Tinkercad 3D Design &
EV Concept Car Workshop
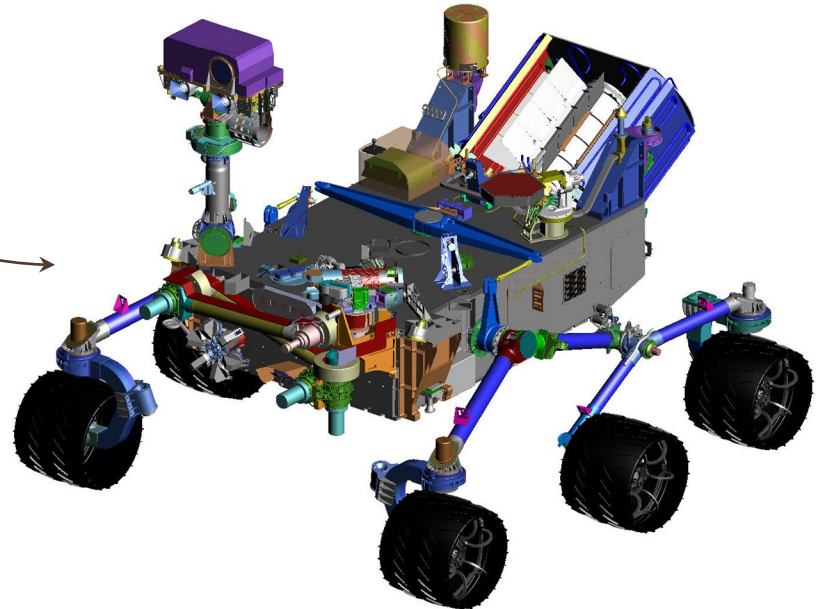
Part 1: Introduction to Tinkercad
& Car Chassis Design

Session 1: Introduction to Tinkercad

Guess what? Even NASA uses CAD!
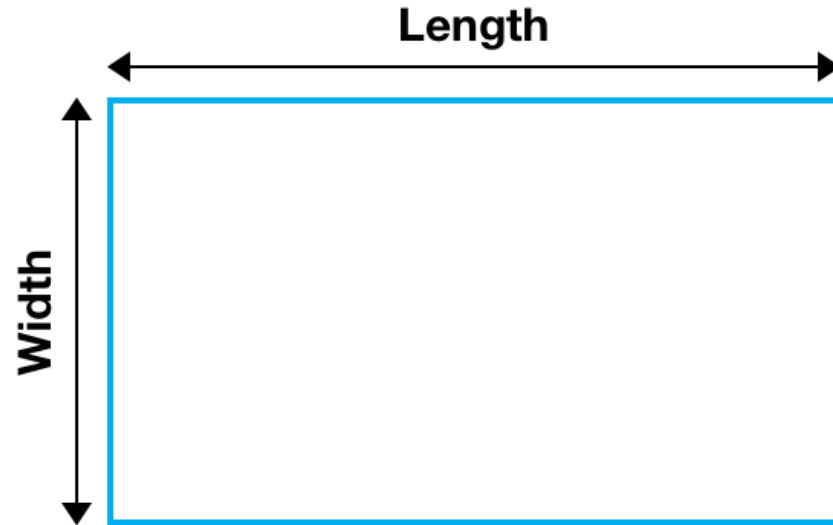
- CAD stands for **computer-aided design** software.

- Engineers, architects, artists, and others use CAD to create precise **2D drawings and 3D models**.
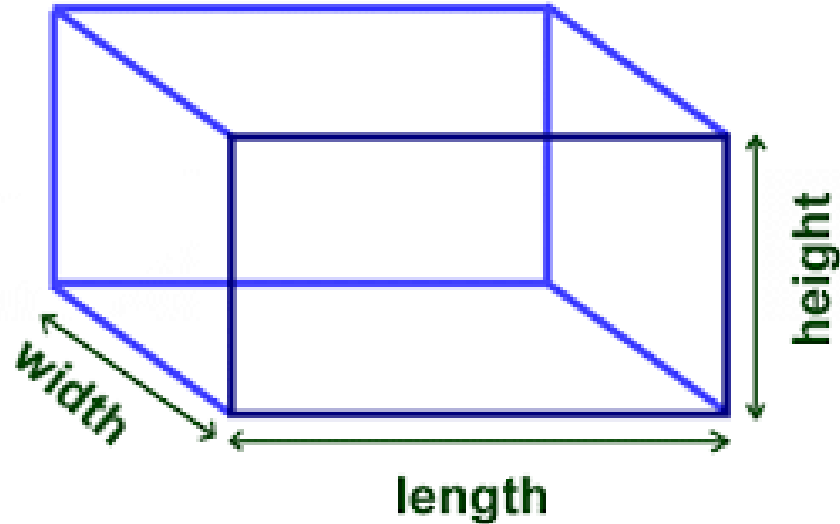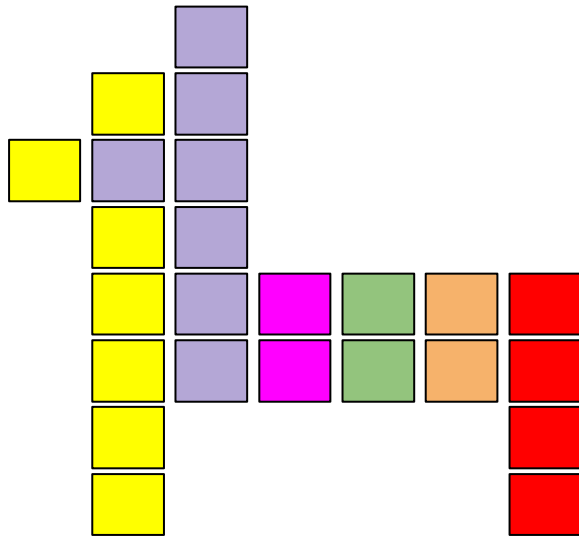
Measuring in 2D

2D objects have a length and width

Measuring in 3D

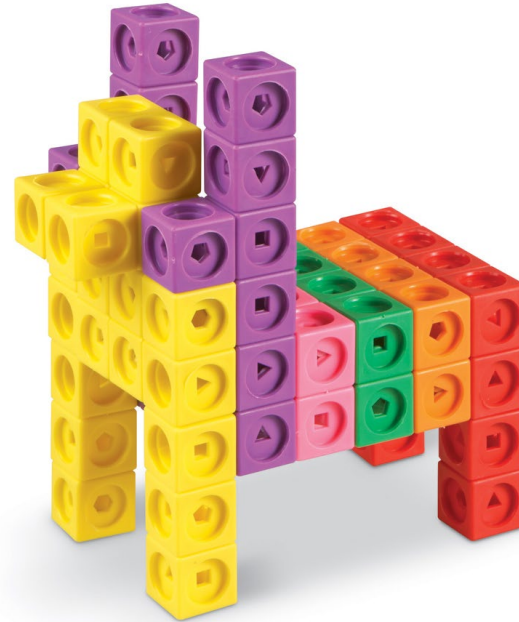## 3D objects have a length, width, and height
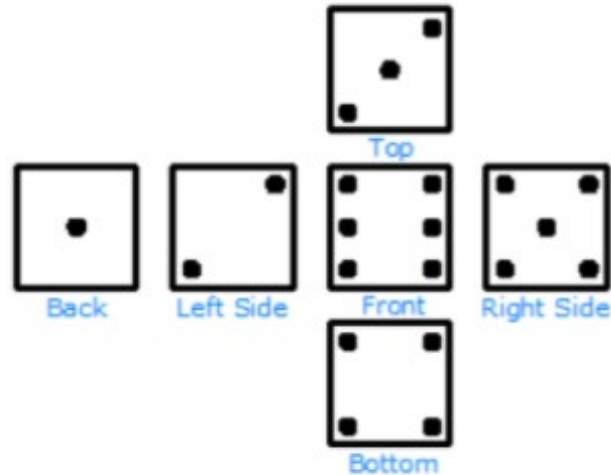
2-dimensional isometric view

3-dimensional orthographic view

Spatial Visualization:
Looking at objects ALL ways!

Isometric (3D) view
and
Orthographic (2D) view

Isometric view of a Die

Orthographic views of a Die

Top

Back Left Side Front Right Side

Bottom

What You'll Need!

Computer, Mouse & Internet Connection
Microsoft Windows 10, Apple OSX10.10, or Chrome OS on Chromebooks

+

TinkerCAD Account
Go to
https://www.tinkercad.com

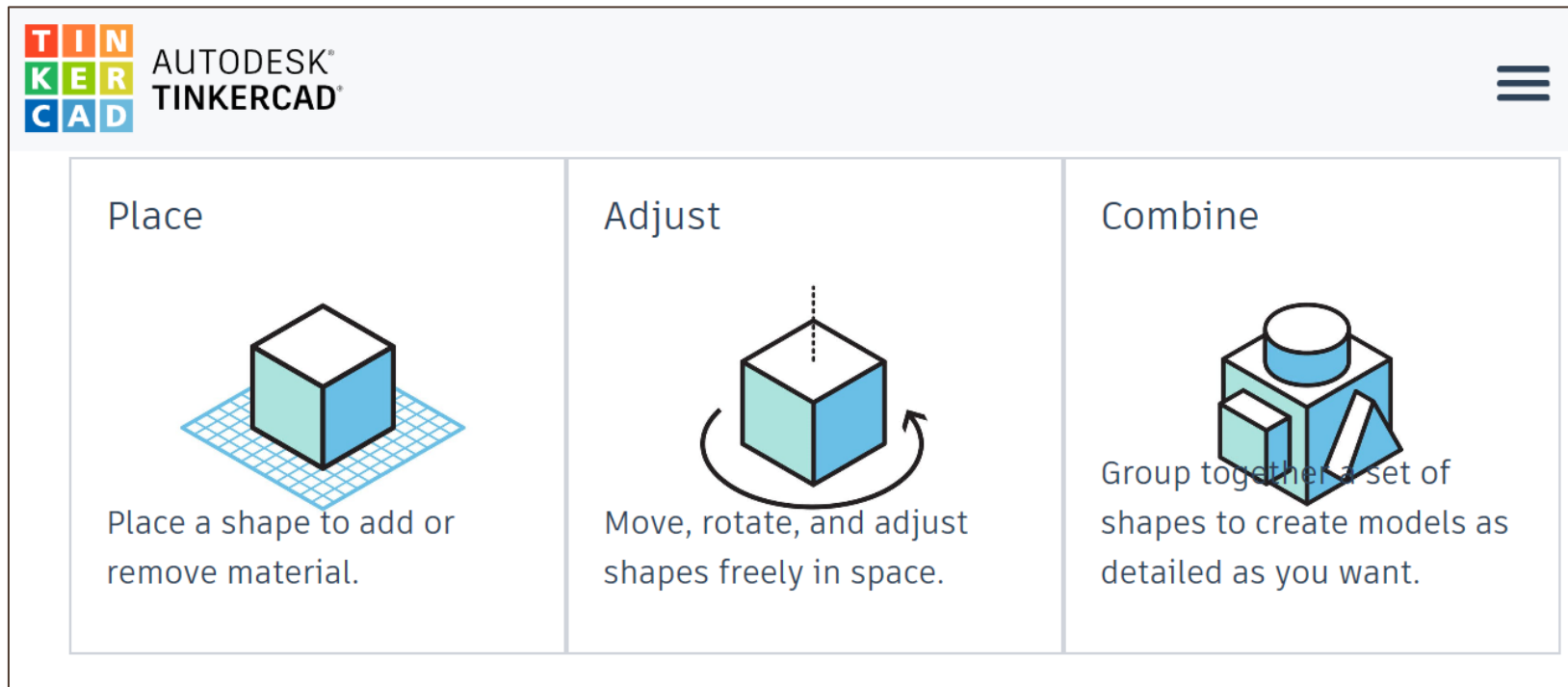Browsers that work best with Tinkercad:
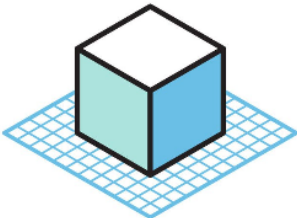
- Google Chrome version 50 (or newer), Safari 10 or newer, Microsoft Edge (Chromium)
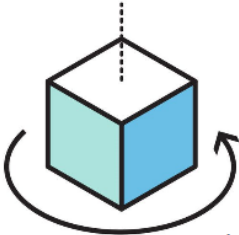
Tinkercad 3D Design

