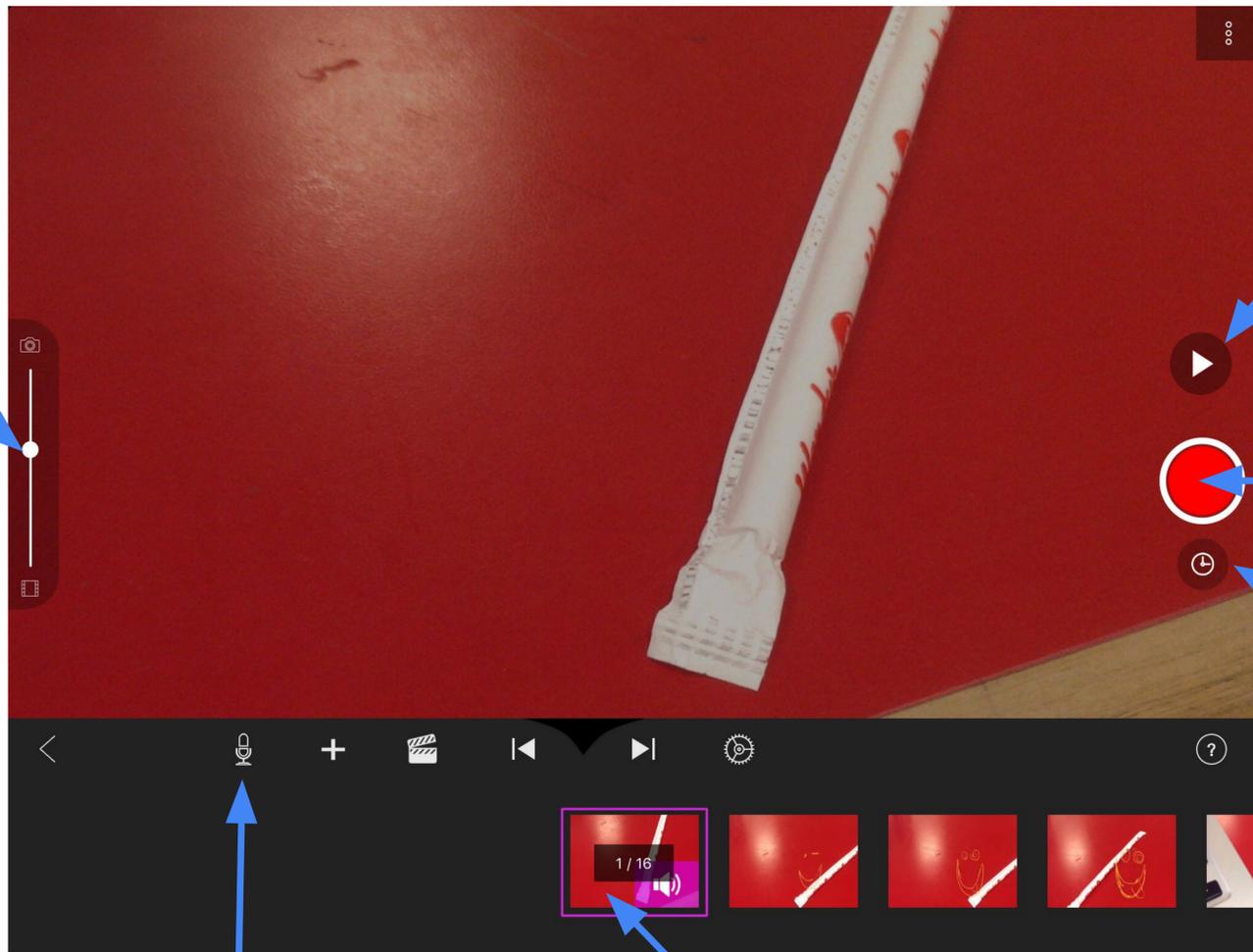
CAN YOU:

- Create an engaging storyline and visuals?
- Take at least 50 photos to help make the animation flow organically.
- Add a voice narration or sound effects?



Stop Motion Studio Tips

Onion skin: make sure to slide this down a bit... This feature allows you to view a "hint" of previous frame.