Place

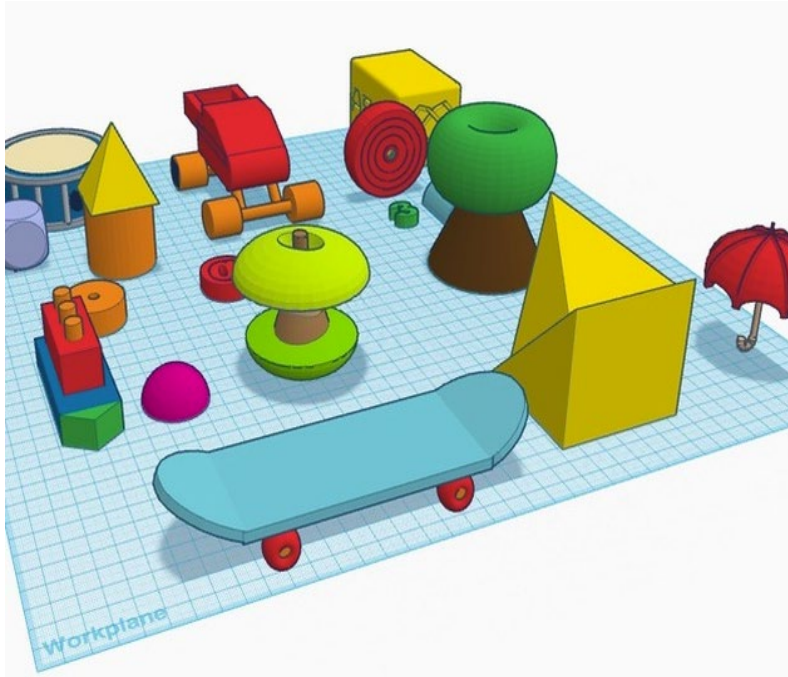Place a shape to add or remove material.

Adjust

Move, rotate, and adjust shapes freely in space.

Combine

Group together a set of shapes to create models as detailed as you want.
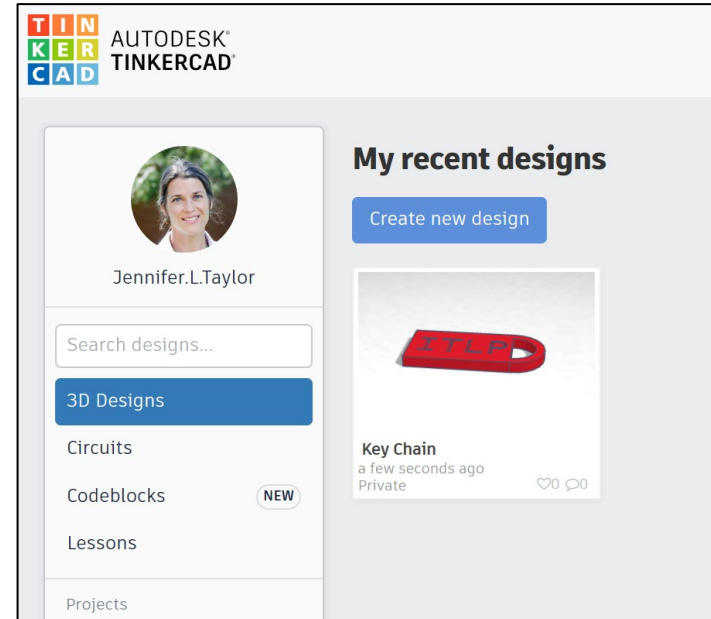
Tinkercad Tips

- Combine shapes to create new designs

- Make sure shapes are touching

- Project is flat on the workplane

Tinkercad Tips

- Use a mouse

- Measure in millimeters (mm)

- Click on the upper left waffle box icon to return to your project homepage.
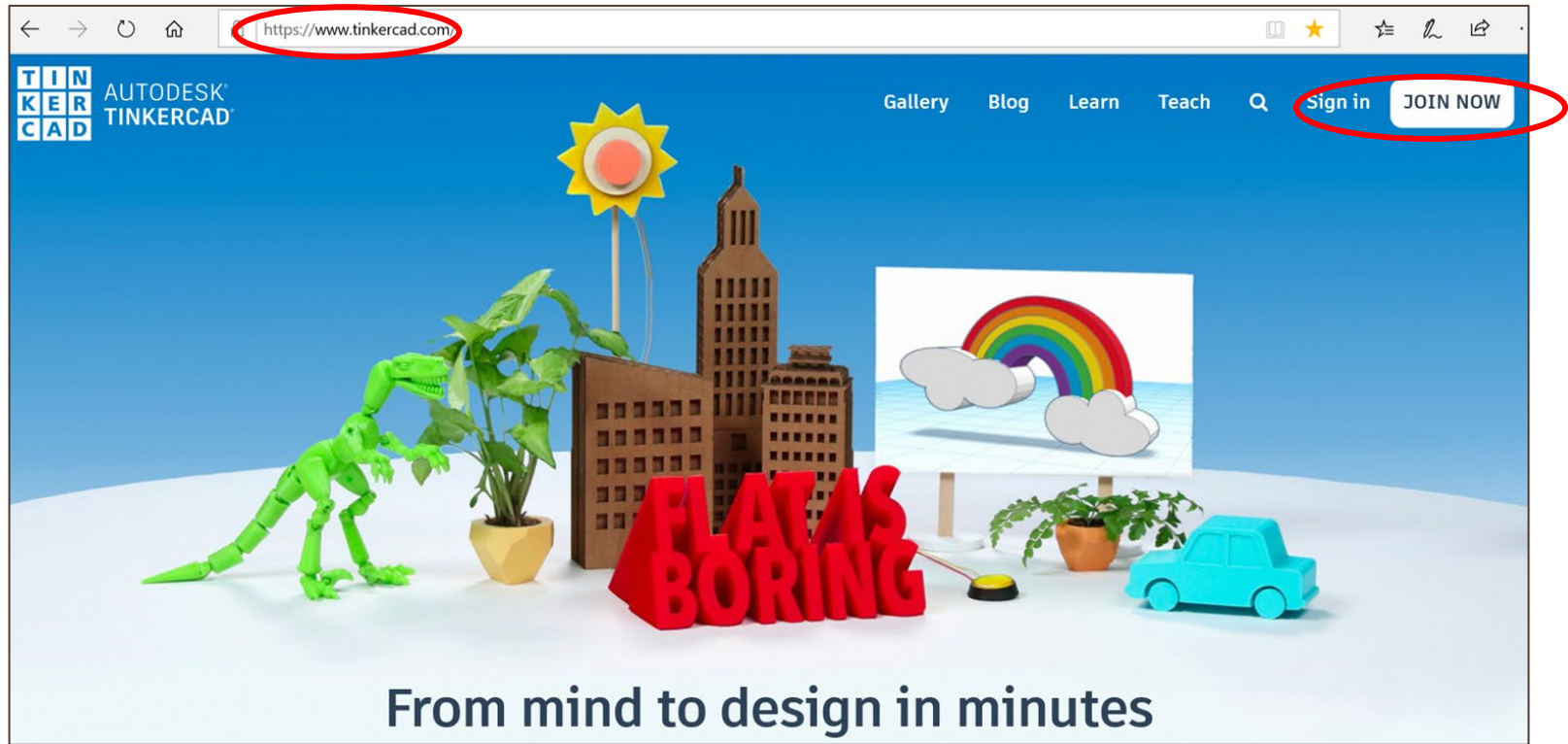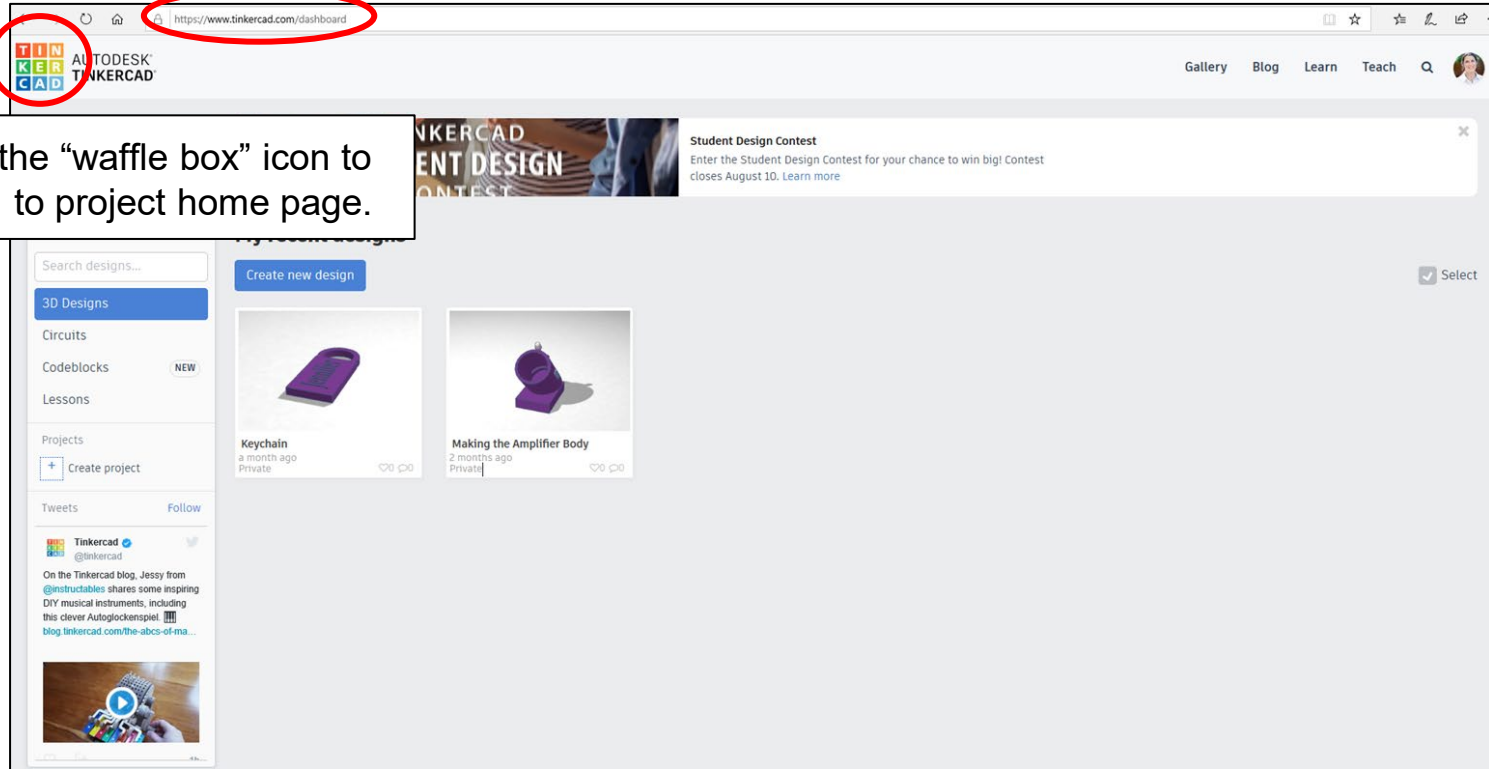

Example of Tinkercad project page

Tinkercad Tutorials

Create Tinkercad.com account

Tinkercad Project Page

Click the "waffle box" icon to return to project home page.
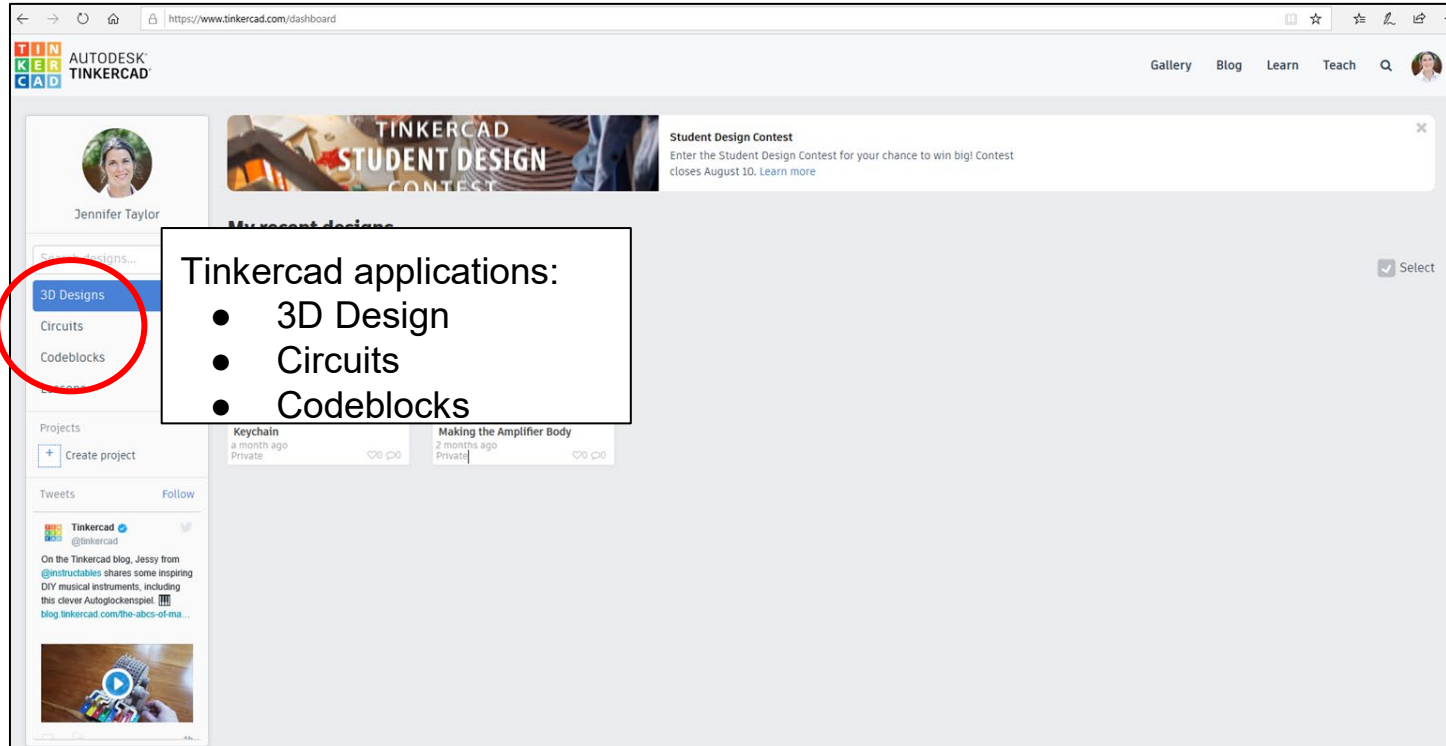
Tinkercad Project Page

Tinkercad resources

Tinkercad Project Page

Tinkercad applications:
- 3D Design
- Circuits
- Codeblocks
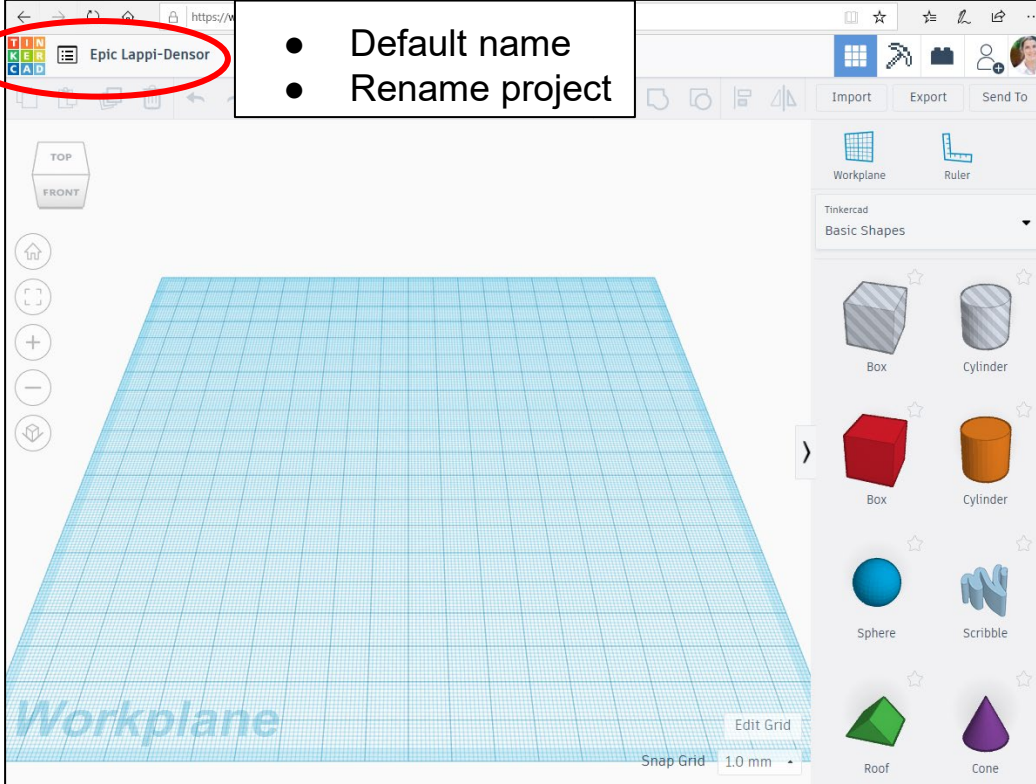
Tinkercad Project Page

- Click a Tinkercad application
- Create a new design

Tinkercad Workplane

- Default name
- Rename project

Tinkercad Workplane

Change 3D design to
- Minecraft block design
- Lego block design

Tinkercad Workplane

- Project view options
- Right click-rotate
- Left click-select, move object

Tinkercad Workplane

- Copy, paste, duplicate, delete objects
- Back arrow or ctrl Z to undo
- Forward arrow or ctrl Y to redo

Tinkercad Workplane

- Show all
- Group
- Ungroup
- Align
- Mirror
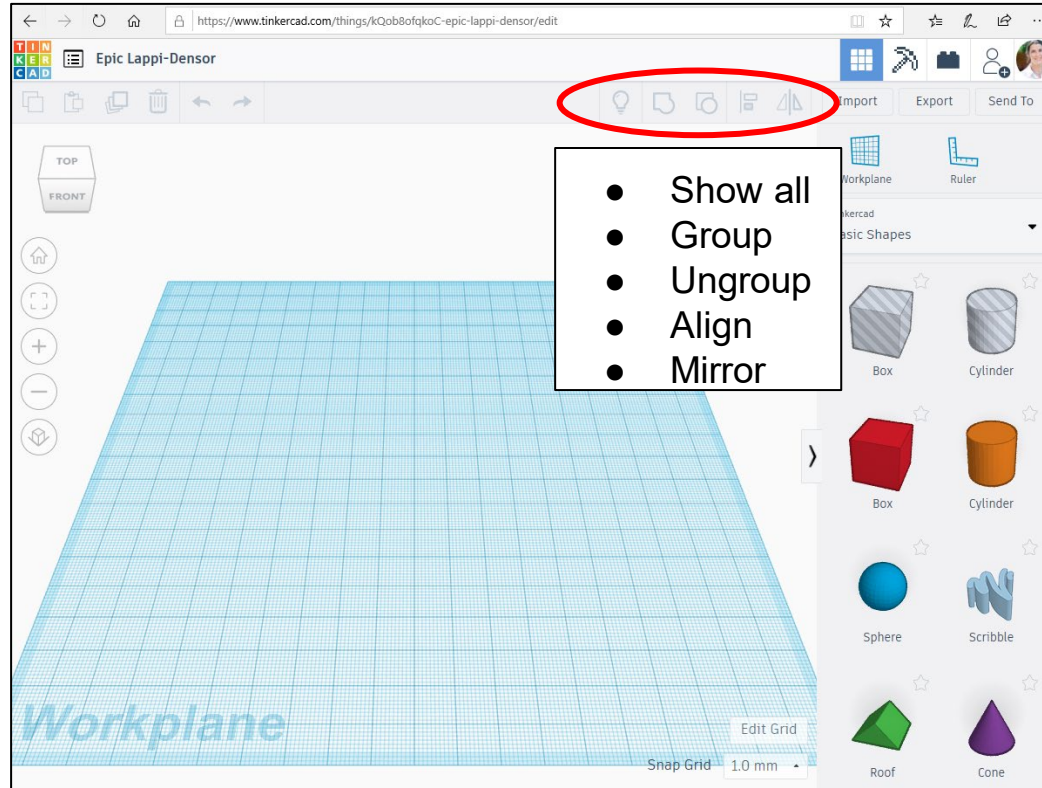
Tinkercad Workplane