Playback

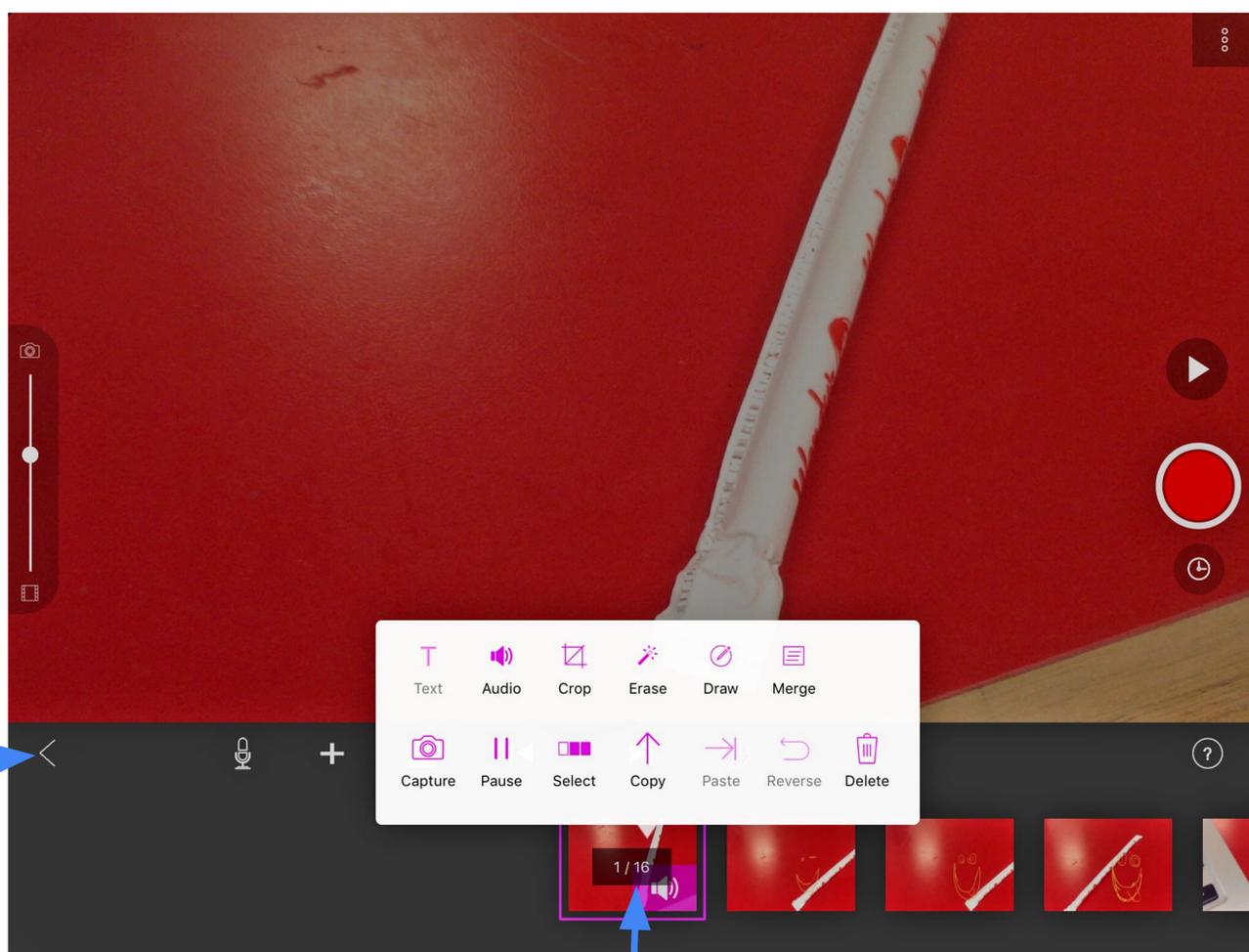
Camera button

Frames per second

Record audio

Timeline

Go back to projects start page to export your video



Holding your finger down on each frame reveals a variety of tools.

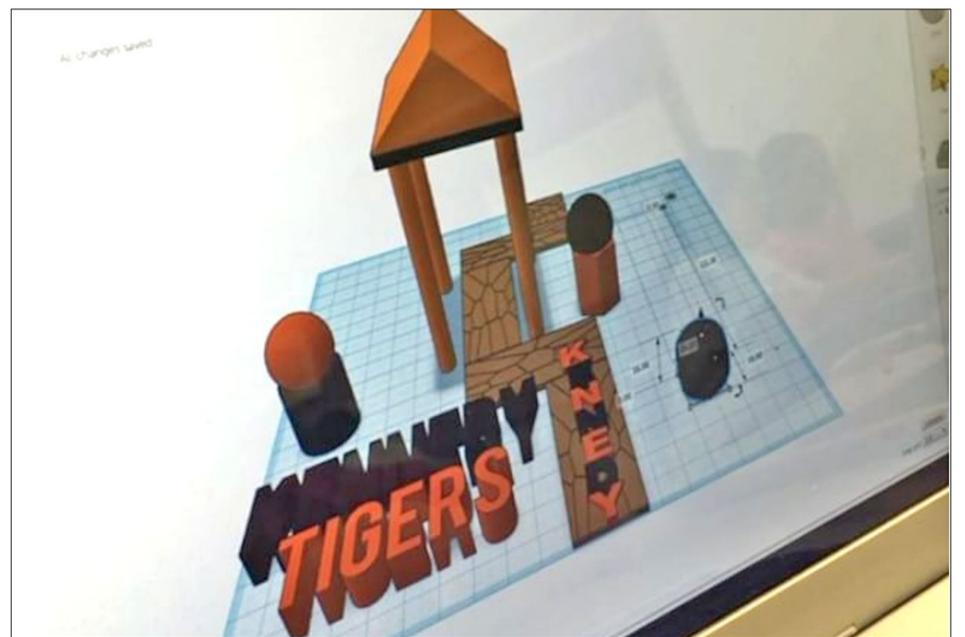
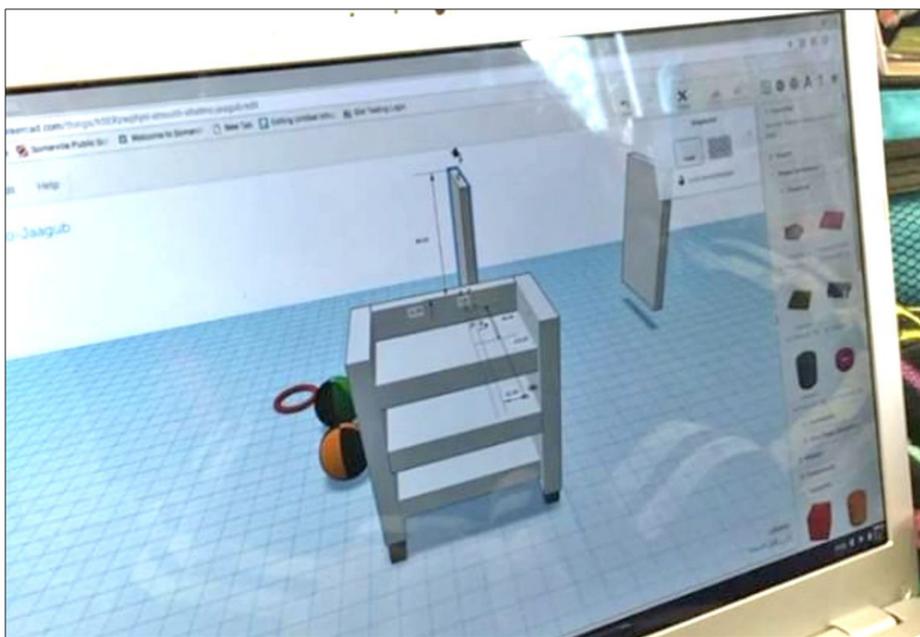
Tinkercad: 3D Modeling