Tinkercad Workplane

Add workplane and ruler options

Tinkercad Workplane

Edit workplane settings

Tinkercad Shape Interface

3D Design options:
- Shapes
- Text & numbers
- Characters
- Connectors

Tinkercad Shape Interface

Click white "handles" to change object dimensions.
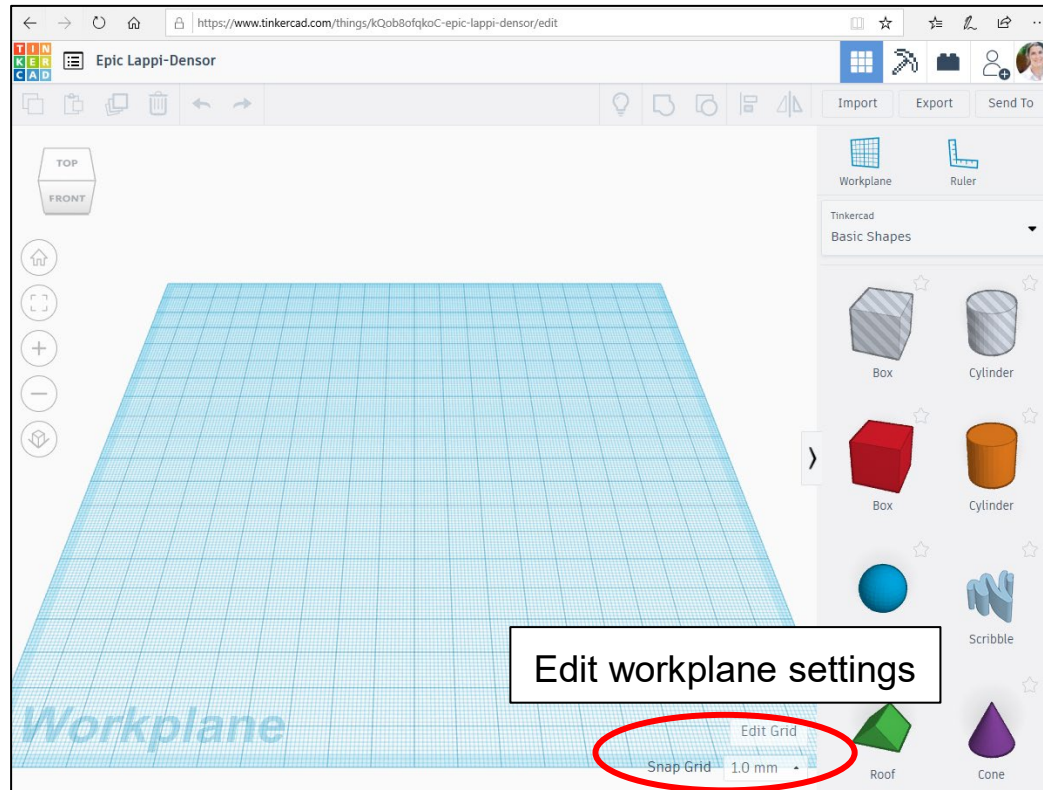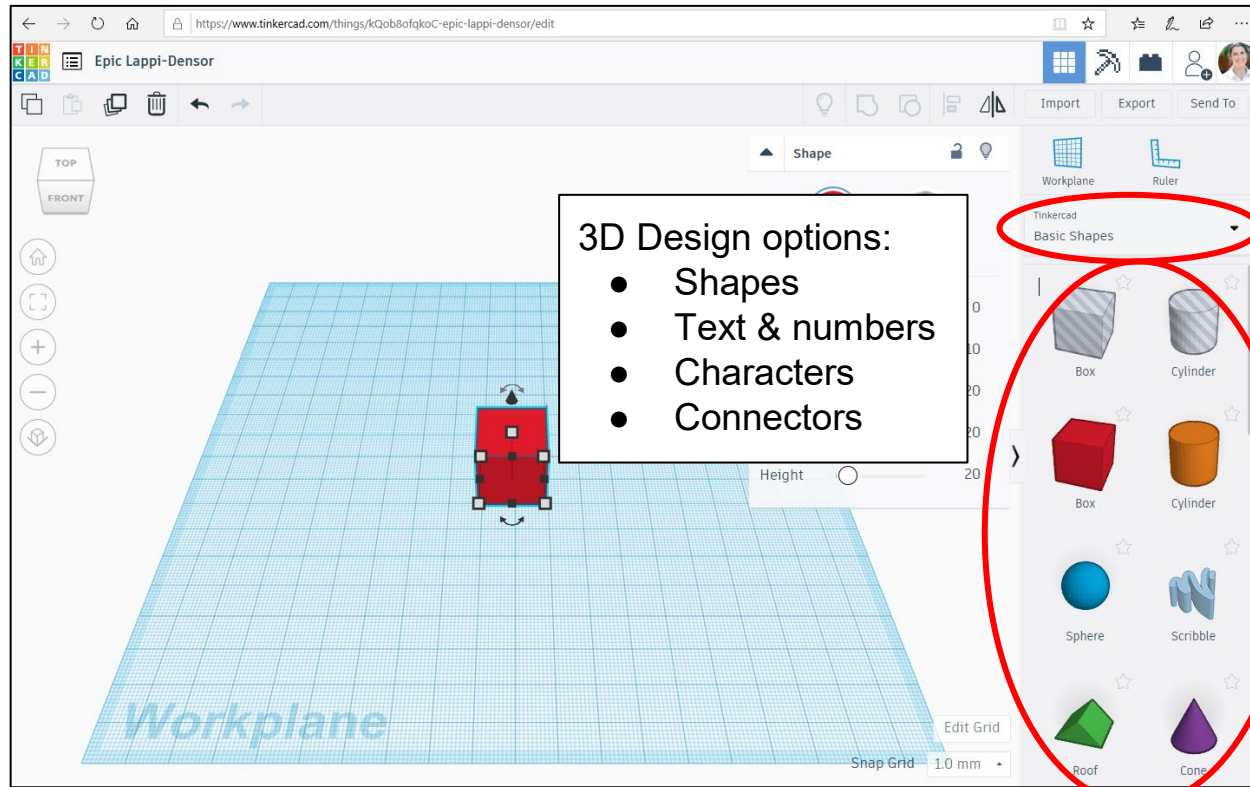
Tinkercad Shape Interface

Tinkercad Shape Interface

Left click and drag the top black cone to raise and lower an object.

Tinkercad Shape Interface

Left click and drag the lower arrows to rotate an object.

Tinkercad Shape Interface

Left click and drag the upper arrows to tilt an object.
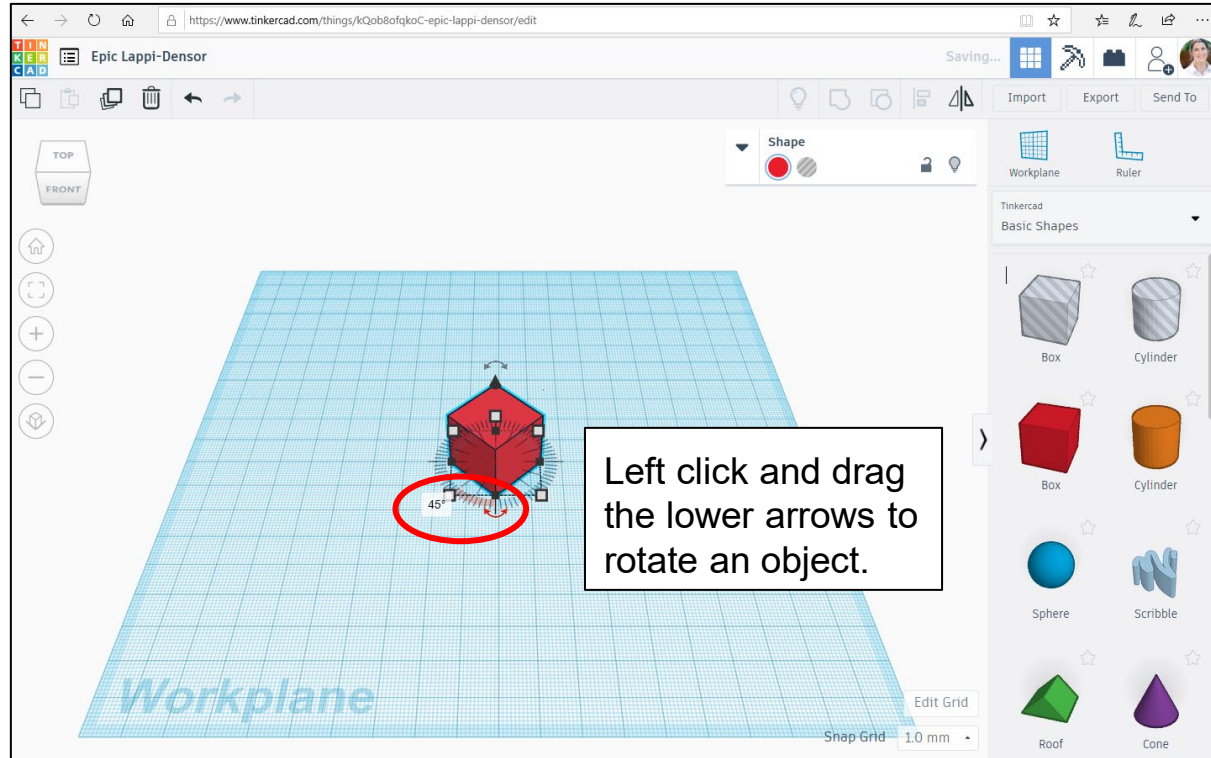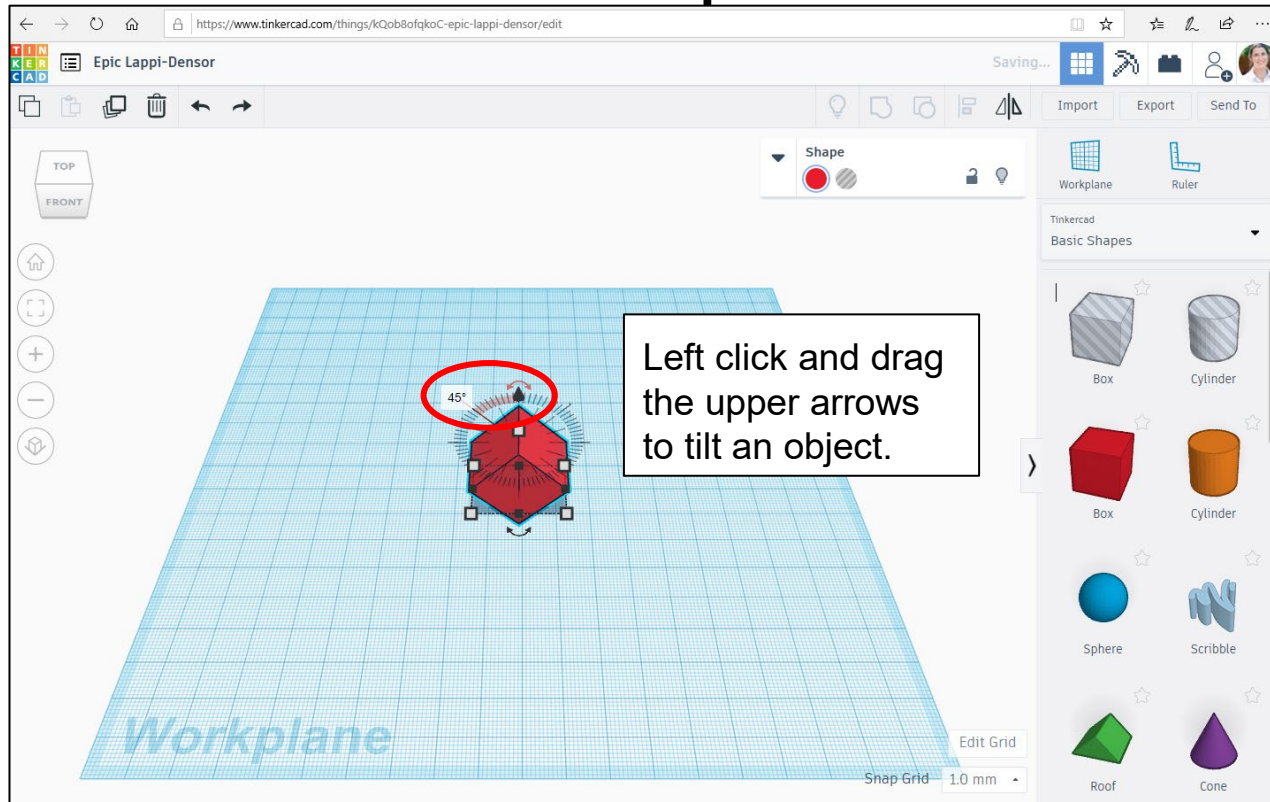
It's YOUR turn to get creative with 3D design!

Instructions:
1. Go to the **"3D"** tab in Tinkercad
2. Click **"Create New Design"**
3. File name: "EV Concept Car"

Reminders:
- Project is flat on the workspace
- Objects are touching
- Back arrow or "Control Z" to undo
- Click on the Tinkercad "waffle box". icon to get back to your project page
- Don't get frustrated, have fun!

ASPIRE
NSF Engineering Research Center

Engineering & Applied Science
UNIVERSITY OF COLORADO **BOULDER**

ITL
INTEGRATED TEACHING & LEARNING
Program and Laboratory

Session 2: Car Chassis Design

Drag a cube onto your workplane, and change the dimensions.

Length: 60 cm

Width: 30 cm

Height: 5 cm

More shapes!

Basic Shapes

Shapes Library
- Your Creations
- Favorites
- Basic Shapes
- Design Starters
- Creatures & Characters
- **Vehicles & Machines**
- Structures & Scenery
- Hardware
- Electronics
- Fun & Games
- Everyday Objects
- Featured Collections
- Shape Generators

Share your reusable creations with the community! Learn more...
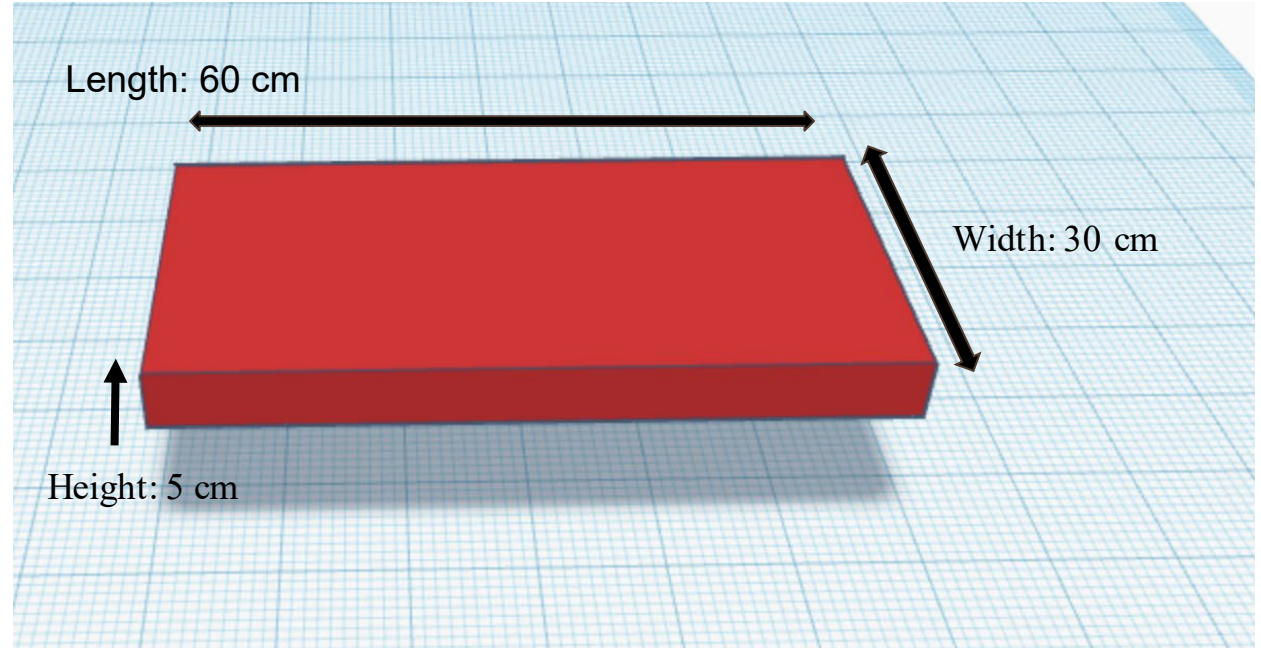
More Shapes
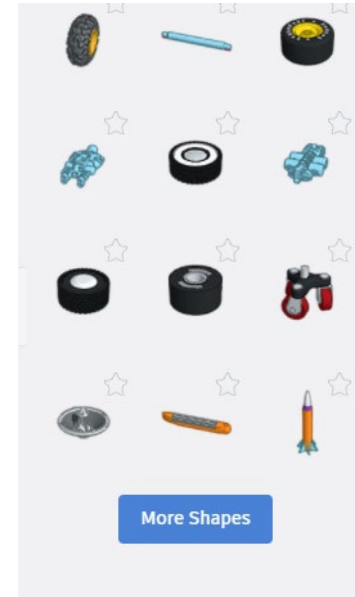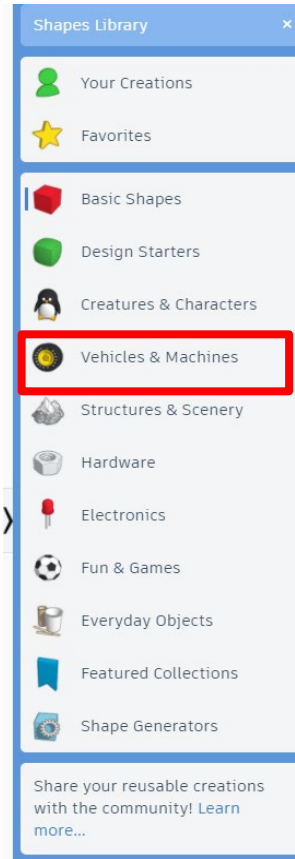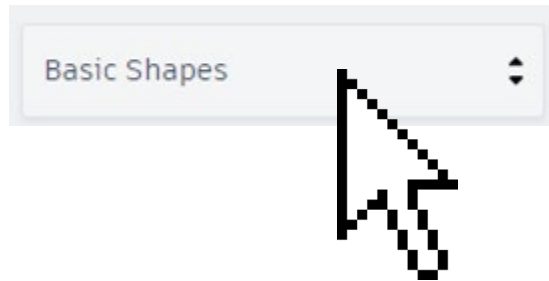
Add a wheel to your project

Scale the wheel

Change to 20
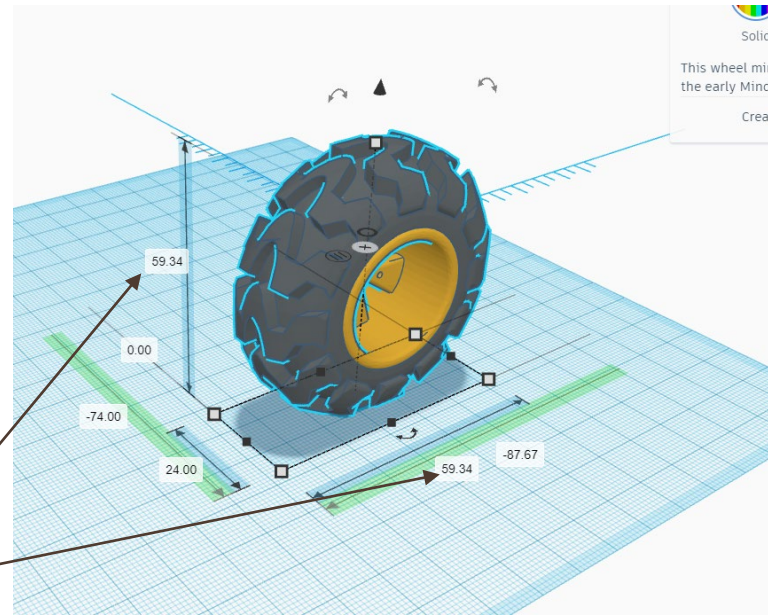
Scale the wheel (cont.)
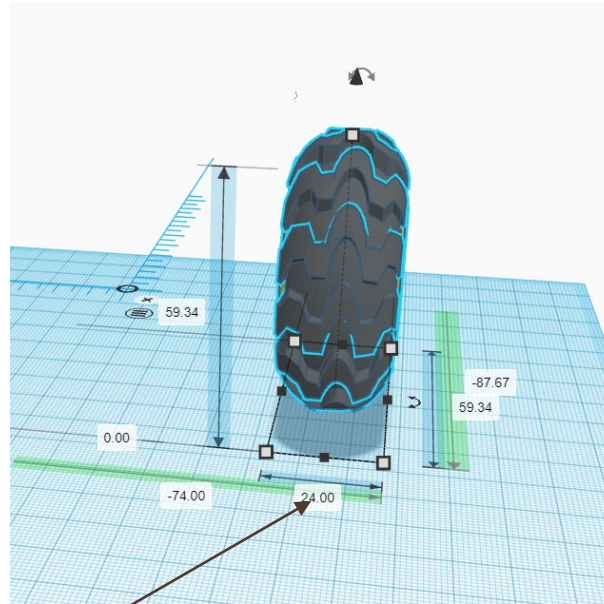
Change to 12