WHAT: Tinkercad is a free online tool that can be used for 3D modeling. Tinkercad allows you to bring your designs to life by creating them in a 3D environment. The 3D models you create in Tinkercad can be displayed on the web or exported to use with a 3D printer.

YOUR CHALLENGE: Brainstorm a new product that solves some kind of everyday problem. Design your new product in Tinkercad in order to pitch it in a Shark Tank style entrepreneurial presentation.

CONSIDER:

- User experience in your product's functionality?
- How the different components of your product might fit together.
- What materials you might use and why.

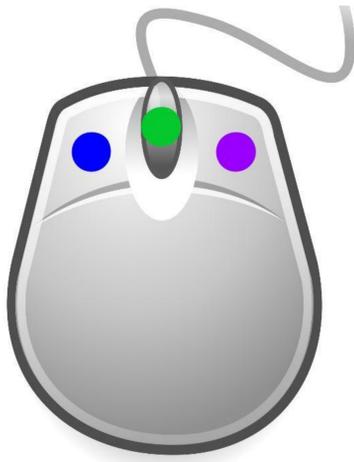


This challenge was introduced in a 6th grade math class. Students created business plans that included profit/loss projections. Kennedy students have also used Tinkercad used to design a water filtration system as well as for visually redesigning their school playground.

Tinkercad Tips

Tinkercad is a free online tool that can be used for 3D modeling. The 3D models can be exported to the .stl format which can be used with the 3D printer. You will need to create a free account before you can begin using tinkercad.

Mouse Controls

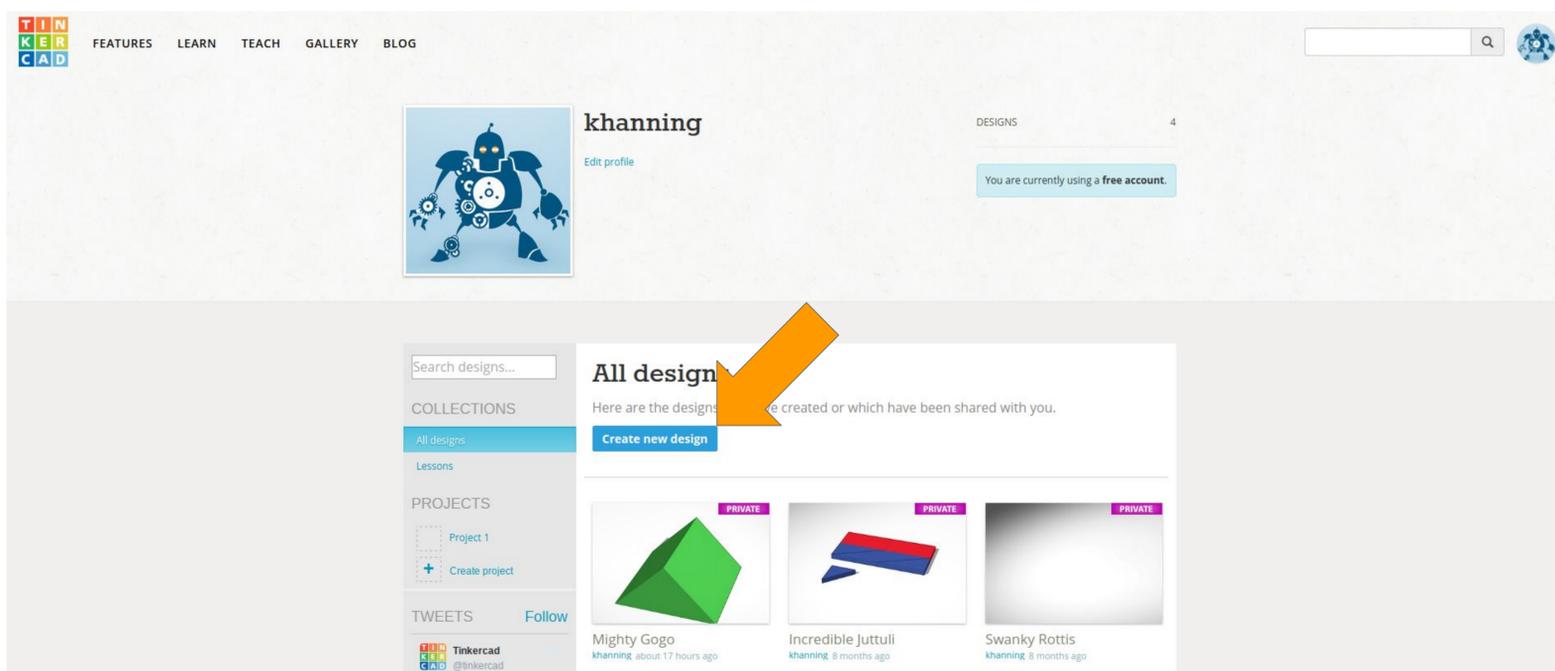


- Left Mouse Button**
Select and drag objects
- Middle Mouse Button (Scroll Wheel)**
Ctrl + Shift + Left Mouse Button also works if you do not have a scroll wheel
Move camera perspective
- Right Mouse Button**
Ctrl + Left Mouse Button also works if you do not have a right mouse button
Rotate camera perspective