Duplicate your first wheel
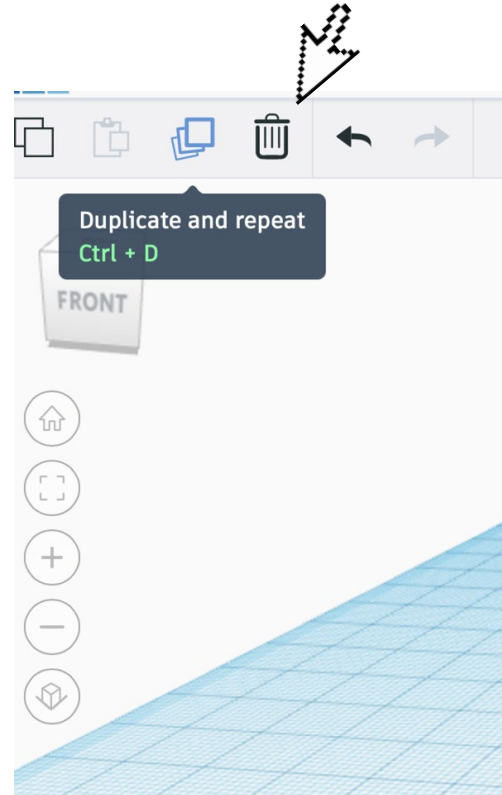
Pull it out from the first wheel
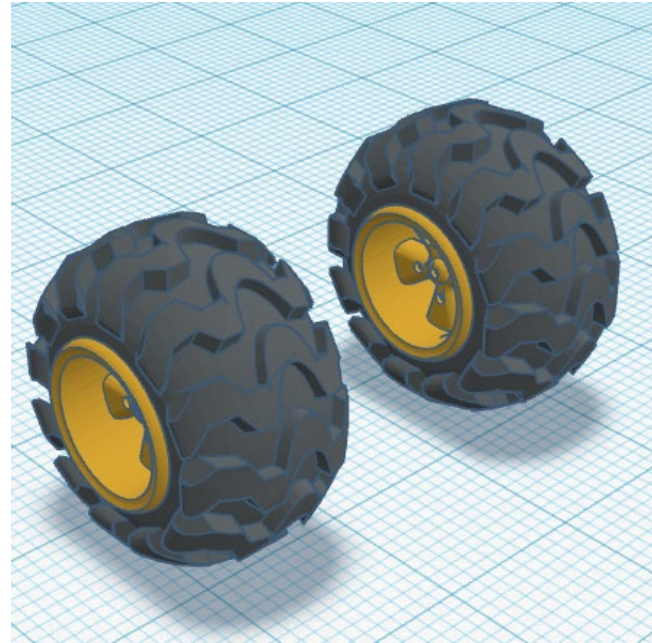
Make an axle

To create an axle, take a new cylinder and rotate it 90° (click on the 0° and type in 90).
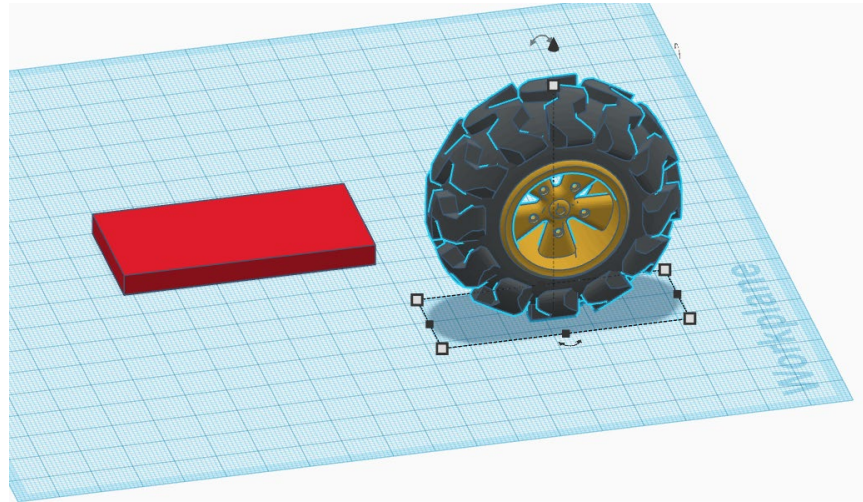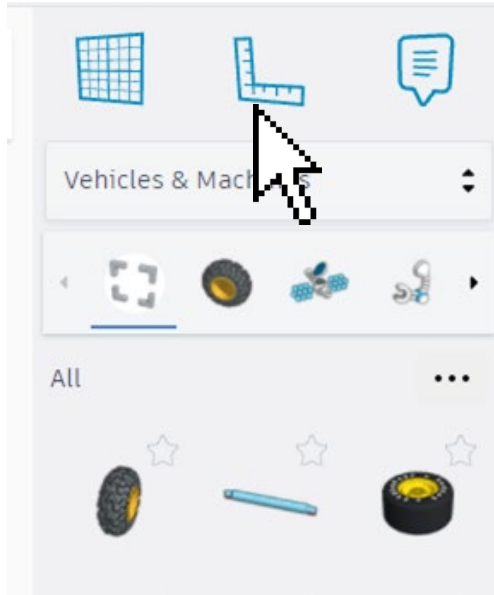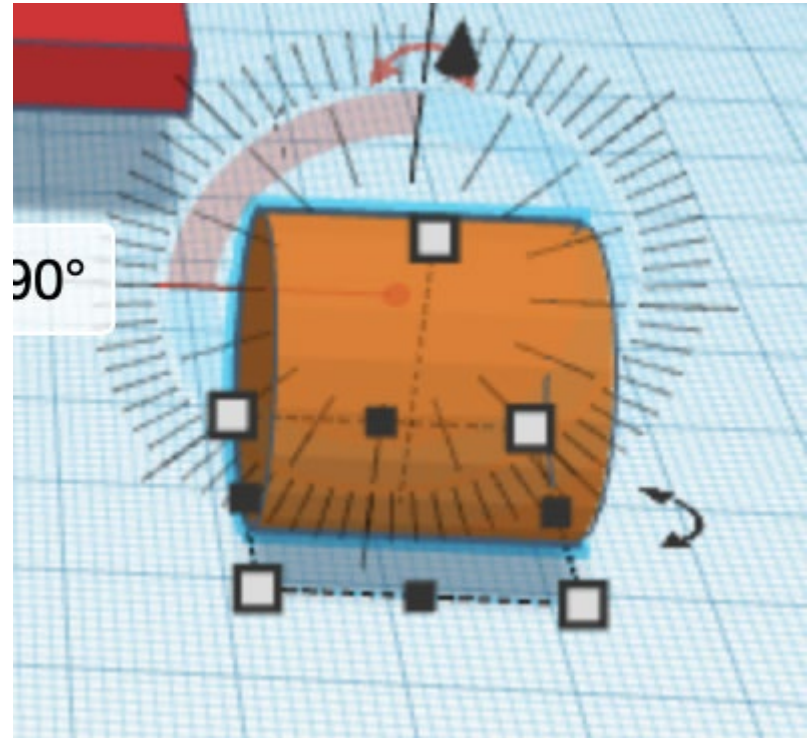
Make an axle (cont.)

Length = 55 cm

Width = 2 cm

Height = 2 cm

Make it thin
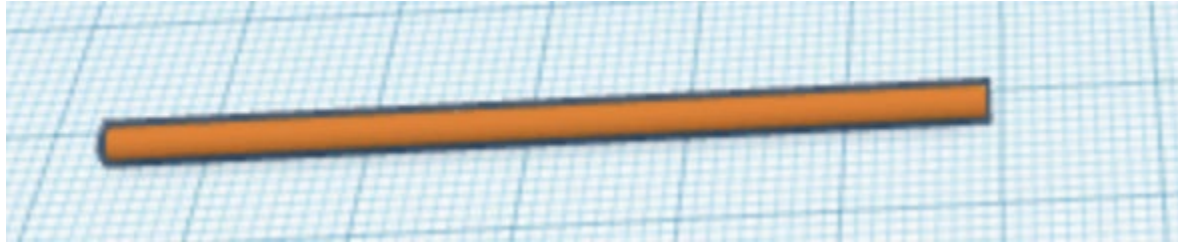
Adjust the dimensions to your liking, you are able to modify this as you work.

Centering objects

Pull the axle off the ground and try to put it in the center of the two wheels.
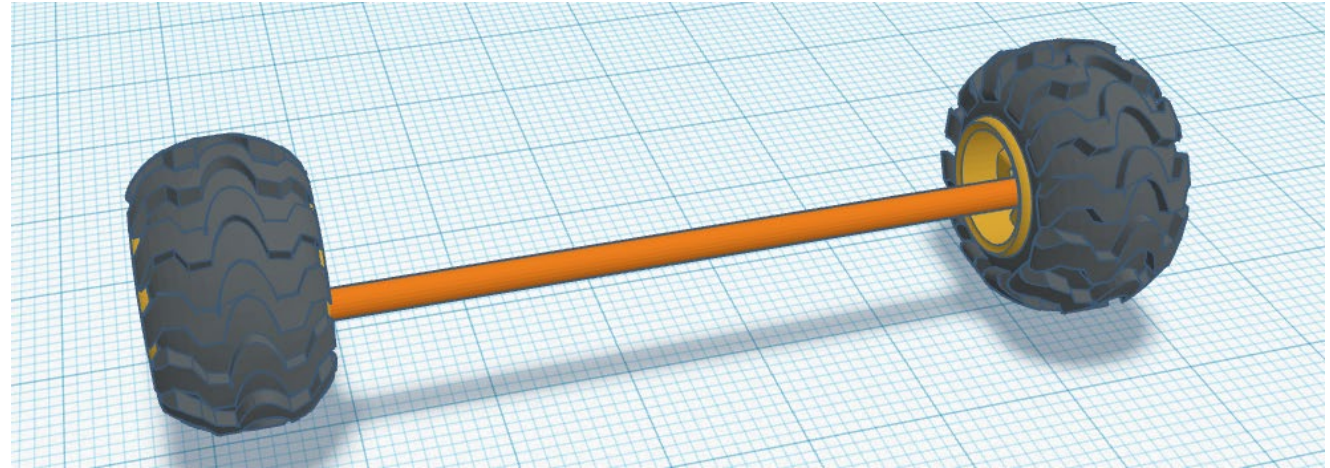
Centering (cont.)

Your design does not have to be perfect yet.

Just make sure the chassis is between the axle and wheels.
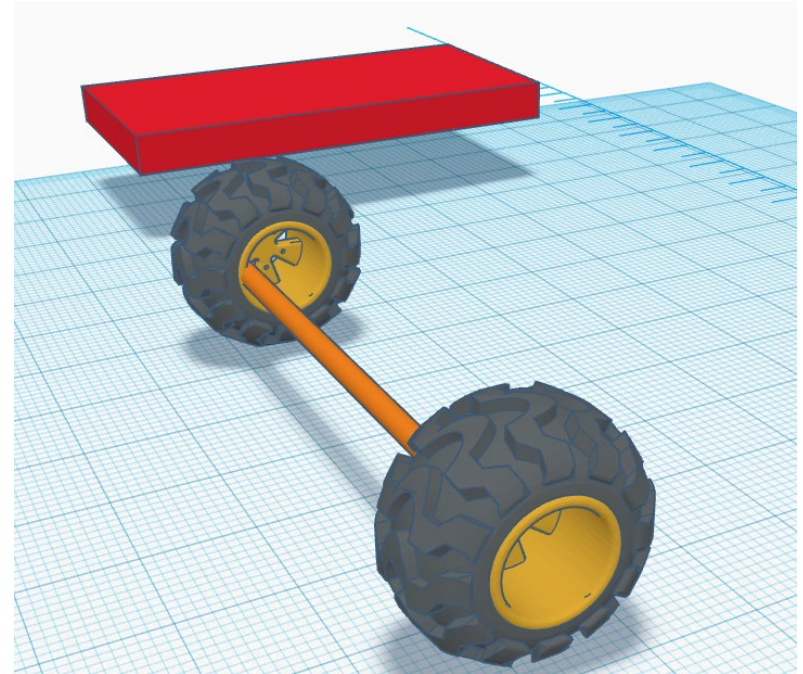
Selecting a group

Hold shift, click on your axle and wheels, all three should be highlighted in blue.
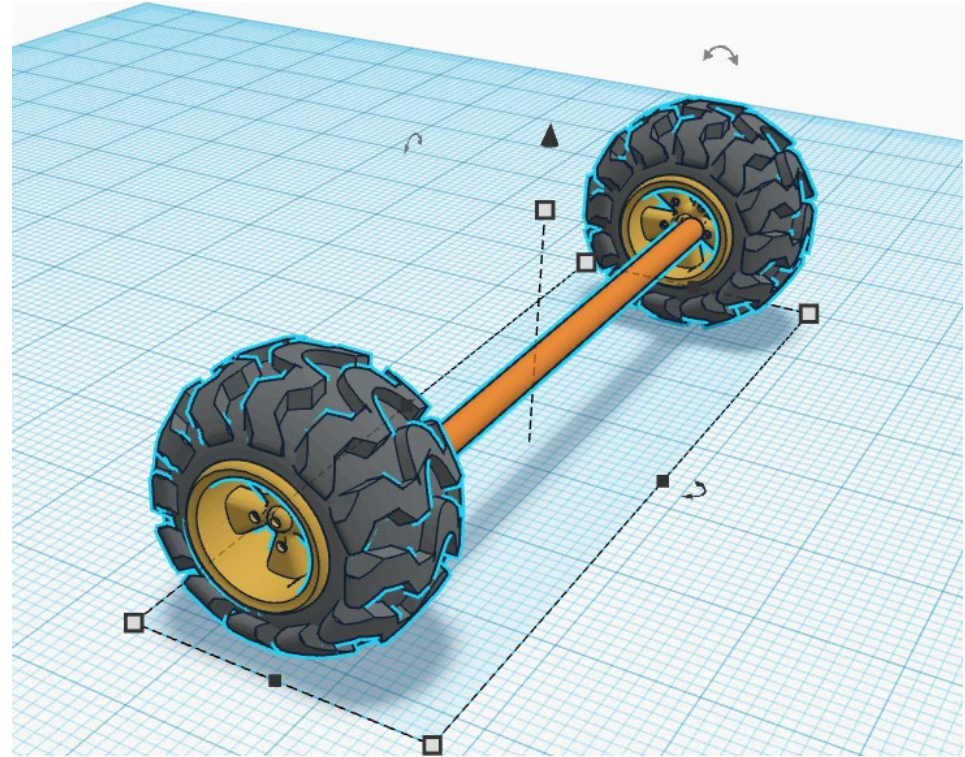
Align objects

Click on the align tool.
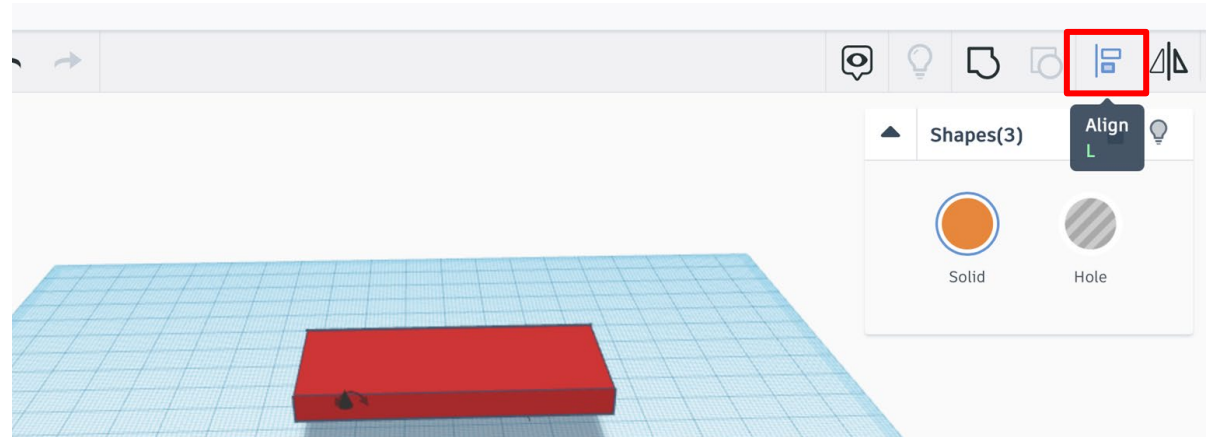
Align (cont.)

Align the centre two dots, which will align it in the center of this view.

Then view it from the side and align it again.
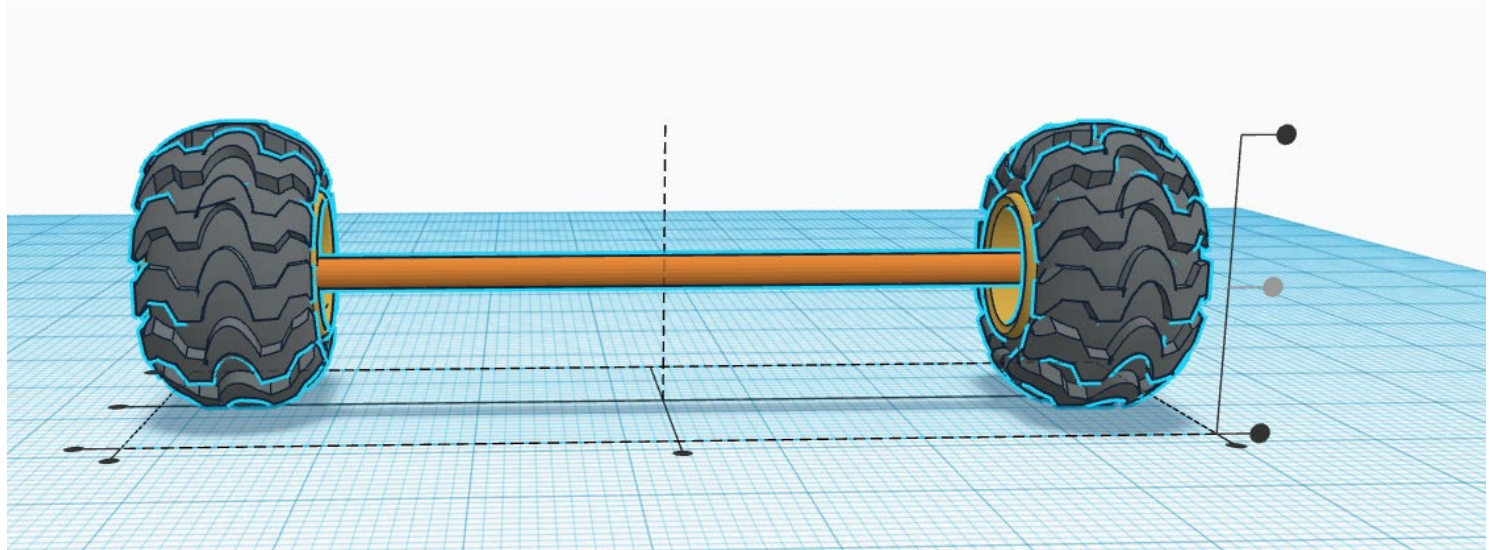
Grouping parts

Group the axle and the wheels to prevent them from separating.
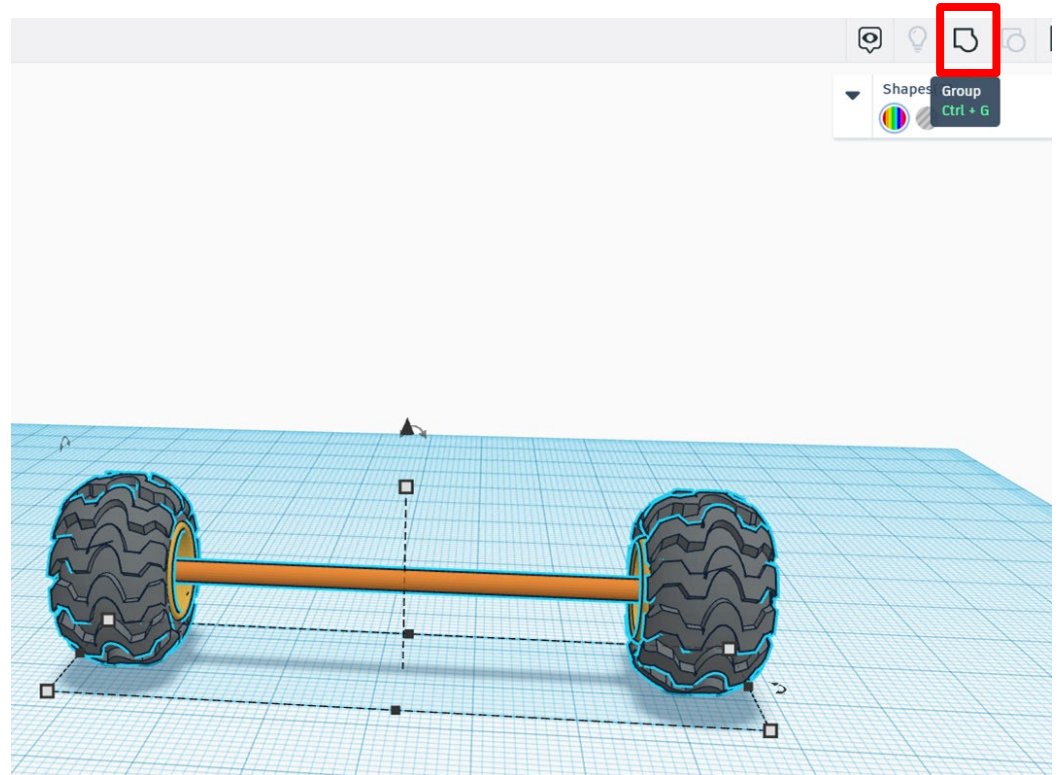
Create more wheels