Getting Started

Begin by logging into your Tinkercad account and clicking

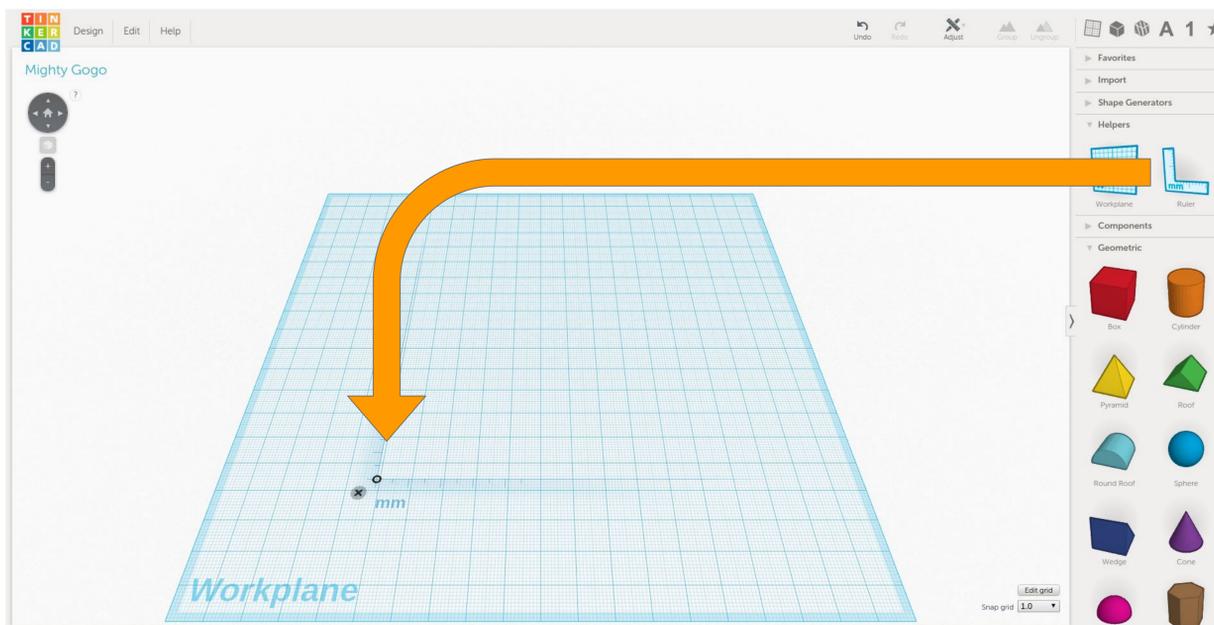
[Create new design](#)



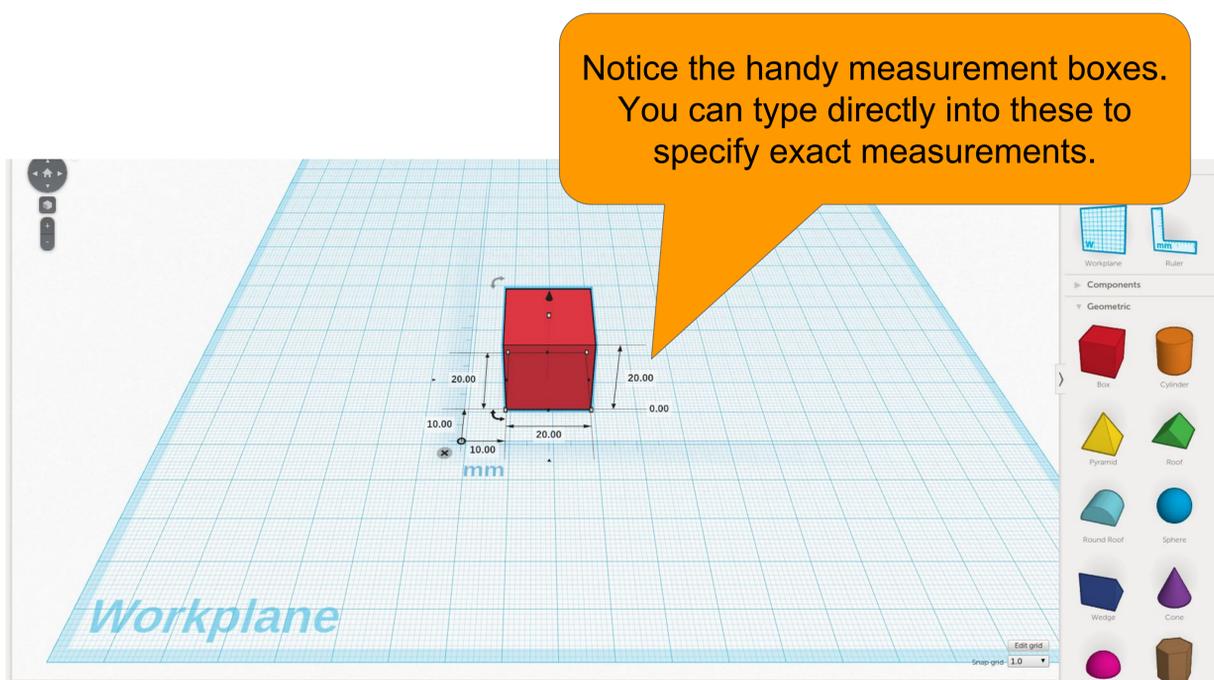
Tinkercad Tips

Ruler Helper

Always begin by dragging the **Ruler** tool onto the Workplane.
The **Ruler** can be found under the **Helpers** category. It doesn't matter where you drop the ruler, only that you bring out the ruler before any other shape.



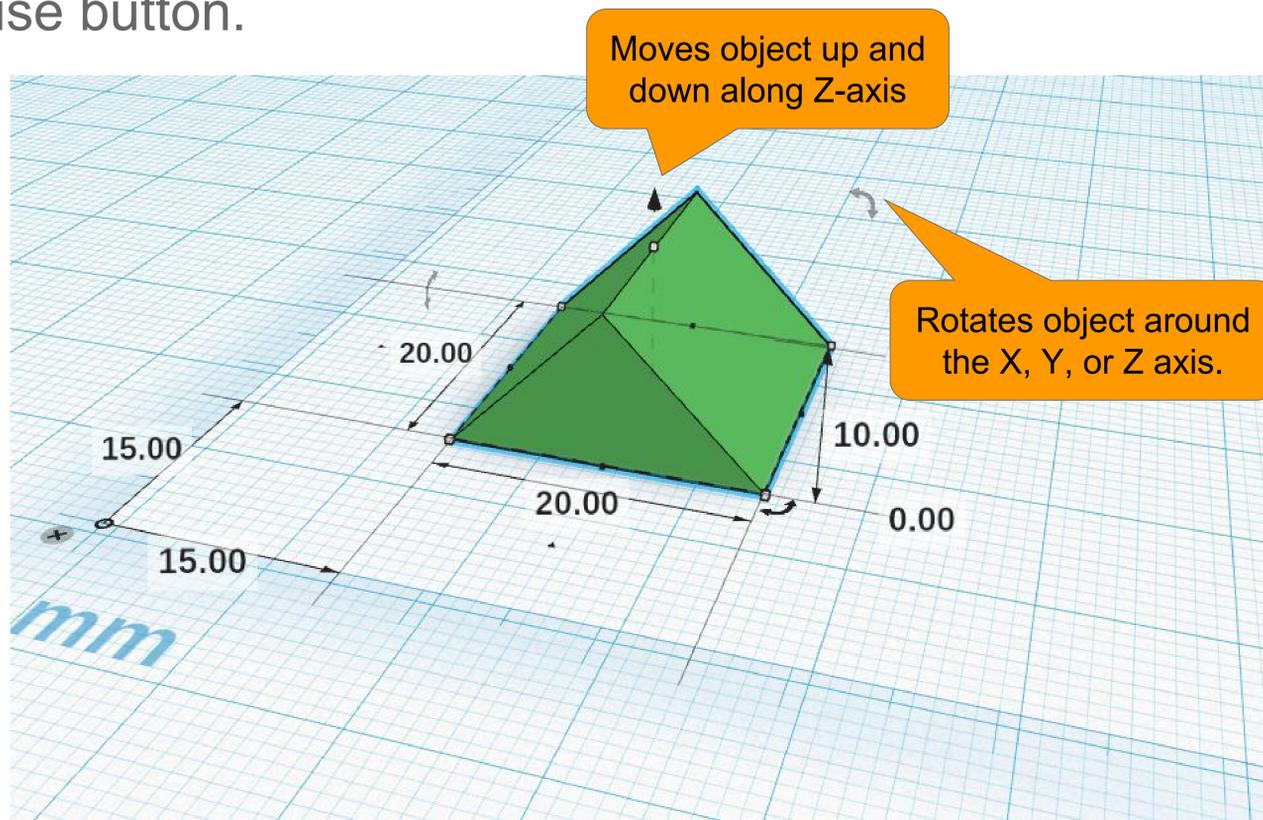
The ruler will make it much easier to align objects or specify exact measurements.