Duplicate again!
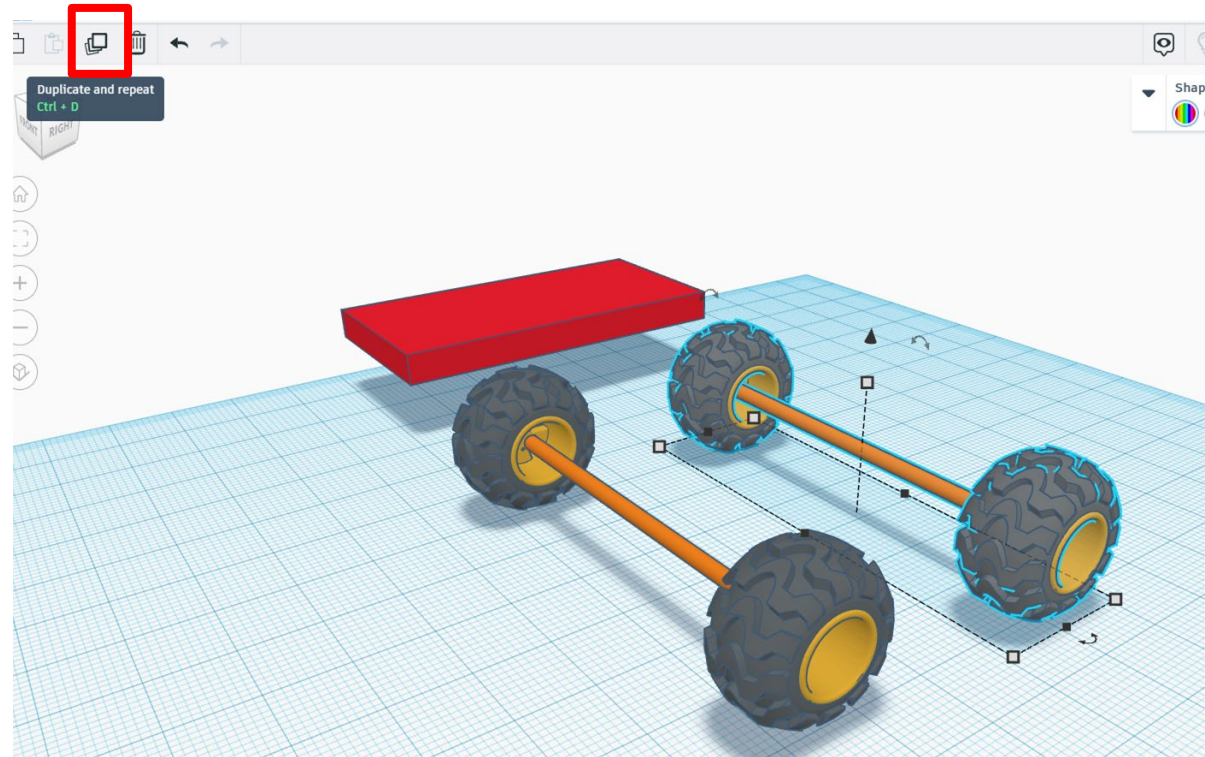
Changing sizes

If one part is too narrow or too wide, you can always change the dimensions.
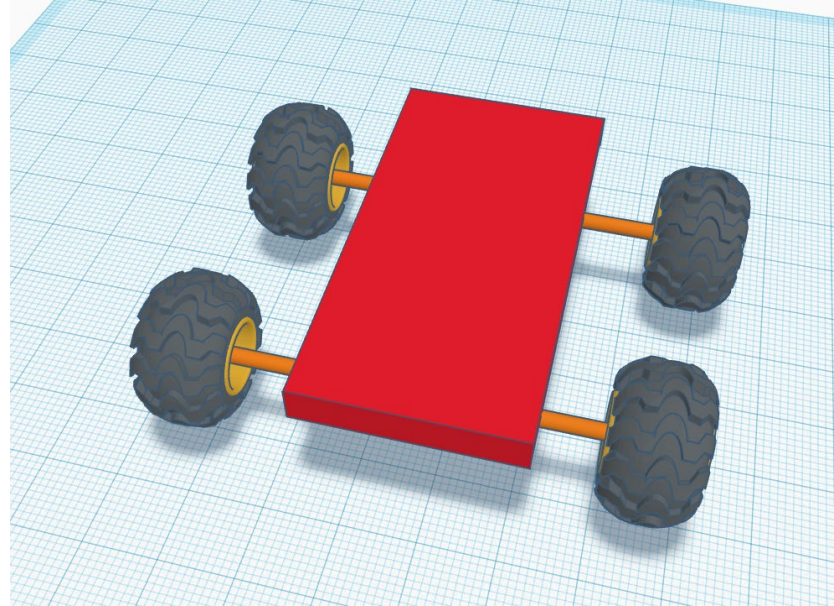
Chassis design

Use the "Align" tool to align the wheels, axles, and chassis.
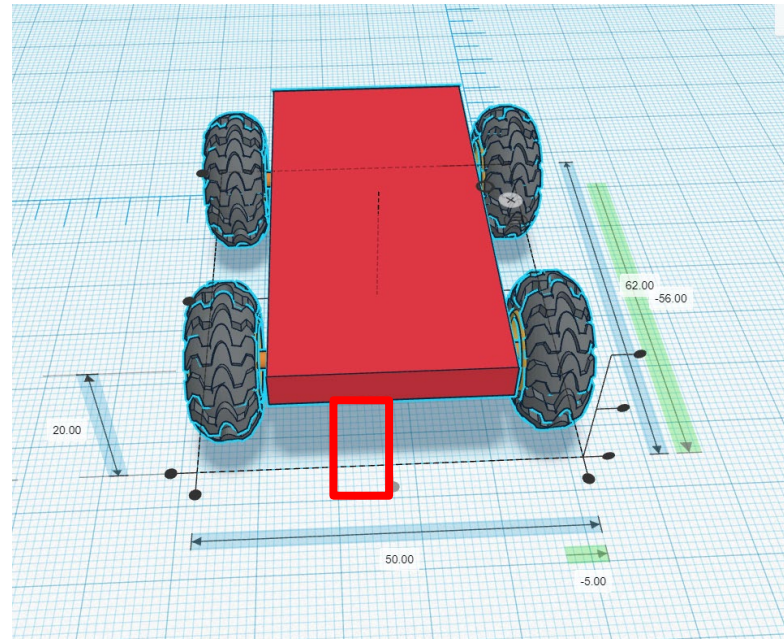
Keeping wheels on the road

Place the axle below the chassis.
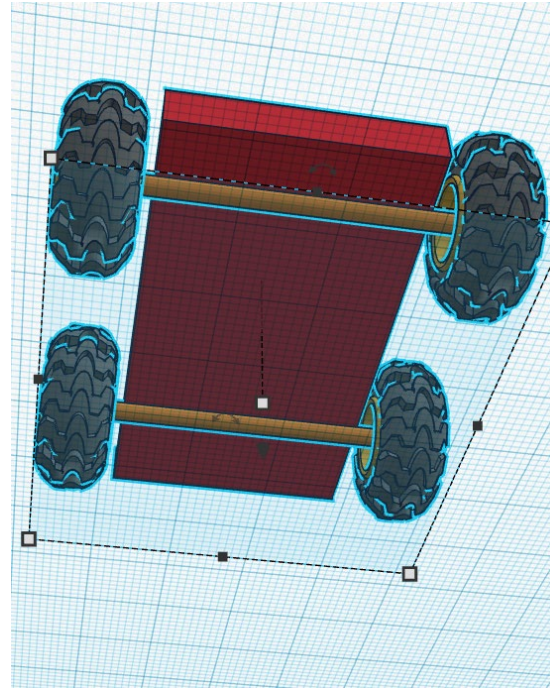
Finish the chassis

Group all items together.
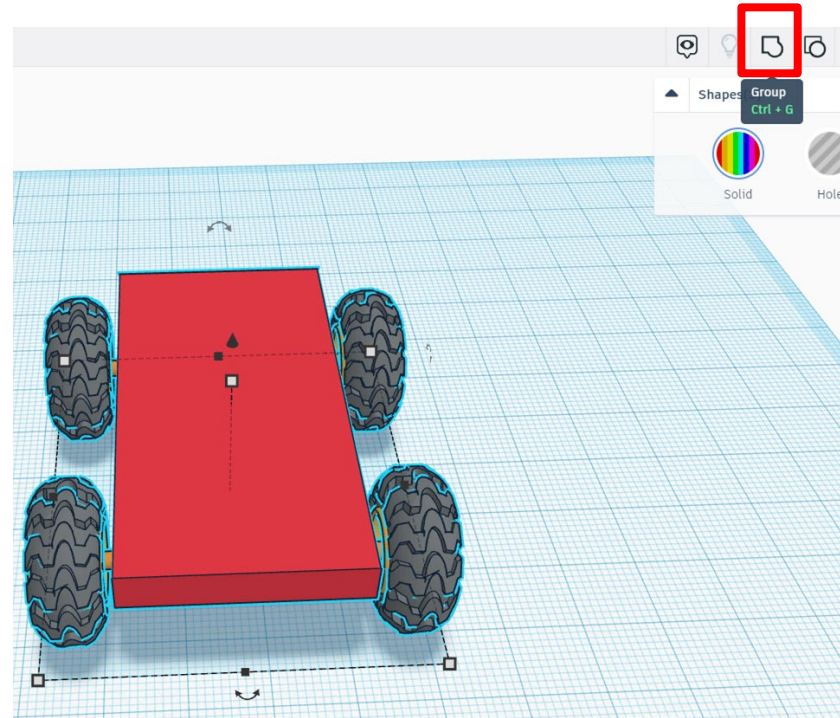
Tinkercad 3D Design &
EV Concept Car Workshop

Part 2: Concept Car Body Design & Review

ASPIRE
NSF Engineering Research Center

Engineering & Applied Science
UNIVERSITY OF COLORADO BOULDER

INTEGRATED
TEACHING & LEARNING
Program and Laboratory

What You'll Need!

**Computer, Mouse &
Internet Connection**

Microsoft Windows 10, Apple OSX10.10,
or Chrome OS on Chromebooks

\+

TinkerCAD Account

Go to
https://www.tinkercad.com

Browsers that work best with Tinkercad:

\- Google Chrome version 50 (or newer), Safari 10 or newer, Microsoft Edge (Chromium)

Session 3: Concept Car Body Design

- Get creative!
- Choose shapes to combine to form the custom car body (fit within 30cm by 60cm chassis)
- Select color(s)
- Make "holes" and then group them with a body
- Customize the wheels, body shape, etc.
- Group objects as you go and on the final draft design

What shapes work best?

Session 4: Concept Car Design Review

- Take a screenshot of your 3D model EV Concept Car design.

- Share it with the class!

- What was the best part of creating your design?

- What was the most challenging part of creating your design?

- How would you change your design next time?

End of Workshop

You CAD do it!