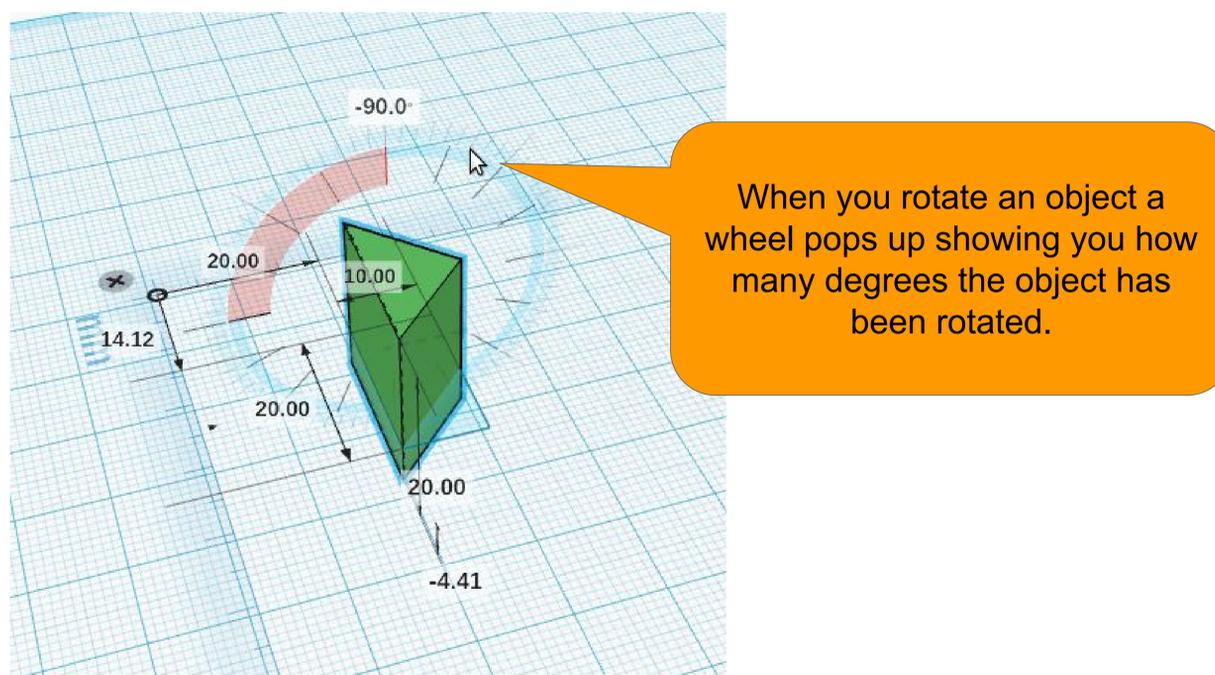
Tinkercad Tips

Rotating Objects

Sometimes you will have to rotate objects. To do this grab and drag the rotation handle across the correct axis. You may have to rotate the view using the right mouse button.



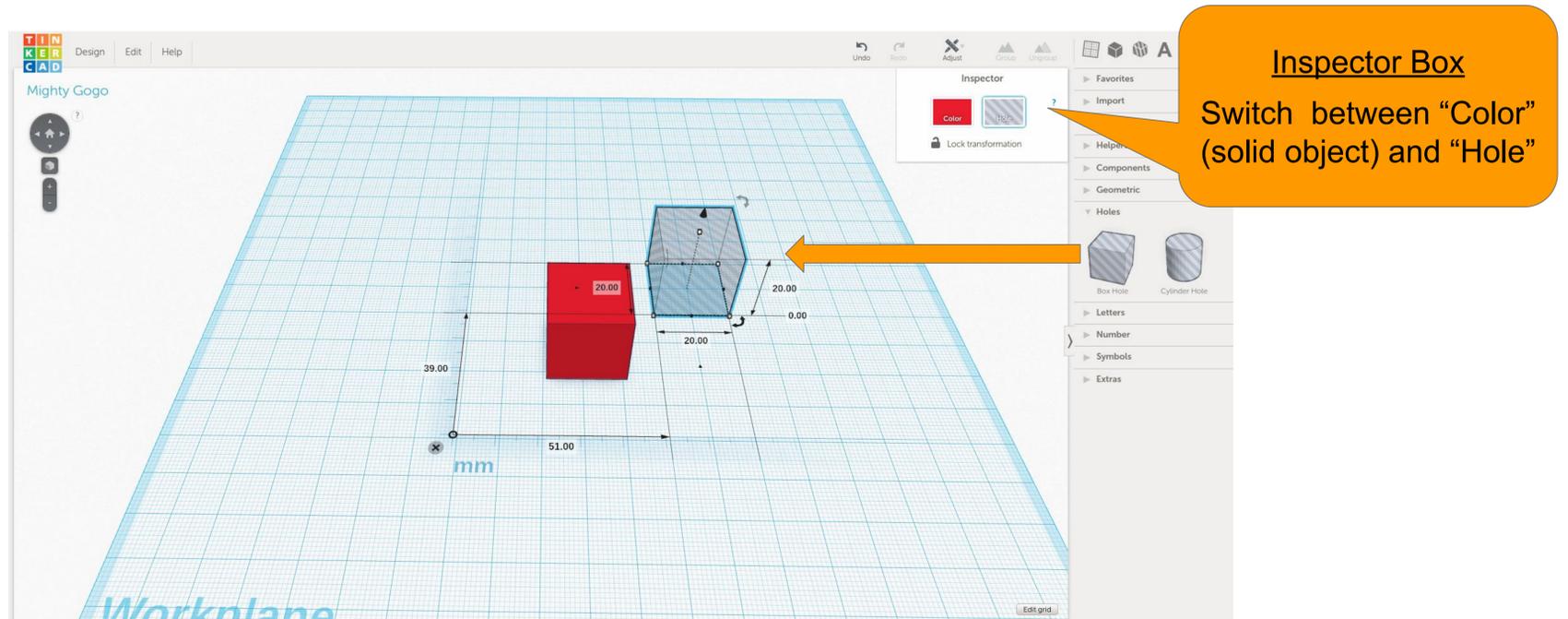
Sometimes you might need to rotate the camera perspective to see all of the rotation handles (↻). Click and drag with the right mouse button (or hold Ctrl + left mouse button) to rotate the camera perspective.



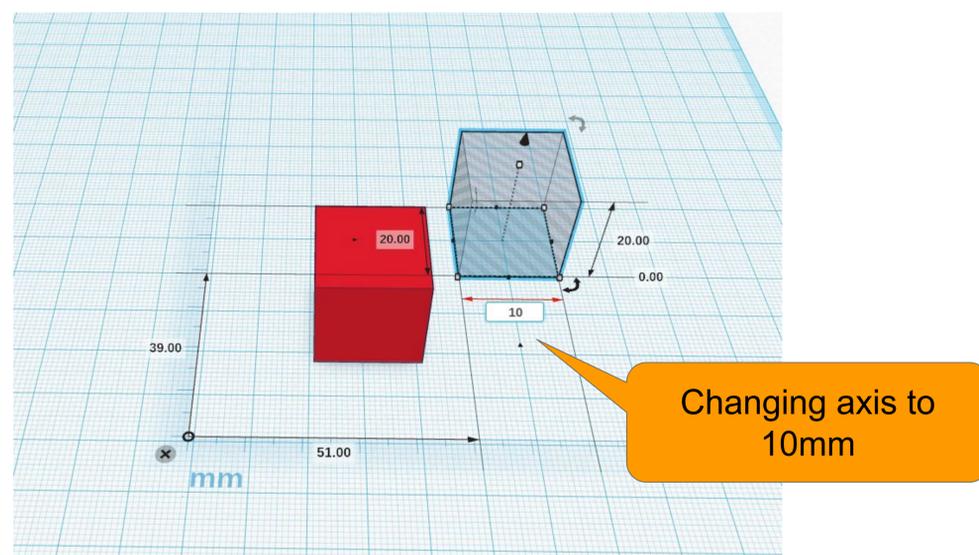
Tinkercad Tips

Making A Hole

To make a hole you can use the **Box Hole** and **Cylinder Hole** tools or you can use any shape by changing from “Color” to “Hole” in the inspector box.



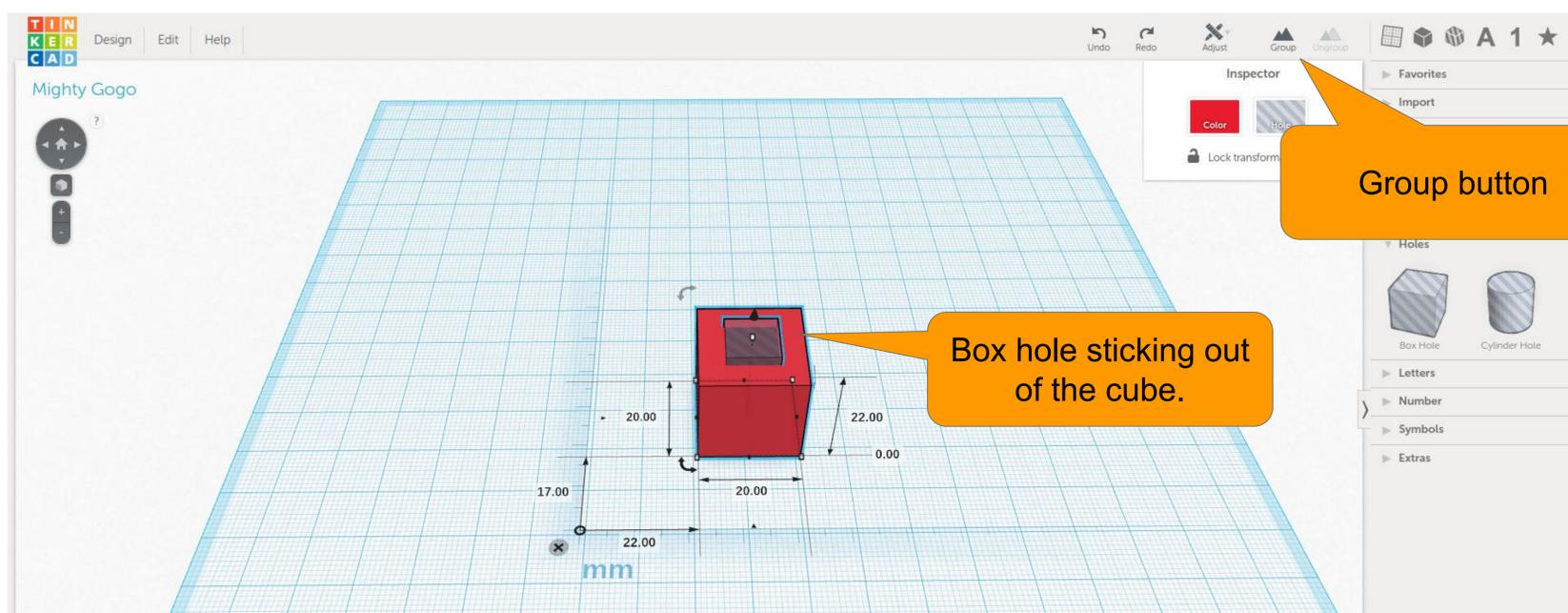
Let's say we want to cut a 10mm hole out of this 20mm box. First I will bring a **Box Hole** onto the workplane and resize it to 10x10x10 by typing in the measurement boxes (You may have to rotate the camera to see all the boxes).



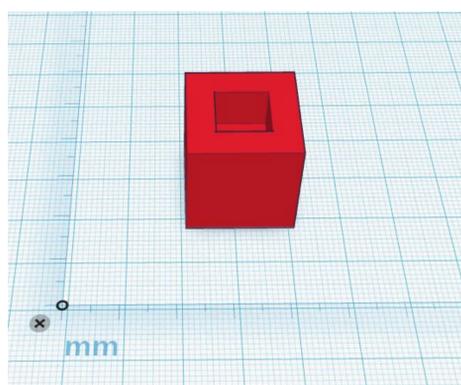
Tinkercad Tips

Making A Hole (cont.)

Now place the **Box Hole** where you want make a hole in the cube. Once the hole is in place, hold the Shift key and click both objects so they are both selected. With the cube and the hole objects selected click the Group button. It may take a minute for the grouping to process, once it is ready the hole object will disappear.



Click off of the object to deselect it, you will see the newly created hole!

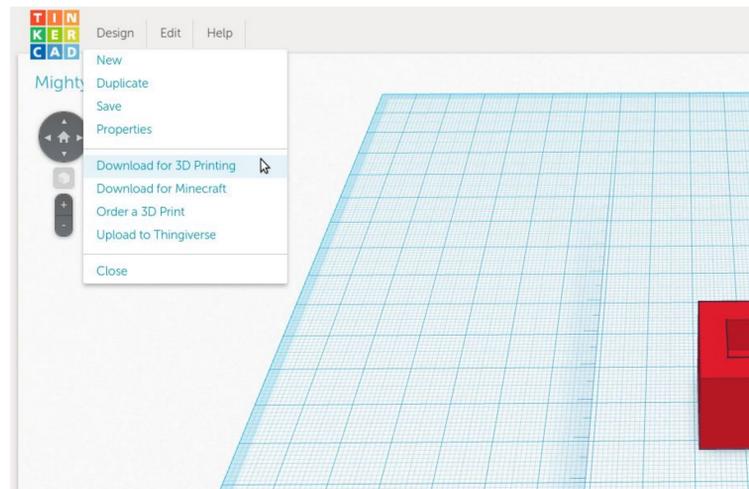


You can always modify the hole by clicking back selecting the object and clicking the Ungroup button

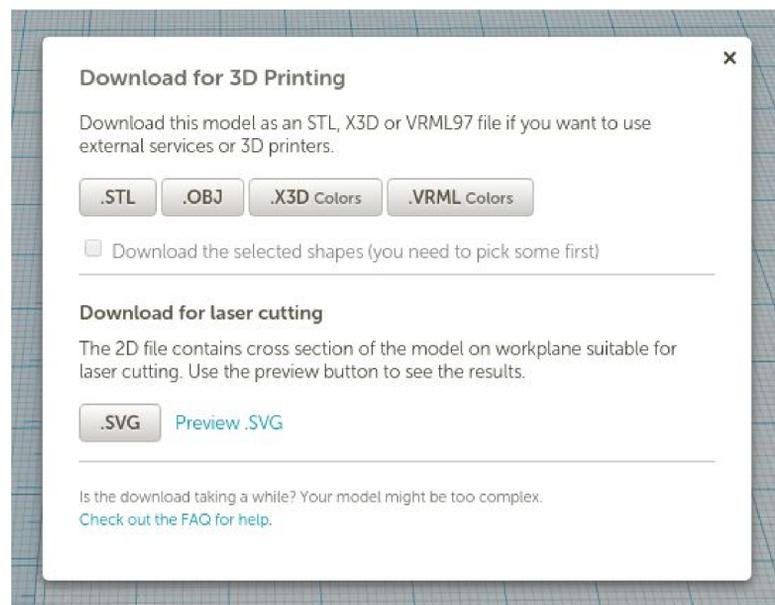
Tinkercad Tips

Download for Printing

Once you are happy with the design we need to download it so we can prepare it for the 3D printer. Click on Design then “Download for 3D Printing”.



We want an .stl (stereolithography) file, which is common 3D model format used with many 3D printers.



That's it! Now we have a 3D model that is ready to be prepped for 3D printing. Unfortunately, 3D printers can't read .stl files directly. What we need to do next is a process called “slicing”. Slicing is the process of converting a 3D model to instructions for the 3D printer which is known as GCODE.

Green Screen

(Self-Directed Activity)



WHAT: Using the Green Screen app DoInk, you can transport yourself anywhere you want to be!

ELEMENTARY & HIGH SCHOOL CHALLENGE:

Picture yourself in Thoreau's cabin at Walden Pond, or peaking into the windows at Paul Revere's house, or looking up at Hogwarts as you dream about the adventures to come!

CAN YOU IMAGINE YOURSELF:

- Traveling through time!
- Inside your favorite book!
- Standing next to your favorite author!

WHERE TO START:

1. Think about "context" - launch Photos and browse the images in the "Greenscreen images" album.
2. Launch Green Screen by DoInk
3. Tap the "+" in the bottom row then tap on the "Image" icon and select your favorite picture from the "Greenscreen images" album, then select "Use"
4. Now select the middle "+" then select the "Camera" icon *and get ready in front of the green screen!*
5. Have a friend take your picture by tapping the round circle by the play button and select Done
6. To share, tap "Show Export Options" - then Select "Twitter"
7. Type in your message, add **#ettSummit**

MaKey MaKey

(Self-Directed Activity)

WHAT: MaKey MaKey works by creating simple circuits connected to an input (space key, up arrow key). Control the computer by turning conductive objects like fruit, tin foil, and water into a touch pad, mouse or keyboard.

ELEMENTARY CHALLENGE:

Use conductive materials to design your own instruments and create an original piece of music.

(<http://makeymakey.com/piano/>)

CAN YOU:

- Make yourself into an instrument?
- Make a friend part of your instrument?
- Make an instrument using all of your friends?



MIDDLE SCHOOL CHALLENGE:

Use Scratch and conductive materials to design your own instruments and create an original piece of music. (<https://scratch.mit.edu/>)

CAN YOU:

- Record your own sound?
- Use the repeat or forever blocks to create loops?
- Make your own block for the refrain?
- Test a few parameters with your new block?